EcoStruxure™

Power Monitoring Expert 2020

System Guide

7EN02-0426-01

04/2020

Legal Information

Electrical equipment should be installed, operated, serviced and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

As standards, specifications and designs change from time to time, please ask for confirmation of the information given in this publication.

Safety Information

Important Information

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service or maintain it. The following special messages may appear throughout this bulletin or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of either symbol to a "Danger" or "Warning" safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **could result in** minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.

Please Note

Electrical equipment should be installed, operated, serviced and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved.

Contents

Safety Precautions

During installation or use of this software, pay attention to all safety messages that occur in the software and that are included in the documentation. The following safety messages apply to this software in its entirety.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Do not use the software or devices for critical control or protection applications where human or equipment safety relies on the operation of the control action.
- Do not use the software to control time-critical functions.
- Do not use the software to control remote equipment without proper access control and status feedback.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

⚠ WARNING

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

⚠ WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

Use cybersecurity best practices to help prevent unauthorized access to the software.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

Work with facility IT System Administrators to ensure that the system adheres to the site-specific cybersecurity policies.

Overview

About this document

This guide is intended for Application Engineers, System Integrators, or other qualified personnel who are responsible for designing, installing, configuring, maintaining, and using EcoStruxure™ Power Monitoring Expert (PME) software.

This document is not a tutorial, it was written with the assumption that you have been trained in the deployment and use of PME.

This document does not discuss the planning, design, and operation of the electrical power system that is being monitored.

Document updates

This document is available online through the Schneider Electric website. We may update the online version over time to improve clarity and accuracy. If you see differences between your local copy and the online version, use the online version as your reference. See Resources for contact information.

Document revisions

Revision Number:	**Rev 01**
MRP#:	7EN02-0426-01
Release Date:	April 2020

Content changes:

Topic	Chapter	Page	Change
Adding a new report	Configuring	359	Clarified (added a note) how saved inputs are handled by reports.
Arc Flash	Multiple	1005, 1008, 1726	Add Arc Flash to the supported alarm and incident types.
Backup Power Module	Configuring	451, 477	Updated the configuration instructions for generator and equipment capacity reporting.
Backup Power Module	Multiple	91, 451, 1529	Completely reworked the planning and configuring instructions for EPSS reporting. Included information on using ASCO ATSs.
Before Installing the software	Installing and Upgrading	161	Clarified the account privileges required for installing PME. Added a cybersecurity warning.
Configuring Gadgets	Reference	1554	Added a note about smart measurements not being supported in Dashboard gadgets.
Customizing a diagram object	Operating	1350	Clarified (added a note) the transparency behavior of numeric and text box objects in Vista and Diagrams.
Cybersecurity features	Cybersecurity	32	Added statement of compliance with SL1 according to IEC 62443-4-1 and IEC 62443-4-2. Added information on the Schneider Electric Cybersecurity Support Portal for security updates and to report vulnerabilities.

Topic	Chapter	Page	Change
Database Backup	Multiple	209, 234, 238, 254, 316, 959, 963, 967	Emphasized the importance of database backups by adding new content and improved NOTICE messages.
Database Maintenance	Configuring	316	Completely reworked the database maintenance topic. Added information on setting up database maintenance tasks for Distributed Database systems.
Enabling HTTP connections	Reference	1484	Added procedure to disable the automatic HTTP -> HTTPS redirect.
Hierarchy Manager	Configuring	785	Added information on how data is aggregated in a hierarchy.
IIS Application Pools	Reference	1452	Corrected the list of applications in the applications pools.
Installing and Upgrading	Reference	1495	Added release notes for PME 2020 CU1.
Insulation Monitoring Module device support	Reference	1612	Removed Vigilohm IM400 from the list of supported devices.
IT Considerations	IT Requirements	54	Added information on the IIS Trust Level setting required for PME web apps.
OPC References	Reference	1620	Added information on OPC tunneling and recommend its use.
Reports	Operating	1244	Added description of the new Power Load Demand & Capacity Report
Reports	Operating	1277	Clarified the PQ report behavior when assigning waveform captures to consecutive PQ events in an incident.
Side-by-Side upgrade	Installing and Upgrading	219	Added the ApplicationModules database to the list of DBs that need to be backed up, deleted, and restored in the upgrade process.
Side-by-Side upgrade	Installing and Upgrading	222	Added information on the handling of custom device drivers by the Configuration Manager tool during and upgrade.
Various topics	General	n/a	Quality and usability improvements.
Web Apps Settings	Configuring	955	Updated the Registration page description. The Connected Service settings moved to this page in PME 2020 CU1.

Revision Number: Rev 00

MRP#: 7EN02-0426-00

Release Date: November 2019

This is the initial release of the PME2020 System Guide.

Document organization and content

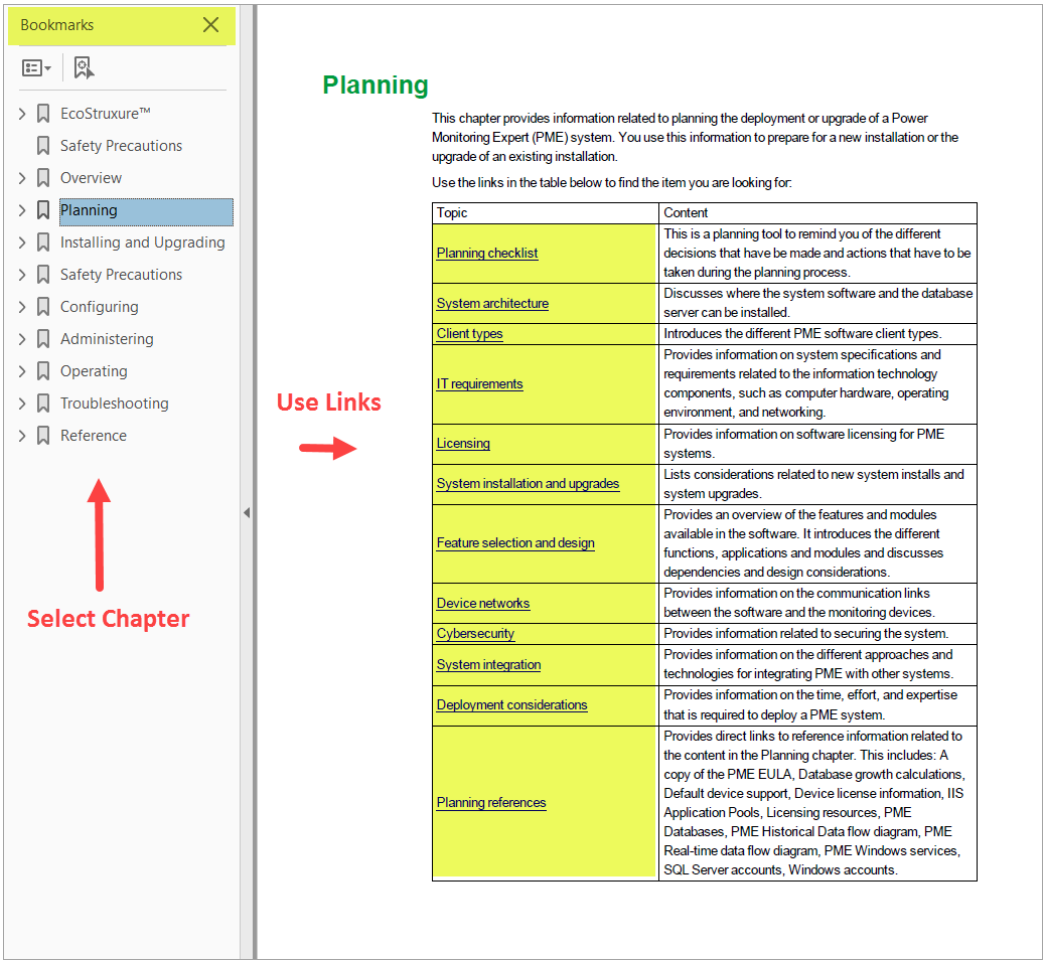
This document is organized by the following functional life-cycle stages: Planning, Installing and Upgrading, Configuring, Administering, Operating, Troubleshooting, and Decommissioning.

Some tools, tasks, or functions are specific to a particular stage, others are part of different stages. For example, deciding on which computer hardware to use, is done during the Planning stage. Licensing, in contrast, has a Planning component, to purchase the correct licenses, and a Configuring component, to activate the licenses on the system.

Reference is a resource chapter that contains detailed information. Use Reference information to deepen your understanding of Power Monitoring Expert concepts, and to complete complex procedures that might require additional information. The Reference section content is organized to mirror the structure of the functional life-cycle stages.

How to use this document

The best way to use this document is by using document bookmarks and the introductory pages for each chapter. Use the Bookmarks to navigate to the chapter introduction, and then use the chapter link page to navigate to the content you are looking for. Much of the content contains hyperlinks to connect related content.



You can also use the table of contents to navigate through the document, or use **Find** to search for specific content.

What's new in Power Monitoring Expert 2020

PME 2020 is a major release that introduces a number of new features and improvements. We highly recommend you upgrade your existing PME system to version 2020.

NOTE: For information on PME 2020 Cumulative Update 1, released in March 2020, see PME 2020 Cumulative Update 1 - Release Notes.

Highlights of this release

- New web-based control in Diagrams, for manual control actions such as resetting values on devices or changing device configuration settings.
- New web-based Device Manager for device and site configuration.
- New alarm analysis tools for Load Loss and Voltage Tolerance.
- VIP Modbus Slave now supports Modbus TCP protocol.
- Event Notification Module now includes a new notification engine that seamlessly integrates with PME for alarm-based notification.
- You can now choose the system language and regional settings on a per user basis. You can also assign devices to different timezones.
- New Reports: Measurement Aggregation Report, Measurement Aggregation Export Report, Billing Verification Report.
- New PME Express Edition - A low cost, low effort, low risk way to get a PME system.
- Support for ION9000T High Speed Transient Capture.

Details of this release

NOTE: The following is a selected list of changes for this release, it is not a comprehensive list.

Web Applications

Item	Details
New Diagrams control	You can now use Diagrams to perform manual control actions on devices. Manual control actions include actions such as resetting values on devices or changing device configuration settings. Before, this was only possible in Vista. **NOTE**: Control in Diagrams is disabled by default.
Diagrams language now configurable	You can now change the Diagrams language on demand. Before, the language was set at install time.

Item	Details
New Alarm Viewer analysis tools	Alarm Viewer now includes the following new tools for analyzing the causes and impacts of alarm events: • Load Loss (Identifies changes in the steady state electrical loads of a power system triggered by a voltage disturbance). • Voltage Tolerance (Uses a graphical display of the magnitude and duration of a voltage disturbance to analyze potential impacts). • High Speed Transient Capture (Displays high resolution voltage and current waveform signatures from monitoring devices with that capability, for example the ION9000T).

Software Modules and Licenses

Item	Details
Event Notification Module redesign	The Event Notification Module (ENM) has been completely redesigned. It is now seamlessly integrated with PME. Notifications are triggered based on alarm views. The module supports SMS and email notification and you can schedule notification activities. **NOTE**: Existing ENM configurations will continue to work on system upgrades. In addition, the new ENM functionality will be available on these systems after upgrade.
New Data Exchange Module	This new module enables the following features in PME: • OPC DA server • Measurement Aggregation Export Report • VIP Modbus Slave • COMTRADE export with ETL **NOTE**: On system upgrade, an existing OPC DA server license is converted automatically to a Data Exchange Module license.
New PME Express Edition	This is a new license package for a scaled down version of PME. PME Express Edition: • Provides a basic Energy and Power Monitoring system. • Has low deployment and licensing cost. • Includes TVDA for consistent deployment and configuration. • Can be expanded to PME Standard Edition in the future. • Complies with ISO 50001, 50002, 50006 and IEC 62443-4-1, IEC 62443-4-2 (SL1).

Tools

Item	Details
New Device Manager	Use this new tool to manage the devices and sites in your system. With Device Manager you can: • Export/import device and site configurations in CSV file format. • Import configurations from ION Setup, EcoStruxure Power Commission (formerly known as EcoReach). • Efficiently filter and search for specific devices and sites. **NOTE**: Management Console is also still available for device and site configuration.
New System Log Viewer	Use the new web-based System Log Viewer to inspect the PME system log.
VIP Modbus Slave	The VIP now supports Modbus TCP protocol for its Modbus Slave functionality. **NOTE**: The VIP Modbus Slave functionality now requires a Data Exchange Module license.

Reporting

Item	Details
New reports	Measurement Aggregation Report Measurement Aggregation Export Report Billing Verification Report
Improved reports	Billing Summary Report Multiple Billing Report Multiple Billing Export

Operating Environment

Item	Details
New Windows version support	Windows Server 2019 Standard
Dropped Windows version support	The following versions of Microsoft Windows are no longer supported: Windows 7 (no longer supported)

For the complete list of supported operating systems and SQL Server versions, see the IT Requirements chapter in this guide.

Devices

Item	Details
New device type support	The following device types are now supported in PME 2020: • ASCO 4000 • ASCO 7000 • iEM 2000 • Exertherm ARM XL • ION9000T • MTZ v3.0 • PM 2000 • Vigilohm IFL12 • ZBRN32 (for LV Busway Thermal Monitoring related devices)
Updated device type support	Drivers for the following device types have been updated with waveform capture support: • Accusine (PCS+, PFV+ and PCSn) • Enersure (BCPM 2.0, iBCPM Enkapsis, Enkapsis)
Device license changes	(Where applicable) The following device types now require a high-end license, instead of a mid-range license: • Accusine (PCS+, PFV+ and PCSn) • Enersure (BCPM 2.0, iBCPM Enkapsis, Enkapsis) • ION7400 • PM8000 • 9410 **NOTE**: On system upgrade, licenses for existing devices of these types are converted automatically from mid-range to high-end in PME.

Cybersecurity

Item	Details
New system integration settings	Control which domains can host PME and which domains PME can redirect to.
New login options settings	Control how users can log into PME, for example using standard PME accounts, Windows accounts, one-click login, and so on.
New server security configuration	Choose to encrypt database connections.

Item	Details
Session timeout settings now configurable	You can now configure session timeouts through the Web Applications Settings.
New fine-grained privilege settings	You can now set application and function specific privileges for user access levels (operator, controller, user, observer).
Other improvements	Several cybersecurity improvements in line with IEC 62443-4-2.

Miscellaneous

Item	Details
Improved system upgrade performance	Installer improvements have reduced upgrade time by up to 40%.
Productivity improvements for Reports	New report template selector.
Productivity improvements for Breaker Configuration tool	New breaker clone function.
Updated look & feel for web applications	New tab and dialog window styles. (Optional) High contrast color theme.
(New) Personalize look & feel based on individual user preferences	You can now set the system language, regional settings, colors and themes on a per user basis. You can also assign devices to different timezones.
Hierarchy Manager improvements	You can now edit weighted apportionments. We have also made significant performance improvements for hierarchy configuration.
SQL Server resale	SQL Server 2017 Standard Edition (English) is available for purchase from Schneider Electric for use with PME 2020.
Quality improvements	PME 2020 includes a wide range of quality improvements.

Removed/Replaced Functionality

Item	Details
Removed VIP Modbus Master functionality	This feature is obsolete. To replace this functionality, add the Modbus Slave devices to PME using default or custom device types. Recreate the VIP functionality by linking to data from these device types.
Removed SQL Agent support for subscriptions	Report subscriptions now use Windows Task Scheduler for all install types.
Removed Alert Monitor functionality	This feature is obsolete.
Removed Alarm Printer functionality	This feature is obsolete.

Item	Details
Removed support for 32-bit operating systems	Only 64-bit operating systems are supported now by PME.

Resources

The Resources page is a central reference for any resources that are referred to in this guide but that are not included in the guide.

Download Center

NOTE: The EcoStruxure™ Power Monitoring Expert System Guide includes the content of the following guides: What's New Guide, IT Guide, Web Applications Guide, and the Insulation Monitoring User Guide.

The following EcoStruxure™ Power Monitoring Expert 2020 documents are available on the Schneider Electric Download Center:

- System Guide (English) – Document number 7EN02-0426
- What's New Guide (English) – Document number 7EN12-0325
- Insulation Monitoring - User Guide (English) – Document number 7EN02-0430
- Web Applications Guide (Multilingual) – (English) Document number 7EN02-0427

Exchange (requires login)

NOTE: On the Exchange you can find discussion forums, key content, service providers, and knowledge base articles. You can also sign-up to become a service provider. To gain access to the Exchange and its content, register at https://exchange.se.com/.

- Schneider Electric Exchange - EcoStruxure Power Monitoring Expert (Portal)
- Power Monitoring Expert Promote & Sell
  - PME End User License Agreement
- Power Monitoring Expert Design and Quote:
  - Tools (Commissioning Time Calculator, Daisy Chain Calculator, Database Growth Calculator, Secondary Server Calculator)
  - Documents (IT Guide (English), PME System Guide)
  - EWS Specification
  - Standard Scope of Work Packages
  - Device Support Matrix
  - Part Numbers list
- Power Monitoring Expert Install and Maintain:
  - Information on PME software updates
  - Application Notes
  - Drivers
  - Help Files
  - Upgrade Map

  - Tools (Configuration Manager, ETL Guides)
  - Documents (PME System Guide, Energy Expert Solution Guide, Insulation Monitoring User Guide)
  - Standard Scope of Work Packages
  - PME Scripts
- EcoStruxure Building Operation documents on Exchange:
  - Architectural Guidelines - EcoStruxure Building Operation
  - IT System Planning Guide - EcoStruxure Building Management
  - EcoStruxure Building Operation - System Reference Guide
  - EcoStruxure Building Operation - Technical Reference Guide
  - EcoStruxure Building Operation - IT Reference Guide
- Other documents and files on Exchange:
  - PSO System Guide
  - EcoStruxure Power Digital Applications for Large Buildings & Critical Facilities - Design Guide for North America
  - Power Advisor Documentation

Exchange Community (requires login)

- PME Exchange Community (Online support and collaboration)
  - Software updates (see Announcements and Downloads)
- PME ETL download
- Billing Module Toolkit
- Device Drivers
  - PME Device Driver Summary Spreadsheet (shows native and downloadable drivers; includes links to downloadable drivers)
  - PME Device Driver downloads (SE, LE- Enter the device name in the search box to find the driver)
  - PME Device Driver downloads (CE)

Other

- Schneider Electric Cybersecurity Support Portal
- Schneider Electric Knowledge Base
- PME Licensing Portal
- Schneider Data Privacy and Cookie Policy
- PME 7.2 Service Pack 2

Technical Support

- Schneider Electric Website (Support)
- mySchneider app
  - 24/7 support. Mobile catalog. Access to expert help.
- Software Licensing Support
  - Offline license activation, license returns
- Software Registration Centers
  - Global contact information. Contact a Software Registration Center (SRC) if you exceed the license return limit, or if a license has become untrusted. Do not contact an SRC for troubleshooting license issues or to get new licenses. They are not able to help with these issues.

External Resources

The following are resources that are referenced in different sections of this guide; they provide additional information and downloadable components.

Microsoft® technical documentation:

- Microsoft® SQL Server® Data-Tier Application Framework Installer Download (DacFramework.msi)
- How to choose antivirus software to run on computers that are running SQL Server
- How to determine which versions and service pack levels of the Microsoft .NET Framework are installed

Cybersecurity

This section includes information on how to help secure your system.

⚠ WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

Use cybersecurity best practices to help prevent unauthorized access to the software.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

Work with facility IT System Administrators to ensure that the system adheres to the site-specific cybersecurity policies.

Cybersecurity awareness

Knowledge is first step to prevent cyber intrusions. Review the following resources to increase your cybersecurity awareness:

- Securing Power Monitoring and Control Systems (Schneider Electric White Paper)
- Social engineering (security)

To find out about the latest cybersecurity news, sign up for security notifications, or to report a vulnerability, visit the Schneider Electric Cybersecurity Support Portal. See Resources for link information.

RECOMMENDATION: Sign-up for security notification emails on the Schneider Electric Cybersecurity Support Portal.

Cybersecurity features

PME includes features that help to secure your system, including:

- Data encryption using SHA-512 and AES-256 cryptography (At Rest) and TLS 1.2 / HTTPS (In Transit)
- Compatibility with antivirus and whitelisting software
- User account management, optionally using Windows Active Directory integration
- Session timeout of inactive user sessions

For more information on these and other features, see Recommended actions.

NOTE: PME2020 complies with the requirements of the security relevant standards for Security Level 1 (SL 1) according to IEC 62443-4-1 and IEC 62443-4-2.

Recommended actions

PME is designed for a defense in depth security strategy, in compliance with IEC 62443, the global standard for industrial automation control system security. A defense in depth strategy is a multi-layered approach to cybersecurity with intentional redundancies to increase the security of a system as a whole.

The different defense in depth layers can be described as:

- Data Layer (includes access control and encryption of data)
- Application Layer (includes antivirus software and application hardening)
- Host Layer (includes patch implementation, user authentication)
- Network Layer (includes IPsec, intrusion detection system)
- Perimeter Layer (includes firewalls, VPN)
- Physical Layer (includes guards, switches, locks, ports, physical access)
- Policies

To help secure your system, you must take specific actions for the different layers and at every stage of the project life-cycle. The following shows the actions we recommend to help secure your system, organized by life-cycle stage:

NOTE: The list of recommended actions below is not a complete list of possible cybersecurity measures. It is meant to be a starting point to improve the security of your system. Consult with cybersecurity experts to plan, install, configure, administer, and decommission your system based on your needs.

Life-cycle Stage	Layer	Recommended Action
Planning	Data Layer	Obtain security certificates.
	Application Layer	Obtain antivirus and application whitelisting software.
	Host Layer	Plan user access.
	Network Layer	Plan your network security.
	Perimeter Layer	Plan to install PME in an intranet environment. Plan IP port use.
	Physical Layer	Plan your site security.
	Policies	Plan for the implementation of cybersecurity standards.
Installing, Upgrading	Application Layer	Install antivirus and application whitelisting software. Verify install file integrity and authenticity. Protect the System Key. Apply PME updates.
	Host Layer	Install latest updates for OS and SQL Server. Check computer for cybersecurity issues.
	Network Layer	Install your network security measures.
Configuring	Data Layer	Install security certificate. Set up encrypted database communication for Distributed Database architectures
	Application Layer	Configure application whitelisting software. Configure antivirus software on your SQL Server.
	Host Layer	Configure PME users and user groups. Customize user account privileges. Restrict Windows login permissions for the PME server. Change the SQL Server Express sa account password. Configure session timeout settings. Do not install or use a web browser on the server computer.
	Network Layer	Set up your network security.
	Perimeter Layer	Disable unused IP ports.
	Physical Layer	Disable unused hardware ports.

Life-cycle Stage	Layer	Recommended Action
Administering	Data Layer	Renew security certificate. Securely store the system key.
	Application Layer	Apply PME updates. Verify update file integrity and authenticity.
	Host Layer	Apply OS and SQL Server updates. Review user accounts on a regular basis.
	Network Layer	Keep network security up-to-date.
	Physical Layer	Keep computer hardware secure.
	Policies	Perform security audits
Decommissioning	Host Layer	Decommission your system at the end of its life.

Planning

Use the information provided in this chapter to prepare for an installation or upgrade of a Power Monitoring Expert (PME) system.

Use the links in the following table to find the content you are looking for:

Topic	Content
Planning checklist	This is a planning tool to remind you of the different decisions that have be made and actions that have to be taken during the planning process.
System architecture	Discusses where the system software and the database server can be installed.
Client types	Introduces the different PME software client types.
IT Requirements	Provides information on information technology components, such as computer hardware, operating environment, and networking.
Cybersecurity	Provides recommended actions to help secure your system.
Licensing	Provides information on software licensing for PME systems.
System installation and upgrades	Lists considerations related to new system installs and system upgrades.
Feature selection and design	Provides an overview of the features and modules available in the software. It introduces the different functions, applications and modules and discusses dependencies and design considerations.
Device Networks	Provides information on the communication links between the software and the monitoring devices.
System Integration	Provides information on the different approaches and technologies for integrating PME with other systems.
Deployment considerations	Provides information on the time, effort, and expertise that is required to deploy a PME system.
Planning references	Links to reference information related to the content of the Planning chapter.

Planning checklist

The following checklist has an entry for each of the sections in the planning chapter of this guide. Use the list as a planning tool to remind you of the different decisions that have be made and actions that have to be taken during the planning process.

Item	Details	Completed
System Architecture	Decide which architecture to use (Standalone, Distributed Database).	☐
Client Types	Decide which type of clients and how many of each are needed (Web Clients, Engineering Clients).	☐
IT requirements	Decide which computer hardware, and operating software to use (OS, SQL Server). Understand the network related dependencies, and plan for them.	☐
Licensing	Understand which licenses (PME, OS, SQL, ...) are required for your system and plan to purchase them in time for the deployment.	☐
System installation and upgrades	Understand the prerequisites and the different options for new installs and upgrades.	☐
Feature Selection and design	Define which features and modules you want to setup for the user. Understand the prerequisites and dependencies, and plan for them.	☐
Device networks	Understand the device network options (Ethernet, serial). Match the devices with features and modules (device capabilities, performance, and so on).	☐
Cybersecurity	Understand the security needs of your customer and application. Develop a security strategy and plan for the system, the network, the devices, and other relevant components (data encryption, virus and malware detection, firewalls, ...).	☐
System integration	Understand the different approaches and technologies for integrating PME with other systems, for example, OPC, EWS, ETL, ODBC, PQDIF, VIP, ...	☐
Deployment considerations	Understand the complexity of the deployment and the time and expertise required.	☐

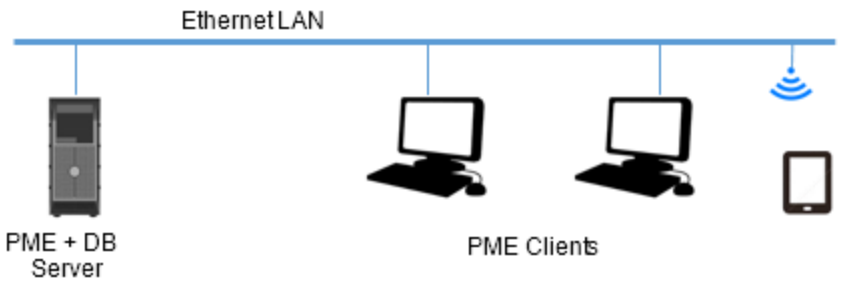
System architecture

PME is a client-server, on-premise software application that collects power monitoring data through a network of connected devices. The power monitoring data is processed and stored using Microsoft SQL Server and can be accessed by users in a variety of formats through different user interfaces.

PME is deployed in one of two basic architectures: Standalone or Distributed Database.

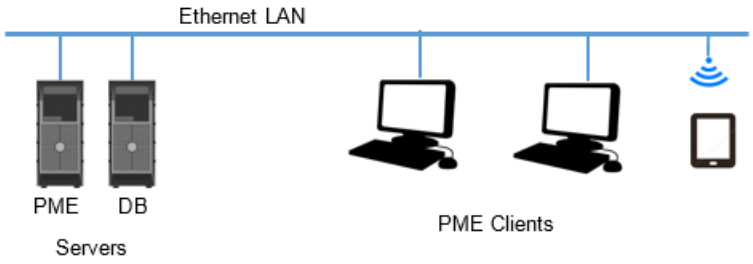
Standalone architecture

In a Standalone architecture, all PME system files, the SQL Server database, and any other tools or utilities are installed on the same computer. You access the power monitoring data through clients.

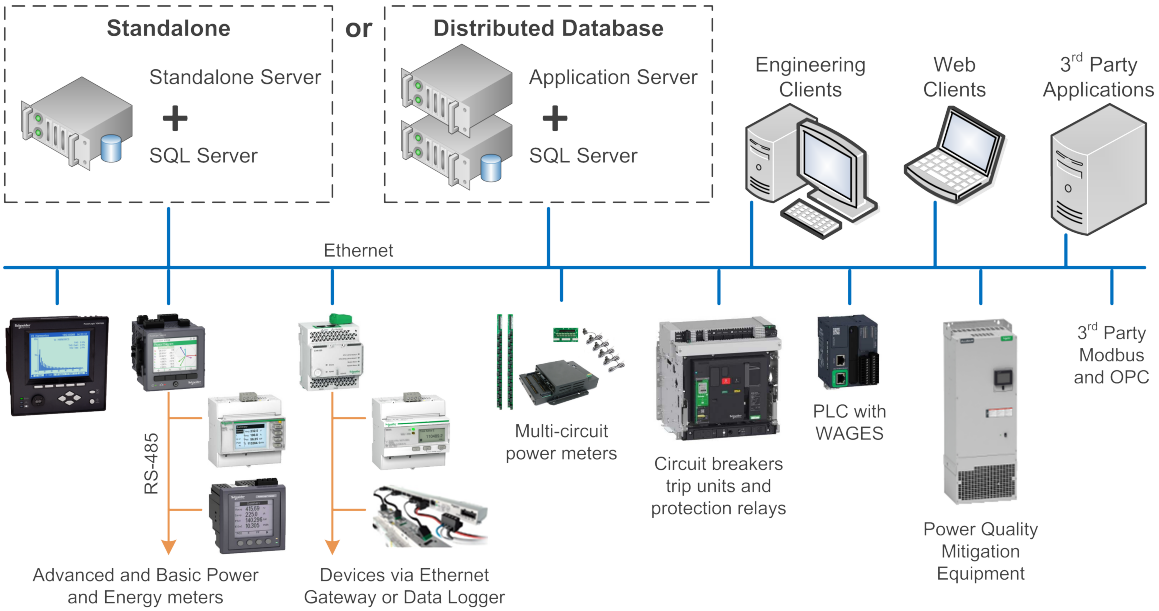


Distributed Database architecture

In a Distributed Database architecture, all PME system files, tools, and utilities are installed on one computer. The database server is installed on a second computer. There are no PME system files installed on the database server except for the historical database files. You access the power monitoring data through clients.



The following example diagram shows both architectures in the context of the overall system, including the monitoring devices:



Which architecture you should choose

We recommend you use the Standalone architecture. It is easier and more cost effective to deploy, and there are no performance advantages in using a Distributed Database architecture.

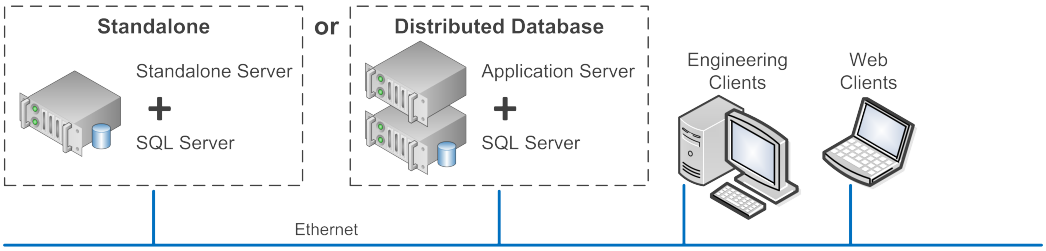
However, in some cases it might be necessary to use the Distributed Database architecture, such as:

- Your customer wants to use an existing SQL server.
- Your customer IT requirements do not allow a Microsoft SQL Server to be installed with another application on the same server.
- The application requires Microsoft SQL Server redundancy with SQL Clustering or other third-party tools.
- The application requires specific rules for database management, for example SQL jobs, back-ups, data security, and so on.

Client types

In PME you use clients to access the configuration tools and the applications for viewing data. There are two different types of clients:

- Engineering Clients configure and administer the system.
- Web Clients view power monitoring information.



NOTE: See Licensing for details on client licensing.

Engineering Client

An Engineering Client is an administrative interface in PME that is used to configure and administer the system. Engineering Clients include tools such as the Management Console, Vista, and Designer.

One Engineering Client is installed, by default, on the PME server. Additional Engineering Clients can be installed on other computers, for example on a portable notebook computer, that are more accessible than the server. Engineering Clients require a Client Access license.

Web Client

A Web Client is used to view power monitoring information such as real-time data, historical information, and alarms which are used in day-to-day power management tasks.

Web Clients access the data on the server through a Web browser. No installation is required. Web Clients can run on any computer on the network. Web Clients require a Client Access license.

Web Clients can access the Web Applications (Dashboards, Diagrams, Trends, Alarms, and Reports) in PME.

To set up a Web Client, enter the fully qualified domain name of the PME server or its IP address, followed by `/Web` into your browser.

Examples:

- `http://10.160.42.1/Web`
- `http://PMEServer.MyCompany.com/Web`

NOTE: `Web` is the default root directory. The root directory is configurable and can be changed during installation.

By default, the first application on the navigation bar in Web Applications opens in the browser. To specify which application should open first, add one of the following application parameters to the Web address: (Note that the parameters are case-sensitive.)

`#Dashboards, #Diagrams, #Trends, #Alarms, #Reports`

For example, `http://PMEServer.MyCompany.com/Web/#Alarms` opens the Alarms application in the browser.

NOTE: For cybersecurity and performance reasons, we recommend that you do not use a Web Client on the PME server computer.

IT Requirements

This section provides information on specifications and requirements related to information technology (IT) components, such as computer hardware, operating environment, and networking.

Use the links in the following table to find the content you are looking for:

Topic	Content
Computer Hardware	Computer types, CPU, RAM, and HDDs.
Operating Environment	OS, DB server, Web browser, and other compatible software.
Network connectivity	Required network shares, Windows domain compatibility, IPv6 compatibility, and IP port requirements.
Other IT considerations	Computer name limitations, display resolution.

Computer Hardware

The performance of a computer is determined by the following factors:

- Computer type (desktop, workstation, or server)
- Central processing unit (CPU)
- Random-access memory (RAM)
- Data storage, for example Hard Disk Drive (HDD)

When choosing the computer hardware for your PME system, you need to consider the following:

- Number of devices in the system
- Number of concurrent users
- System performance expectations
- Data exchange with other systems
- Historical data logging needs
- System availability and recovery needs

NOTE: Undersized computer hardware is a common source of performance issues with PME systems.

Choosing Computer Type, CPU, and RAM

The computer type, CPU, and RAM determine the overall performance and reliability of the system. CPU is important for device communications and RAM affects SQL Server performance.

As a starting point for the selection of these components, we are defining two different system categories, **Basic Systems** and **Advanced Systems**. Decide which category best describes your system needs and then use the information provided in the tables below to define your computer hardware specifications.

Basic Systems

A *basic system* is defined by the following characteristics:

- Factory default measurement logging (logging frequency >= 15 minutes)
- No custom applications
- No Power Quality Performance monitoring
- Only a small number of branch circuit monitor devices in the system
- A device type mix of approximately:
  - 70% entry level devices (for example iEM3xxx)
  - 20% intermediate level devices (for example PM8xxx)
  - 10% advanced level devices (for example ION9000)

Minimum recommended computer hardware for servers in Basic Systems:

System Size	Devices	Users	Computer Hardware
Small	≤ 100	≤ 5	Desktop Intel Core i5 (2 core) 8 GB (RAM)
Medium	≤ 250	≤ 10	Workstation Intel Xeon W-21xx (4 core) 16 GB (RAM)
	≤ 600	≤ 10	Server Intel Xeon E3-12xx (6 core) 24 GB (RAM)
Large	≤ 2500	≤ 10	Server Intel Xeon E3-12xx (10 core) 32 GB (RAM)

Advanced Systems

An *advanced system* is defined by the following characteristics:

- Custom measurement logging with <15-minute intervals
- Custom applications using the VIP module
- Power Quality Performance monitoring
- Large number of concurrent users
- High percentage of advanced level devices in the system
- Large number of branch circuit monitor devices in the system
- Large scale data exchange with third party systems (for example through OPC or EWS)
- Other resource intensive software systems installed on the same computer

Minimum recommended computer hardware for servers in Advanced Systems:

System Size	Devices	Users	OPC Tags	Computer Hardware
Small	≤ 100	≤ 15	5000	Workstation Intel Xeon W-21xx (4 core) 16 GB (RAM)
Medium	≤ 250	≤ 20	10000	Server Intel Xeon E- 12xx (6 core) 24 GB (RAM)
	≤ 600	≤ 35	30000	Server Intel Xeon E3-12xx (10 core) 32 GB (RAM)

System Size	Devices	Users	OPC Tags	Computer Hardware
Large	≤ 2500	≤ 50	50000	Server Intel Xeon Scalable Silver (12 core) 64 GB (RAM)

Client Computers

Since all the data processing is done on the server, the client computer hardware recommendations are the same for Basic Systems and Advanced Systems.

Minimum recommended computer hardware for clients:

- Engineering Client
  - Intel Core i3 (2 core or better)
  - 4 GB of RAM
- Web Client
  - 2 GHz, Dual Core processor
  - 4 GB of RAM
  - Monitor resolution of 1280 x 960 pixels

NOTE: To improve the information display, we recommend a minimum monitor resolution of 1440 x 1080.

Choosing Data Storage

The type of data storage determines the historical data access performance and the amount of historical data that can be stored in the system. Data storage configurations are also important for system availability and recovery.

Storage Size

The data storage must have enough space for the different programs and applications that are running on the computer. This includes space for the historical data that is recorded by the system and some free space as a buffer.

The following table shows the estimated storage space that is required, without the historical data logs. The estimates are rounded up and allow for updates and system maintenance.

Component	Storage Space
Windows Operating System software	100 GB
Microsoft SQL Server software	2 GB
PME software	5 GB
PME system databases	5 GB
PME historical database	**(see below)**
Free space	30% of the storage size

PME historical database

The storage space that is required for the historical database (ION_Data), is equal to five times the size of the main database file (ION_data.mdf):

```
Storage Space for ION_Data (GB) = 5x .mdf (GB)
```

It can be broken down into the following components:

Component	Storage Space
Main database file (.mdf)	(1x) ION_data.mdf size
Transaction log file (.ldf)	(1x) ION_data.mdf size
Backups	(2x) ION_data.mdf size
Free Space for Backups or tempDB	(1x) ION_data.mdf size
Total	**(5x) ION_data.mdf size**

The estimates above are based on the following assumptions:

- The .ldf file is typically just 10% of the .mdf size, but occasionally expands to 100% during normal operation.
- The system default is to keep two database backups.
- 100% of the .mdf size is required for free space. The tempDB will occasionally expand to 100% of the total .mdf size, but not at the same time as a backup. If the backups and tempDB are on different hard drive groups, each of them require x1 .mdf in hard drive space.

Main Database File Size (ION_data.mdf)

Unlike the system software, the historical database size is continuously growing. Its size and growth can be estimated based on the amount of:

- Factory default measurement logging
- Custom measurement logging
- Power quality event logging

Also, the database occasionally grows by 10% to create room for additional measurements. This growth operation can occur at any time and you need to consider it in the database size calculations.

NOTE: Use the Database Growth Calculator tool to estimate the database growth for your system. The tool is available through the Exchange Community. See Resources for link information.

Storage Performance and Availability

Storage Type

The two main storage solutions that are available are Hard Disk Drives (HDD) and Solid-State Drives (SSD). HDDs are good at providing cheap, bulk storage for non-performance critical data. SSDs are good at providing strategic storage for high performance data. We recommend that you

use SSDs for the Microsoft Message Queuing (MSMQ) storage in medium, large, and extra large PME systems.

Storage Configuration

Storage drives can be configured as single drives or a number of separate drives. For a small Basic Systems, a single drive is sufficient. For all other systems, we recommend that you divide the data storage into different drives.

For **medium to large systems** (250-2,500 devices):

Drive Type	Components
SSD	Software: OS, PME, SQL Databases: ApplicationModules, ION_Network, ION_SystemLog MSMQ
HDD or SSD	SQL tempdb
HDD or SSD	ION_Data
HDD or SSD	ION_Data.ldf, database backups

For **very large systems** (2,500+ devices):

Drive Type	Components
HDD or SSD	Software: OS, PME, SQL Databases: ApplicationModules, ION_Network, ION_SystemLog
SSD	MSMQ
HDD or SSD	SQL tempdb
HDD or SSD	ION_Data
HDD or SSD	ION_Data.ldf, database backups

RAID Systems

In addition to separating the software components into different drive groups, redundant arrays (RAID) can be used to improve performance and add simple redundancy. In a RAID 1 configuration, one drive is a complete copy of a second drive. If either of the two drives stops operating, the other takes over without any data loss. The faulty drive can then be replaced to restore the RAID configuration.

Recommended RAID 1 configurations:

2x Drive

Component	Group 0 Drive 1+2
OS	✓
tempDB	✓

Component	Group 0 Drive 1+2
MDF	✓
LDF	✓
Backups	✓

4x Drive

Component	Group 0 Drive 1+2	Group 1 Drive 3+4
OS	✓	
tempDB		✓
MDF	✓	
LDF		✓
Backups		✓

6x Drive

Component	Group 0 Drive 1+2	Group 1 Drive 3+4	Group 2 Drive 5+6
OS	✓		
tempDB	✓		
MDF		✓	
LDF			✓
Backups			✓

8x Drive

Component	Group 0 Drive 1+2	Group 1 Drive 3+4	Group 2 Drive 5+6	Group 3 Drive 7+8
OS	✓			
tempDB		✓		
MDF			✓	
LDF				✓
Backups				✓

NOTE: Plan for system growth by having a computer with space for additional drives. This makes it easy to add additional storage as the system grows.

NOTE: It is possible to use other RAID configurations, such as RAID 0 or RAID 5. These configurations are not discussed in this document.

Operating Environment

PME supports the following environments and software:

NOTE: The operating system and SQL Server combination you choose must be supported by Microsoft. This applies to edition, version, and 32-/64-bit.

NOTE: Apply the latest updates to the operating system and database system before installing or upgrading PME.

Software	Supported Versions
Operating system*	Windows 10 Professional/Enterprise Windows Server 2012 R2 Standard/Enterprise Windows Server 2016 Standard Windows Server 2019 Standard
Database system**	SQL Server 2012 Express SQL Server 2014 Express SQL Server 2016 Express (included with PME) SQL Server 2017 Express SQL Server 2012 Standard/Enterprise/Business Intelligence SQL Server 2014 Standard/Enterprise/Business Intelligence SQL Server 2016 Standard/Enterprise/Business Intelligence SQL Server 2017 Standard/Enterprise/Business Intelligence
Virtual environment***	VMWare Workstation 10 VMWare ESX1 6.0 Oracle Virtual Box 5.0.4 Microsoft Hyper-V from Windows 8.1, Windows Server 2012 Citrix XenServer 6.2 Parallels Desktop 10 QEMU-KVM
Microsoft Excel	Microsoft Excel 2013, 2016, 365
Desktop Web browser	Microsoft Edge Google Chrome version 42 and later Mozilla Firefox version 35 and later Apple Safari versions 7 or 8 and later
Mobile Web browser	Safari on iOS8.3+ operating systems, Chrome on Android systems
.NET Framework	.NET 4.6 or higher

* For information on choosing an operating system, see Operating System considerations.

** PME includes a free version of SQL Server Express. You have the option to install this Express version during the installation of PME, if you don't want to use a different SQL Server. For information on the limitations when using SQL Server Express, see SQL Server considerations.

*** You must configure virtual environments with a supported Windows operating system and SQL Server edition. It is possible to mix virtual and non-virtual environments for PME server and clients.

Windows Updates

⚠ WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

Apply the latest updates and hotfixes to your Operating System and software.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

Critical and routine Windows Updates can be applied to the operating systems hosting the PME server and clients without prior approval by Schneider Electric.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Before installing the update, verify that the system is not performing critical control actions that may affect human or equipment safety.
- Verify correct system operation after the update.

Failure to follow these instructions can result in death or serious injury.

⚠ WARNING

INACCURATE DATA RESULTS

- Before installing the update, verify that the system data results are not used for critical decision making that may affect human or equipment safety.
- Verify correct system data results after the update.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

Localization

PME supports the following languages:

English, Chinese (Traditional and Simplified), Czech, French, German, Italian, Polish, Portuguese, Russian, Spanish, and Swedish.

A non-English version of PME only supports an operating system and SQL Server of the same locale. For example, a Spanish version of the product must be used with a Spanish version of SQL Server and an operating system with a regional setting of Spanish.

The English version of PME can be used with a supported language, non-English operating system and SQL Server as long as both have the same locale. For example, an English version of the product can be used with a German version of SQL Server and an operating system with a regional setting of German.

Operating System considerations

Windows or Windows Server?

PME supports both Windows and Windows Server operating systems. However, we recommend you use the Windows Server for the following reasons:

- Windows Server can use server-class computer hardware. It can access more CPUs and more RAM than Windows. For example, Windows 10 is limited to two physical CPUs.
- Windows Server offers better performance for running PME services.

32-bit or 64-bit systems?

PME supports 64-bit operating systems only.

SQL Server considerations

Express Version or Full version?

Microsoft SQL Server is available as a free, scaled down Express version, and as a priced, full server version. You can use both versions with PME. However, the Express version has the following built in limitations:

- Maximum database size of 10 GB.
- No SQL Server Agent service.
- Limited to lesser of 1 socket or 4 cores.
- Limited to use a maximum of 1 GB of the total system RAM.

In addition, PME has the following limitations when used with SQL Server Express:

- Only supported for Standalone systems, not for Distributed Database systems.
- Not supported for systems with Power Quality Performance module.

NOTE: PME includes a free version of SQL Server Express. You have the option to install this Express version during the installation of PME, if you do not want to use a different SQL Server.

Existing or new SQL Server?

You can use PME with an existing SQL Server, or you can install a new one. The following table lists the installation requirements for new and existing SQL Server types:

Type	Description
New SQL Server Standard	PME requires a certain configuration of the SQL Server. Find the installation instructions for SQL Server in the Installing and Upgrading chapter of this guide.
New SQL Server Express	PME includes a free version of SQL Server Express. You have the option to install this Express version during the installation of PME.

Type	Description
Existing SQL Server Standard	To use an existing instance of SQL Server Standard , the SQL Server setup wizard must be rerun to configure the software correctly for use with PME. Find the configuration instructions for SQL Server in the Installing and Upgrading chapter of this guide.
Existing SQL Server Express	The PME installer can add a new instance to an existing SQL Server Express for use with PME.

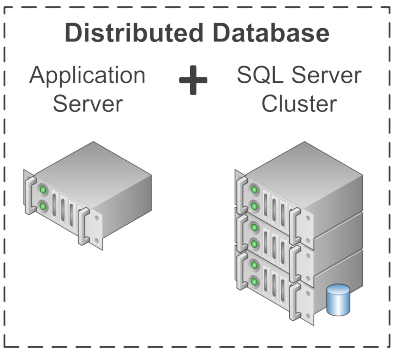
NOTE: The operating system and SQL Server combination you choose must be supported by Microsoft. This applies to edition, version, and 32-/64-bit.

SQL Server clustering

Clustering refers to a group of two or more SQL Servers that work together and appear as a single server to the outside. When a client connects to an SQL Server cluster, it appears that there is only a single SQL Server. In case of a server failure, the remaining servers take over without an interruption. Using clustering increases system availability.

PME can be used in a clustered environment when deployed in a Distributed Database architecture.

- The **Application Server** is deployed in a non-clustered environment.
- The **SQL Server** component is deployed in the clustered environment.



NOTE: SQL Server clustering is only supported for Distributed Database systems, not for Standalone systems.

Network connectivity

Network communication

The PME server, database server, and clients must be able to communicate with each other over the network using TCP/IP protocol. The licensing component of PME requires that PME clients and server can resolve each other's address by name (not just fully qualified domain name or IP address). If a proxy server is used on the network, then a local address bypass must be configured on the PME server.

An Internet connection is not required for PME to function correctly.

Network shares

Engineering Clients require that the **Power Monitoring Expert** folder on the PME server is shared with full read and write permissions. File and Printer Sharing must be enabled.

Windows Domain compatibility

Domain membership is not required for PME to function.

- PME can be installed on servers in a domain environment, however it cannot be installed on domain controllers. If PME is installed on a server that is subsequently changed to a domain controller, the software ceases to function correctly.
- For Distributed Database installations of PME, the Database Manager tool can only be used if the database server and the PME application server are in the same domain. The Database Manager cannot be used, in a distributed database installation, if the database server and the PME application server are in workgroups.
- A domain account is required for Side-by-Side upgrades of distributed systems using the Configuration Manager Tool. This domain account must be:
  - A member of the Administrators group on the PME server
  - Added as a Login in SQL Server with sysadmin role in the database instance.
- PME supports Windows Active Directory services for user account sharing.

IPv6 compatibility

PME supports IPv6 (and IPv4) for communications with metering devices. The software components of PME require IPv4. That means PME can be used on computers with single stack IPv4 or dual stack IPv4/IPv6 network adapters.

IP Port Requirements

PME uses certain ports for the communication between its components and the connected devices. Which ports are required for a specific installation depends on the system configuration and the monitoring devices used. See IP Ports for a list of relevant ports.

Other IT considerations

Internet Information Services (IIS) .NET Trust Level

The .NET Trust Level for PME web applications and Default Web Site must be set to **Full (internal)**, in IIS Manager. See IIS Application Pools for a list of PME web (ASP.NET) applications.

PME Server name limitations

The computer name for the PME server must have 15 characters or less, and use only letters, numbers or hyphens.

NOTE: The computer name must not be changed after the PME software is installed. If the computer name is changed after the install, the software ceases to function correctly. If that occurs, contact Technical Support for assistance.

Display resolution

The minimum display resolution for PME user interfaces is 1280 x 960 pixels.

Cybersecurity

This section provides information to help you plan your system security.

Obtain security certificates

PME uses Transport Layer Security (TLS) 1.2 for an encrypted, authenticated connection using HTTPS between the server and its web clients. Both self-signed and authority issued certificates are supported. PME is installed with a self-signed certificate and a self-signed certificate is configured automatically. We recommend that you replace this with a security certificates from a Certificate Authority (CA).

You also need a certificate for the database server computer to use an encrypted connection between PME and the SQL database server in a Distributed Database architecture installation. See Set up encrypted database communication for Distributed Database architectures for more information on this topic and for links to Microsoft articles with certificate requirements for SQL server computers.

See Data encryption for information on data encryption, at rest and in transit, in PME.

Obtain antivirus and application whitelisting software

PME can be used with antivirus software.

PME can be used with application whitelisting software products such as McAfee Application Control software. See Configure application whitelisting software for more information.

NOTE: AV software can have a significant impact on system performance if not set up correctly. In particular, SQL Server performance can be affected if data and log files are not excluded from on-access scans. See Configure antivirus software on your SQL Server for more information.

Plan user access

Define a list of user accounts, access levels, and access permissions for your PME system. See PME accounts, Network shares, and Session timeout for more information.

Plan your network security

Determine the network security measures for your IT and device networks to provide your desired level of security.

This can include:

- use of industrial firewalls
- use of intrusion detection and prevention systems (IDS, IPS)
- application of ISO27001 (Information Security Management System Standard [=policies and procedures])
- managing wireless access and remote access
- device security
- deep packet inspection firewalls
- physically securing device access

Determine what level of expertise will be required to deploy and maintain the network architectures and security measures. Plan to have this expertise available for the system deployment and maintenance.

Plan to install PME in an intranet environment

PME is designed for an intranet environment within a secured network infrastructure. PME is NOT designed for direct Internet connection.

Plan IP port use

Determine which IP ports are required and which ones can be disabled. See IP Ports for details on PME port requirements.

Plan your site security

Determine the hardware locking measures required to provide your desired level of security.

This can include:

- personnel access restrictions to server locations
- physical locking of the computer, for example with a cable
- cementing the USB drive
- removing the CD-ROM drive
- tools such as McAfee® Enterprise Policy Orchestrator (ePO) suite of products
- industrial, security hardened PCs such as the Magelis Box

Define workarounds and alternatives for cybersecurity-imposed restrictions, for example, for USB and CD-ROM drive access.

Plan for the implementation of cybersecurity standards

Consider implementing cybersecurity standards such as:

- IEC62443, the global standard for industrial automation control system security.
- ISO27001, a specification for an information security management system.

Licensing

This section provides information on software licensing for PME systems.

Use the links in the following tables to find the content you are looking for:

PME Licensing:

Topic	Content
Licensing overview	The licensing model and the different license types in PME
Licensing process	High level flow diagrams showing the licensing process.
Licensing tools	Different tools related to licensing.
Important notes on licensing	A list of items for you to consider when planning a PME system.
Licensing resources	Links and contact information for other license related resources.

Operating Environment Licensing:

Topic	Content
Operating System licensing	Microsoft Windows operating system software licensing.
SQL Server Licensing	Microsoft SQL Server software licensing.
Other software licensing	Third party software application licensing.

For information on how to configure licensing in PME, see the Licensing configuration section in the Configuring chapter of this guide.

Licensing overview

PME is a proprietary software that uses licensing to control its use and distribution. The licensing is enforced through mechanisms that disable certain software functions if no valid license has been activated.

To use PME, you must purchase software licenses and activate them in the system. The licenses give you the right to use the software according to the terms and conditions described in the software End User License Agreement (EULA). The licenses generally do not expire, unless stated otherwise in the software EULA. PME licenses are per system. If you have multiple systems, you must purchase separate licenses for each. Multi-system, or enterprise licenses are not available.

PME uses a modular licensing structure where different licenses enable different functions in the software. Some of these functions are optional, others are required. The licenses are cumulative, meaning that you can add additional licenses to a system, to enable additional functionality.

See Resources for information on where to find a copy of the PME EULA.

License activation

Purchased licenses must be activated either through online or offline methods. An Internet connection for the PME server is required for online activation. Offline activation must be done from an alternate Internet-connected computer or smart-phone with web access. See Activating a license for details.

Licenses are tied to the host computer (physical or virtual). If PME needs to be moved to a new computer, the licenses must first be returned and then reactivated on the new computer. Licenses can only be returned and reactivated twice per calendar year.

NOTE: Contact a Software Registration Center for help if you exceed the license return limit. See Licensing resources for contact information.

License types

PME licenses bundle together one or more PME features. For example, a Client Access license includes an engineering tool feature and a web applications feature.

The following table shows the different licenses that are available for PME:

Type	Description
Trial license	New system installations include a time limited Trial license. The Trial license: • enables all of the PME features (except Connected Services) • includes an unlimited device license • expires after 90 days • may be extended on demand (See Licensing resources for contact information.) • cannot be reinstalled • includes a Client Access license (Engineering Client can only be used on the primary server, not on a client computer) • remains active until its expiry even if other licenses have been activated • aggregates together with other active licenses
Base license	This is a required license. It enables the PME server functions and the basic system functions. Without the Base license the system is not functional. The same Base license can be used for Standalone or Distributed Database systems. The Base license also includes one engineering tools feature and two web application features.

<table>
<tr><th>Type</th><th>Description</th></tr>
<tr><td>Express Base license</td><td>The Express Base license is similar to the Base license but with reduced functionality. It is intended for small starter or entry-level systems. The following shows the differences between Base and Express Base licenses:
<table>
<tr><th>Feature</th><th></th><th>Express Base</th><th>Base</th></tr>
<tr><td>Included device licenses</td><td></td><td>10</td><td>None</td></tr>
<tr><td>PQ Reports</td><td></td><td>No</td><td>Yes</td></tr>
<tr><td rowspan="5">Expansion (optional):</td><td>Device Licenses (DL)</td><td>Max of 10 additional</td><td>Yes</td></tr>
<tr><td>Client Licenses (CL)</td><td>Max of 2 additional</td><td>Yes</td></tr>
<tr><td>Unlimited DL</td><td>No</td><td>Yes</td></tr>
<tr><td>Unlimited CL</td><td>No</td><td>Yes</td></tr>
<tr><td>Data Exchange Module</td><td>No</td><td>Yes</td></tr>
<tr><td rowspan="9">SW Modules (optional)</td><td>Energy Billing</td><td>No</td><td>Yes</td></tr>
<tr><td>Energy Analysis Reports</td><td>Yes</td><td>Yes</td></tr>
<tr><td>Energy Analysis Dashboards</td><td>Yes</td><td>Yes</td></tr>
<tr><td>Capacity Management</td><td>No</td><td>Yes</td></tr>
<tr><td>Insulation Monitoring</td><td>No</td><td>Yes</td></tr>
<tr><td>PQ Performance</td><td>No</td><td>Yes</td></tr>
<tr><td>Breaker Performance</td><td>No</td><td>Yes</td></tr>
<tr><td>Backup Power</td><td>No</td><td>Yes</td></tr>
<tr><td>Event Notification</td><td>No</td><td>Yes</td></tr>
<tr><td>Edition Upgrade</td><td></td><td>To Standard Edition</td><td>n/a</td></tr>
</table></td></tr>
</table>

Type	Description
Device license	This is a required license. It enables the use of monitoring devices in PME. Depending on the locale, device licenses are sold as: • Bundles of 5, 25, 50, 100, 200, unlimited - for the US, Canada, and India. • Individual licenses, with 3 different license types - for countries other than the US, Canada, and India: – **E** for entry-range device types – **M** for mid-range device types – **S** for high-end device types See the Default device type support list for details on which device types require which licenses. **NOTE**: Unlimited individual device licenses are available. **NOTE**: At least one device license must be activated in the system for PME to be able to communicate with a device.

Type	Description
Client Access license	This is an optional license. It allow access to Engineering Clients and Web Applications. Engineering Client access: • Client Access licenses are assigned to Windows sessions, not to users. • Each concurrent Windows session requires its own Client Access license. **NOTE**: A remote desktop connection is a separate Windows session. Web Application access: • Client Access licenses are assigned to users. • Each user needs their own Client Access license. • A Client Access license is assigned and bound to a new user when they first log into the PME web applications. • The **supervisor** account also needs a Client Access license. • To free up an assigned Client Access license, the user must be deleted in PME. **NOTE**: An unlimited Client Access license is available that includes unlimited engineering tools and web application use. **NOTE**: Management Console does not require a license.
Software Module license	This is an optional license. It enables the use of a Software Module. Each Software Module requires its own specific license. The following Software Modules exist in PME: • Backup Power Module • Breaker Performance Module • Capacity Management Module • Energy Analysis Dashboard Module • Energy Analysis Reports Module • Energy Billing Module • Event Notification Module • Insulation Monitoring Module • Power Quality Performance Module

Type	Description
Data Exchange Module license	This is an optional license. It enables the use of the following features and functions in PME: • OPC DA Server • Measurement Aggregation Export Report • VIP Modbus Slave functionality • COMTRADE export with ETL **NOTE**: OPC DA Server licenses on older PME systems will automatically be converted to Data Exchange Module licenses on upgrade.
Developer/Demo license	This is a special license. Contact Schneider Electric for details.

Related topics:

- Licensing overview
- Licensing process
- Licensing tools
- Important notes on licensing
- Operating System licensing
- SQL Server Licensing
- Other software licensing
- Licensing configuration

For reference information see:

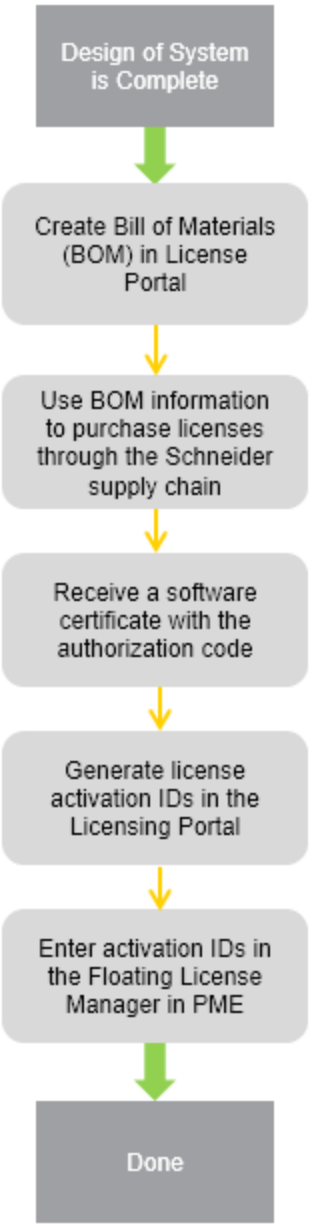
- Device license information
- Licensing resources

Licensing process

The licensing process is different for new systems, system upgrades, and system migrations. The following shows the high-level process for each. For further information, see the resources provided in Licensing resources.

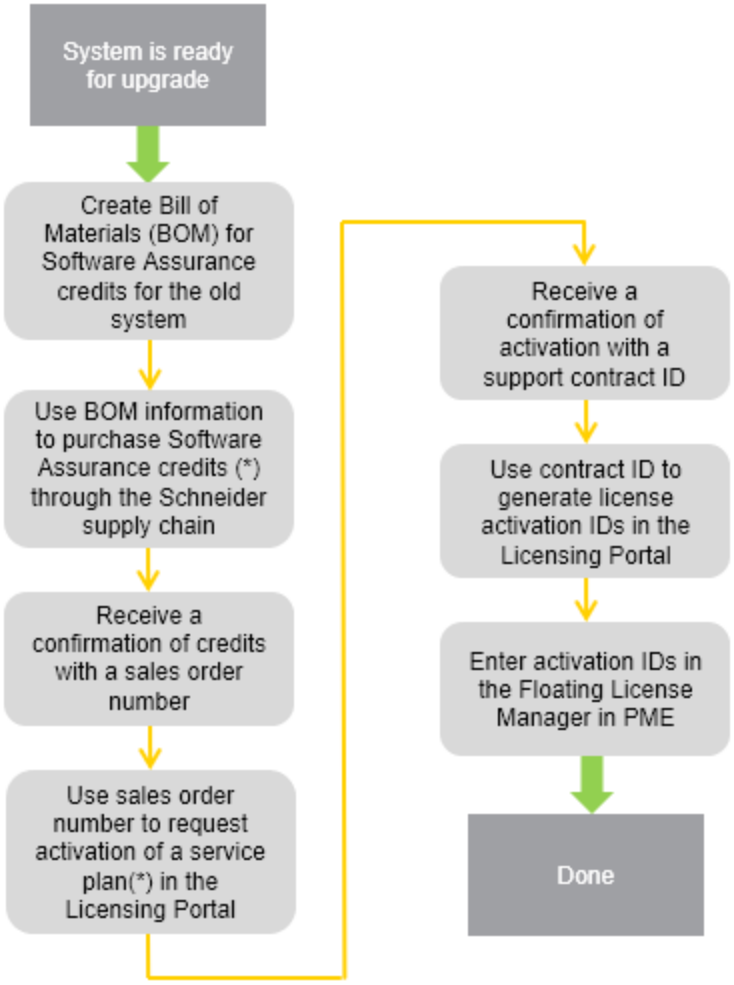
New system licensing

The following shows the high-level licensing process for new PME systems:



System upgrade licensing

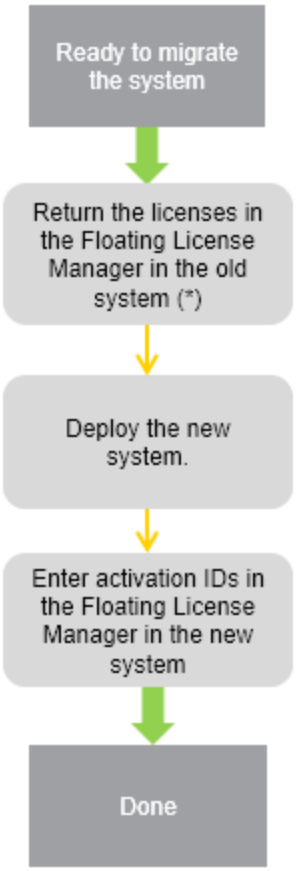
The following shows the high-level licensing process for PME system upgrades:



(*) PME systems must be upgraded using a services plan with software assurance.

System migration licensing

The following shows the high-level licensing process for moving a PME system to a new server, or reinstalling it on the same server after the operating system has been reinstalled:



(*) There is a limit on the number of license returns that are allowed per calendar year. See System migration and license returns for more details.

Related topics:

- Licensing overview
- Licensing process
- Licensing tools
- Important notes on licensing
- Operating System licensing
- SQL Server Licensing
- Other software licensing
- Licensing configuration

For reference information see:

- Device license information
- Licensing resources

Licensing tools

The tools you use during the licensing process are the Licensing Portal, the Floating License Manager, and the License Manager.

Licensing Portal

The licensing portal is an online tool. Use it to create the Bill of Materials (BOM) for your license purchase, to activate or renew a service plan, and to generate licenses. You can also view license information for an existing system. The licensing portal can be accessed through an Internet connection with a computer or a mobile device.

For information on how to access the licensing portal, see Licensing resources.

Floating License Manager

The Floating License Manager (FLM) is a tool that is installed with PME. Use the FLM to activate licenses, return licenses, or to view all the licenses that have been activated in the system. All licenses, except for the trial license, are managed through the FLM.

TIP: To find the FLM on your system, search for "Floating License Manager" in the Windows Start menu.

License Manager

The License Manager (LM) is a tool that is installed with PME. Use the LM to delete the trial license after you have activated the purchased software licenses. You also use the LM to edit the port settings for the licensing service.

TIP: To find the LM on your system, search for "License Manager" in the Windows Start menu.

Related topics:

- Licensing overview
- Licensing process
- Licensing tools
- Important notes on licensing
- Operating System licensing
- SQL Server Licensing
- Other software licensing
- Licensing configuration

For reference information see:

- Device license information
- Licensing resources

Important notes on licensing

Consider the following licensing related items, when planning a PME system:

Trial license and new system installations

New system installations of PME have a Trial license that expires after 90 days. The Trial license enables all of the software features. We recommend that you have purchased license activation IDs ready when the system is deployed. Don't rely on the Trial license, use it as a backup, in case you can't get the purchased licensing in time. Delete the Trial license after the purchased licenses have been activated.

Trial license and system upgrades

A new Trial license is given when you upgrade a PME system to version 2020.

Engineering Client access and Remote Desktop connections

You need one Client Access license for each concurrent Windows session, Remote Desktop Protocol (RDP) session, or any connected client machine sessions. The trial license only allows one RDP session, at a time, to access the engineering client tools. Activate the purchased licenses and delete the trial license to enable multiple concurrent RDP sessions.

Upgrade licenses

PME systems must be upgraded using a services plan with software assurance. Activating or renewing a services plan might add extra time to the licensing process. See the Licensing Overview resources link in the Licensing resources section for details on upgrade licensing.

System migration and license returns

A license can only be activated on one PME server at a time. For a system migration, you must return the licenses on the old system and then activate the same licenses again on the new system. You are allowed to return/reactivate licenses twice per calendar year. No trial license is given for a migrated system. Contact your Software Registration Center if you exceed the license return limit or if you forgot to return the licenses on the old system and they have become untrusted. See Licensing resources for contact information.

NOTE: System migration includes the case where you reinstall PME on the same server after the operating system has been reinstalled.

Licensing and Firewalls

The PME clients access a licensing service that is running on the PME server to confirm that valid licensing has been activated. The IP port used by the licensing server must not be blocked if a firewall is used between the PME client and server. See IP Ports for details.

License Server

Each PME system must have its own license server. You cannot share a license server between multiple PME systems.

Related topics:

- Licensing overview
- Licensing process
- Licensing tools
- Important notes on licensing
- Operating System licensing
- SQL Server Licensing
- Other software licensing
- Licensing configuration

For reference information see:

- Device license information
- Licensing resources

Operating System licensing

PME is designed to run on a Microsoft Windows operating system. You must have a computer with a supported and licensed version of Microsoft Windows to install PME. See Operating Environment for a list of supported Microsoft Windows versions and editions.

The operating system license is not included in the PME license. Schneider Electric does not resell Microsoft Windows licenses.

Related topics:

- Licensing overview
- Licensing process
- Licensing tools
- Important notes on licensing
- Operating system licensing
- SQL Server Licensing
- Other software licensing
- Licensing configuration

For reference information see:

- Device license information
- Licensing resources

SQL Server Licensing

PME is designed to operate with a Microsoft SQL Server database system. See Operating Environment for a list of supported Microsoft SQL Server versions and editions.

Microsoft SQL Server is available as a free, scaled down Express version, and as a licensed, full server version. You can use both versions with PME. For information on the limitations when using SQL Server Express, see SQL Server considerations.

A free version of SQL Server Express is included in the PME installation files and you have the option to install it during the installation of PME.

You can purchase licenses for a full server version from Microsoft or from Schneider Electric. Schneider Electric only resells licenses for specific versions and editions of Microsoft SQL Server, that are compatible with PME. Contact Schneider Electric for details. See Resources for contact information.

Related topics:

- Licensing overview
- Licensing process
- Licensing tools
- Important notes on licensing
- Operating System licensing
- SQL Server licensing
- Other software licensing
- Licensing configuration

For reference information see:

- Device license information
- Licensing resources

Other software licensing

PME can be used with a number of third party, add-on applications. These applications can be integrated with PME or can be used standalone. Check the licensing requirements of these applications before using them with PME.

Third party software licenses for add-on applications are not included in the PME license. Schneider Electric does not resell third-party add-on licenses.

Examples of third party add-on applications include:

- Microsoft Office
- Virtual Machine software
- Third party OPC server/client software
- Virus and malware detection and application control software

Related topics:

- Licensing overview
- Licensing process
- Licensing tools
- Important notes on licensing
- Operating System licensing
- SQL Server Licensing
- Other software licensing
- Licensing configuration

For reference information see:

- Device license information
- Licensing resources

System installation and upgrades

This section provides information on planning for a system installation or upgrade.

Use the links in the following table to find the content you are looking for:

Topic	Content
Install planning	Things to consider when preparing for a new system installation.
Upgrade planning	Things to consider when preparing for a system upgrade.
Migration planning	Things to consider when preparing for a system migration.
PME Installer	Installer overview, operation, and functions.
PME 2020 Install notes	Release notes for PME 2020, related to system installation.
PME 2020 Upgrade notes	Release notes for PME 2020, related to system upgrade.

Install planning

Prerequisites

To plan for the installation of the software, review all relevant sections in the Planning chapter of this guide. In particular, review the sections on system architecture, client types, IT requirements, licensing, cybersecurity, and deployment considerations. Also review the Installing and Upgrading chapter which provides details on the installation work-flow.

Setup types

In alignment with the system architectures, the PME Installer provides the following Setup Type options:

- Standalone Server
- Application Server
- Secondary Server
- Engineering Client

Standalone Server

This setup type is used for a Standalone architecture. For information on PME system architectures, see System architecture.

The Standalone Server installation includes all PME server components, an Engineering Client, and (optionally) a version of SQL Server Express.

Application Server

This setup type is used for a Distributed Database architecture. For information on PME system architectures, see System architecture.

The Application Server installation includes all PME server components and an Engineering Client.

NOTE: Before you can install the Application Server, you must have the remote database server ready with an installed and configured version of SQL Server. Only full versions of SQL Server are supported in this architecture. SQL Server Express versions are not supported.

Complete the following tasks before installing an Application Server:

- Ensure that the Windows user or the SQL Server user specified on the **Database Software** page of the Installer is a member of the sysadmin SQL Server role.
- Ensure that all of the servers on the network can communicate with each other. For information on how to test network communications, see Network communication test.

Secondary Server

Secondary Server installations are not common and are used only in exceptional circumstances. Secondary Server installations require advanced network configuration. Contact Technical Services if you think you need a Secondary Server.

Engineering Client

This setup type is used to install Engineering Clients on client computers for both Standalone and Distributed Database architectures. For information on PME Client types, see Client types.

The Engineering Client installation includes all Engineering tools and applications.

NOTE: You must install a Standalone Server or an Application Server before installing an Engineering Client.

The following dependencies exist:

- The PME system key, from the Standalone Server or the Application Server is required to install an Engineering Client.
- For Standalone Servers with SQL Server Express, the TCP/IP protocol must be enabled in the database for Engineering Clients to be able to connect to the server. For information on how to enable this protocol, see Enabling TCP/IP protocol in SQL Server Express.
- If you intend to use Engineering Clients in a firewall-enabled environment, contact Technical Support for installation considerations.

NOTE: Web clients do not require any software installation. Using a supported browser, Web clients access power monitoring data through the web server running on the PME server. For information on Web Clients, see Client types.

TLS 1.2 and digital certificates

PME supports Transport Layer Security (TLS) 1.2 for encrypted database connections and web client communications using HTTPS.

The default configuration of the software only allows HTTPS connections between the PME application server and the web clients. This requires that a digital certificate issued by a trusted Certificate Authority is bound to the default website. If no bound certificate is detected during the installation of the software, a self-signed certificate is installed. The self-signed certificate is intended as a temporary solution until an authority issued certificate is installed.

NOTE: Plan to have an authority issued security certificate installed before, or shortly after the installation of PME.

For information on how to enable HTTP connections for PME, see Enabling HTTP connections for PME.

Windows Integrated Authentication for SQL Server

NOTE: Windows Integrated Authentication is not supported for PME systems with Secondary Servers.

PME can be installed with either SQL Server Authentication or Windows Integrated Authentication for SQL database server access.

SQL Server Authentication

This is the traditional way of installing PME with database access through both Windows accounts and SQL user accounts. With SQL Server Authentication, the PME installer creates a number of SQL accounts and a Windows account during the installation of the software. These accounts are then used during operation to access the databases. See SQL Server accounts for details on which accounts are created.

Windows Integrated Authentication

With Windows Integrated Authentication PME uses a Windows account, instead of the SQL accounts, to access the SQL server databases. You must create this Windows account before installing the software and provide account details during the installation. The Windows account must have the required access permissions to the SQL Server database. See Windows accounts for account details. See Before Installing the software and After installing the software for more information on Windows Integrated Authentication requirements.

NOTE: When PME is installed with Windows Integrated Authentication, the Windows account that is used to access the database is also used to run the PME services and the IIS Application Pools.

Cybersecurity

Review the cybersecurity information. See Cybersecurity for details.

Miscellaneous

Hard disk drive (HDD) allocation

HDD read/write operations have a big impact on system performance. To optimize your system performance, plan to have different HDDs installed for the system files, the database files, and the Microsoft Message Queuing (MSMQ) files.

Starting with PME 2020, the software uses MSMQ for writing device data logs to the SQL database. By storing the MSMQ files on a different HDD from the database files, both can be written to simultaneously, increasing system performance. For details on optimizing SQL Server performance and changing the MSMQ storage location, see information from Microsoft and other sources available online.

Database growth

The database occasionally grows by 10% to create room for additional measurements. This growth operation can occur at any time and can have a significant impact on server and database operation. Therefore, it is recommended that you pre-allocate the hard drive space for the database during the initial commissioning phase of the system. For example, if you calculate that a database will grow to 500 GB over 5 years, it is recommended that you pre-allocate the hard drive space to avoid the effects of the periodic growth operations.

Other

- Install and configure the Terminal Server component if Terminal Server connection to the PME Primary Server is required. Refer to the “Terminal Server Licensing Overview” topic in your Microsoft Windows documentation to learn about Terminal Server Licensing requirements.
- Configure the Remote Desktop Connection if you require remote connection to a PME primary server, see support information provided by Microsoft.
- If you plan to use TAPI modem drivers for Windows (WinModems) in your PME system, install and configure the WinModems. See Adding a modem for more information.

Related topics:

- Installing and Upgrading

Upgrade planning

Prerequisites

To plan for the upgrade of the software, review all relevant sections in the Planning chapter of this guide. In particular, review the sections on system architecture, client types, IT requirements, licensing, cybersecurity, and deployment considerations. Also review the Installing and Upgrading chapter which provides details on the upgrade work-flow.

Upgrade support and limitations

Upgrade version support

The PME upgrade tools support upgrades of software versions that are up to 2 major releases behind the latest version. That means the following upgrades are supported for PME 2020:

From	To
PME 9.0	PME 2020
PME 8.x	PME 2020
PME 7.2.2 *	PME 2020

* PME 7.2.2 systems cannot be upgraded using the PME 2020 installer. To upgrade a PME 7.2.2 system, use the Configuration Manager 2020 tool. See Upgrades from PME 7.2.2 for more information.

See PME release history for more information.

NOTE: To upgrade PME 7.2.x systems, you must first apply the latest service packs to get the systems to version PME 7.2.2. See Upgrade tools and resources for information on where to find the service packs.

Contact technical support if you want to upgrade older versions of the software that are not supported by the tools.

Upgrade limitations

- Only upgrades within the same architecture are supported (Standalone -> Standalone, Distributed Database -> Distributed Database).
- Only upgrades within the same language are supported, for example English -> English, Spanish -> Spanish, … .

Upgrade limitations specific to side-by-side upgrades

- You cannot downgrade to an earlier version of SQL. For example go from a PME with SQL 2016 to PME with SQL 2012. You can always migrate to a new version of SQL Server.
- You cannot downgrade to SQL Express from any version of SQL. You can however migrate from SQL Express to any other version of SQL.

Determine your upgrade path

An upgrade path describes from which older system to which newer system PME is upgraded. The upgrade path includes the PME version and edition and the system architecture. For example, upgrading from PME 9.0 Standard Edition standalone architecture to PME 2020 Standard Edition

standalone architecture is an upgrade path.

There are many possible upgrade paths, but only some are supported by the In-Place and Side-by-Side upgrade tools and procedures. Use the Upgrade Map tool to find the supported upgrade paths and methods for your system. See Upgrade tools and resources for information on where to get the Upgrade Map tool.

NOTE: Upgrade paths that are not listed by the Upgrade Map are considered custom upgrades. If you need to perform a custom upgrade, contact technical support for help.

Determine the upgrade type

NOTE: Determine your upgrade path before deciding on the upgrade type. Not all upgrade types are supported for all upgrade paths.

There are two different upgrade types, **In-Place Upgrade** and **Side-by-Side (SBS) Upgrade**. Each type uses different tools and has different prerequisites.

In-place upgrade

Use an In-Place upgrade to upgrade an older version of PME to the latest version on the same computer. The upgrade replaces the old system files with new files and leaves the old configuration and data in place. After the upgrade, the new software has the same configuration and data as the old one had. The installer of the new PME version performs an In-Place upgrade automatically if it detects that an old version of the software exists on the computer.

Advantages of an in-place upgrade

- The installer of the new software automatically does the upgrade.
- Very little user interaction is needed.
- The same computer is used for the new version of the software as for the old version before.
- All non-PME settings and configurations on the computer stay as they were.

Disadvantages of an in-place upgrade

- The computer hardware is the same as before, which means the performance of the new system on the old computer might not be as expected.
- The OS and DB Server versions are the same as before, which means the performance of the new system on the old OS and DB Server versions might not be as expected.
- The power monitoring system is unavailable during the upgrade process until the new system has been put into service.
- The old system is no longer available after the upgrade. A downgrade is not possible.
- Only more recent versions of the software can be upgraded in place. An in-place upgrade for older versions may not be possible.

side-by-side upgrade

Use an SBS upgrade to copy the configuration and data of an old PME system to a new system on a different computer. The new version of PME is installed on a new computer. The old version of PME stays installed on the old computer. After the SBS upgrade, the new software has the same configuration and data as the old one but exists on a different computer. SBS upgrades are performed manually with the Configuration Manager tool. See Upgrade tools and resources for information on where to get the Configuration Manager tool.

Advantages of an SBS upgrade

- The new PME system is installed on a new computer that can be sized to meet your performance expectations.
- The new PME system is installed on a new OS and DB server version.
- The old PME system stays in service until the new system is ready to be put into service.
- A parallel operation of the old and new systems for a certain amount of time might be possible.
- The old system stays available after the upgrade.
- Many older PME versions and editions can be upgraded SBS.

Disadvantages of an SBS upgrade

- The upgrade process is more complex than an in-place upgrade and takes more time.
- A new computer is used for the new version of the software, which means that any non-PME settings and configurations must be recreated on the new computer.

TLS 1.2 and security certificates

See TLS 1.2 and digital certificates in the Install Planning section of this guide for details.

Windows Integrated Authentication for SQL Server

NOTE: Windows Integrated Authentication is not supported for PME systems with Secondary Servers.

PME can be installed with either SQL Server Authentication or Windows Integrated Authentication for SQL database server access.

SQL Server Authentication

This is the traditional way of installing PME with database access through both Windows accounts and SQL user accounts. With SQL Server Authentication, the PME installer creates a number of SQL accounts and a Windows account during the installation of the software. These accounts are then used during operation to access the databases. See SQL Server accounts for details on which accounts are created.

Windows Integrated Authentication

With Windows Integrated Authentication PME uses a Windows account, instead of the SQL accounts, to access the SQL server databases. You must create this Windows account before installing the software and provide account details during the installation. The Windows account

must have the required access permissions to the SQL Server database. See Windows accounts for account details. See Before upgrading the software and After upgrading the software for more information on Windows Integrated Authentication requirements.

NOTE: When PME is installed with Windows Integrated Authentication, the Windows account that is used to access the database is also used to run the PME services and the IIS Application Pools.

Cybersecurity

Review the cybersecurity information. See Cybersecurity for details.

Miscellaneous

Hard disk drive (HDD) allocation

HDD read/write operations have a big impact on system performance. To optimize your system performance, plan to have different HDDs installed for the system files, the database files, and the Microsoft Message Queuing (MSMQ) files.

Starting with PME 2020, the software uses MSMQ for writing device data logs to the SQL database. By storing the MSMQ files on a different HDD from the database files, both can be written to simultaneously, increasing system performance. For details on optimizing SQL Server performance and changing the MSMQ storage location, see information from Microsoft and other sources available online.

Historical Data Management

Consider archiving and trimming the historical data in the existing system before upgrading. This reduces the upgrade time and improves performance on the new system. After the upgrade, the Alarms Web application processes existing Power Quality data the first time it starts up. This processing is very time consuming. You can control how much of the existing data is processed to reduce the processing time. See Configuring first time Alarms processing for more information.

Related topics:

- Installing and Upgrading

Migration planning

System migration

During a system migration, you are copying the configuration of one PME system to another PME system on a different computer. Both PME systems are the same version. Before you can migrate an existing system, you must first install the new version of PME on the new computer, following the new system install procedures. The Configuration Manager tool that is used to help with the migration only supports the migration of the PME version it was built for. For example Configuration Manager 2020 can only be used to migrate PME 2020 systems. Example applications for system migrations include off-site configuration, and computer hardware upgrades.

TIP: You can use the system migration workflow to rename your PME server computer. To do this, save the configuration with Configuration Manager, uninstall PME, rename the server, re-install PME, write the configuration with Configuration Manager.

Prerequisites

To plan for the migration of the software, review all relevant sections in the Planning chapter of this guide. In particular, review the sections on system architecture, client types, IT requirements, licensing, cybersecurity, and deployment considerations. Also review the Installing and Upgrading chapter which provides details on the migration work-flow.

Windows Integrated Authentication for SQL Server

NOTE: Windows Integrated Authentication is not supported for PME systems with Secondary Servers.

PME can be installed with either SQL Server Authentication or Windows Integrated Authentication for SQL database server access.

SQL Server Authentication

This is the traditional way of installing PME with database access through both Windows accounts and SQL user accounts. With SQL Server Authentication, the PME installer creates a number of SQL accounts and a Windows account during the installation of the software. These accounts are then used during operation to access the databases. See SQL Server accounts for details on which accounts are created.

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NOTE: When PME is installed with Windows Integrated Authentication, the Windows account that is used to access the database is also used to run the PME services and the IIS Application Pools.

Cybersecurity

Review the cybersecurity information. See Cybersecurity for details.

Related topics:

- Installing and Upgrading

Feature selection and design

This section provides an overview of the features and modules available in PME. It introduces the different functions, applications and modules and discusses dependencies and design considerations.

Use the links in the following tables to find the content you are looking for:

Software features:

Feature	Details
Real-time Monitoring	This includes the Diagrams, Trends, Dashboards, and Vista applications.
Alarm Management	This includes the Alarm Viewer, the Alarm Annunciator, and Software Alarms.
Analytics and Visualization	This includes the Dashboards and Reports applications.

Software modules:

Module	Application
Backup Power Module design	Generator and Uninterruptible Power Supply (UPS) performance monitoring and reporting, including battery health.
Breaker Performance Module Design	Circuit breaker aging and breaker settings monitoring.
Capacity Management Module Design	Generator and Uninterruptible Power Supply (UPS) capacity monitoring and reporting. Includes transformer and UPS loss monitoring.
Energy Analysis Dashboard Module design	Gadgets for identifying consumption patterns and anomalies and for comparing different consumers over time.
Energy Analysis Reports Module design	Reports for energy consumption monitoring and modeling, including energy usage by process area or by product output.
Energy Billing Module design	Energy-based billing and reporting, including consumption monitoring and reporting at the branch circuit level.
Event Notification Module Design	Notifications of power system events via email or SMS.
Insulation Monitoring Module Design	Monitoring for isolated power systems, such as the ones found in hospital operating rooms.
Power Quality Performance Module Design	Analysis of power quality events and disturbances and their impact on the monitored system.

Real-time Monitoring

Real-time monitoring is the viewing of power monitoring data as it is being measured by the monitoring devices. The data is transferred from the device through the communication network to the software, where it is displayed. The software displays the data, either as individual measurements, or as part of a sequence, such as a trend. The data might be temporarily stored by the software while it is being displayed, but it is not logged into the database for long-term storage.

Components

The following applications are used to view real-time data:

- Diagrams
- Trends
- Dashboards
- Vista

For details on how to use these applications see the Operating chapter. For details on how to configure these applications see the Configuring chapter.

Prerequisites

The measurement data you want to display must be available from the devices. That means that the devices must provide the measurements and the device driver must support the measurements. The devices must also be online and communicating for the data to be available in the user interface.

Design Considerations

Consider which of the real-time applications best meet the user needs. The Trends and Dashboards applications only require a small amount of configuration. The amount of configuration and custom engineering required to create diagrams for the Vista and Diagrams application depend on the user needs. Creating nested, graphical diagrams, or facility one-line diagrams might require a considerable amount of time and effort.

Ensure that the monitoring devices that are used have the capabilities required to provide the desired real-time data.

The Trends application can take advantage of historical data to show trends that seamlessly extend from the present into the past. The required measurements must be recorded by the monitoring devices if you want to use historical data with trends.

Related topics:

Software features

- Real-time monitoring
- Alarm Management
- Analytics and Visualization

Software Modules

- Backup Power Module design
- Breaker Performance Module Design
- Capacity Management Module Design
- Energy Analysis Dashboard Module design
- Energy Analysis Reports Module design
- Energy Billing Module design
- Event Notification Module Design
- Insulation Monitoring Module Design
- Power Quality Performance Module Design

Alarm Management

Alarm management is the viewing, analyzing, and processing of software generated and device based Incidents and Alarms. It might also include the configuration of these alarms on the devices and in the software.

Alarm conditions are monitored by the devices, or by the software. When a condition is met, an Alarm is logged to the database and displayed in the software. The software processes the Alarm information to categorize the Alarm and associate it with an Incident. Users can acknowledge Alarms.

Components

The following applications are used for Alarm management:

- Alarms (Viewer)
- Alarm Annunciator
- Software Alarms

For details on how to use these applications see the Operating chapter. For details on how to configure these applications see the Configuring chapter.

Prerequisites

The alarm conditions must be defined and actively monitored on the devices or in the software. That means that the devices or the software must indicate the active or inactive alarm states and must log the alarm details into the database. Software alarms require real-time communications with the devices that are monitoring the measurements that are being alarmed on.

Design Considerations

Carefully choose the alarm conditions on the devices and in the software. Alarming on too many, too few, or incorrect alarm conditions leads to poor system performance for alarm management.

When using software alarms, keep in mind that:

- Reliable communication links to the devices that are providing the measurements are required.
- There is a greater and less predictable time delay than for device-based alarming
- Alarms are logged with the date and time of the software server, not the monitoring device.

Consider setting up logging of alarm related information, such as waveform captures or system states. This additional information might be valuable when analyzing Incidents. When creating Alarm Views, consider the needs of the users and their applications.

Related topics:

Software features

- Real-time Monitoring
- Alarm management
- Analytics and Visualization

Software Modules

- Backup Power Module design
- Breaker Performance Module Design
- Capacity Management Module Design
- Energy Analysis Dashboard Module design
- Energy Analysis Reports Module design
- Energy Billing Module design
- Event Notification Module Design
- Insulation Monitoring Module Design
- Power Quality Performance Module Design

Analytics and Visualization

Analytics and visualization are the processing of historical, logged power monitoring data to discover and highlight patterns and relationships. The data is aggregated, transformed, and correlated, and then displayed in a format that makes it possible to understand its meaning. A simple example is a load profile chart, that shows a graphical view of power demand measurements over time. A complex example is a modeling report that shows the delta between an expected, modeled consumption and the actual consumption of a facility over time.

Components

The following applications are used for analytics and visualization:

- Dashboards
- Reports

For details on how to use these applications see the Operating chapter. For details on how to configure these applications see the Configuring chapter.

Prerequisites

The measurement data you want to analyze or visualize must be available in the database as historical data logs. This includes data recorded by the monitoring devices and any third-party data, such as weather measurements, or process measurements, that might be required. Individual reports or dashboard gadgets might have specific requirements that must be met.

The use of some of the reports and gadgets is not included in the BASE license for the system, and requires additional licensing.

Design Considerations

The features related to these applications vary greatly in complexity and input requirements. It is important that you understand the user needs and that you manage the user expectations. There might be a need to provide user training to interpret the visualizations and to get the most value from the results.

Some dashboards and reports require input data from specialized devices, such as high-end power monitoring devices with advanced power quality monitoring capabilities, or advanced breaker monitoring. The required data must be available from the devices in the system to provide the analytics and visualizations.

Some dashboard gadgets and reports require input data that might not be directly monitored and recorded by the software, for example weather data or process data. This data has to be imported into the database. Upfront planning and the use of third-party tools might be required to get this data.

Expect an iterative approach when working with your users to provide the results they are looking for.

Related topics:

Software features

- Real-time Monitoring
- Alarm Management
- Analytics and visualization

Software Modules

- Backup Power Module design
- Breaker Performance Module Design
- Capacity Management Module Design
- Energy Analysis Dashboard Module design
- Energy Analysis Reports Module design
- Energy Billing Module design
- Event Notification Module Design
- Insulation Monitoring Module Design
- Power Quality Performance Module Design

Backup Power Module design

The Backup Power Module provides generator and Uninterruptible Power Supply (UPS) monitoring and reporting. It reports on generator and UPS performance and battery health.

The Generator Test EPSS Report can be configured to conform to the requirements for an Emergency Power Supply System (EPSS) test, including automatic transfer switches (ATS). For example, the report shows the transfer time of the lead ATS and indicates whether the transfer time passes or does not pass the test requirements. See Emergency Power Supply Systems for more information on EPSS.

Components

The following applications and features are part of this module:

Reports:

- Generator Activity Report
- Generator Battery Health Report
- Generator Battery Health Export
- Generator Test EPSS Report
- Generator Load Summary Report
- UPS Auto Test Report
- UPS Battery Health Report

Tools:

- Generator Performance Configuration Tool with EPSS Test Module (includes a generator run history)
- UPS Configuration Tool

Diagrams:

- EPSS Vista Diagrams
- UPS Auto Test Diagrams

Prerequisites

- The different reports have different input requirements. See Supported measurements and devices for more information.
- The measurement data for the reports must be available as historical data logs in the database.
- The generators, UPSs, and other equipment must be configured in the configuration tools before running the reports.
- This module requires a separate license. See Licensing for more information.

Design Considerations

- This module contains reports for different applications. Only some of these applications might apply to your system.

- Some of the reports only work with certain device types.
- The generator test report is complex. Configuring this report takes time and expertise.

Design considerations for EPSS reporting

The Generator Test EPSS report and diagrams require specific generator and ATS data. Depending on the EPSS configuration and type of equipment used, one or more monitoring devices, and the ATS itself, can provide this data.

The following table shows the required and optional data, for each ATS and generator:

Data	Measurements	Importance	Comments
ATS Status Indicators	Normal Test Emergency Power Outage	Required Required Required Optional(*)	This data is typically available through digital output signals from the ATS.(**) **NOTE:** All statuses for a specific ATS must be recorded by the same monitoring device.
ATS Load Data	kW or kVA	Optional(*)	This data needs to be provided by a power monitoring device connected to the ATS load-side feeder.(**)
Generator Status Indicators	Stopped Running Starting Emergency Power Source Available (EPA)	Required Required Optional(*) Optional(*)	This data is typically available through digital output signals from the generator. **NOTE:** All statuses for a specific generator must be recorded by the same monitoring device.
Generator Electrical Data	Vln a,b,c,avg; Vll ab, bc,ca,avg I a,b,c,avg; kW tot; kVA tot; PF sign tot; Frequency	Required	This data needs to be provided by a power monitoring device connected to the generator feeder.

Data	Measurements	Importance	Comments
Generator Engine Data	Engine Temperature Exhaust Gas (single or dual) Engine Oil Pressure and other engine parameters	Required (see Comments) Required (see Comments) Optional(*)	This data is typically available through analog output signals from the generator. **NOTE:** Generator Engine data is only required for certain EPSS test evaluation methods. See Editing the generator Evaluation Method for details.

(*) This data can be included in the report, but it is not required to configure and run the report.
(**) The ASCO 4000 and ASCO 7000 ATS can provide logging of ATS status and load measurements. These ATS types are natively supported in PME. Depending on the ATS configuration, no external ATS status and load measurements might be required if these ATS types are used.

The digital and analog output data from the ATS and generator can be recorded by the power monitoring devices used to measure the ATS load data and generator electrical data. See Supported measurements and devices for monitoring device recommendations.

NOTE: Do not use software logging for the ATS and generator status data. Software logging introduces unpredictable time delays which result in low timestamp accuracy for the logged data. Always use device on-board logging for this data.

For more information on EPSS testing, see EPSS test.

NOTE: The Generator Test EPSS Report supports both Open Transition Transfer (OTT) and Closed Transition Transfer (CTT) power transfers. By default, the Power Monitoring Expert system is set for OTT. To run a CTT test, visit the PME Exchange Community and download the necessary scripts, from the Install and Maintain section.

Related topics:

Backup Power topics

- Backup Power Module design
- Backup Power Module configuration
- Backup Power Module operation

Other software features

- Real-time Monitoring
- Alarm Management
- Analytics and Visualization

Other Software Modules

- Breaker Performance Module Design
- Capacity Management Module Design
- Energy Analysis Dashboard Module design
- Energy Analysis Reports Module design
- Energy Billing Module design
- Event Notification Module Design
- Insulation Monitoring Module Design
- Power Quality Performance Module Design

Breaker Performance Module Design

The Breaker Performance Module monitors aging and wear of circuit breakers and reports on breaker protection settings. It provides historical and real-time information for aging and wear related breaker parameters. You can also set up alarming on these parameters.

Components

The following applications and features are used for this module:

- Breaker Aging Report
- Breaker Settings Report
- Vista diagrams
- VIP framework
- ION Software Modbus Gateway Service
- Breaker Aging Calculation Service
- Breaker Configuration Tool

Prerequisites

- This module can only be used with specific device types, see Supported devices for more information.
- The measurement data for the reports must be available as historical data logs in the database.
- This module requires a separate license. See Licensing for more information.

Design Considerations

- This module only works with the devices listed above under Prerequisites.
- Configuring this module takes time and expertise.

Related topics:

Breaker Performance Module topics

- Breaker Performance Module design
- Breaker Performance Module configuration
- Breaker Performance Module operation

Other software features

- Real-time Monitoring
- Alarm Management
- Analytics and Visualization

Other Software Modules

- Backup Power Module design
- Capacity Management Module Design
- Energy Analysis Dashboard Module design

- Energy Analysis Reports Module design
- Energy Billing Module design
- Event Notification Module Design
- Insulation Monitoring Module Design
- Power Quality Performance Module Design

Capacity Management Module Design

The Capacity Management Module provides generator, Uninterruptible Power Supply (UPS), and general equipment monitoring and reporting. It also includes transformer and UPS loss monitoring and reporting. The losses are reported in terms of energy and cost.

Components

The following applications and features are part of this module:

Reports:

- Branch Circuit Power Report
- Equipment Capacity Report
- Generator Capacity Report
- Generator Power Report
- Power Losses Report
- UPS Power Report

Tools:

- Generator Performance Configuration Tool
- Generator Power Configuration Utility
- UPS Power Configuration Utility
- Power Losses Configuration Utility

Diagrams:

- Equipment Vista Diagrams

Prerequisites

- The measurement data for the reports must be available as historical data logs in the database before running the report.
- This module requires a separate license. See Licensing for more information.

Report	Needs
Branch Circuit Power Report	• A hierarchy must be configured using the data center hierarchy template. • Branch circuit level measurements for current and power must exist. • A meter on the main incomer is needed for coincident demand measurements. (See Supported measurements and devices for more information.)

Report	Needs
Equipment Capacity Report Generator Capacity Report	• The generators and equipment must be configured in the Generator Performance Configuration Tool before running the reports. (See Supported Measurements and Devices for more information.)
Generator Power Report	• The generators must be configured in the Generator Power Configuration Utility before running the report. (See Supported Measurements and Devices for more information.)
Power Losses Report	• The transformers and UPS must be monitored on both the primary and secondary side (in and out) for the loss calculations. • The transformers and UPS must be configured in the Power Losses Configuration Utility before running the report. (See Supported Measurements and Devices for more information.)
UPS Power Report	• The UPS must be configured in the UPS Power Configuration Utility before running the report. (See Supported Measurements and Devices for more information.)

Design Considerations

- Some of the reports only work with certain device types.

Related topics:

Capacity Management Module topics

- Capacity Management Module design
- Capacity Management Module configuration
- Capacity Management Module operation

Other software features

- Real-time Monitoring
- Alarm Management
- Analytics and Visualization

Other Software Modules

- Backup Power Module design
- Breaker Performance Module Design
- Energy Analysis Dashboard Module design
- Energy Analysis Reports Module design
- Energy Billing Module design
- Event Notification Module Design

- Insulation Monitoring Module Design
- Power Quality Performance Module Design

Energy Analysis Dashboard Module design

The Energy Analysis Dashboard Module includes dashboard gadgets that help you break down consumption by load type, visualize consumption cost, and do an 80/20 analysis to identify the largest consumers. You can identify consumption patterns and anomalies and compare different consumers over time.

Components

The following gadgets are part of this module:

- Sankey gadget
- Pareto Chart gadget
- Aggregated Pareto Chart gadget
- Heat Map gadget
- Consumption Ranking gadget
- Aggregated Consumption Ranking gadget

Prerequisites

- The gadgets need consumption data, for example electrical consumption (kWh) or WAGES (water, air, gas, effluent, steam) consumption.
- The consumption measurement data for the gadgets must be available as historical data logs in the database.
- For the Sankey gadget you need to set up a hierarchy for the input measurements. See Hierarchy Manager for information on setting up a hierarchy.

Design Considerations

No special design considerations.

Related topics:

Energy Analysis Dashboard Module topics

- Energy Analysis Dashboard Module design
- Energy Analysis Dashboard Module configuration
- Energy Analysis Dashboard Module operation

Other software features

- Real-time Monitoring
- Alarm Management
- Analytics and Visualization

Other Software Modules

- Backup Power Module design
- Breaker Performance Module Design
- Capacity Management Module Design

- Energy Analysis Reports Module design
- Energy Billing Module design
- Event Notification Module Design
- Insulation Monitoring Module Design
- Power Quality Performance Module Design

Energy Analysis Reports Module design

The Energy Analysis Reports Module includes reports that help you understand energy usage patterns to find energy waste, analyze transformer and circuit capacity and assess energy usage by process area or by product output. Use the energy modeling capabilities in this module, to forecast consumption, identify unexpected changes in your consumption, or identify actual savings as a result of energy management measures.

Components

The following reports are part of this module:

- Create Model Report
- Duration Curve Report
- Energy Modeling Reports
- Energy Regression Analysis Report
- Energy Usage Per State Report
- KPI Report
- Multi Equipment Operation Report
- Power Usage Per State Report
- PUE Summary Report
- Single Equipment Operation Report
- Use Model Report

Prerequisites

- The different reports have different input requirements. See Supported measurements and devices for more information.
- The measurement data for the reports must be available as historical data logs in the database.
- Before you can use the energy modeling report you must create a model.
- This module requires a separate license. See Licensing for more information.

Design Considerations

- Consider how to measure and log the different states for the Per State reports.
- You might have to import state measurements into PME (I/O, Modbus, OPC, ETL) if they are captured in a different system.
- The Energy Regression Analysis Report is a complex report which requires some expertise to create and to interpret the results correctly.
- The KPI Report requires some upfront planning to define the KPI calculations and ensure that the required input parameters are available in the system.
- PUE Category 1 and 2 (based on the Uptime Institute recommendations) are supported.
- The energy modeling report is complex. Configuring this report takes time and expertise.

Related topics:

Energy Analysis Reports Module topics

- Energy Analysis Reports Module design
- Energy Analysis Reports Module configuration
- Energy Analysis Reports Module operation

Other software features

- Real-time Monitoring
- Alarm Management
- Analytics and Visualization

Other Software Modules

- Backup Power Module design
- Breaker Performance Module Design
- Capacity Management Module Design
- Energy Analysis Dashboard Module design
- Energy Billing Module design
- Event Notification Module Design
- Insulation Monitoring Module Design
- Power Quality Performance Module Design

Energy Billing Module design

The Energy Billing Module is a fully functional energy-based billing reporting system. It also provides load and consumption monitoring and reporting at the branch circuit level, which is typically used in data center applications.

Components

The following reports are part of this module:

- Billing Report
- Billing Summary Report
- Billing Verification Report
- Energy by IT Customer Report
- Multiple Billing Report
- Multiple Billing Export Report

Prerequisites

This module requires the following:

- A certain hierarchy configuration and a rate file configuration.
- Energy, or demand, or WAGES type input measurements. Any device type that can provide these measurement types can be used.
- A Time of Use (TOU) schedule might have to be configured.
- For the Energy by IT Customer Report, branch circuit level measurements are required, see Supported measurements and devices for more information.
- The measurement data for the reports must be available as historical data logs in the database.
- This module requires a separate license. See Licensing for more information.

Basic Energy and Demand measurements have been pre-mapped for this module, but might have to be adjusted or added to in the rate file. See Supported measurements and devices for more information.

Design Considerations

- Setting up the hierarchy and the rate file requires manual xml file editing.
- Importing the hierarchy requires command line tool use.
- Expect 2-3 days of deployment time to configure this module.
- The monitoring devices providing the billing data should have revenue metering accuracy.
- The monitoring devices might require analog or digital inputs for WAGES monitoring.

Related topics:

Energy Billing Module topics

- Energy Billing Module design
- Energy Billing Module configuration
- Energy Billing Module operation

Other software features

- Real-time Monitoring
- Alarm Management
- Analytics and Visualization

Other Software Modules

- Backup Power Module design
- Breaker Performance Module Design
- Capacity Management Module Design
- Energy Analysis Dashboard Module design
- Energy Analysis Reports Module design
- Event Notification Module Design
- Insulation Monitoring Module Design
- Power Quality Performance Module Design

Event Notification Module Design

Use the Event Notification Module (ENM) to notify recipients about critical power system events. ENM can send notifications of power system events through email or SMS. ENM uses the Alarms application to detect system events. You can set up notifications for activity in any of the event, alarm, or incident views. The notification details are defined in a notification rule. A notification rule can be enabled or disabled, and you can use a schedule to determine when the rule is applied. You can define more than one notification rule.

Components

The following application is used for this module:

- Notifications

Prerequisites

To configure a notification rule, you need:

- One or more alarm views to use to trigger the notification. This can be default system views or custom views.
- Recipient information such as an email address or a phone number (for SMS notification).
- SMTP server information if you want to use email notifications.
- SMS account information from Twilio if you want to use SMS notifications.

  NOTE: The SMS capabilities of the Event Notification Module are built on technology from Twilio, a third-party vendor. To use SMS with notifications, you need to open an account with Twilio and sign up for SMS service. See the Twilio web site for more information.

- This module requires a separate license. See Licensing for more information.

Design Considerations

Consider the following when setting up notifications:

- Configure the alarm views so that they only display the alarms you want to be notified on.
- Decide if you want to be notified on all activity in the alarm view or only when an alarm goes active or when a new incident occurs.
- Decide if you want the notification to be sent immediately when the activity is detected, or after a short delay to wait for additional activity (reduces the number of notifications sent during an incident).
- Use maintenance mode to temporarily disable all notifications before a planned power system event, for example a planned shutdown.
- Test the notification delivery. Check your spam filter inbox and settings if you do not receive the test email.

Related topics:

Event Notification Module topics

- Event Notification Module design
- Event Notification Module configuration
- Event Notification Module operation

Other software features

- Real-time Monitoring
- Alarm Management
- Analytics and Visualization

Other Software Modules

- Backup Power Module design
- Breaker Performance Module Design
- Capacity Management Module Design
- Energy Analysis Dashboard Module design
- Energy Analysis Reports Module design
- Energy Billing Module design
- Insulation Monitoring Module Design
- Power Quality Performance Module Design

Insulation Monitoring Module Design

The Insulation Monitoring Module provides monitoring for isolated (IT) power systems, such as the ones found in hospital operating rooms. It also helps in locating isolation faults. The module can be configured for applications based on the IEC standard, and for applications based on the ANSI standard.

Components

The following components are part of this module:

- Insulation Monitoring Report
- Vista diagrams
- VIP framework
- Insulation Monitoring Configuration Tool

Prerequisites

- This module can only be used with specific device types, see Supported measurements and devices for more information.
- The measurement data for the report must be available as historical data logs in the database.

Design Considerations

- In IEC configuration, the module monitors insulation resistance.
- In ANSI configuration, the module monitors total hazard current.
- This module requires the configuration of VIP frameworks and Vista diagrams.
- This module is used for very specific applications. It needs certain types of devices and equipment.

See Insulation Monitoring Design for ANSI for more information on this application in the ANSI market.

Related topics:

Insulation Monitoring Module topics

- Insulation Monitoring Module design
- Insulation Monitoring Module configuration
- Insulation Monitoring Module operation

Other software features

- Real-time Monitoring
- Alarm Management
- Analytics and Visualization

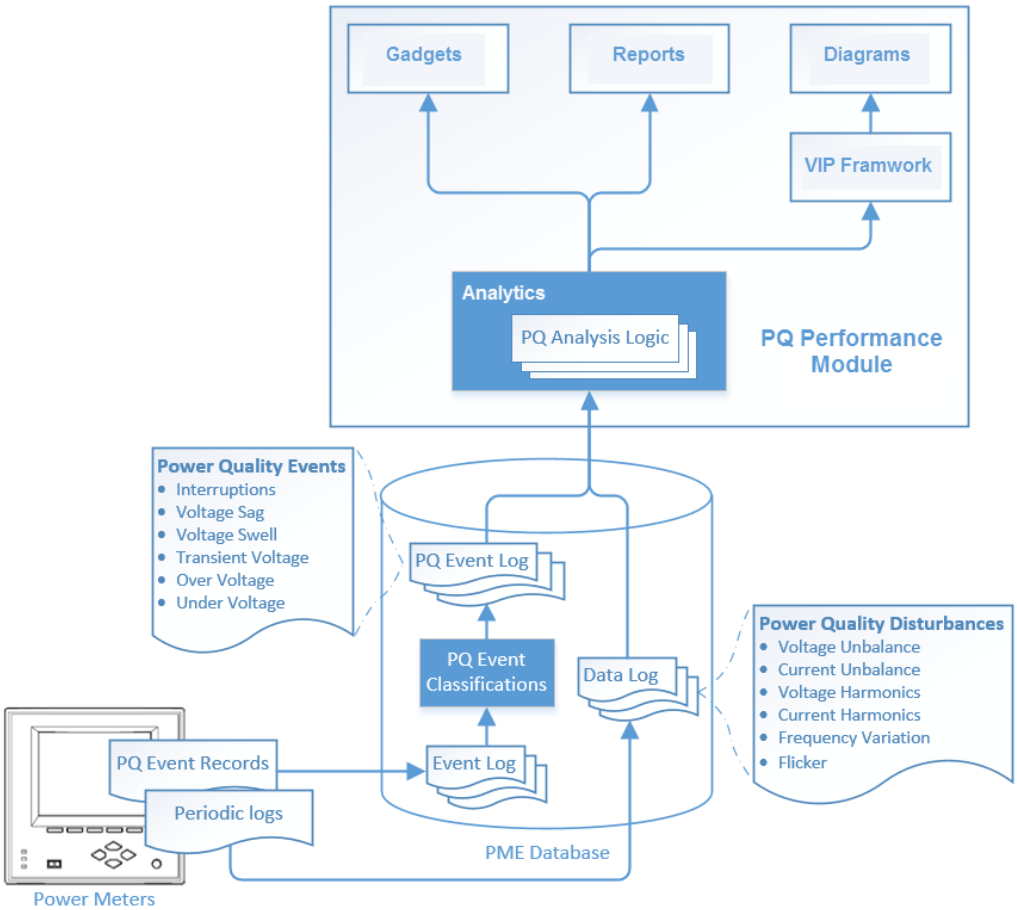
Other Software Modules

- Backup Power Module design
- Breaker Performance Module Design
- Capacity Management Module Design
- Energy Analysis Dashboard Module design
- Energy Analysis Reports Module design
- Energy Billing Module design
- Event Notification Module Design
- Power Quality Performance Module Design

Power Quality Performance Module Design

The Power Quality (PQ) Performance Module analyzes power quality event and disturbance data as well as power factor measurements. It determines the potential impacts of power quality on the monitored power system and displays the results in graphical formats, with color coding to highlight problem areas. The module combines standard software features with specialized components to produce its outputs.

The following diagram shows the different elements that are part of this module:



For definitions and classifications of power quality phenomena, see power quality events and disturbances.

Components

The following applications and features are used for this module:

- Diagrams
  - PQ Indicator diagrams
  - Standardized Equipment diagrams
- Dashboards
  - Power Quality Rating gadget
  - Power Quality Rating Trend gadget
  - Power Quality Incident Breakdown gadget

  - Power Quality Incident Impact gadget
  - Power Quality Incident Location gadget
  - Power Quality Impact gadget
  - Power Quality Impact Trend gadget
  - Power Factor Impact gadget
  - Power Factor Impact Trend gadget
- Reports
  - Power Quality Impact report
  - Power Quality Analysis report
- VIP

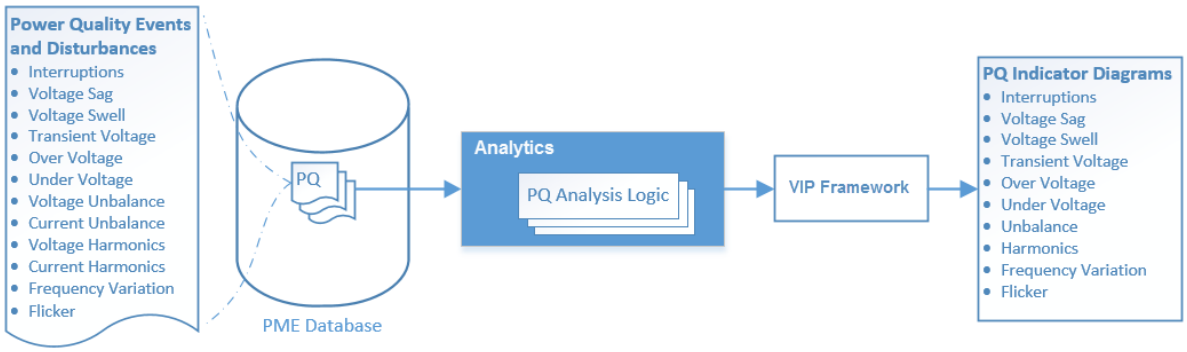
Prerequisites

This module has very specific requirements regarding system configuration and available measurements:

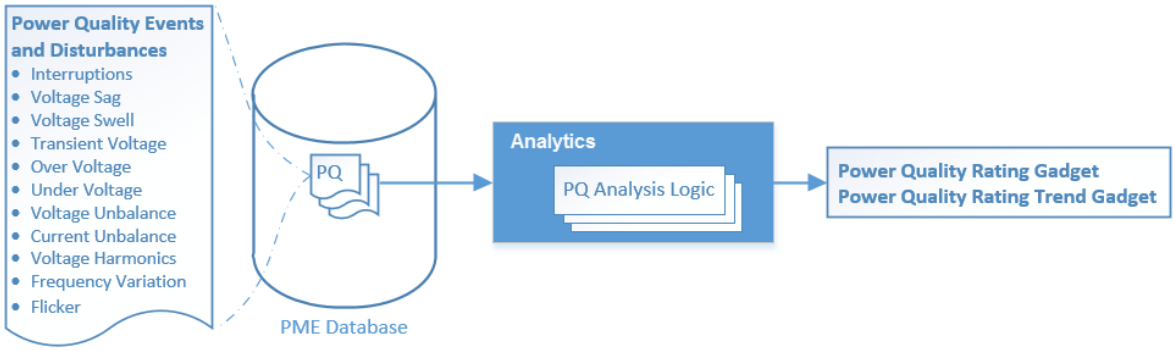
- Most of the gadgets and reports require advanced power quality measurements taken by the monitoring devices. The power quality data is aggregated across multiple devices and depends on data from the right device types in the right monitoring locations, see Device Selection for Power Quality Performance monitoring for more information.
- The Standardized Equipment diagrams are designed for very specific equipment types. See the Standardized Equipment Diagrams device list for details on compatible device types.
- For the Impact gadgets and report, process impact alarms are required. These alarms might require measurements from third party equipment, which might have to be brought into the system.
- For the Impact gadgets and report, billing rates must be defined to convert the measured values into cost data.

The following diagrams show the power quality inputs that are required for the different diagrams, gadgets, and reports:

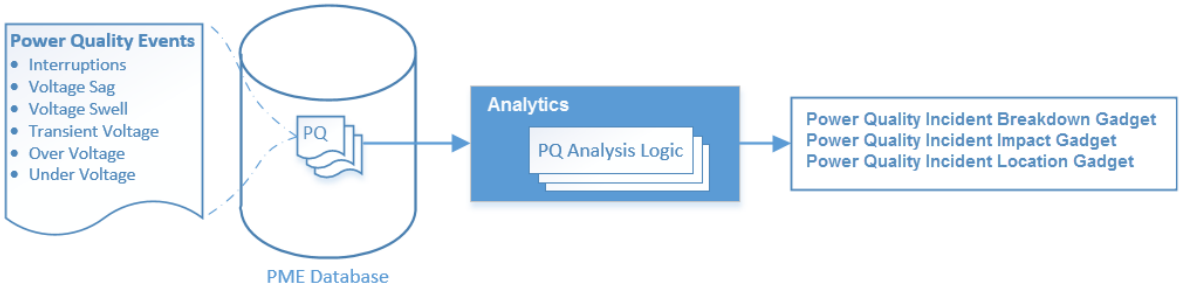
Indicator diagrams



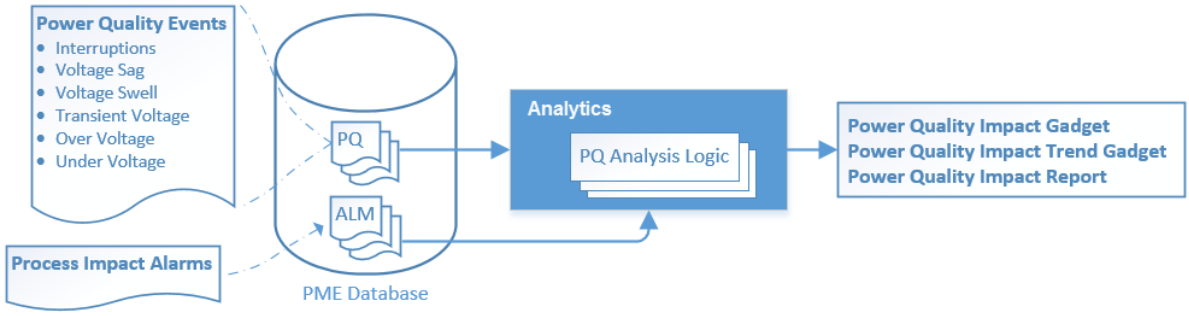
Rating gadgets



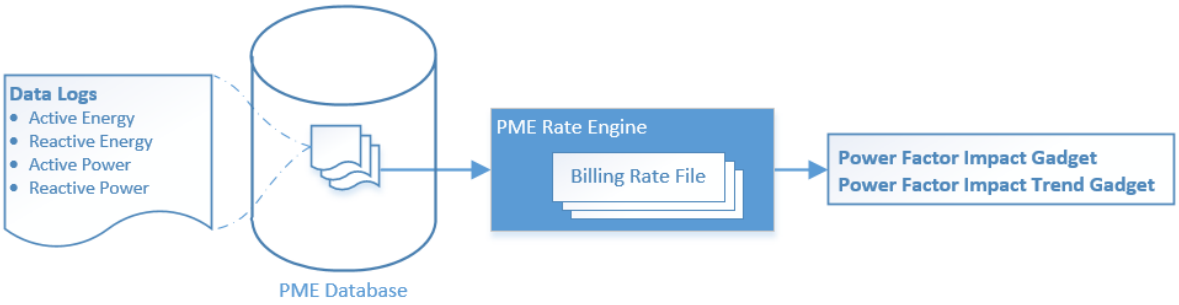
Incident gadgets



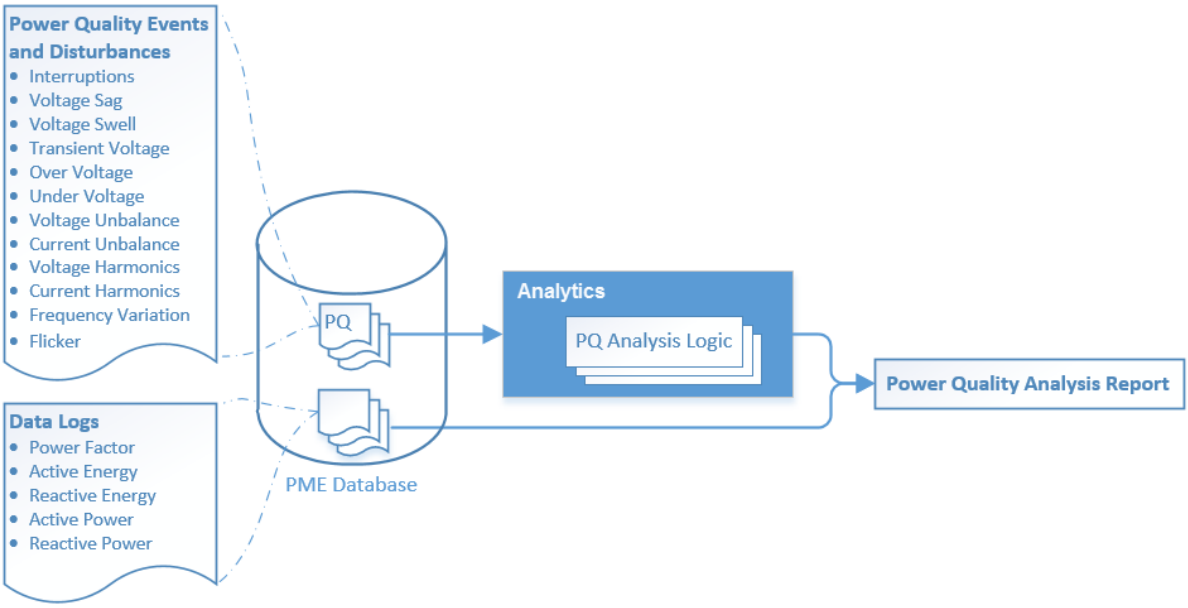
PQ Impact gadgets and report



PF Impact gadgets



PQ Analysis report



See Required measurements for Power Quality Performance monitoring for more information.

Design Considerations

The power quality information provided by this module is only as good as the data monitored by the devices. To get the full value, use the device types recommended for the different monitoring locations.

Use the Advanced Systems hardware and SQL Server database servers (not Express) for systems with the PQ Performance Module.

Time synchronization of the devices and the software is very important for this module. The standard time synchronization methods for devices in the software are sufficient. High accuracy time synchronization, such as IRIG-B, can be used, but is not required.

Review the configuration steps for this module to identify any unexpected requirements or dependencies.

If the devices that are used for power quality performance monitoring do not support all the required power quality measurements, then the information that is based on these measurements is not displayed in the gadgets, diagrams, and reports. However, other power quality information, that is based on available measurements might still be displayed. In this case, analyze which module outputs are affected and manage the user expectations accordingly.

Related topics:

Power Quality Performance Module topics

- Power Quality Performance Module design
- Power Quality Performance Module configuration
- Power Quality Performance Module operation

Other software features

- Real-time Monitoring
- Alarm Management
- Analytics and Visualization

Other Software Modules

- Backup Power Module design
- Breaker Performance Module Design
- Capacity Management Module Design
- Energy Analysis Dashboard Module design
- Energy Analysis Reports Module design
- Energy Billing Module design
- Event Notification Module Design
- Insulation Monitoring Module Design

Device Networks

This section provides information on the communication links between the software and the monitoring devices.

Use the links in the following table to find the content you are looking for:

Topic	Content
Device networks overview	Device network basics and the supported protocols and device types.
Network types	Ethernet and serial communication networks.
Network performance	Ways to improve the device communication performance.
Time synchronization	Time synchronization on the monitoring device network.
Tools	The Daisy Chain Calculator tool.

Device networks overview

PME is a software application that processes, stores, analyzes, and displays power system data and information. PME collects the source data from devices that are installed in the electrical system that is being monitored. Each device must be connected to a communication network through which the software initiates the data retrieval.

Examples of monitoring devices include:

- Power and energy monitoring devices
- Contactors and protection relays
- Circuit breaker trip units
- Smart panels
- Power quality mitigation equipment
- Programmable Logic Controllers (PLCs)

PME supports the following communication protocols:

- Modbus™ TCP
- Modbus™ RTU
- ION™
- OPC DA

For a device to be compatible with PME, it must support one of these communication protocols.

Related topics:

- Device networks overview
- Network types
- Network performance
- Time synchronization
- Tools

For reference information see:

- Default device type support (list of pre-configured device types in PME)
- Resources (information on where to find additional, add-on device types)
- Device Type Editor

Network types

The two basic types of communication networks for PME are Ethernet and serial.

Ethernet (TCP) networks

Ethernet (TCP) device networks can be integrated into regular corporate LANs or they can be separate, independent networks, providing a higher level of security and availability.

Devices are configured in PME by providing fixed IP addresses (IPv4 or IPv6) and ports, or based on host names. Host names must be used for devices with dynamic address assignment, for example using the DHCP protocol. When host names are used in PME, then a host name resolution mechanism is required by the external IT network.

Device communications are based on encapsulated Modbus or ION protocol and are not encrypted. Bandwidth requirements per device are typically low, but depend heavily on the amount and type of data requested from the device by PME.

Ethernet (TCP) networks are in many ways superior to serial networks and we recommend that you use Ethernet (TCP) networks whenever possible.

Serial device networks

Serial communication is the traditional way of connecting devices to PME. Serial communications require an intermediate converter or gateway, for example a Link150, to establish a network connection. The performance of a serial communication network can become the limiting factor for the overall system performance.

NOTE: If you use an ION meter as a gateway, with Ethergate protocol, you lose the ability to multi-master the serial devices.

Serial device communications are based on Modbus RTU or ION protocol and are not encrypted. See Tools for information on how to design a serial network.

PME also supports communication through telephone modems.

Reasons for using serial networks include:

- The device type only supports serial communications.
- A serial communication network is already in place.
- The existing Ethernet (TCP) networks do not allow the connection of monitoring devices.
- Serial communications are less affected by electrical noise.

Ethernet (TCP) networks are in many ways superior to serial networks and we recommend that you use Ethernet (TCP) networks whenever possible.

Related topics:

- Device networks overview
- Network types
- Network performance
- Time synchronization
- Tools

For reference information see:

- Default device type support (list of pre-configured device types in PME)
- Resources (information on where to find additional, add-on device types)
- Device Type Editor

Network performance

Communications between the software and the devices consist of:

- On demand, real-time data requests, for example for Diagrams or Dashboards displays.
- Periodic polling and uploading of data logs, events, and waveform records.

To optimize the on demand and background polling performance, consider the following when designing the system and the communication network:

- Real-time data polling periods should be set to meet the user needs. Do not poll with high speed when it is not needed. Real-time data clients include Vista, Diagrams, OPC, VIP, Trends, and EWS.
- Disable devices that are not presently commissioned or functional. This includes devices that are inoperable, or that have a communication error rate >5%.
- Connect high-end devices with power quality monitoring features, such as the ION9000, directly through Ethernet, not serial. These devices can generate large amounts of logged data, such as power quality data, which requires a high bandwidth connection to the monitoring software. If a direct Ethernet connection is not possible, then connect the devices through small serial loops, with one or two devices per loop.

  NOTE: Test the data upload performance when using high-end devices on serial networks. Depending on configuration and operating conditions, it is possible for devices to have a higher data generation rate than can be uploaded over a serial network.

  NOTE: The ION9000T, a high-end power monitoring device with high speed transient capture, will not upload high speed transient waveform data to the software if it is connected through a serial connection.

- Setup the devices to only log those measurements that are needed to meet the user needs.
- Schedule the log uploads to occur at times when the system usage is low, for example during night time or off hours.
- Use the Daisy Chain Calculator tool to determine the maximum number of devices in a serial loop for your system. See Tools for more information.
- In most applications, Ethernet networks will provide a better performance than serial networks.

Related topics:

- Device networks overview
- Network types
- Network performance
- Time synchronization
- Tools

For reference information see:

- Default device type support (list of pre-configured device types in PME)
- Resources (information on where to find additional, add-on device types)
- Device Type Editor

Time synchronization

To maintain accurate time in the monitoring system, the devices must be time synchronized. Depending on the synchronization mechanism, different levels of time accuracy can be achieved. PME has the ability to synchronize devices to the PME server computer clock. This can be done over serial networks and Ethernet networks. See Time synchronization for ION meters and Time synchronization blackout for more details.

The time synchronization to the computer clock using the regular communications protocols can maintain a system time accuracy in the range of seconds. This is accurate enough for many applications. However, for applications such as power event analysis or protection coordination studies, that require high absolute and relative time accuracy, you need to use other time synchronization methods for the devices, such as PTP or GPS time synchronization.

NOTE: Time synchronization might be disabled by default in certain monitoring devices. Configure time synchronization for your devices and the software as part of the device or system deployment. Choose a single time synchronization source per device.

Related topics:

- Device networks overview
- Network types
- Network performance
- Time synchronization
- Tools

For reference information see:

- Default device type support (list of pre-configured device types in PME)
- Resources (information on where to find additional, add-on device types)
- Device Type Editor

Tools

Use the Daisy Chain Calculator tool to design your serial communication networks. This tool helps you estimate the communication utilization for serial daisy chains. You can use it for new system design and for optimizing existing systems.

NOTE: The Daisy Chain Calculator is available through the Exchange Community. See Resources for link information.

Related topics:

- Device networks overview
- Network types
- Network performance
- Time synchronization
- Tools

For reference information see:

- Default device type support (list of pre-configured device types in PME)
- Resources (information on where to find additional, add-on device types)
- Device Type Editor

System Integration

This section provides information on the different approaches and technologies for integrating PME with other systems.

Use the links in the following table to find the content you are looking for:

Topic	Content
Overview	Integration basics and the supported technologies.
Integration technologies	OPC, EWS, ETL, ODBC, PQDIF, VIP
Integration with PSO	References to PSO documentation.
Integration with EBO	Detailed planning information on the integration of PME with EcoStruxure Building Operation.

Overview

In addition to data collection from monitoring devices, PME can also connect to and share data with other systems or software. Using PME in such a connected way is called system integration.

In an integrated system, PME either acts as a server, providing data to other systems, or as a client, receiving data from other systems, or both at the same time. Real-time data and historical data can be exchanged between the systems.

The reason for integrating systems is to leverage the strengths and capabilities of each system in order to provide value that could not be achieved with any of the systems alone.

PME offers the following technologies for system integration:

- OPC DA server for exporting real-time data.
- OPC DA client for importing real-time data.
- EWS server for exporting real-time data, historical data, and alarm data.
- ETL for exporting or importing historical data.
- ODBC for providing access to historical data.
- PQDIF for exporting power quality data.
- VIP for exporting or importing real-time data or historical data.

Each of these technologies has its strengths and weaknesses. Which technologies to use depends on the system capabilities, the application needs, and the performance expectations. See Integration technologies for more details.

Integration technologies

The following sections discuss the integration technologies available in PME.

⚠ WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

Use cybersecurity best practices to help prevent unauthorized access to the software.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

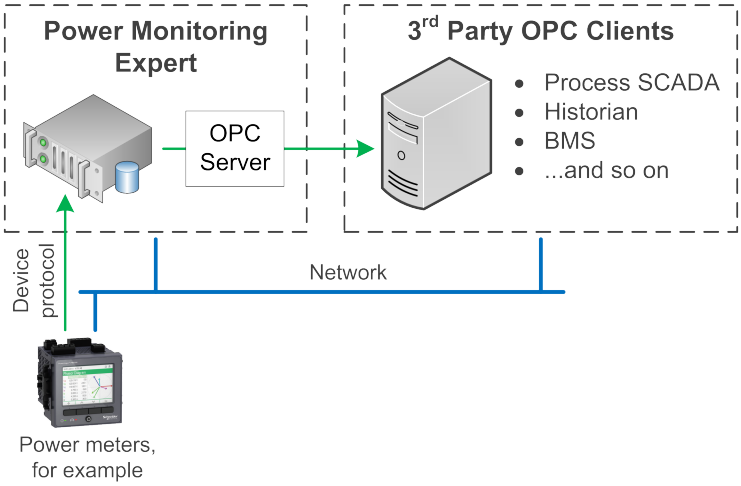
Work with facility IT System Administrators to ensure that the system adheres to the site-specific cybersecurity policies.

Open Platform Communications (OPC)

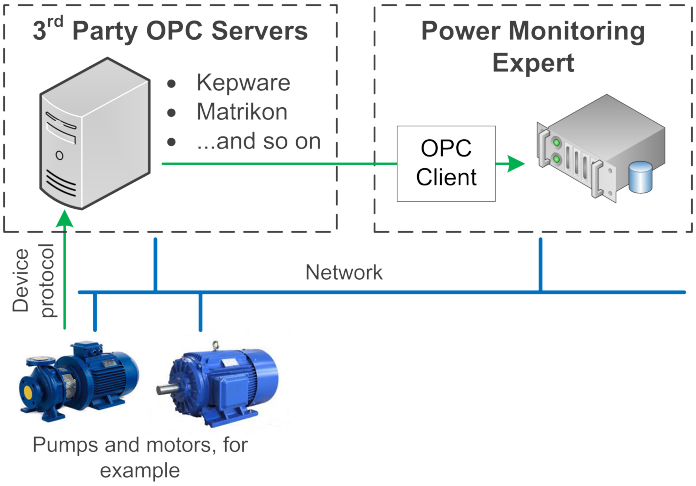
OPC is an industry standard for data exchange between software applications and control devices from different manufacturers. The OPC standard includes separate specifications for different data types. PME supports the OPC Data Access (DA) specification, OPC DA 2.05a, which is used for real-time data.

PME includes an OPC server and an OPC client, which means it can export and import real-time data to or from another system.

The following shows an example where the OPC server capabilities in PME are used to share device real-time data with another application:



The following shows an example where the OPC client capabilities in PME are used to bring device real-time data into PME from another application:



See OPC Server Support for more information.

RECOMMENDATION: Use an OPC tunneling application for OPC data exchange over a network

EcoStruxure Web Services (EWS)

EWS is a Schneider Electric standard for sharing data between EcoStruxure™ software platforms. It is based on SOAP 1.2, an industry standard Web Services technology.

PME includes an EWS server, which means that EWS can be used to export real-time data, historical data, and alarms from PME to another system.

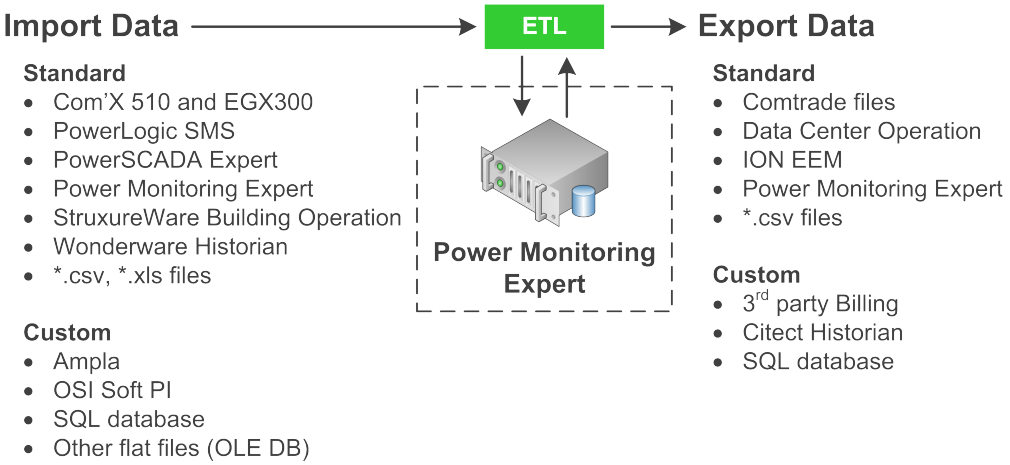
PME does not include an EWS client, which means that EWS cannot be used to import data into PME from another system.

Visit the Exchange Community Web site for more information on EWS. See Resources for contact information.

Extract Transform Load (ETL)

The ETL is a proprietary software application that copies historical data from one data store to another data store. During the copy process, the ETL can modify the data, to make it fit the target data store or target application. The ETL can be used to copy data as a one-time transaction, or it can be scheduled to copy data automatically on an ongoing basis.

The following graphic shows the data source and target stores and formats that are supported by the ETL:



Visit the Exchange Community Web site for more information on ETL. See Resources for contact information.

Open Database Connectivity (ODBC)

ODBC is a standard application programming interface (API) for accessing database management systems (DBMS). PME is ODBC-compliant, which makes it possible to access any historical data in the PME database from any other, ODBC-compliant application. See Accessing the ION Database with 3rd-party applications for an example using Microsoft Excel to access data in the PME database.

Power Quality Data Interchange Format (PQDIF)

PQDIF is a standard power quality data interchange format for exchanging power quality data between software applications and monitoring devices. PME can export power quality data in PQDIF format. See PQDIF Exporter for more information.

Virtual Processor (VIP)

The VIP is a PME component. Use the VIP for data import, data export, data processing, and control functions. It supports a variety of protocols and standards. See Virtual Processor service (VIP) for more information. The following protocols and formats are supported by the VIP:

Data Import

- ION
- Modbus
- XML web pages
- SQL databases

Data Export

- ION
- SQL Databases
- SMTP email

- SMS text
- .exe program

Integration with EcoStruxure™ Power SCADA Operation (PSO)

The goal of this integration is to combine the PME Reports and Dashboards features with the Power SCADA Operation functionality. In the integrated system, PSO shows PME reports and dashboards embedded in the PSO user interfaces for a seamless user experience.

For planning and configuration information on this integration see the *Power SCADA Operation 2020 System Guide*. See Resources for contact information.

Integration with EcoStruxure™ Building Operation (EBO) - Planning

The integration of PME with EBO – hereafter referred to as PME/EBO Integration – is an engineered solution that embeds features of EcoStruxure™ Power Monitoring Expert (PME) into EcoStruxure™ Building Operation (Building Operation).

The PME/EBO Integration solution provides access to PME Dashboards, Reports, Diagrams, alarm and real-time data through Building Operation, for a seamless user experience.

PME/EBO Integration is intended for large buildings, such as high-rise commercial office buildings, shopping malls, and university campuses. It provides easy to understand energy information for building managers with limited electrical systems knowledge.

This integration planning section includes the following topics:

- Solution Components
- Solution Limitations
- Software compatibility
- Computer hardware
- Solution architectures
- Guidance on choosing an architecture
- Communications and data transfer

NOTE: The deployment of the PME/EBO Integration solution requires application engineering expertise in installing and configuring EBO and PME.

Solution Components

The PME/EBO Integration solution includes the following components:

Building Operation 3.0.1

Building Operation software provides integrated monitoring, control and management of energy, HVAC systems, lighting and fire safety systems. It is a centralized system with scalability from a single building to a global enterprise.

Power Monitoring Expert 2020

Power Monitoring Expert is a supervisory software for power management applications. It enables you to maximize operational efficiency, optimize your power distribution system, and improve your bottom-line performance.

EcoStruxure™ Web Services (EWS)

EcoStruxure Web Services (EWS) is a Schneider Electric standard for sharing data among various EcoStruxure software platforms to facilitate the creation of EcoStruxure solutions. EWS is based on conventional Web Services technology (SOAP, WSDL) and provides a way for solution architects and solution development teams to build solutions that require data to be shared among different EcoStruxure software platforms.

SmartWidgets

SmartWidgets are device driver packages for Building Operation. SmartWidgets make it fast and easy for you to add devices like Power Meters to the software. They are easy to install, and they provide Modbus register mappings for the common measurements for a given device type. They also provide Building Operation graphics components for consistent visualization and interaction with devices.

Extract Transform Load (ETL) Tool

The Extract, Transform, Load (ETL) tool connects to the Building Operation EWS server on either Enterprise Server or Application Server, extracts select historical data from trend logs, and inserts the data into the PME database. This makes trend data from Building Operation available to PME Dashboards and Reports.

Solution Limitations

Only the PME Standalone Architecture installation type, where the PME application server and the database server are installed on the same computer, is supported by the PME/EBO Integration solution. The PME Distributed Database architecture installation type is not supported. See System architecture for more information on PME installation architectures.

Software compatibility

This section describes the PME/EBO Integration solution software compatibility as well as the operating environment requirements.

NOTICE

LOSS OF COMMUNICATION

- Activate product and component licenses prior to the expiry of the trial license.
- Activate sufficient licenses for the servers and devices in your system.
- Export the existing hierarchy template out of Power Monitoring Expert before importing a new template. The new template can overwrite the existing template, which can permanently remove all information contained in the original.
- Backup or archive any SQL Server database data before adjusting any database memory options.
- Only personnel with advanced knowledge of SQL Server databases should make database parameter changes.

Failure to follow these instructions can result in loss of data.

NOTICE

UNAUTHORIZED OR UNINTENDED ACCESS TO CUSTOMER DATA

- Personnel setting up the PME/EBO Integration third-party authentication must be aware that links to data are not secure.
- Do not setup access links to sensitive or secure data.

Failure to follow these instructions can result in unauthorized or unintended access to sensitive or secure customer data.

Building Operation and PME version compatibility

The PME/EBO Integration solution supports the following software versions:

PME Version	SBO 1.6	SBO 1.7	SBO 1.8	SBO 1.9	EBO 2.0	EBO 3.0.1
8.0	Y	Y				
8.1	Y	Y	Y			
8.2			Y	Y	Y	
9.0				Y	Y	
2020						Y

Operating Environment

PME

See Operating Environment for supported operating systems and SQL Server versions.

Building Operation

See *EcoStruxure™ Building Operation Information Technology System Planning Guide* for supported operating systems and SQL Server versions.

Integration requirements

- For deployments where Building Operation and PME are installed on the same server, the operating environment must be supported by both systems.
- The following browsers are supported when using PME Web Applications in Building Operation WebStation:
  - Microsoft Internet Explorer 11
  - Google Chrome
  - Mozilla Firefox
- Installing PME and Building Operation Report Server on the same computer is NOT supported.
- Sharing SQL Server between PME and Building Operation Report Server is NOT supported.

Port Settings

PME

See IP Ports for more information.

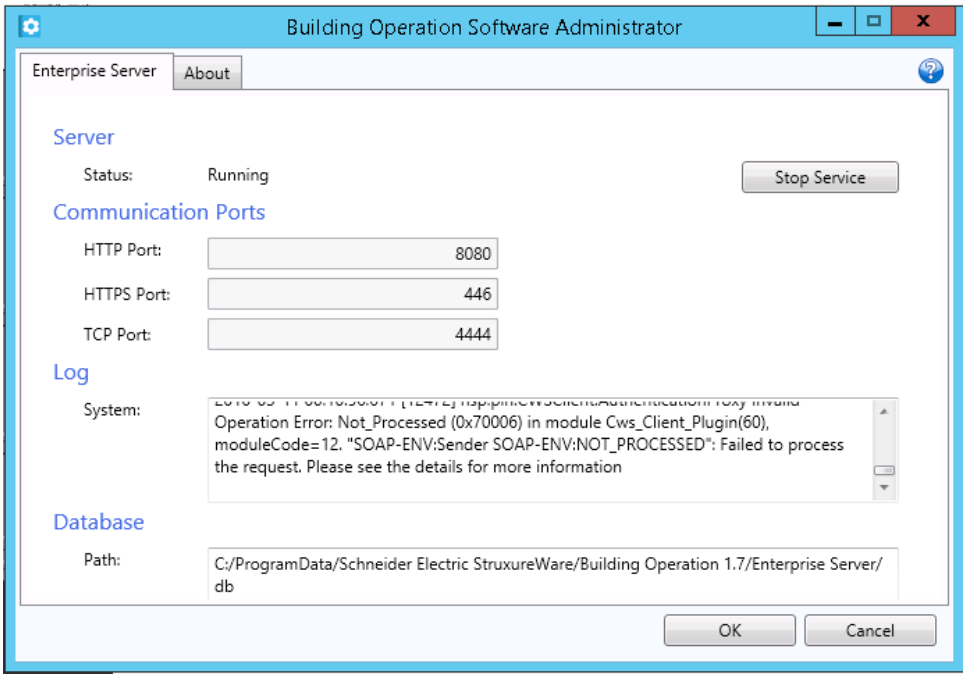
Building Operation

The Enterprise Server uses HTTP and TCP protocols to communicate with other servers and clients. In the Software Administrator, you configure the port number of each protocol the Enterprise Server listens to when communicating through a specific protocol. Refer to the *EcoStruxure™ Building Operation Information Technology System Planning Guide* for a full list of required open ports.

Changing Port Settings

Building Operation and PME both use the same HTTP (80) and HTTPS (443) ports by default. If you install Enterprise Server and PME on the same computer, you must change these ports for Building Operation to avoid a port conflict.

For example, use 8080 and 446 as shown below:



Therefore, during the design phase, the IT policy needs to be checked to make sure this is acceptable. If it is not, PME and the Enterprise Server should not be installed on the same computer and should instead be installed on separate servers.

Computer hardware

PME

See Computer Hardware for information on hardware specifications.

Building Operation

For information on Building Operation hardware specifications, see the *IT System Planning Guide - EcoStruxure Building Management*.

PME and Building Operation on the same computer

CPU and RAM

As a general guideline, we recommend that you use the PME Advanced Systems hardware specifications for systems based on Architecture 2 where the PME and Building Operation software is installed on the same server.

HDD

To install PME and Building Operation on the same server, add 2 GB to the required PME HDD space for the Building Operation application and additional space for historical data in Building Operation.

Solution architectures

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Do not use the software or devices for critical control or protection applications where human or equipment safety relies on the operation of the control action.
- Do not use the software to control time-critical functions.
- Do not use the software to control remote equipment without proper access control and status feedback.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

⚠ WARNING

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

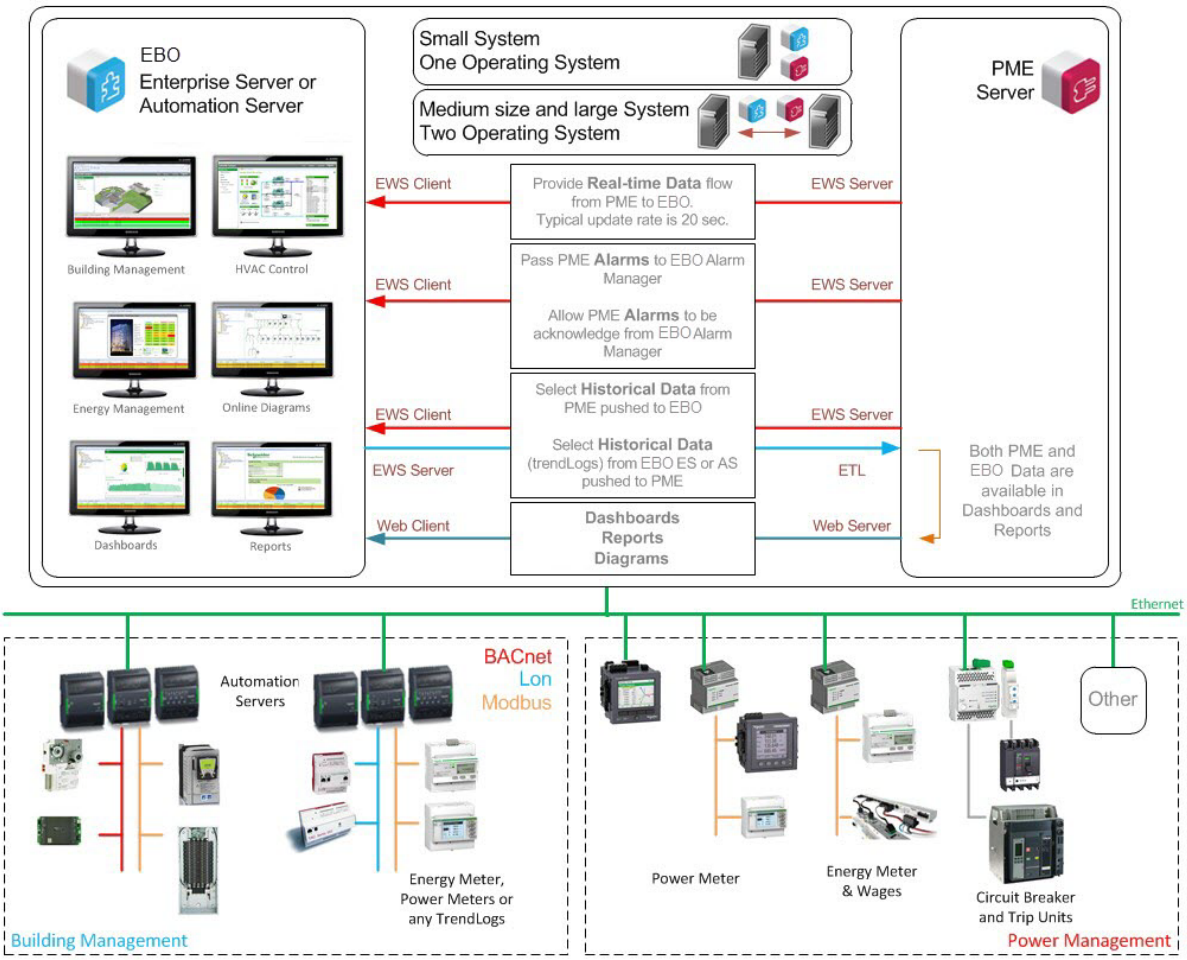
Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

The PME/EBO Integration solution supports the following integration architectures:

- Architecture 1 - Devices connected to Building Operation
- Architecture 2 - Devices connected to PME

NOTE: Hybrid versions of the architectures are possible, to meet specific application needs.

The following diagram shows an integrated view of both architectures:



Architecture 1 – Devices Connected to Building Operation

- Power devices are connected to Building Operation (Automation Server or Enterprise Server).
- Logging of historical data is done by Building Operation (Automation Server or Enterprise Server).
- Historical data (Trend Logs), for display in Dashboards and Reports, is copied from Building Operation to PME using the ETL.

  NOTE: (Optional) Historical data for simple trending can be displayed directly through Building Operation Trend objects.

- PME serves up historical data views in its Web Applications (Dashboards, Reports) to Building Operation through its secured Web Server.

Architecture 2 – Devices Connected to PME

- Power devices are connected to PME.
- Logging of historical data is done by PME.

  NOTE: (Optional) Historical data for simple trending can be copied to Building Operation via EWS and displayed through Trend objects.

- Real-time data and alarm data are provided to Building Operation via EWS

- PME serves up historical data views in its Web Applications (Dashboards, Reports) to Building Operation through its Web Server

Real-time Data Flow

Regardless of how the data is collected, directly by Building Operation or by PME, it will be viewed by the user in Building Operation user interface.

Architecture 1

Building Operation collects the real-time data from the devices through an Automation Server or Enterprise Server.

Architecture 2

PME collects the real-time data and provides it to Building Operation through EWS.

Alarms Data Flow

All alarm data must end up in the Building Operation database, whether the alarms are triggered in Building Operation or PME.

In Architecture 1, all alarm data is logged directly to the Building Operation database. You must configure power alarms in Building Operation, manually, or through existing alarms in the SmartWidget.

In Architecture 2, power alarm data is first logged to the PME database and then copied to the Building Operation database using EWS. You must configure device based or software-based power alarms in PME.

Historical Data Flow

Historical Data for Simple Trending in Building Operation

You can use the Building Operation Trend objects for displaying simple trend data. In this case, any historical data collected in PME, that is to be displayed in Building Operation, needs to be copied to Building Operation.

NOTE: This does not involve PME Dashboards or Reports.

Architecture 1

Building Operation collects the historical data directly.

Architecture 2

PME collects the historical data and copies it to Building Operation via EWS.

NOTE: The data transfer interval can be set to the PME logging interval, for example 15 minutes, or to a longer interval, such as once per day, to transfer a larger set of data per connection.

Historical Data for Dashboards and Reports

For complex historical data and larger data sets, use the PME Dashboards and Reports applications for displaying the data. In this case, any historical data in Building Operation that is to be displayed in a dashboard or report needs to be copied to PME, using the ETL tool.

Architecture 1

Building Operation collects the historical data and copies it to PME, using the ETL tool.

Architecture 2

PME collects the historical data directly.

Guidance on choosing an architecture

There are a number of factors to consider when choosing whether to use Architecture 1, Architecture 2, or a combination of the two. The key factors to consider are:

- Data Collection
- User experience
- Commissioning time
- IT Considerations

NOTE: Hybrid versions of the architectures are possible, to meet specific application needs.

Data Collection

To decide which architecture is best for data collection, consider the following:

A. Device type of the power monitoring devices

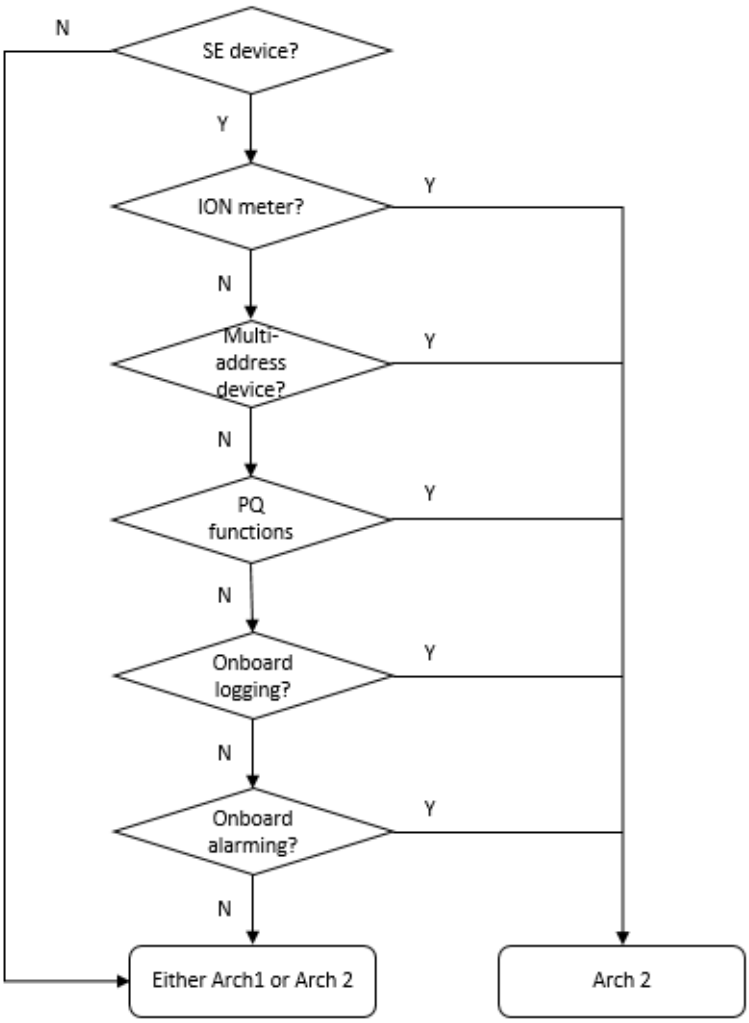
B. Number of registers to be requested

C. Device location

A. Device Type

Which types of power devices are used in the system is the most important aspect to consider when selecting an architecture.

Use the flow chart below to help you with the decision-making process:



Descriptions:

SE (Schneider Electric) device

Most of the SE meters and circuit breakers are supported in PME by default. In addition, a large number of add-on device drivers for PME can be downloaded from the Exchange community. For those device types that are not supported by existing drivers, you can create custom drivers with tools provided by PME. The commissioning time is reduced when there are pre-existing drivers for your device types in PME.

Building Operation has SmartWidgets for some of the SE power devices. For those device types that are not supported, you must perform manual mapping in order to communicate to the device. The commissioning time is reduced when there is a SmartWidget for your device.

NOTE: If the device uses a protocol other than Modbus, further investigation on gateways might be needed before choosing a communication architecture.

ION meter

ION meters use ION protocol, which is supported by PME but not by Building Operation. Therefore, it is required to connect these meters to PME (→ Architecture 2).

NOTE: Most of the ION meters also support Modbus protocol. However, advanced functions, such as waveforms, on-board logging or on-board alarms, are not available through Modbus communication. Therefore, connecting an ION meter through Modbus is not recommended.

Multi-address device

A Multi-address device is a Modbus device that has multiple Modbus IDs, such as the Masterpact. Multi-address devices are supported in PME but not in Building Operation. In Building Operation, multiple Modbus devices need to be created for each multi-address device, because each Building Operation device can only have one Modbus ID. This increases the complexity of the system tree structure and requires more commissioning time and effort as compared to PME (→ Architecture 2).

PQ (Power Quality) functions

If the devices have PQ functions and you want to make use of these functions, Architecture 2 is recommended because PME provides access to events, waveforms, reports, and all other power quality related information (→ Architecture 2).

On-board logging

If the devices have on-board logging functions, Architecture 2 is recommended because PME can retrieve the on-board logs instead of doing software-based logging, like Building Operation (→ Architecture 2).

NOTE: On-board data logging is typically more reliable and more accurate than software-based logging.

On-board alarming

If the devices have on-board alarming functions, Architecture 2 is recommended because PME can retrieve the on-board alarms instead of monitoring the values and generating alarms in the software, like Building Operation (→ Architecture 2).

NOTE: On-board alarming is typically more reliable and more accurate than software-based alarming, which is particularly important for power failure root cause analysis.

Conclusion:

For many applications, Architecture 2 is the better choice with regards to power monitoring device types. However, when only low-end power meters, energy meters, or pulse meters are used, there is no difference between the two architectures.

B. Number of Registers to be Requested

If only kWh and a few power measurements are needed from a device, then either Architecture 2 or Architecture 1 can be used, as long as the existing Automation Server can handle the Modbus serial loop communication of the power devices.

However, if many measurements are needed for each power device, we recommend you use Architecture 2 to keep communication of the power devices separated from the building automation devices.

C. Device Location

Consider the device location and communication network layout when choosing an architecture. If all power devices are located together in the electrical room, then we recommend you use communication gateways, such as the Link150, to connect them with dedicated daisy chains. However, when a limited number of devices is located close to an Automation Server, it might be to connect them directly to that server.

TIP: Since you can combine the two architectures, choose the most convenient way to connect to the devices.

User experience

The user experience differs between the two architectures in two ways:

- The types of graphics available to display real-time power device data
- The update rate for real-time values

Graphics for Power Devices

Architecture 1

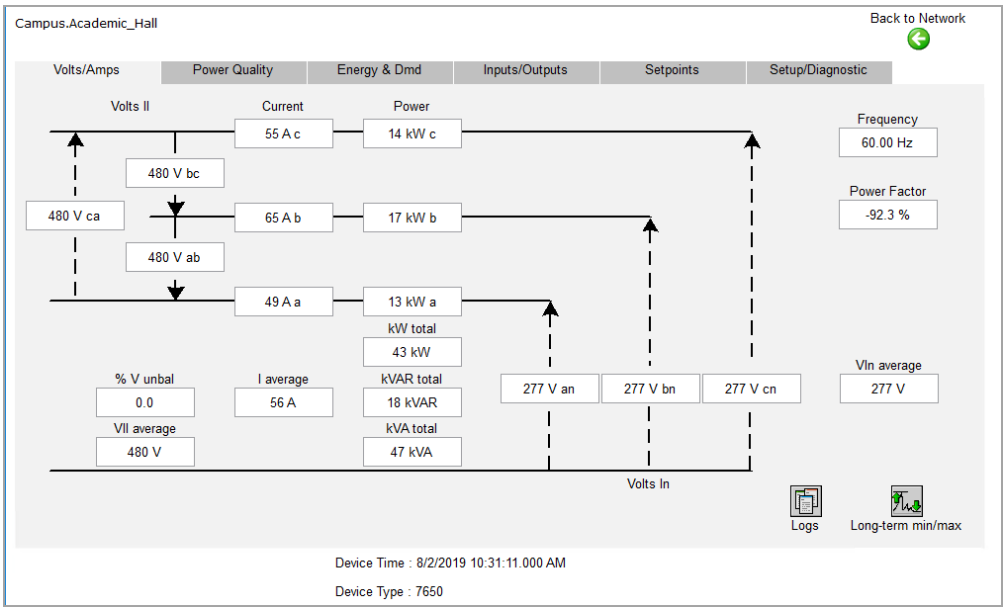
Real-time data is collected and displayed directly by Building Operation. If there is a SmartWidget available for a device type in Building Operation, users can use the pre-built graphics in the SmartWidget. If there is no SmartWidget for the device, users must build their own graphics based on their needs.

Architecture 2

Real-time data is collected by PME and then transferred to Building Operation through EWS. This real-time data can then be displayed in the same way as in Architecture 1.

However, it is also possible to use the native PME diagrams to display the data, and then integrated the diagrams into Building Operation through the PME Web Applications. This provides much more detailed electrical views with more electrical information.

Here is an example of a PME diagram with real-time data:



Unlike Building Operation, PME has native support for many types of power devices. Using the diagrams in PME provides electrical views with more detailed information, reducing commissioning time. However, for simple power devices with only a few registers, the extended diagrams from PME become less valuable.

NOTE: If a device type is not natively supported by PME, additional commissioning time is needed for creating a custom device type and diagrams.

Update Rate for Real-time Values

The number of communication layers the real-time values have to go through, in each polling cycle, differs between the two architectures. This can affect the real-time data update rate in the user interface.

Architecture 1

In Architecture 1, Building Operation polls the devices directly. The update rate of the real-time values in the user interface depends on the following:

- Serial communication speed
- Number of devices in the serial loop and number of registers to be requested
- Capability of the Automation Server or Enterprise Server and its load

Architecture 2

In Architecture 2, PME polls the devices directly and then transfers the data to Building Operation through EWS. The update rate of the real-time value in user interface depends on the following:

- Update rate for EWS communication
- Serial communication speed
- Number of devices in the serial loop and numbers of registers to be requested

- Capability of the PME server
- Bandwidth allocation between real-time and log retrieving of PME

Because of the added communication layers, and the available real-time data bandwidth in PME, the update rate for a real-time value for architecture 2 is typically slower than Architecture 1. Refer to Communications and data transfer for more information.

Conclusion

If the real-time update rate is your top priority and only a small number of registers are needed, choose Architecture 1. Otherwise, choose Architecture 2 to make use of all the functions of your power devices.

Commissioning time

The engineering time required for the integration varies for different architectures. See the PME/EBO Integration section for details.

IT Considerations

The server recommendations are different for Architecture 1 and Architecture 2. See Computer hardware for more information.

Communications and data transfer

System communication design varies significantly between Architecture 1 and Architecture 2.

Architecture 1

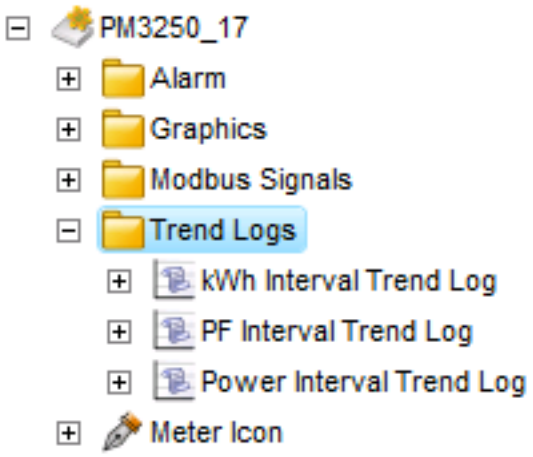
Device Communications

In Architecture 1, device communications are handled by Building Operation (Enterprise Server, Automation Server, or any other BMS field-level devices).

Refer to the *Architectural Guidelines - EcoStruxure Building Management* document and relevant device documentation for more communication design information.

Logging Data in Building Operation

In Architecture 1, historical data is collected in TrendLogs. TrendLogs can be fed by any Building Operation variables, including BACnet, LON, XML, or Modbus Point.



NOTE: When logging data in Building Operation, it is recommended to use interval trend log to log the raw data from meters. The cumulative raw data is then inserted into the PME database by the ETL tool. PME Dashboards and Reports have an aggregation mechanism to make use of the data. Hourly, daily, and monthly usage does not need to be calculated in Building Operation for PME use.

If both Trendlog and Extended Trendlog are used, it is recommended to send the data in the Trendlog to PME (via ETL) to avoid the lagging between Extended Trendlog and Trendlog.

It is recommended to plan the variables to be logged during the design phase so that the size of the Trendlog files can be forecast. Also, it is important to plan which Trendlogs are to be transferred to PME in order to forecast the size and growth of the database.

ETL Jobs

An ETL job is a set of task definitions that the ETL engine follows in order to Extract, Transform, and Load data from one data source to another. An ETL job contains an extract task to pull the data, a transform task to manipulate the data, and a load task that applies the data to the new location.

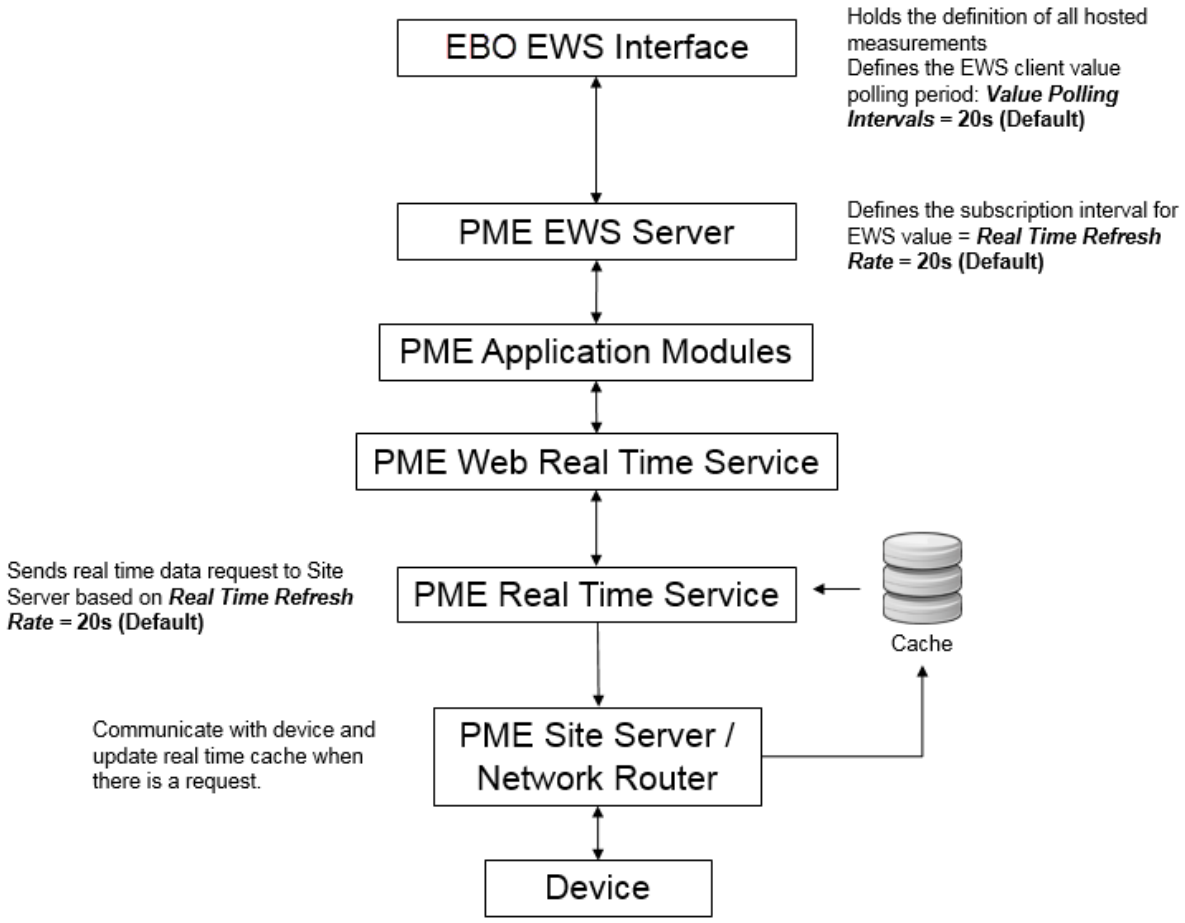
After the job is set up, you can set the job to run as a service. When set to run as a service, a job automatically runs at set times based on the settings you input in the Job tab. The Sleep Time Between Execution value (in seconds) allows you to define the frequency with a default value of 3600 seconds. The value defines when new data can be displayed in the Dashboards and Reports. You can use a smaller value if you want the job to run more frequently. For meter interval data, 900 seconds is usually fast enough for the updates. When increasing this value, consider the Building Operation Trendlog size to make sure it can be covered before being overwritten in order to prevent missing TrendLogs.

ETL does not use any of the PME processes, so this has little impact on PME performance while loading. SQL supports multi-threading and will serve both ETL and PME needs. If SQL is overloaded, the data buffer handles it.

Architecture 2

Real-time Communication

The following flow chart shows the detail of the real-time data flow in PME when integrating with Building Operation under Architecture 2.

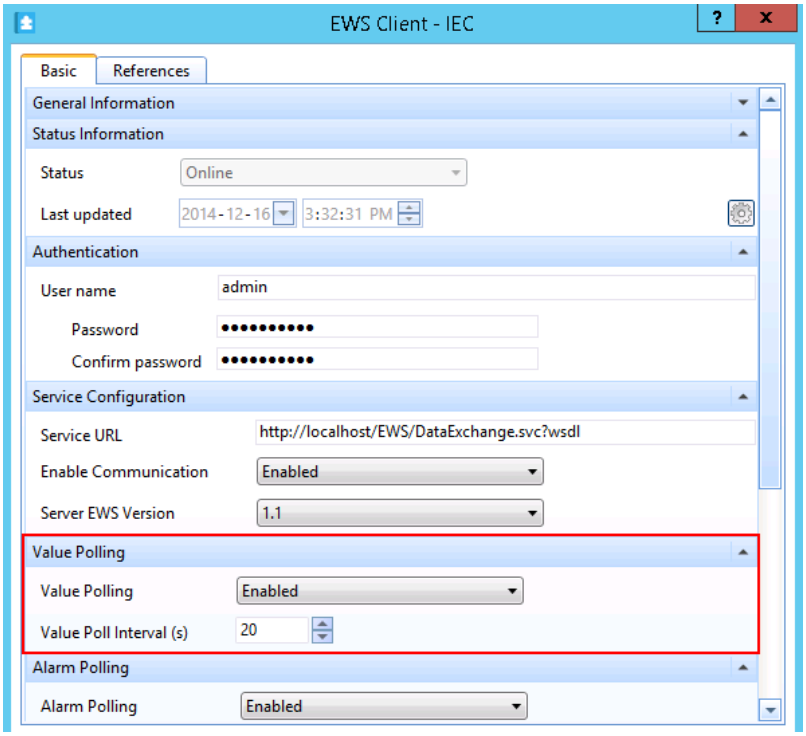


EWS Communication

There are two configurable settings that control the EWS communication and that you can use to optimize system performance: **Value Poll Interval**, in Building Operation, and **Real-time Refresh Rate**, in PME.

Value Poll Interval

In the Building Operation EWS Interface, you can configure the Value Poll Interval, which defines the frequency of the EWS polling, for real-time values. The default value is 20 seconds.



Real-time Refresh Rate

In the PME EWS server `web.config` file, in `...\Power Monitoring Expert\applications\EWS`, you can set the Real-time Refresh Rate. This setting controls how often the PME EWS server updates the real-time data it serves up. The default Real-time Refresh Rate setting is 30 seconds.

Default set of EWS `web.config` file settings in PME:

```
<appSettings>
<add key="ServiceInventoryEndpoint"
value="http://STANDALONE:23102/CoreServicesHost/Inventory/InventoryService" />
<add key="EWSRealTimeTimeout" value="120" />
<add key="ServiceLocation" value="EWS Services" />
<add key="DigestAuthenticationModule_Realm" value="DataExchangeService" />
<add key="AllowMD5DigestHash" value="1" />
<add key="EWSEnabled" value="1" />
<add key="ContainerItemStructure" value="0" />
<add key="NaNValue" value="" />
<add key="ConcatSourceAlarmEventId" value="1" />
<add key="RealTimeRefreshRate" value="30" />
<add key="RealTimeSessions" value="10" />
<add key="InternalStructureCacheTimeInSeconds" value="120" />
<add key="NumberOfDaysBackToInclude" value="10" />
<add key="InvalidAlarmTypes" value="ALM_CONTROL_EVENT,ALM_LOOSE_DROPOUT,ALM_
GENERIC_EVENT,ALM_CLOCK" />
</appSettings>
```

Communication Performance

The following shows the results of an EWS server performance test in PME:

NOTE: This test was performed on an earlier version of the PME/EBO Integration solution, called Power Manager at that time.

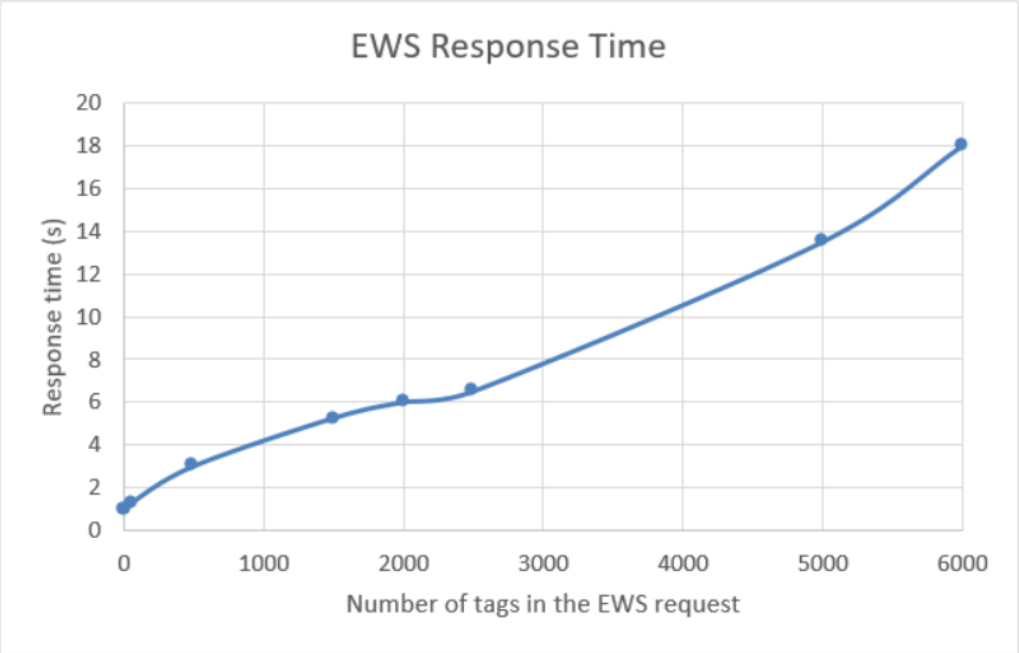
Computer Type: Server
OS: Windows Server 2012 R2
SQL: 2012 Standard SP1
CPU: x2 Intel Xeon E56xx (4 core)
RAM: 24 GB
HDD: x6 300 GB
Software: Building Operation 1.6 + Power Manager 1.0

Number of Devices	Number of Tags per Device	Total Number of tags	Average Response Time (s)
5	1	5	< 1
5	4	20	< 1
5	10	50	1.25
500	1	500	3
500	4	2000	6

Number of Devices	Number of Tags per Device	Total Number of tags	Average Response Time (s)
500	10	5000	13.5
1500	1	1500	5.75
1500	4	6000	18
2000	1	2500	6.5

NOTE: The EWS response time is independent of the measurement and device type, as long as the number of measurements, and the number of devices they were distributed across, remains the same.

The chart below shows a graphical representation of the EWS response time vs. Number of tags in an EWS request:



As discussed previously, the EWS request is sent from Building Operation only when there is a need, for example a graphic is open. Therefore, typically an EWS request from Building Operation to PME contains less than 1000 tags. For example, if 100 devices are shown in one graphic, and each has four bound values, then an EWS request for the 400 values (tags) is sent to the PME EWS Server when the graphic is opened in Building Operation. In case, based on the above test results, the EWS response time is about three seconds. This provides plenty of buffer time with a 20 second value polling setting in Building Operation as the default.

NOTE: Consider the impact on other parts of the Building Operation system, when tuning the polling rate to achieve faster refresh.

Alarm Communication

In Architecture 1, alarms are created in Building Operation, Automation Server or Enterprise Server.

In Architecture 2, technically the alarms can be created in both systems, PME or Building Operation. A proper design of the alarm generation logic and communication is important for a successful solution.

PME Alarms

PME alarm data is transferred to Building Operation using EWS. It is important to understand the two possible sources of an alarm in the PME system:

- On-board alarm – Generated and logged in the device (meter, circuit breaker, and so on)
- Software-based alarm – Generated by the PME software and logged in the computer cache.

On-board Alarms

For important alarms, such as circuit breaker trips, power outage, or over current, try to use the device on-board alarms in circuit breakers or meters. Even for less important alarms, on-board alarms are recommended to use to gain higher system reliability and also to make use of the device functionality.

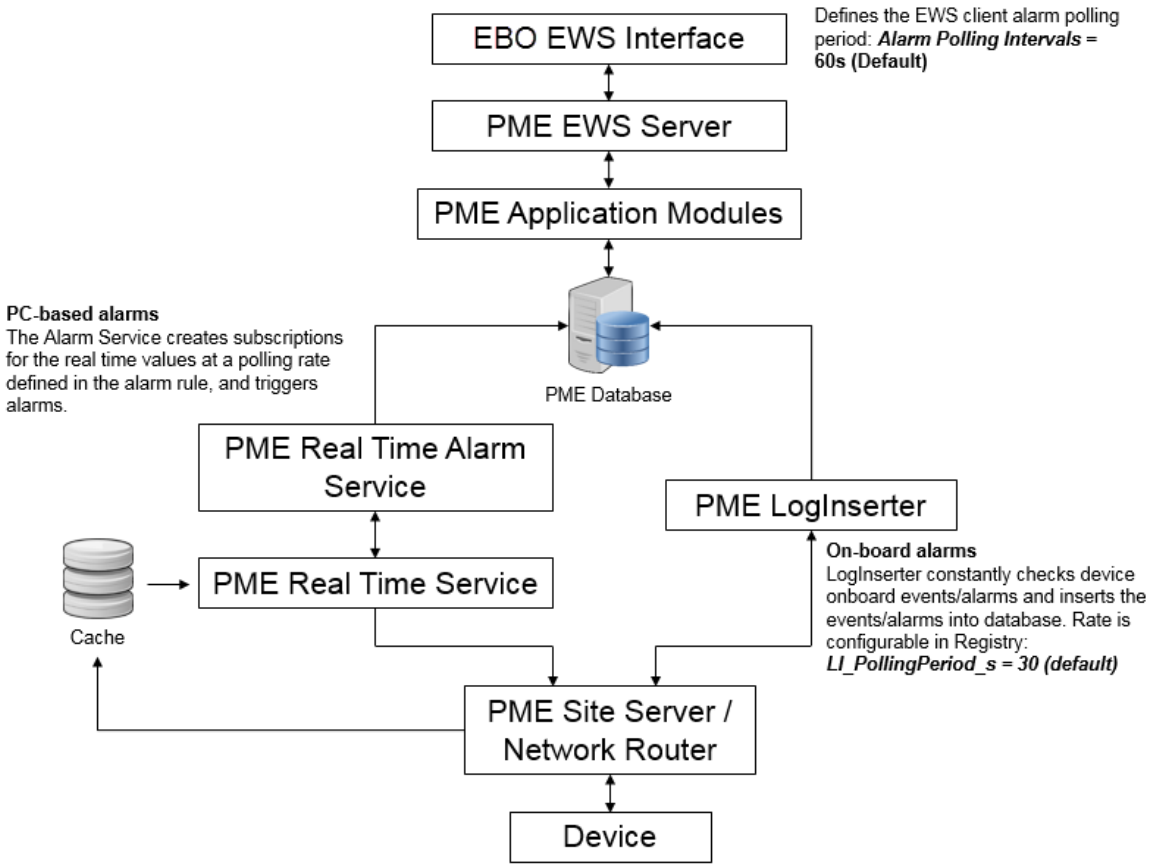
Software based Alarms

If the device does not have on-board alarming, or additional alarms need to be created, it is recommended to create the alarm in Software Alarms in PME, rather than create an alarm in Building Operation based on real-time values read via EWS.

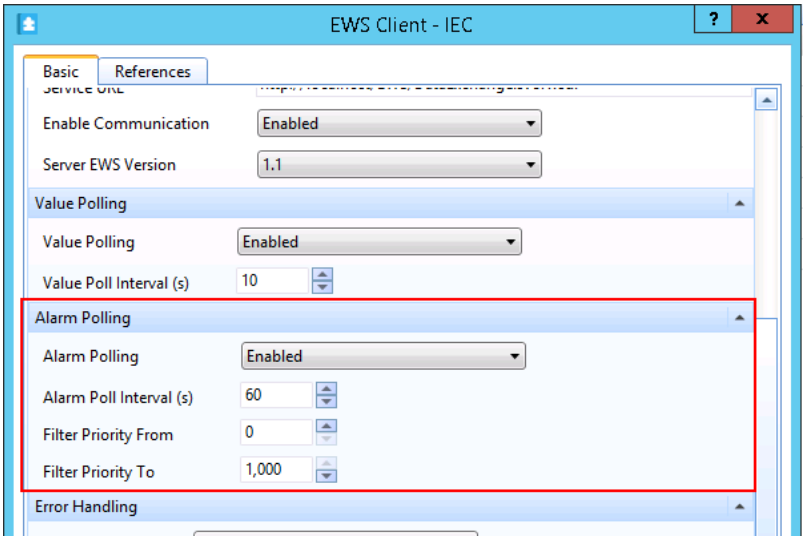
NOTE: VIP alarms are not exposed through EWS.

EWS Alarm Communication

The following flow chart shows the details of the alarm data flow in PME when integrating with Building Operation under Architecture 2.



PME alarms are polled only if the Alarm Polling is enabled for the EWS interface in Building Operation.



A filter can be configured to poll only the alarms that are needed.

The priority of an alarm or event can be configured in the PME system. The typical PME alarm priority categorization is:

- High priority alarm: 193 - 255
- Med priority alarm: 128 - 192

- Low priority alarm: 64 -127
- Information: 0 - 63.

NOTE: Any alarm priority setting greater than 255, in Building Operation, will be set to 255 for PME.

When a user acknowledges EWS alarms in Building Operation, the corresponding alarms in the PME system are also acknowledged automatically.

Performance: Alarm Latency

With the default software settings, an on-board alarm event is expected to be seen, in Building Operation within 90s on average. The settings can be tuned to achieve faster performance. Using the same concept, for a software-based alarm, the latency depends on the Building Operation EWS polling rate and the alarm polling rate defined for the alarm.

NOTE: Consider the impact on other parts of the system, such as the real-time data performance when tuning the polling rate to achieve a faster alarm refresh rate.

Best Practice for Using EWS Alarms in Building Operation

When choosing Architecture 2, it is not recommended to create Building Operation alarms based on real-time values read via EWS. For real-time values, EWS communication only takes place when there is a need, for instance, a graphic is opened by the user. In contrast, if an alarm is created based on an EWS tag, then the EWS real-time subscription for this value will be constantly active.

However, in Building Operation, the EWS alarm object is not the same as a regular alarm object. If there are requirements for consistent alarm messages, alarm priority, and user action associations, which EWS alarms may not meet, it is recommended to use the Building Operation **Sum Alarm** function to create a new alarm on top of one or more EWS alarms. Then the newly created Building Operation alarm can be managed consistently with other Building Operation alarms. Refer to Building Operation online help for more information about the Sum Alarm function.

Deployment considerations

This section provides information on the time, effort, and expertise that is required to deploy PME systems and its components.

Use the links in the following table below to find the content you are looking for:

Topic	Content
Power Quality (PQ) Performance Module	Prerequisites and configuration time estimates.
PME/EBO Integration	Commissioning time estimates for the integration of PME and EcoStruxure Building Operation (EBO).

Power Quality (PQ) Performance Module

Commissioning Time Estimates

This section provides time estimates for the deployment of the PQ Performance module.

Prerequisites

Competency

Application Engineers who are responsible for deploying the PQ Performance module must have a basic knowledge of power quality and also be familiar with the following:

- Power Monitoring Expert software systems.
- Schneider Electric power meters and circuit breakers
- Microsoft Windows operating systems
- Microsoft SQL Server.

We strongly recommend that you take the PME PQ Performance technical training from your local or regional training center.

Time Estimates

The following time estimates are based on the configuration steps documented for the PQ Performance module. The assumption is that all the prerequisites are met. For details on how to configure this module, see the Configuring chapter.

Configuration Step	Time (min.)	Comments
Device Preparation	2	(Per device). This might include verifying PQ event detection, PQ disturbance logging, and time synchronization.
Global configuration	1	
Configure PQ Indicator Diagram	2	
Configure Equipment Diagram		
Landing page and grouping page	15	
Detail page	5	Per corrective equipment
Configure PQ Impact Gadgets and Reports		
Acquire Process Impact Signal	0	Using electrical value (e.g. current drop) for this estimate. Using a non-electrical, process related measurement might require additional time to get the signal through DI, OPC, PLC, ...
Set Up Process Impact Alarms	5	

Configuration Step	Time (min.)	Comments
Set Up PQ Groups	1	(Per group). This does not take into account the time required to understand the relationship between a customer's production and electrical distribution.
Configure Power Factor Impact Gadgets		
Set Up the Power Factor Impact Rate File	1	Using one of the sample rate files. This is site-specific and based on the rate structure of the customer's utility contract.
Set Up the Incomer Meters in the Hierarchy	2	
Set Up PQ Performance Dashboards and Reports		
Set Up PQ Performance Dashboards	6	One PQ overview dashboard and one PQ detail dashboard
Set Up PQ Performance Reports	1	Per report as required
Fine-Tuning *		**This is site-specific, and highly dependent on the customer requirements. It might require a deep understanding of the local power quality standards and particular customer needs.**
Change Device Inclusion and Exclusion for the Analysis	-	
Change PQ Indicator Thresholds	-	
Disable Unused PQ Indicators	-	

* This is site-specific, and highly dependent on the customer requirements. It might require a deep understanding of the local power quality standards and particular customer needs.

PME/EBO Integration

The engineering time required for the integration varies for different architectures. Typically, it is faster to deploy Architecture 2 than Architecture 1 for the following reasons:

- When the power devices are supported by PME, it is faster to configure the devices in Architecture 2 than in Architecture 1, even when there are SmartWidgets available in Building Operation. When no SmartWidgets are available, the time for creating the Modbus map in Building Operation can be considerable.
- Configuring the ETL to setup the historical data transfer from Building Operation to PME, which is required for Architecture 1, can add considerable deployment time.

Architecture 1

Below are commissioning time estimates for PME/EBO Integration solutions for Architecture 1:

Architecture 1 Configuration Workflow			Average Time (min)	Standard Deviation (min)
1	**Installing and licensing Building Operation** *		16.7	1.5
	1.1	Installing and licensing License Server		
	1.2	Installing Enterprise Server		
	1.3	Installing Workstation		
	1.4	Installing **Building Operation** Connector components, snippets, and binding template		
	1.5	Single-server install only: Changing Building Operation ports		
2	**Installing and licensing PME** *		54.7	18.4
	2.1	Installing PME		
	2.2	Activating PME licenses		
	2.3	Single-server install only: Changing PME ports		
3	**Configure the devices in Building Operation with SmartWidgets**		81.7	36.6
	3.1	Configuring Modbus Master Interface		
	3.2	Importing SmartWidgets		
	3.3	Modifying SmartWidgets graphic		
	3.4	Creating trend logs for SmartWidgets		
	3.5	Copy, paste and edit to have the full system		
4	**ETL**		40.3	30.3
	4.1	Installing ETL		
	4.2	Creating ETL job		
	4.3	Adding and configuring the tasks		
	4.4	Configuring the mapping		
	4.5	Run job once and then register as a service		

5	**Integration Utility and Building Operation Import**		12.7	15
	5.1	Setting up the two tabs with "Reports Home Link" and "Dashboards Home Link"		
	5.2	Exporting the XML		
	5.3	Importing the XML		
6	**Setting up Dashboards and Reports** *		39.7	21.1
	6.1	Configuring Dashboards		
	6.2	Configuring Reports		
7	**Setting up Graphics** *		141.7	40.8
	7.1	Setting up Electrical One Line Diagram		
	7.2	Setting up System Network Health screen		
		Total	387.3	116.9

* These steps are identical for both architectures.

Architecture 2

Below are commissioning time estimates for PME/EBO Integration solutions for Architecture 2:

Architecture 2 Configuration Workflow			**Average Time (min)**	**Standard Deviation (min)**
1	**Installing and licensing Building Operation** *		14.0	6.1
	1.1	Installing and licensing License Server		
	1.2	Installing Enterprise Server		
	1.3	Installing Workstation		
	1.4	Installing Building Operation Connector components, snippets, and binding template		
	1.5	Single-server install only: Changing Building Operation ports		
2	**Installing and licensing PME** *		41.0	8.2
	2.1	Installing PME		
	2.2	Activating PME licenses		
	2.3	Single-server install only: Changing PME ports		
3	**Configure the devices in PME**		23.0	9.0
	3.1	Adding Devices in PME		
	3.2	Generating a Vista Network Diagram		
	3.3	Update EWS Server		
4	**Integration Utility and Building Operation Import**		15.3	7.8
	4.1	Setting up the four tabs with " All Device Diagram Links", "Reports Home Link", "Dashboards Home Link", "EWS Link & All Measurements"		
	4.2	Exporting the XML		
	4.3	Importing the XML		

5	**Setting up Dashboards and Reports** *		29.7	8
	5.1	Configuring Dashboards		
	5.2	Configuring Reports		
6	**Setting up Graphics** *		138.7	27.7
	6.1	Setting up Electrical One Line Diagram		
	6.2	Setting up System Network Health screen		
		Total	**261.7**	**66.8**

* These steps are identical for both architectures.

Estimation Guidelines

Below are guidelines for estimating the engineering time required to set up the key components of an PME/EBO Integration solution.

Software Installation

The installation and licensing of the solution does not vary based on the size of the system.

Device Configuration

The time required to configure the devices varies greatly based on the device types and their native support in the system. Do not simply multiply the amount of time provided in our commissioning time estimates by the number of devices in your system. Use the estimates only as a general guideline for the engineering time that might be required.

ETL

Configuring the ETL to setup the historical data transfer from Building Operation to PME is an additional task for Architecture 1, which takes a considerable amount of time. The required effort depends on the number of devices, device types, and the number of logs and measurement types. The use of batch editing, when configuring the Mapping in the ETL, can significantly reduce the configuration time.

Integration Utility

The time it takes to integrate PME and Building Operation by using the Integration Utility does not vary based on the size of the system. The exception being the following:

- The time it takes to populate the list under the EWS tab will vary somewhat based on size of the system.
- The export and import in Building Operation takes slightly longer for larger systems.

Setting up Dashboards and Reports

The time for setting up Dashboards and Reports is determined by the customer needs. The reference system used for estimation covers basic Dashboards and Reports for the power management of a building.

Setting up Graphics

For the graphics configuration (Electrical Network Graphics) the time recorded was the time to build them from scratch. The default Electric One Line Diagram ANSI/IEC and default Electrical Health Summary Screen is part of the reference system package. Time can be saved by modifying the default diagrams rather than building them from scratch.

Installing and Upgrading

Use the information provided in this chapter for installing or upgrading a Power Monitoring Expert (PME) system.

The topics in this section are organized into the following:

- New system install
- System update
- System upgrade
- System migration
- Cybersecurity
- Tools
- References

New system install

Use the links in the following table to find the content you are looking for.

Topic	Content
Before Installing the software	Provides information and reminders for you to consider before starting the installation.
Installation process	Provides detailed information on installing the SQL Server and the PME software.
After installing the software	Provides procedures for you to complete after the installation.
PME 2020 Install notes	Provides release notes related to the installation of PME 2020.
Installing the PME/EBO Integration solution	Provides information on installing the PME/EBO Integration solution.

Before Installing the software

Review the prerequisites

Before starting the installation, review the Planning chapter in this guide and confirm that your system meets all the relevant prerequisites. In particular, review the install planning, computer hardware, operating environment, network connectivity, and licensing requirements. Also review the PME 2020 Install notes, which provide information regarding installation that is specific to the latest version of the software.

Cybersecurity

Review the cybersecurity information. See Cybersecurity for details.

Use an account with administrative privileges to install the software

For installing PME, log on to your Windows system using an account that is a member of the Administrators group.

NOTE: Permissions for the Administrators group can be restricted by system policies which might affect the PME installation. Work with your network administrator to resolve any permissions issues.

⚠ WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

Use cybersecurity best practices to help prevent unauthorized access to the software.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

Work with facility IT System Administrators to ensure that the system adheres to the site-specific cybersecurity policies.

Create a file share for Engineering clients and Secondary servers

Engineering clients and Secondary servers must be able to access files on the PME application server. This is done through sharing the Power Monitoring Expert product folder on the server. You must set up this file share before installing Engineering clients or Secondary servers.

NOTE: Vista and Designer, on Engineering clients and Secondary servers, use this file share to access diagram files on the application server.

To create a file share for Engineering clients and Secondary servers:

1. On the PME application server, open File Explorer.
2. Navigate to the PME product folder `...\Power Monitoring Expert.`
3. Right-click the product folder and select **Properties**, this opens the Properties window.
4. In Properties, select the **Sharing** tab.
5. On the Sharing tab, select **Advanced Sharing**.
6. In Advanced Sharing, add a new share with the following details:
   - Select **Share this folder**
   - Share name: ION-Ent
   - Comments (Optional): Power Monitoring Expert file share
   - Permissions:
     - Groups or user names: Select the user that will be installing the Engineering client or Secondary server, and the users that will be accessing them. Alternatively, select the Everyone group.

       RECOMMENDATION: Select individual users instead of Everyone. That limits access to specific users and increases cybersecurity.
     - Permissions: **Change** and **Read**
7. Click **OK** in Advanced Sharing.
8. Click **Apply** and the **OK** in the Properties window.

Windows Integrated Authentication for SQL Server

If you are planning to install PME with Windows Integrated Authentication, then complete the following before starting the install:

NOTE: Windows Integrated Authentication is not supported for PME systems with Secondary Servers.

Standalone architecture

On the PME application server:

- Add the Windows account for the user who is installing the software to the local Administrator group.

- Add the Windows account for the install user to the SQL database logins with a sysadmin Server Role.

  NOTE: You can remove this account from the SQL database logins after PME is installed.

- Add the Windows account that is used by PME to access the databases to the local Administrator group.
- Set the 'Logon As A Service' privilege for the database access account.

Distributed Database architecture

On the Windows Domain, in the Active Directory:

- Add an account for the user who is installing PME. This only needs to be a domain user account, not a domain admin account.
- Add an account that PME will use to access the databases. This only needs to be a domain user account, not a domain admin account.

On the PME application server:

- Add the account for the install user to the local Administrator group.
- Add the database access account for PME to the local Administrator group.
- Set the 'Logon As A Service' privileges for the database access account.

On the database server:

- Add the account for the install user to the local Administrator group.
- Add the account for the install user to the SQL database logins with a sysadmin Server Role.

  NOTE: You can remove this account from the SQL database logins after PME is installed.

NOTE: When PME is installed with Windows Integrated Authentication, the Windows account that is used to access the database is also used to run the PME services and the IIS Application Pools.

Update the operating system

Run the Windows Update service to install the latest security patches and hotfixes from Microsoft.

Install troubleshooting

Unsuccessful installation due to invalid account passwords

Problem:

The installation of PME was not successful, after changing the Windows accounts or database accounts passwords to passwords that do not meet the password policies.

Background:

PME uses Windows accounts and database accounts to run its services and access the databases. These accounts are created during the installation of the software. The installer generates default passwords for these accounts. The default passwords are long and complex and most likely comply with your Windows and SQL Server password policies.

The installer also gives you the option to change these default passwords. If you decide to change the passwords, the passwords you are providing must comply with your Windows and SQL Server password policies. The software installer cannot validate the passwords at the time you enter them. If the passwords are not valid, the installation will not be successful.

Solution:

If the installation does not succeed because the passwords do not meet the policies, do the following:

1. Complete the installation, skipping any unsuccessful steps.
2. After the installation is complete, run the installer again.

   NOTE: The installer will detect that the software has been installed on this computer, and open in maintenance mode.

3. Select **Reset Accounts**.
4. Follow the wizard and change the passwords for the Windows and database accounts to passwords that meet the password policies. Allow the installer to complete the account reset.
5. Click **Close** to close the installer.

Installation process

The installation is a two-step process that must be performed in the following order:

1. Installing the SQL Server.
2. Installing the PME software.

NOTE: The same PME installer is used to install a Standalone Server, Application Server, or Engineering Client. Which component is installed is determined by the Setup Type, which you select during the installation. Based on this Setup Type, the installer displays the appropriate setup pages. See Setup Types and applicable Installer pages for more information.

For information on the different Setup Types, see Standalone Server, Application Server, Engineering Client.

Web Clients do not need to be installed. For information on Web Clients, see Client types.

Installing the SQL Server

There are several options for the installation of the SQL Server. You must choose one of these options and complete the installation of SQL Server before you can install PME.

Option 1 - Install a new, full SQL Server version.

For detailed installation instructions for this option, continue with Installing a new SQL Server.

Option 2 - Reuse an existing SQL Server version instance.

This can be a full SQL Server version or a SQL Server Express version. To reuse an existing SQL Server instance, configuration steps are required to prepare this instance for use with PME. For detailed configuration instructions, continue with Configuring an existing SQL Server.

Option 3 - Use the SQL Server Express version included in PME

The SQL Server Express is installed by the PME installer as part of the software installation process. For detailed instructions, continue with Installing the PME software.

NOTE: Option 3 is only supported for Standalone architectures. Distributed Database architectures require the full version of SQL Server.

For information on choosing a supported SQL Server version, see Operating Environment, SQL Server considerations, and SQL Server Licensing.

Installing a new SQL Server

Log into Windows as a user with administrative privileges. Make sure that no other programs are running; save your work and close any open applications.

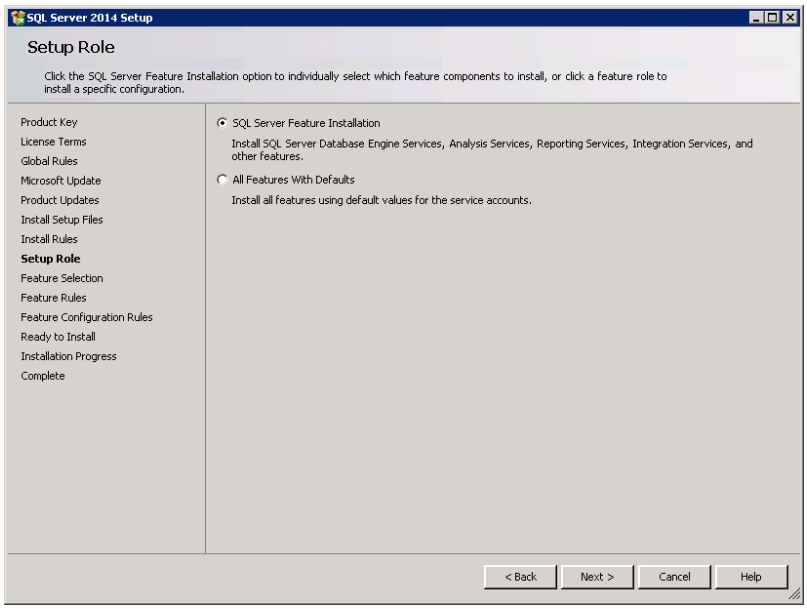
The installation steps are generally the same for all supported SQL Servers. For illustration purposes, the images in the following steps are from the SQL Server 2014 Standard edition installation unless indicated otherwise.

1. Insert the SQL Server Installation DVD in your DVD drive or access the installation media on your system, then navigate to the root directory on the DVD and double-click `setup.exe` to open the **SQL Server Installation Center**.
2. Select **Installation** in the left pane and **New SQL Server stand-alone installation or add features to an existing installation** on the right.
3. Follow the steps provided by the installation wizard until you reach the **Setup Role** page, for SQL Server 2012 and 2014, or the **Feature Selection** page, for SQL Server 2016 and 2017.

   NOTE: Whenever a validation process occurs during installation, if validation is not successful, follow the instructions in the wizard to resolve the problem and click **Re-run**. Click **Next** when the validation is successful.

4. (For SQL Server 2012 and 2014) **Setup Role** page:

   Leave **SQL Server Feature Installation** selected, and click **Next**.



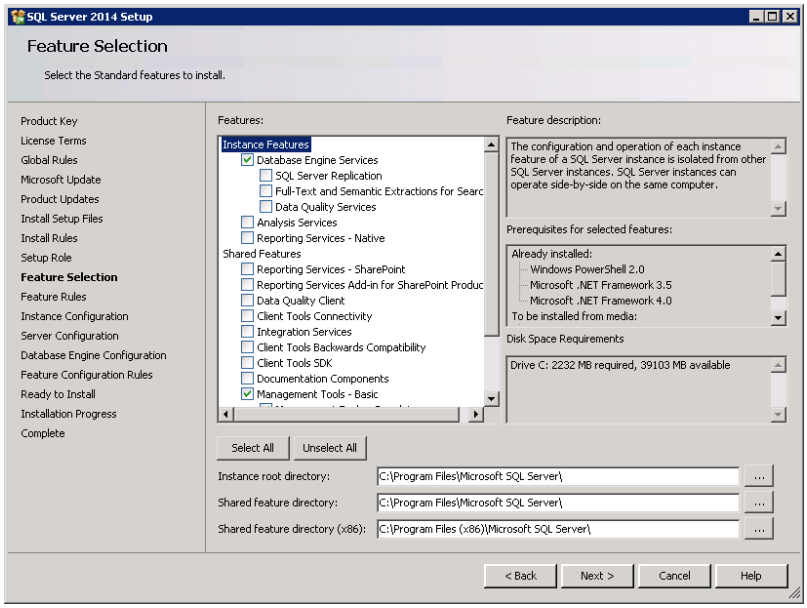
5. **Feature Selection** page:

   Under **Instance Features**, select **Database Engine Services**.

   (For SQL Server 2012 and 2014) Under **Shared Features**, select **Management Tools - Basic** and **Management Tools - Complete**.

   (For SQL Server 2016 and 2017) The Management Tools are installed in a separate Web-based process after completing the installation of SQL Server.

   Click **Next**.

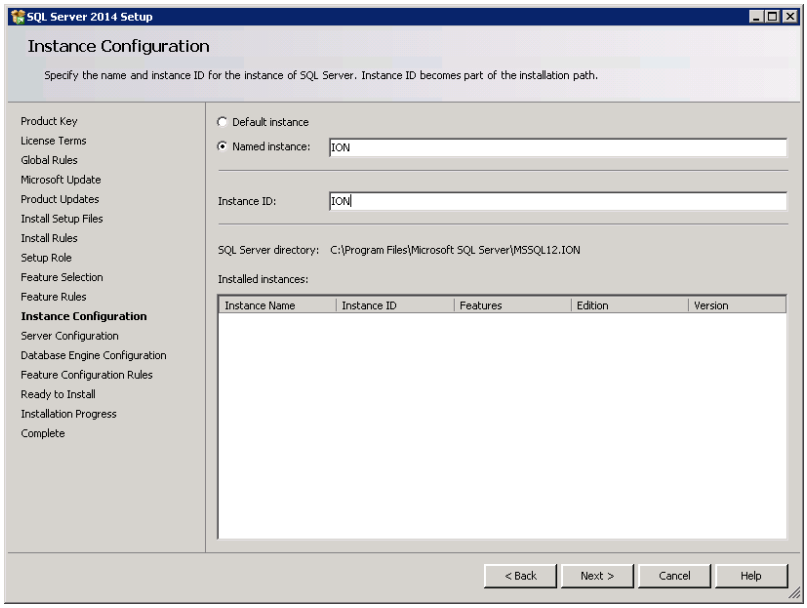


6. **Feature Rules** page:

   This page identifies any errors related to the feature selection validation. If successful, the next page opens. If not successful, follow the instructions on the page and click **Re-run**. Click **Next** when the process completes successfully.

7. **Instance Configuration** page:

   Select **Named instance** and enter a name in the **Instance Name** field, for example **ION**. (Do not use an underscore character (_) within the instance name.) Click in the **Instance ID** field to automatically add your **Instance name** entry. Click **Next**.



8. **Server Configuration** page:

   Change the **Account Name** for SQL Server Agent and SQL Server Database Engine to **NT AUTHORITY\SYSTEM** (your local system account). To do this, highlight the existing entries

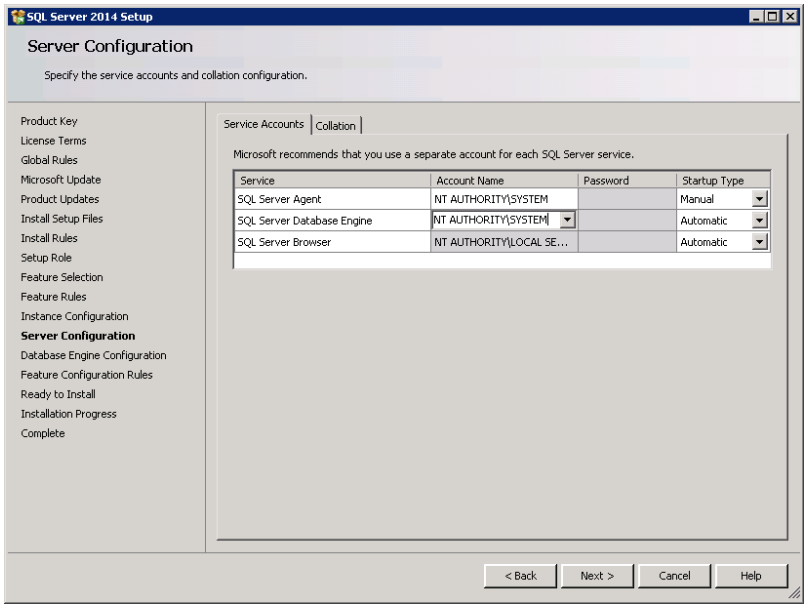
in the **Account Name** column and enter `NT AUTHORITY\SYSTEM` for the two services. (For SQL Server 2017) Select **Grant Perform Volume Maintenance Task privileges to SQL Server Database Engine Service**. Click **Next**.

NOTE:
If you specify a Windows account other than the local system account, when you begin installing PME, the **Check System** page in the Installer indicates that the service account under which the SQL Server currently runs does not have the required system permissions. To resolve this situation, you need to do one of the following:

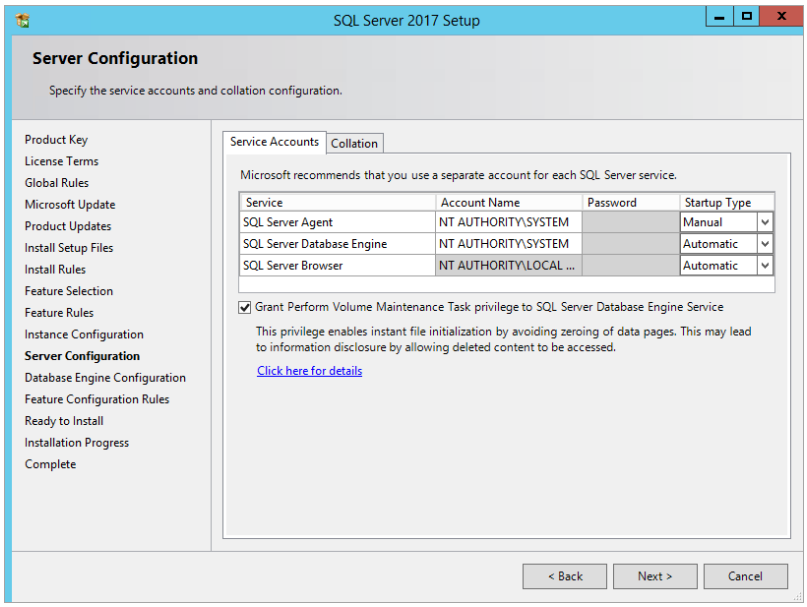
- Temporarily change the SQL Server service to run under an account that has Write permissions to (1) the folder created for the product's databases (the default is the install location for `...\Power Monitoring Expert\`), and (2), for the current logged-in user's Temp folder. (To find the full path to the Temp folder, click **Start > Run**, enter %Temp% and click **OK**.) The default local system account is an example of an account with these privileges.
- Temporarily grant Write permission for the two folders mentioned above to the Windows account that the SQL Server service runs under. Use the Windows Services control panel to identify this account. (Click **Start > Administrative Tools > Services**, right-click **SQL Server**, click the **Log On** tab in the **SQL Server Properties** dialog.)

Revert the temporary changes after the installation of PME completes.

SQL Server 2014:



SQL Server 2017:



9. **Database Engine Configuration** page, on the **Server Configuration** tab:
   a. Select **Mixed Mode**.

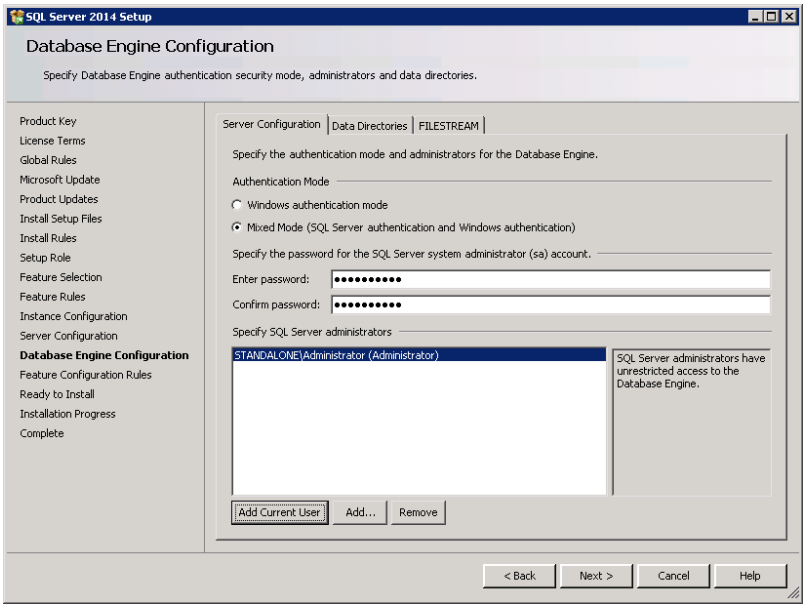
   > **NOTE**: If you are planning to install PME with Windows Integrated Authentication, then you can choose to configure the database engine either with Windows Authentication Mode or Mixed Mode. Mixed Mode authentication is also referred to as SQL Server authentication in this document.

   b. (For Mixed Mode) Type a password for the SQL Server system administrator (sa) account in the **Enter password** and **Confirm password** fields. (Keep a record of the password for future use.)

   > **⚠ WARNING**
   >
   > **POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY**
   >
   > Use cybersecurity best practices for password creation and management.
   >
   > **Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.**

   Cybersecurity policies that govern user accounts and access - such as least privilege, separation of duties - vary from site to site. Work with the facility IT System Administrator to ensure that user access adheres to the site-specific cybersecurity policies.

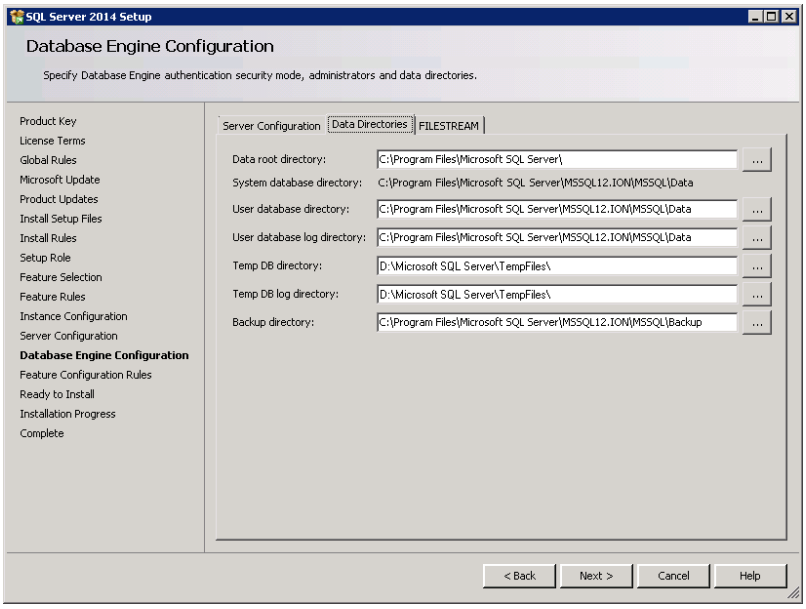
   c. Click **Add Current User** to add the SQL Server Administrator if it is not specified by default.

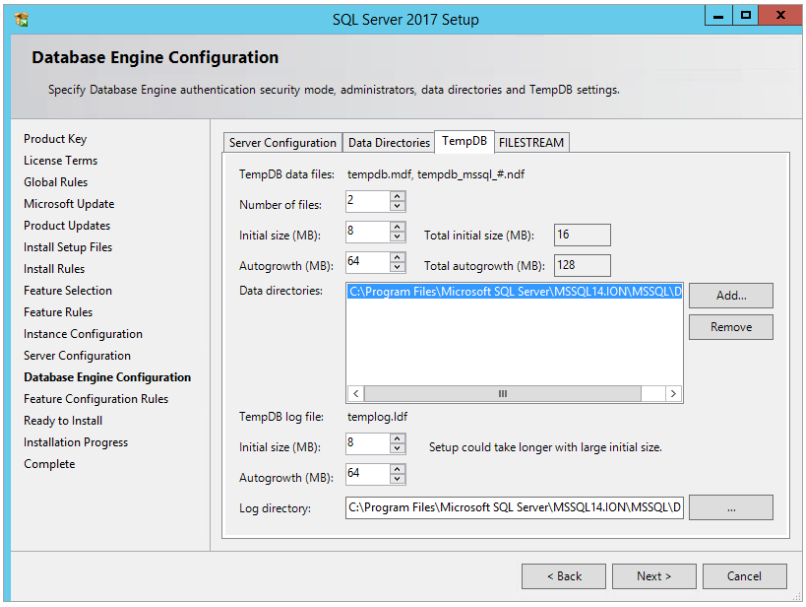


d. (For SQL Server 2012 and 2014) Click the **Data Directories** tab. (For SQL Server 2016 and 2017) Click the **TempDB** tab.

e. Specify a drive for the TempDB directories (Data and Log). If possible, locate these files on different drives than the database directories to improve performance. Click **Next**.

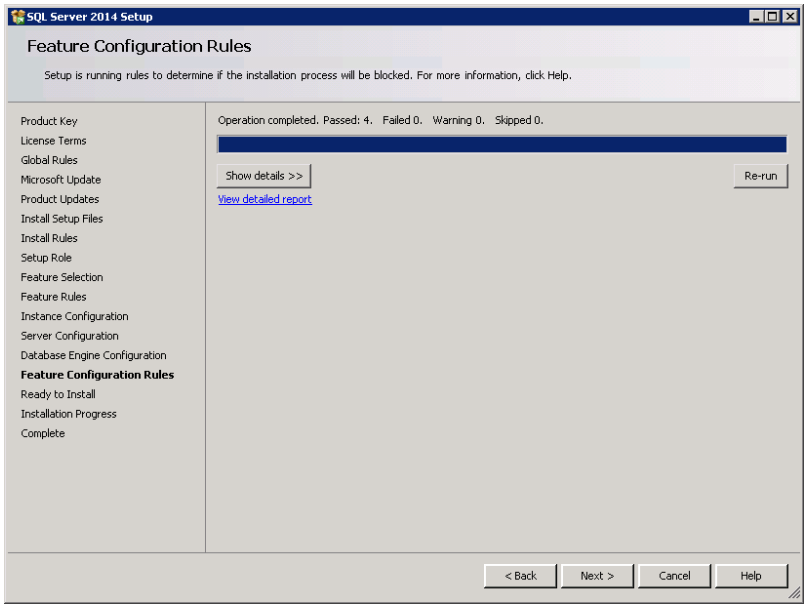
> **NOTE**: The specification of different drives is for performance reasons. If all of the files are located on the same drive, data that is being inserted, updated, or deleted can potentially result in slower write operations than if the Temp DB directories are located on a separate drive. The specification of different drives is dependent on your hardware configuration and may not be possible in all cases.





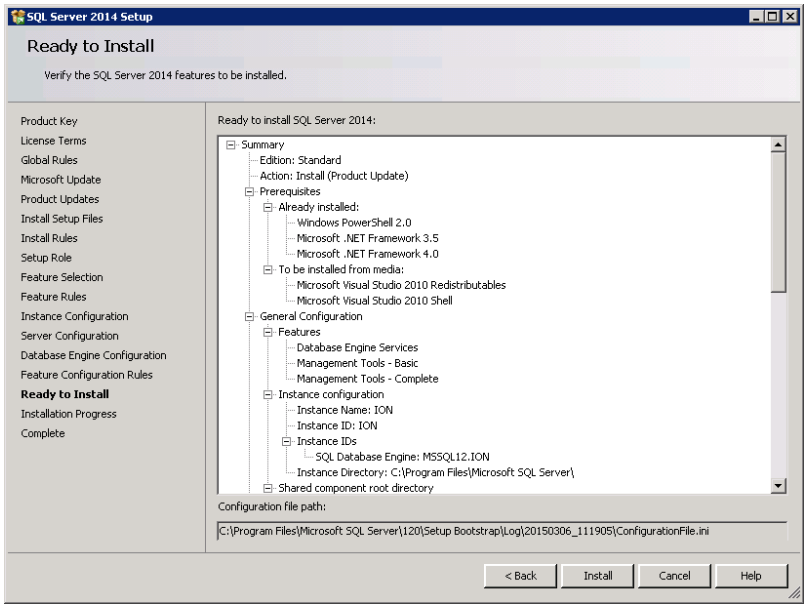
10. **Feature Configuration Rules** page:

    The rules are run automatically to validate that the installation can proceed. If validation is successful, the next page opens. This can be very quick and it might seem that the install wizard jumps directly to the next page. If validation is not successful, follow the instructions on the page and click **Re-run**. Click **Next** when the validation is successful.



11. **Ready to Install** page:

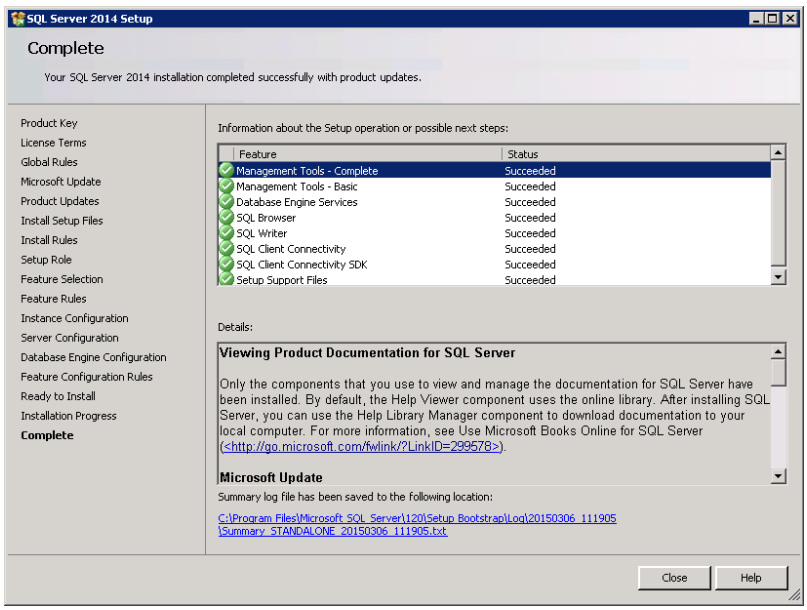
    The page shows the SQL Server features that are about to be installed. Click **Install**.



The **Installation Progress** page provides a visual indication of the progress of the installation. When the installation finishes, the **Complete** page opens.

12. **Complete** page:

    Contains information about the Setup operations or possible next steps, as well as supplemental information related to your installation. Click **Close** to close the setup dialog.



13. (For SQL Server 2016 and 2017) In SQL Server Installation Center, click **Install SQL Server Management Tools** to launch the download page for the installation of SQL Server Management Studio. Follow the instructions to install SQL Server Management Studio. A system reboot is required after installing SQL Server Management Studio.

    NOTE: Internet access is required. If Internet access is not possible from this server, download the SQL Server Management Studio setup file on a different computer and copy it to the SQL Server computer for installation.

14. Go to the **Maintenance** page in the **SQL Server Installation Center** and click **Launch Windows Update to search for product updates** that you can install.
15. Close the **SQL Server Installation Center**.
16. (Recommended) Set the SQL Server memory options. See Setting SQL Server memory options for more information.

Configuring an existing SQL Server

If you have an existing installation of SQL Server Express, the PME Installer adds the instance that is required by PME.

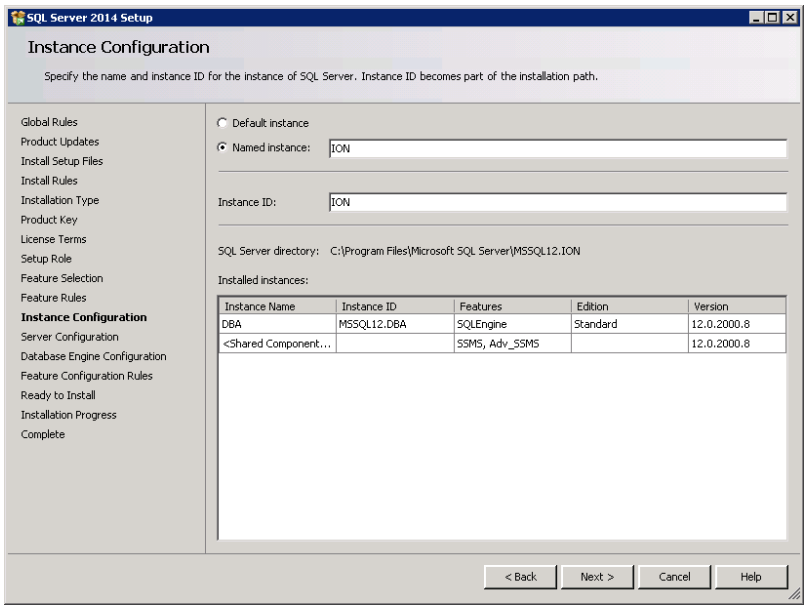
If you have an existing installation of SQL Server Standard Edition, then rerun the SQL Server Setup wizard and follow the steps described in Installing a new SQL Server.

In most cases, fewer steps are required. The **Instance Configuration** page is slightly different, as noted below.

The **Instance Configuration** page:

1. Enter a name in the **Instance Name** field, for example **ION**. (Do not use an underscore character (_) within the instance name.)
2. Click in the **Instance ID** field to automatically add your **Instance name** entry.
3. Click **Next**.

   Any existing instance names appear in the **Installed Instances** area on the page. If Management Studio Tools have previously been installed, they are identified as the shared components **SSMS**, and **Adv_SSMS**.



Complete the remaining steps in the instance addition process and close the **SQL Server Installation Center**.

(Recommended) Set the SQL Server memory options. See Setting SQL Server memory options for more information.

For SQL Server 2016 and 2017, if SQL Server Management Tools need to be installed, click **Install SQL Server Management Tools** in the SQL Server Installation Center to launch the download page for their installation. Internet access is required.

Installing the PME software

NOTE: Perform the software installation directly on the server, do not do a remote installation.

NOTE: As part of the software installation you need to provide SQL Server credentials with sysadmin privileges on the database server. For Distributed Database architectures, if you are not able to provide these kinds of credentials, see Installing PME with manual installation of the databases for an alternate installation method.

Start the installation process by inserting the PME DVD into the DVD drive. If the installation does not start automatically, use Windows Explorer to navigate to the DVD drive and double-click `MainSetup.exe`.

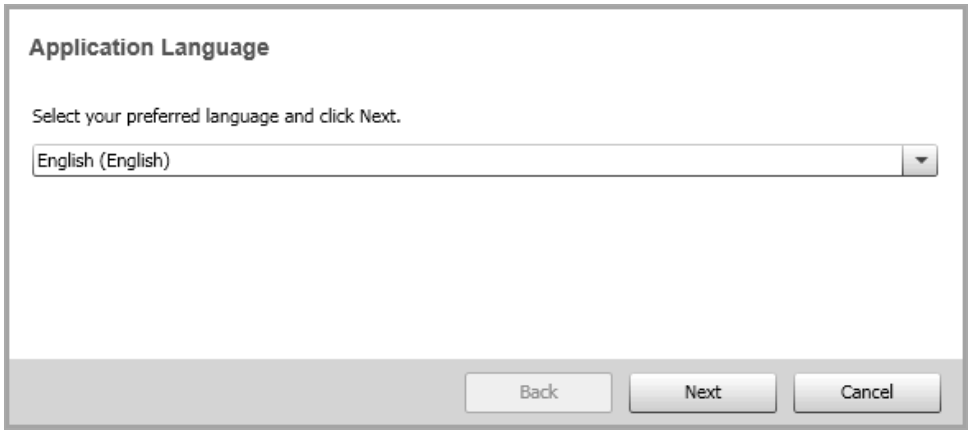
1. Install Microsoft .NET Framework if prompted.

   After installing the .NET Framework, you are prompted to restart your system. After the restart, double-click `MainSetup.exe` to continue the PME installation.

2. **Application Language** page:

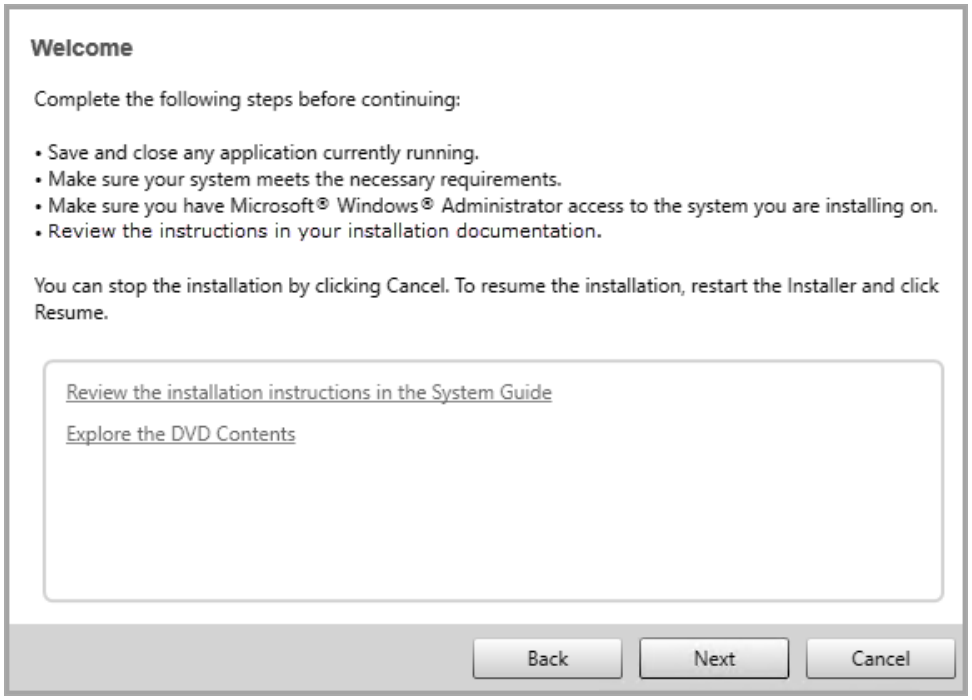
   Select the **Application Language** and click **Next**.

   The **Application Language** setting determines the language that is displayed in the following installer pages and the language of the PME system that is installed.



3. **Welcome** page:

   Review the reminders for tasks to complete before continuing with the installation, and click **Next**.



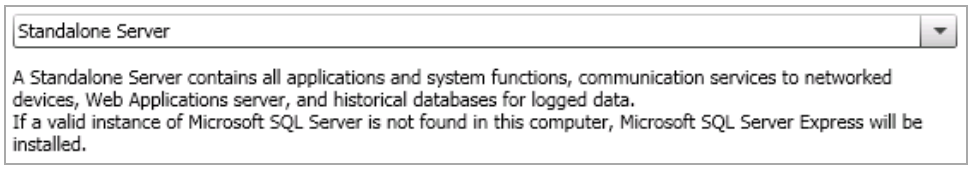
4. **License Agreement** page:

   Read the End User License Agreement (EULA) on the **License Agreement** page. If you accept the terms of the license agreement, click **I Agree** to proceed.

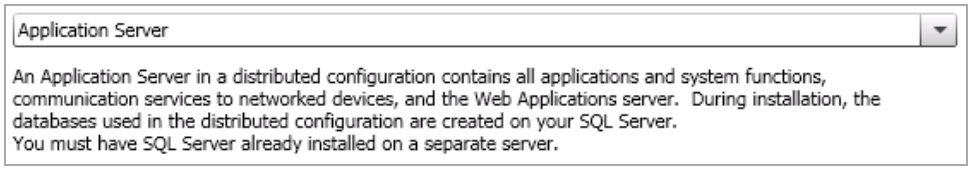
5. **Setup Type** page:

   Select the Setup Type you want to install and click **Next**.

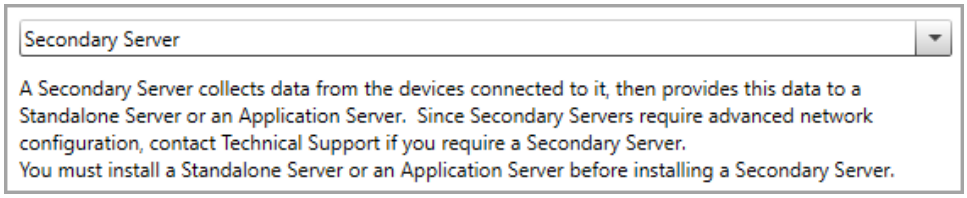
   Standalone Server:



   Application Server:



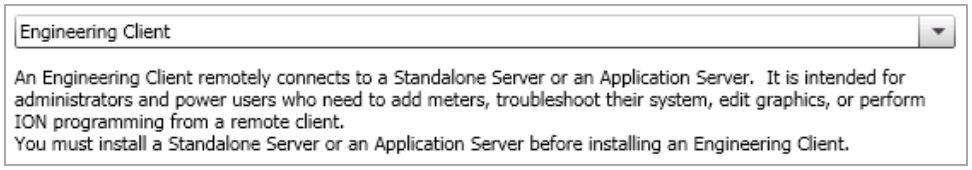
   Secondary Server



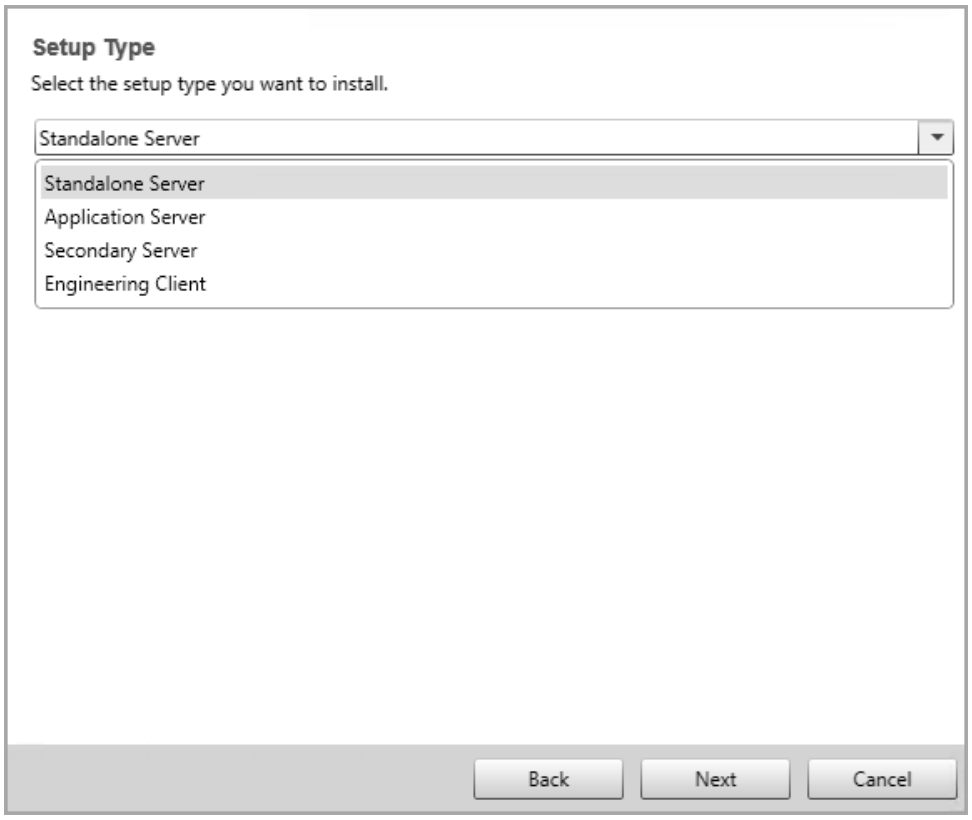
NOTE: Secondary Server installations are not common and are used only in exceptional circumstances. They require advanced network configuration. Contact Technical Services if you think you need a Secondary Server.

NOTE: Secondary servers must be able to access files on the primary application server. This is done through a file share on the primary server. You must set up this file share before continuing with the Secondary server install. The install will not be successful if the file share cannot be found. For details on how to set up the file share, see Create a file share for Engineering clients and Secondary servers.

Engineering Client:



NOTE: Engineering clients must be able to access files on the application server. This is done through a file share on the server. You must set up this file share before continuing with the Engineering client install. The install will not be successful if the file share cannot be found. For details on how to set up the file share, see Create a file share for Engineering clients and Secondary servers.



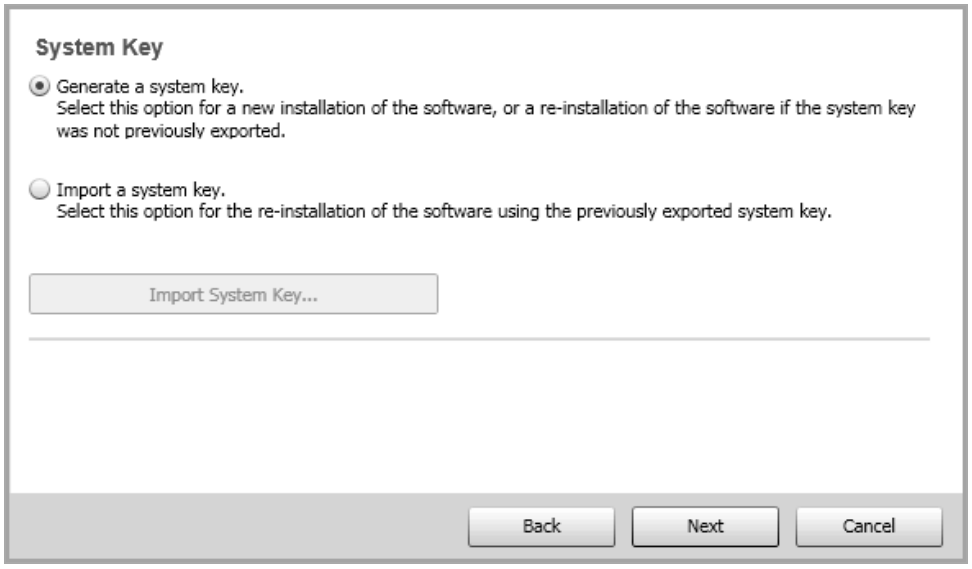
NOTE: Not all of the following installer pages are shown for all Setup Types. See Setup Types and applicable Installer pages for more information.

6. (Standalone Server and Application Server) **System Key** page:

   Select **Generate a system key** or **Import a system key** and click **Next**.

   Generate a system key for the initial installation of a Standalone Server or Application Server setup type, or when you are re-installing one of those setup types and a system key is not available.

   Import a system key when you are re-installing a Standalone Server, or an Application Server setup type and you have the system key that you previously exported.



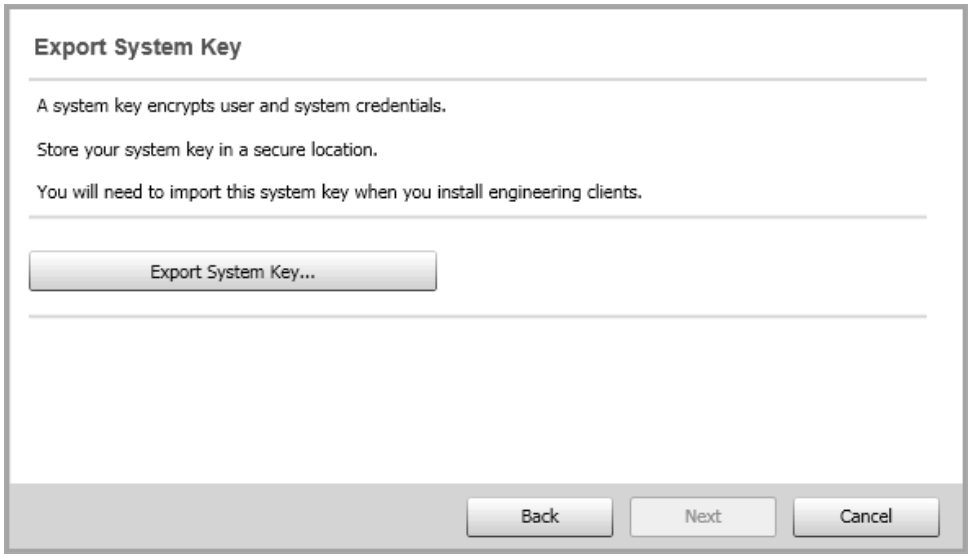
7. (Standalone Server and Application Server) **Export System Key** page:

   It is mandatory that you export the system key. **Next** is enabled after you complete the export.

   a. Click **Export System Key** to open the file explorer.
   b. Navigate to the location where you want to store the system key.
   c. Type a file name for the system key and click **Save**.
   d. Click **Next**.

   The system key is required if you install an Engineering Client, or if you need to uninstall and then reinstall Power Monitoring Expert.

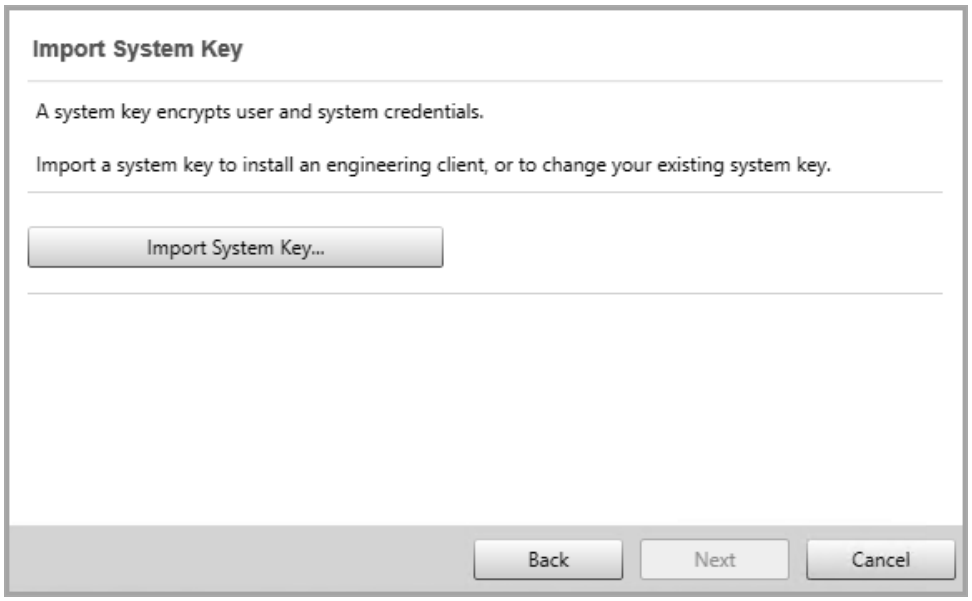
   NOTE: You can export the system key at any time after the installation. See PME Installer for details.



8. (Engineering Client) **Import System Key** page:

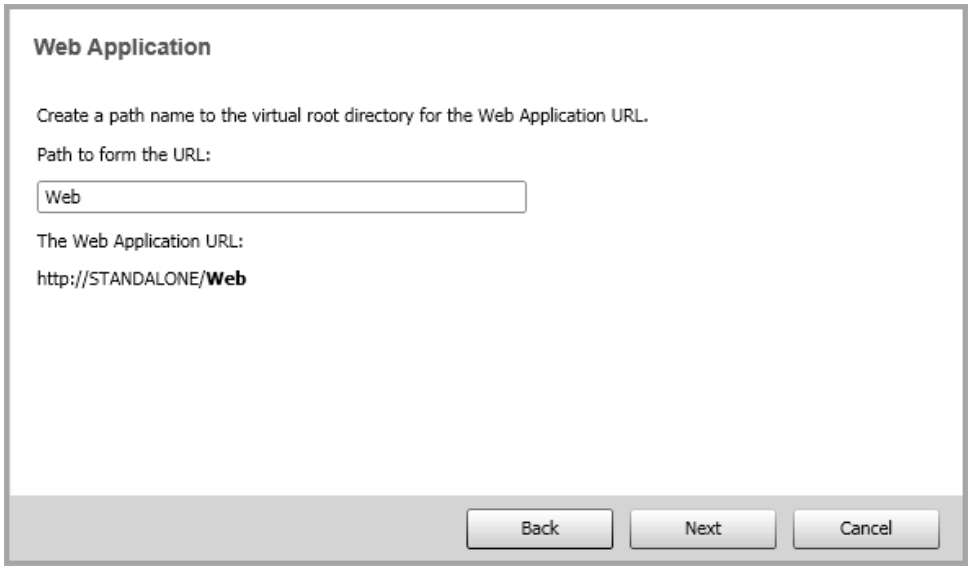
   The Engineering Client installation needs to use the system key that you exported when you installed a Standalone Server or an Application Server.

   a. Ensure that the system key is available.
   b. Click **Import System Key** to open a file explorer.
   c. Navigate to and click the system key file.
   d. Click **Open** to add the system key location to the **Import System Key** page.
   e. Click **Next**.



9. (Standalone Server and Application Server) **Web Application** page:

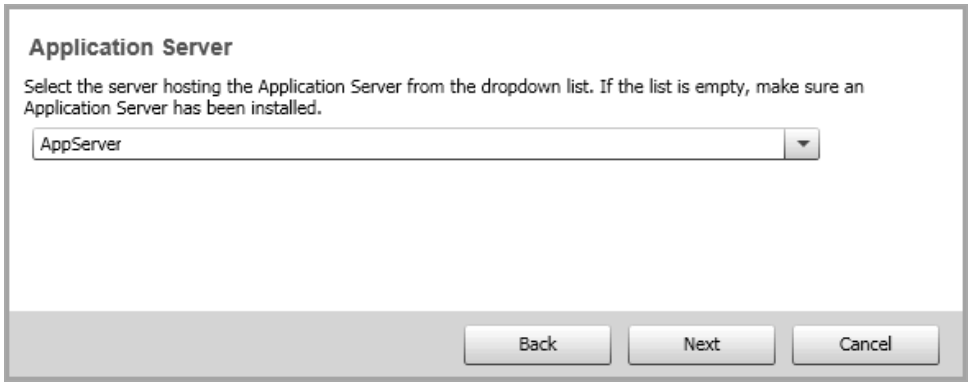
   Change the default URL path for the Web Applications component of the product, or use the default values, and click **Next**.



10. (Engineering Client) **Application Server** page:

    Enter or select the PME Application Server and click **Next**.

    NOTE: The first time you are installing an Engineering Client for a system, the selection box on this page is empty. Manually enter the name of the Application Server or Standalone Server. For repeated client installs, you can select the server name from the box.



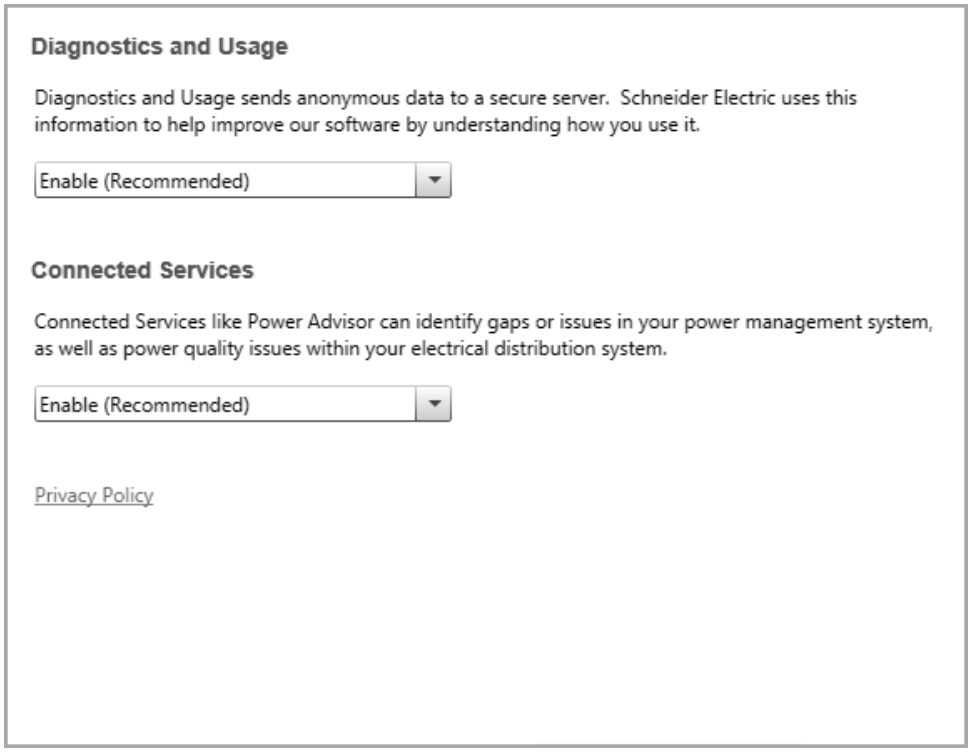
11. (Standalone Server and Application Server) **Diagnostics and Usage** and **Connected Services** page:

    Enable or disable these services and click **Next**.

    Diagnostics and Usage, when enabled, collects and sends system data to Schneider Electric. We use this data to help improve our software by understanding how you use it. See Diagnostics and Usage for details.

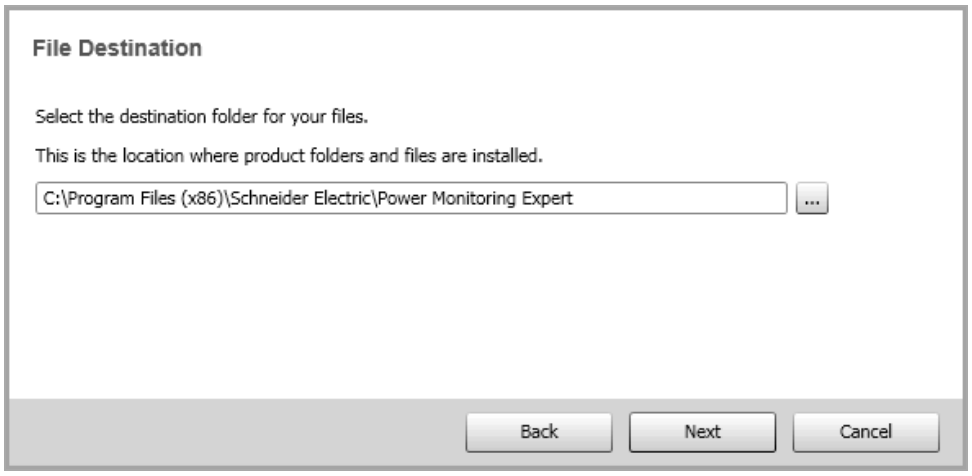
    Connected Services, when enabled, collects and sends energy and power data to Schneider Electric. We can use this data to identify data issues in your power monitoring system or power quality issues within your electrical distribution system. See Connected Services for details.

    See Resources for a link to the Privacy Policy.



12. **File Destination** page:

    This page shows the default installation location for the product folders and files. Use the browse button to select a different location if desired. Click **Next**. Click **Yes** if you are prompted to create the folder.



13. (Standalone Server and Application Server) **Supervisor Account** page:

    Enter and confirm a password for the supervisor account for the software. Click **Next**.

    The supervisor account has the highest level of access to the system. Use this account to configure the system. The strength of the password is evaluated as you type, and the evaluation is included on the page. The password strength evaluation ranges from very weak to very strong.

⚠ WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

Use cybersecurity best practices for password creation and management.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

Cybersecurity policies that govern user accounts and access - such as least privilege, separation of duties - vary from site to site. Work with the facility IT System Administrator to ensure that user access adheres to the site-specific cybersecurity policies.

NOTE: If you continue to the next pages in the Installer and then return to this page by clicking **Back**, the page contains a **Change Password** button. If you want to change the password that you initially entered, click **Change Password**, type the new password in the fields, and click **Next** to proceed.

14. (Standalone Server and Application Server) **Windows Accounts** page:

    Use the default password for the Windows accounts or change the password and click **Next**.

    NOTE: If you change the password, the password you are providing must comply with the password policies of the Windows server and the SQL server.
    The software installer cannot validate the password at the time you enter it.
    If the password is not valid, the installation will not be successful. In that case, complete the installation, skipping any unsuccessful steps. See Unsuccessful installation due to invalid account passwords for information on how to repair the unsuccessful install.

    PME uses two Windows accounts for its operation, `IONMaintenance` and `IONUser`. By default, the password for these accounts is generated automatically by the installer. The same password is used for both accounts.

The `IONMaintenance` account is used to run PME database jobs in Windows Task Scheduler. The `IONUser` account is used for subscriptions created in the Reports application when the generated report is created using the fileshare option.

NOTE: If you want to later change the settings for the database jobs in Windows Task Scheduler, you need the password for the `IONMaintenance` account. In this case you must choose your own password for the Windows Accounts on this page since the default password cannot be retrieved.

NOTE: You can change the Windows Accounts password at any time after the installation. See PME Installer for details.

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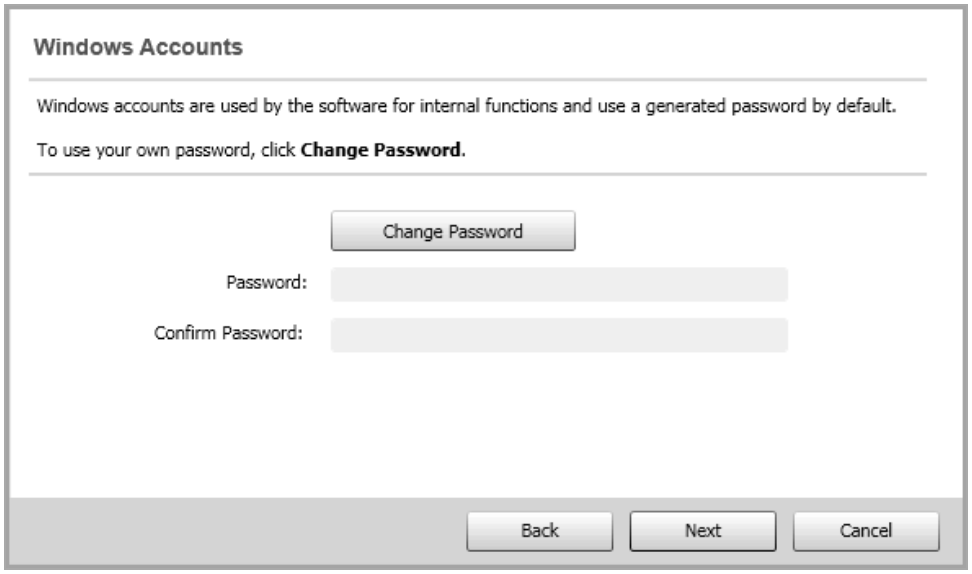

15. (Standalone Server and Application Server) **Database Accounts** page:

    Select **Use SQL Server Authentication** or **Use Windows Integrated Authentication** for the PME database accounts. For SQL Server Authentication, use the default password for the database accounts, or change the password. For Windows Integrated Authentication, specify an existing Windows account. Click **Next**.

NOTE: Windows Integrated Authentication is not supported for PME systems with Secondary Servers.

NOTE: If you change the password, the password you are providing must comply with the password policies of the Windows server and the SQL server.
The software installer cannot validate the password at the time you enter it.
If the password is not valid, the installation will not be successful. In that case, complete the installation, skipping any unsuccessful steps. See Unsuccessful installation due to invalid account passwords for information on how to repair the unsuccessful install.

With SQL Server Authentication, PME uses three SQL accounts for its database access, `ION`, `ionedsd` and `AMUser`. These accounts are created by the installer. By default, the password for these accounts is generated automatically by the installer. The same password is used for all three accounts.

With Windows Integrated Authentication, PME uses one Windows account for its database access. You must choose an existing account or create a new one with the correct access permissions. We recommend you create a new, dedicated Windows account for this.

NOTE: The Windows account for Windows Integrated Authentication must be created outside of the PME installer. You cannot create this account through the installer.

NOTE: When PME is installed with Windows Integrated Authentication, the Windows account that is used to access the database is also used to run the PME services and the IIS Application Pools.

NOTE: You can change the password for the SQL accounts and update the password for the Integrated Authentication Windows account at any time after the installation. See PME Installer for details.

⚠ WARNING

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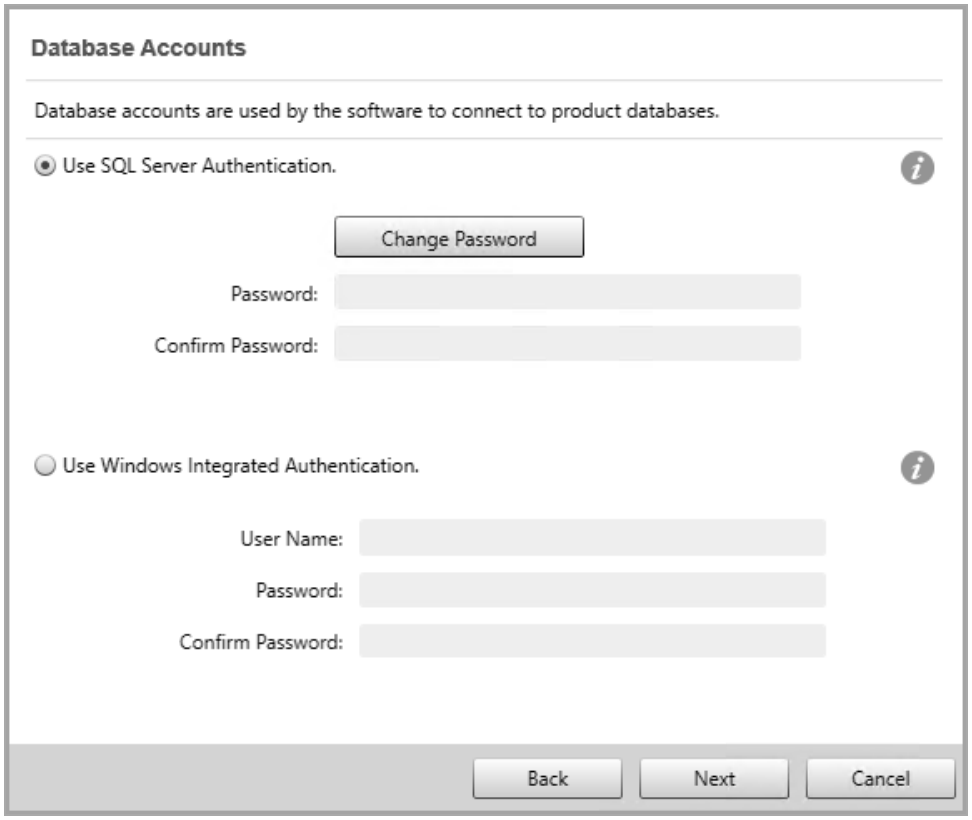
Cybersecurity policies that govern user accounts and access - such as least privilege, separation of duties - vary from site to site. Work with the facility IT System Administrator to ensure that user access adheres to the site-specific cybersecurity policies.

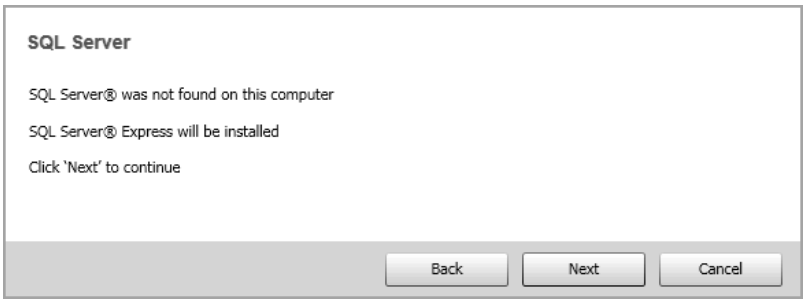


NOTE: For Windows Integrated Authentication, enter the Windows account User Name as `DOMAIN\UserName` or `COMPUTERNAME\UserName`.

16. (Standalone Server and Application Server) **SQL Server** page:

For a Standalone Server setup type when no SQL Server instance is detected

- The page indicates that SQL Server Express will be installed. Click **Next**.



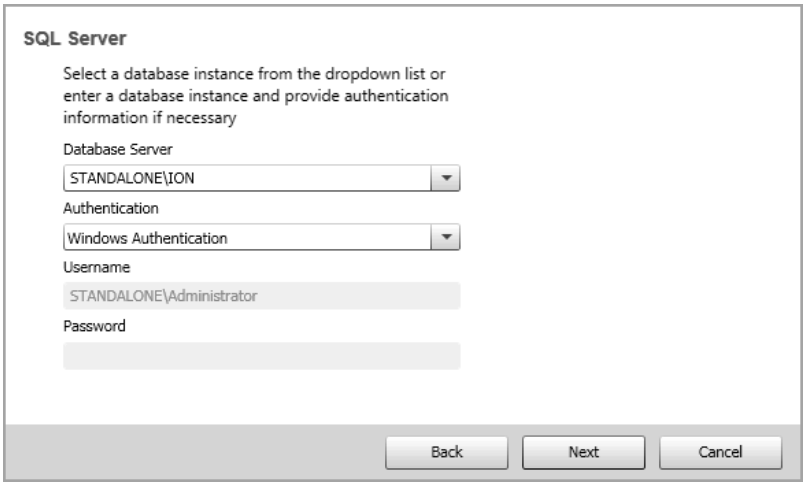
For a Standalone Server setup type when the detected SQL Server instances include one with the name ION

- Select the database server instance, provide the necessary authentication values, and click **Next**.

NOTE: The user account, Windows or SQL, that is specified in this step, is used for the installation of PME and for future password changes. This is different from the database accounts that are used during the operation of the software. These accounts were defined in the previous step.

NOTE: For the Windows Authentication option, the current Windows user needs to be a member of the sysadmin SQL Server role. For the specified SQL Server authentication option, the SQL Server user needs to be a member of the sysadmin SQL Server role.

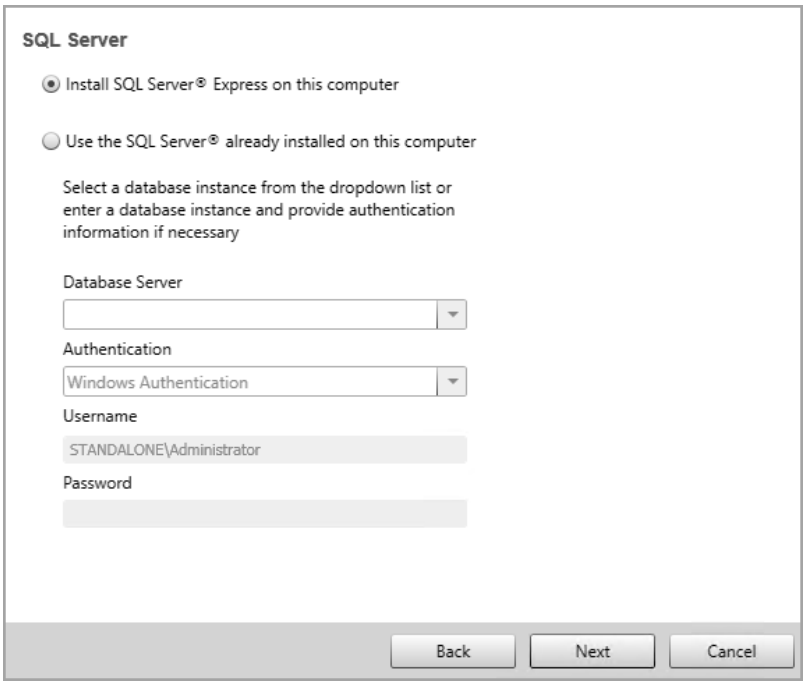
Select the SQL Server instance that you were planning to use with PME when you installed or reconfigured the SQL Server.



For a Standalone Server setup type when the detected SQL Server instances do not include one with the name ION

- Select either the **Install SQL Server Express on this computer** option to install an instance specifically for use with PME or select one of the detected database instances you want to use with PME. Click **Next**.

NOTE: The user account, Windows or SQL, that is specified in this step, is used for PME installation. This is different from the database accounts that are used during the operation of the software. These accounts were defined in the previous step.



After the completion of the SQL Server Express installation, a system check is performed to verify that the mandatory prerequisites have been met. The results of the verification are shown on the **Check System** page.

⚠ WARNING

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Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

Cybersecurity policies that govern user accounts and access - such as least privilege, separation of duties - vary from site to site. Work with the facility IT System Administrator to ensure that user access adheres to the site-specific cybersecurity policies.

NOTE: We recommend that you change the SQL Server Express sa account password after installing PME.

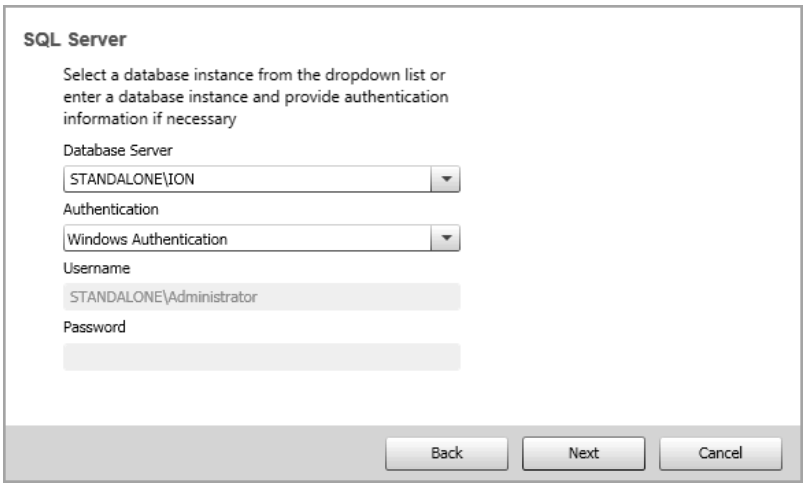
For an Application Server setup type

- If this is the first time that you are installing an application server, the dropdown field for the remote database server is empty. Ensure that your database server is defined in your system network and type its name and the SQL Server instance in the **Database Server** field, where the format is *server_name\instance_name*.

  Click **Next**.

  NOTE: The user account, Windows or SQL, that is specified in this step, is used for PME installation. This is different from the database accounts that are used during the operation of the software. These accounts were defined in the previous step.

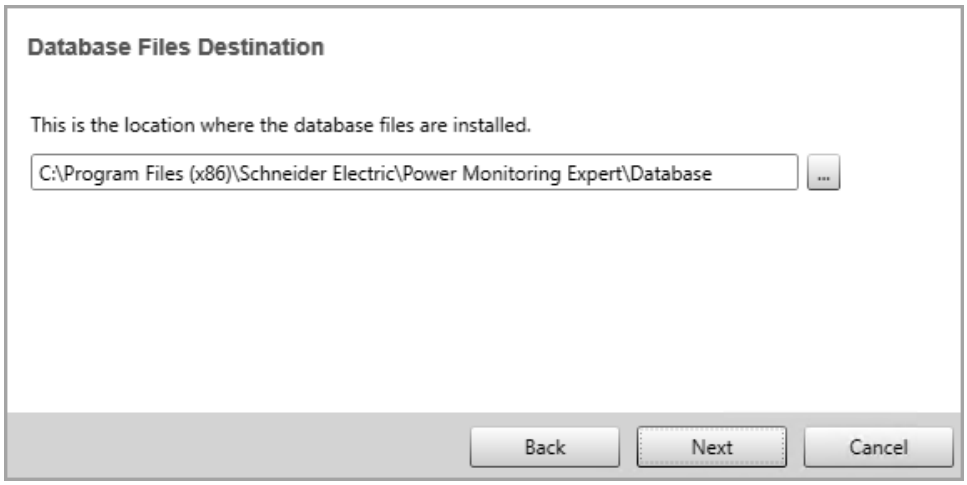
  NOTE: For the Windows Authentication option, the current Windows user needs to be a member of the sysadmin SQL Server role. For the specified SQL Server authentication option, the SQL Server user needs to be a member of the sysadmin SQL Server role.



17. (Standalone Server and Application Server) **Database Files Destination** page:

For the Standalone Server setup type

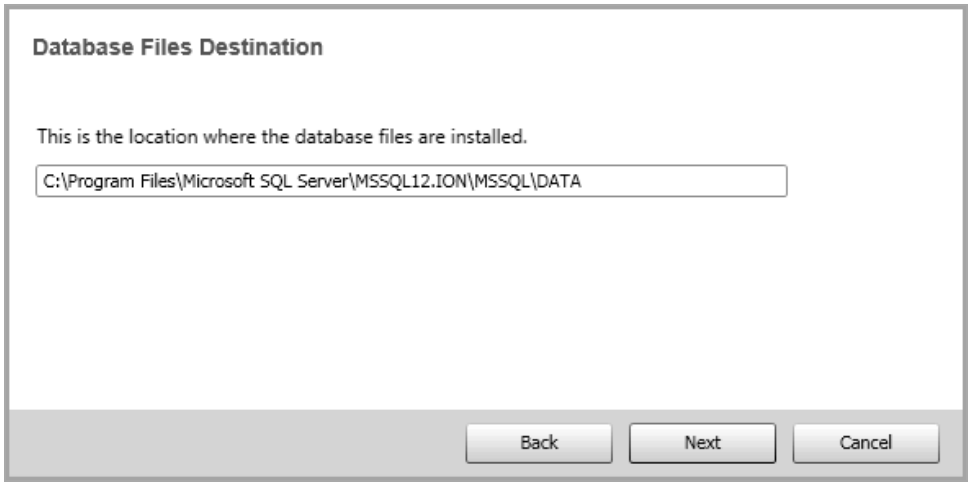
This page shows the installation location for the PME databases. Click **Next**. Click **Yes** if you are prompted to create the folder.



For the Application Server setup type

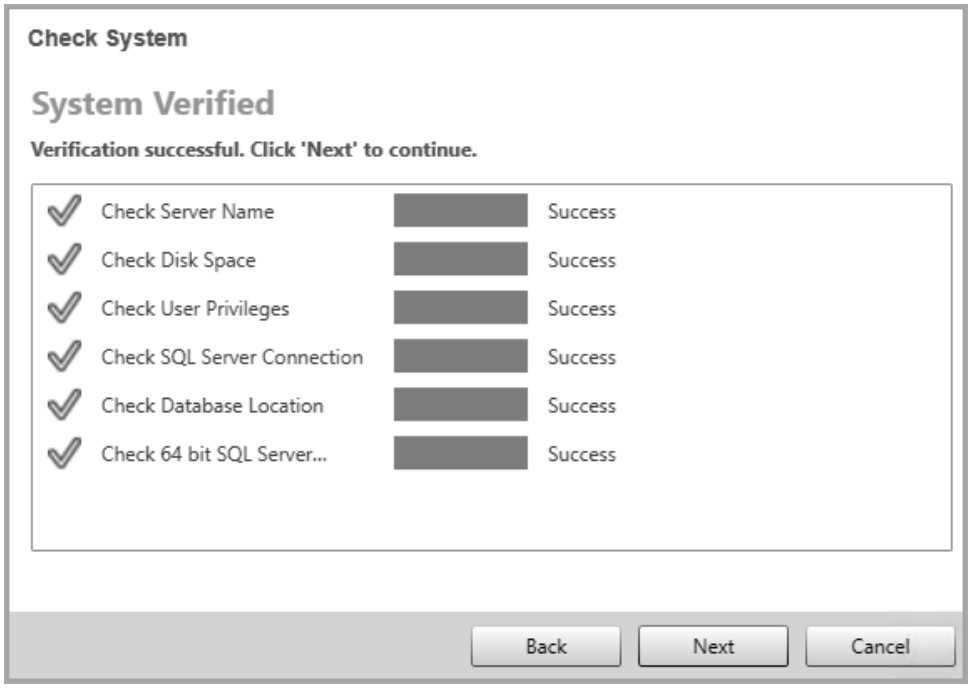
This page shows the database file location on the database server that you selected on the **Database Software** page.

NOTE: Enter the path to the folder on the database server where you want to install the database files (MDF and LDF files). The installer will create this folder if it does not exist.



18. **Check System** page:

    The **Check System** page verifies that the mandatory prerequisites have been met before proceeding. If there is a problem, the item is identified and clicking on it displays additional information about the situation. Click **Next**.



Note that if you specified a Windows account other than the local system account when you installed SQL Server, the **Check System** page will show that the service account under which the SQL Server currently runs does not have the required system permissions. In that case do one of the following:

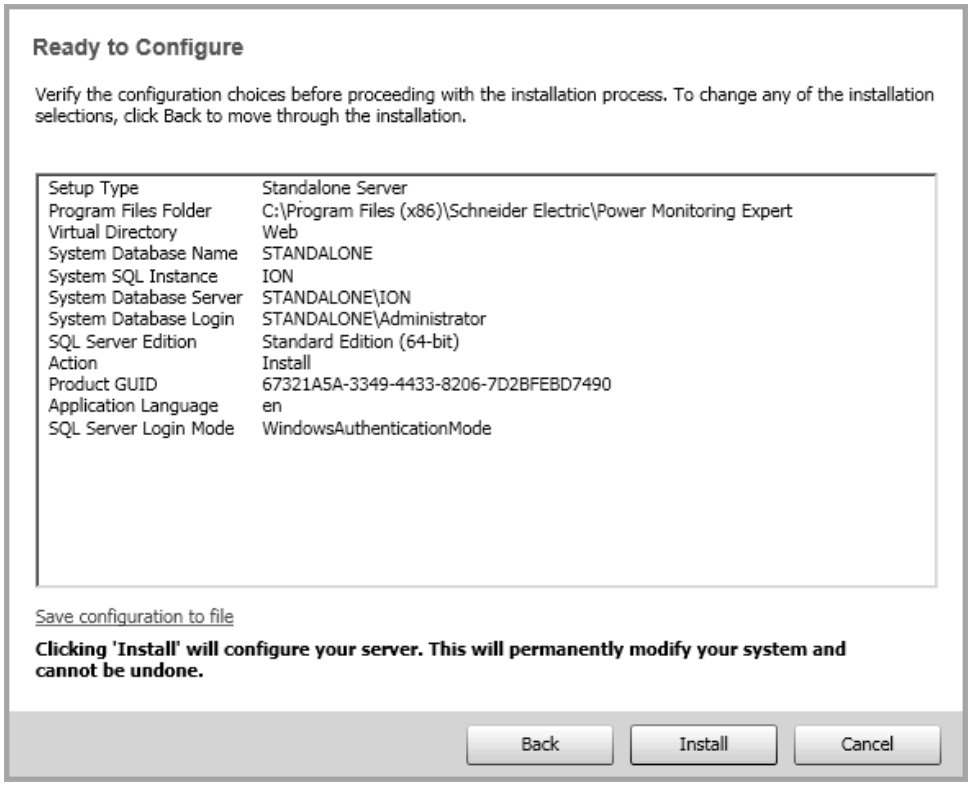
- Temporarily change the SQL Server service to run under an account that has Write permissions to (1) the folder created for the product's databases (the default is the install location for `...\Power Monitoring Expert\`), and (2) the current logged-in user's Temp folder. (To find the full path to the Temp folder, click **Start > Run**, enter %Temp% and click **OK**.) The default local system account is an example of an account with these privileges.

- Temporarily grant Write permission for the two folders mentioned above to the Windows account that the SQL Server service runs under. Use the Windows Services control panel to identify this account. (Click **Start > Administrative Tools > Services**, right-click **SQL Server**, click the **Log On** tab in the **SQL Server Properties** dialog.)

Revert the temporary changes after the installation of PME completes.

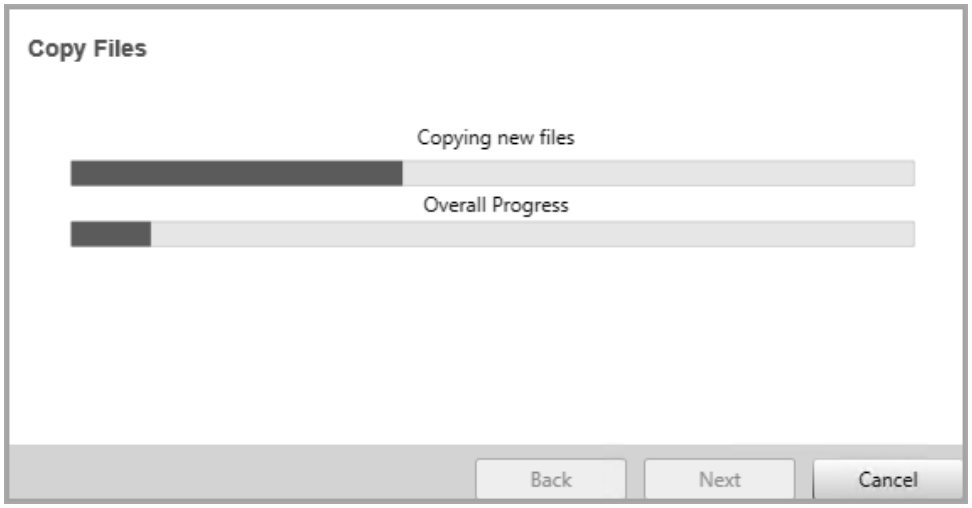
19. **Ready to Configure** page:

The **Ready to Configure** page summarizes your configuration for the installation of the software. Click **Install** to begin the installation.



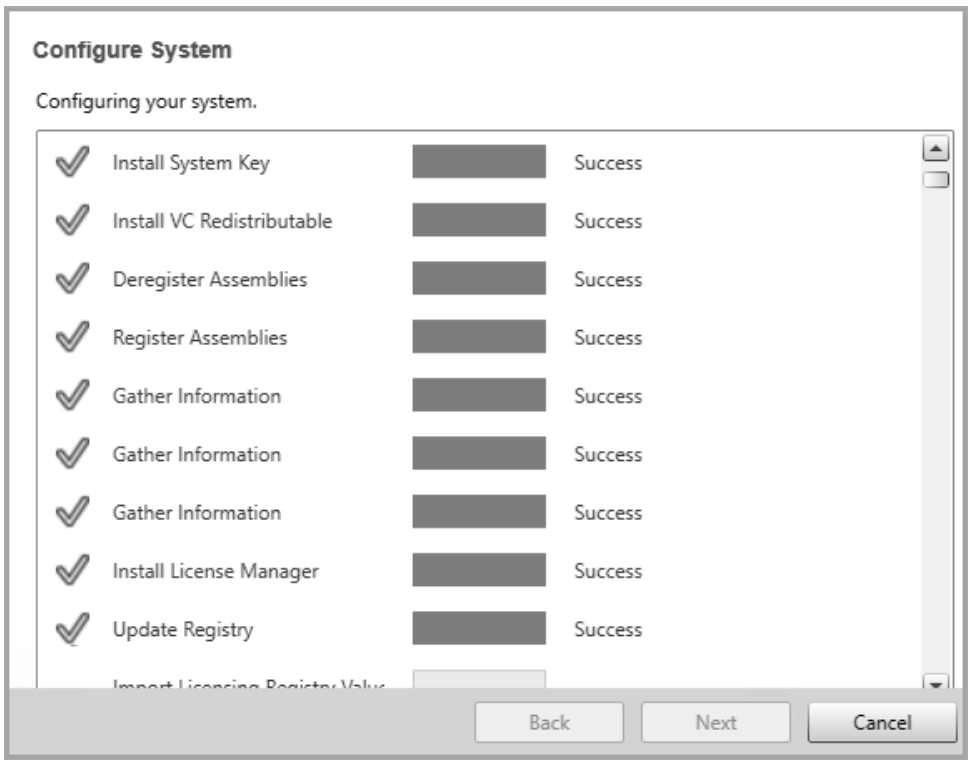
20. **Copy Files** page:

The **Copy Files** page indicates the progress as files are copied to the server as part of the installation.



When the copy operation is complete, the system configuration process begins and is shown on the **Configure System** page. Click **Next** when the configuration process ends.

The **Configure System** page shows each of the configuration steps. If a configuration step is not successful, an X appears in a column to the left of the item. Click the link on the message text on the right of the item to display instructions for resolving the error. If you correct the problem, click **Try Again** to continue with the installation. Otherwise, cancel the install process until you can resolve the problem.

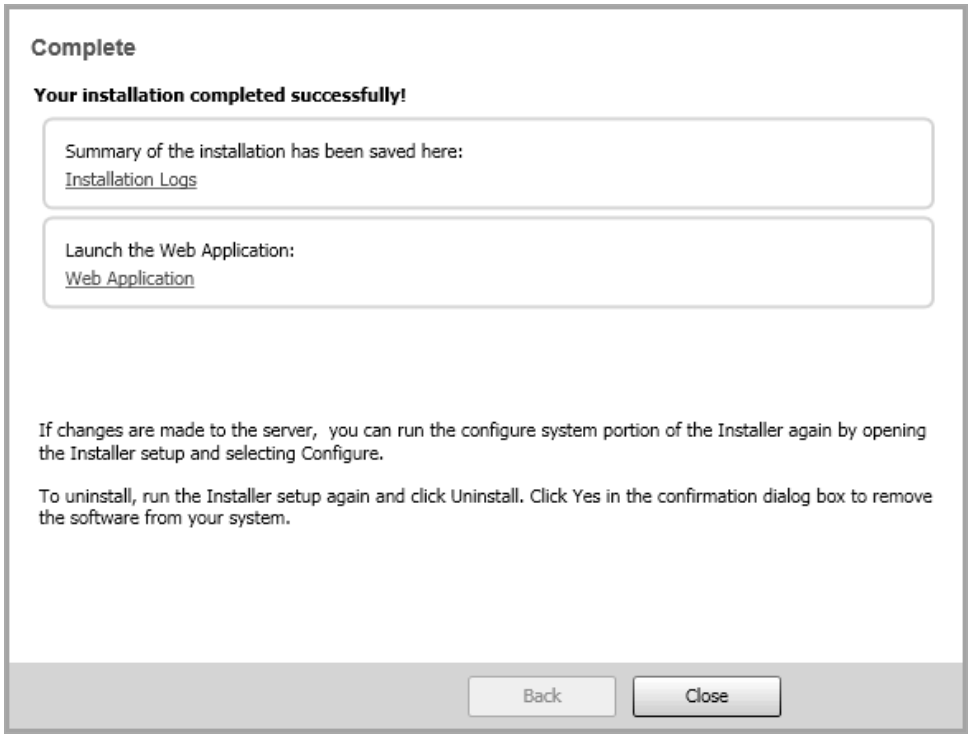


21. **Complete** page:

    The **Complete** page contains links that open the Installation Log and start the Web Applications component, respectively.

    The Installation Log summarizes the processing that took place during the installation process. (You can access the installation log at a later time in the install location within `...\Power Monitoring Expert\SetupLogs`).

    Click the Web Application link to verify that Web Applications component launches successfully in a browser.



22. Click **Close** to close the installer.

After installing the software

Perform the following procedures after you install the PME software.

(Recommended) Restart the system

Restart (reboot) your system.

(Recommended) Complete the product registration

You can complete the product registration by entering your information in **SETTINGS** > **Registration & Analytics** > **Registration** in Web Applications. Registered systems display a personalized login page with customer and service provider information.

Activate software licenses

The installed software includes a 90-day trial license for all features of the product. You must activate valid purchased software licenses within 90 days, otherwise some software functionality is disabled.

NOTICE

LOSS OF COMMUNICATION

- Activate product and component licenses prior to the expiry of the trial license.
- Activate sufficient licenses for the servers and devices in your system.
- Export the existing hierarchy template out of Power Monitoring Expert before importing a new template. The new template can overwrite the existing template, which can permanently remove all information contained in the original.
- Backup or archive any SQL Server database data before adjusting any database memory options.
- Only personnel with advanced knowledge of SQL Server databases should make database parameter changes.

Failure to follow these instructions can result in loss of data.

For information on how to activate licenses, see Licensing configuration. For general information on licensing, see Licensing.

Cybersecurity

Review the cybersecurity information. See Cybersecurity for details.

Revert write permissions for the SQL Server service

If you implemented write permissions for the SQL Server service during installation of SQL Server, revert those changes since they are only intended as a temporary measure to ensure a successful installation of SQL Server. See the information related to specifying the **Account Name** in Installing a new SQL Server.

(Recommended) Set SQL Server memory options

Set the SQL Server memory options. See Setting SQL Server memory options for more information.

Install a security certificate for TLS 1.2

PME uses Transport Layer Security (TLS) 1.2 for an encrypted, authenticated connection using HTTPS between the server and the Web clients.

A security certificate must be installed on the PME server and must be bound to the Default Web Site, which is used by PME. By default, if no bound certificate is detected, PME is installed with a self-signed certificate.

RECOMMENDATION: We strongly recommend that you replace the self-signed certificate with an authority issued certificate.

For information on how to install and bind a certificate, see Installing and binding security certificates.

For information on how to enable HTTP connections for PME, see Enabling HTTP connections for PME.

Windows Integrated Authentication for SQL Server

If you installed PME to use Windows Integrated Authentication, then you need to manually add the Windows accounts for Engineering tool users to the SQL database server. This is needed for using the tools on the PME server or on Engineering clients. Engineering tools include applications such as Vista, Designer, Management Console, and Management Console tools.

We recommend that you:

- Create a Window group for PME Engineering Client users.
- Add the Windows group to PME as a User. See Adding a Windows group for details.
- Add the Windows group to the SQL database server with db_owner role for the PME databases. (See work flow steps below)
- Add all users who need to access to Engineering client applications to the Windows group. All members of this Windows group now have the required permissions to access PME and the database through the Engineering Client applications.
- Remove the Windows account for the install user from the SQL database logins. See Before Installing the software for more information on this account.

To add a Windows group to the SQL database server,

1. Start Microsoft SQL Server Management Studio on the database server.
2. Connect with an account with sysadmin privileges.
3. Navigate to **Security > Logins**, right-click Logins, and select **New Login** from the context menu. This opens the Login - New window.
4. In Login - New, select **Windows authentication**, click **Search**, and locate the Windows group you want to add.
5. In the Select a page pane on the left, select **User Mapping**.
6. In User Mapping, select all 4 PME databases (ApplicationModules, ION_Data, ION_Network, ION_Systemlog), then select db_owner as database role membership.
7. Click **OK**.

If you don't want to create a Windows group:

To add an individual Windows user account to the SQL database server,

1. Start Microsoft SQL Server Management Studio on the database server.
2. Connect with an account with sysadmin privileges.
3. Navigate to **Security > Logins**, right-click Logins, and select **New Login** from the context menu. This opens the Login - New window.
4. In Login - New, select **Windows authentication**, click **Search**, and locate the Windows user you want to add.
5. In the Select a page pane on the left, select **User Mapping**.
6. In User Mapping, select all 4 PME databases (ApplicationModules, ION_Data, ION_Network, ION_Systemlog), then select db_owner as database role membership.
7. Click **OK**.

NOTE: When PME is installed with Windows Integrated Authentication, the Windows account that is used to access the database is also used to run the PME services and the IIS Application Pools.

Check services

Open the Windows Services dialog and ensure that all of the necessary ION services are started. The services run under the Local System or the NT AUTHORITY\System account, by default. You can change the **Log On As** attribute of a service by specifying the account and password. Use the **Log On** tab on the service properties dialog to do this. The **Log On As** account must have read/write permissions on the product's installation directory, which by default is `...\Power Monitoring Expert\`.

For more information the ION Windows Services, see PME Windows services.

(Optional) Create Windows user groups

You can create Microsoft Windows local user groups on a PME primary server (that is, on the Standalone Server or the Primary Server) as a way to manage user access through group permissions. The table below shows the permissions assigned to an administrator group and a user group:

Group Name	Access to ...\Power Monitoring Expert\system	Access to ...\Power Monitoring Expert\config
Administrator_Group_Name, which is the name you create for your administrator group.	Full Control	Full Control
User_Group_Name, which is the name you create for your user group.	Read	Change

Review Windows Task Scheduler

The Windows Task Scheduler has pre-configured scheduled jobs for performing backups, maintenance, size notification, trims, and archiving (on the ION_Data database) on the PME databases. Review these schedules and make any modifications that you require.

For more information on Database Manager and Windows Task Scheduler, see Database Manager.

Check IIS

Ensure that Internet Information Services (IIS) is working by typing the URL `http://localhost/` in the address field of your browser to display an IIS image. In some cases, security restrictions may block access to this web page.

Set up Web Clients

Set up Web Client access in your browser, by entering the fully qualified domain name of the server hosting PME, or its IP address, followed by the path name. The path name is configurable during the install of the software. The default path name is `/Web` . Example: `https://ServerName/Web` or `https://10.152.35.18/Web`. For more information on Web Clients, see Client types.

Configure SQL Express for Engineering Client access

An Engineering Client can connect to a Standalone Server if the TCP/IP protocol is enabled in SQL Express. For information on how to enable this protocol, see Enabling TCP/IP protocol in SQL Server Express.

Install the PME/EBO Integration solution

Installing the PME/EBO Integration solution includes the following steps:

1. Downloading the PME/EBO Integration Toolkit
2. Installing EcoStruxure Building Operation
3. Installing the components, snippets, and binding template
4. Installing PME
5. Installing ETL (only for Architecture 1 solutions)

NOTE: Steps 1 - 4 are required for both solution architectures.

See the following sections for details.

1. Downloading the PME/EBO Integration Toolkit

The PME/EBO Integration Toolkit is used to integrate PME into Building Operation WorkStation.

The Toolkit contains:

- Building Operation components, snippets, and binding template
- Integration Utility
- ETL

To get the toolkit, download the `PME_EBO Integration Tools.zip` file from the Exchange Extranet (see Resources for link information). Extract the files in the zip archive to the location on the Building Operation server, where you want to run the tools.

2. Installing Building Operation

The following describes the installation and licensing of Building Operation. Refer to the "Installation" section in the *EcoStruxure Building Operation IT Reference Guide* for more information.

To install Building Operation

1. Install License Administrator.
   a. When the License Administrator installation wizard prompts, include the License Administrator and License Server components.
   b. Open License Administrator and activate the licenses.

NOTICE
LOSS OF COMMUNICATION • Activate product and component licenses prior to the expiry of the trial license. • Activate sufficient licenses for the servers and devices in your system. **Failure to follow these instructions can result in loss of data.**

2. Install Enterprise Server.
3. Install Workstation.

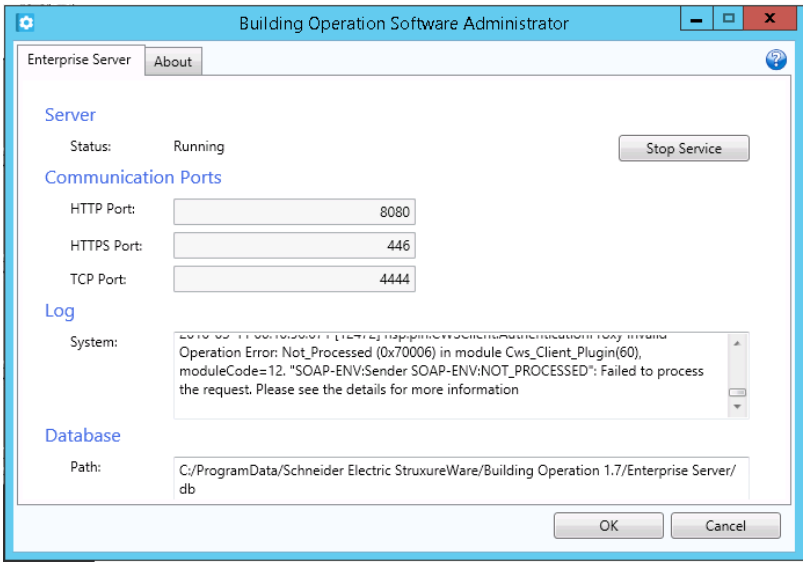
Changing Building Operation port settings (for single server installation only)

If Building Operation and PME are installed on the same server, you must change the ports used by Building Operation through the Software Administrator in order to avoid conflicts between Building Operation and PME. The default ports of 80 and 443 are reserved for PME.

To change the Building Operation server ports:

1. Open Software Administrator.
2. Click **Stop Service** if the service is currently running.
3. Under Communication Ports, change the values for the server ports, for example change the HTTP Port to 8080 and the HTTPS Port to 446.

   NOTE: For the HTTP server port, do not use the value 80, and for the HTTPS server port, do not use the value 443—these values are reserved for PME.



4. Click **Start Service**, allow time for the service to start, and then click **OK** to exit.

After you changed the server port settings, you must modify the Building Operation Workstation login.

To modify the Building Operation Workstation login:

1. Open Workstation.
2. Add ":446" (the HTTPS port defined above) to the server information. For example, if your server name is "Standalone", make it appear as "Standalone:446".
3. Provide your user name and password credentials and click **Log on**.

3. Installing the components, snippets, and binding template

Install the components, snippets, and the binding template into Building Operation.

Components are standardized, predefined graphics that represent features in a live system. They are located in dedicated libraries, and are displayed in the Components pane. You add components to a graphic instead of drawing all the drawing objects yourself to simplify the graphics creation process.

Snippets are standardized, predefined functions that typically represent a feature in a live system. They are located in dedicated libraries, and are displayed in the Snippets pane.

The binding template is used to automatically bind EcoStruxure Web Services (EWS) measurements or SmartWidget values to corresponding measurements in Building Operation graphics library objects. Using the binding template, you create bindings between the Automation Server program variables, internal values, and I/O points.

NOTE: Before you install these tools, close the Building Operation Graphics Editor.

Installing Components and Snippets

1. In File Explorer, navigate to where you extracted the PME/EBO Integration Toolkit.
2. Navigate to the **PME_EBO Integration Tools > EBO Components for Energy Expert > Graphics Editor > Components** folder.
3. Double-click each file in the Components folder. The components (ANSI Symbols, Generic Components, IEC Symbols, and Meter Graphics) are installed in the Graphics Editor and appear in the Components pane at the left.
4. Navigate to the **PME_EBO Integration Tools > EBO Components for Energy Expert > Graphics Editor > Snippets** folder.
5. Double-click the file in the Snippets folder. The snippets are installed and appear in the Snippets pane at the left.

NOTE: The PME/EBO Integration is also known as Energy Expert, or Power Manager. These names refer to the same solution.

Importing the Binding Template

1. Log on to WorkStation.
2. In the System Tree, expand **Server > System**.
3. Right-click **Binding Templates** and select **Import** from the list. The Open dialog appears.
4. Navigate to **PME_EBO Integration Tools > EBO Components for Energy Expert > WorkStation** and select Power Manager - Binding Template.xml.
5. Click **Open**. The Import dialog appears.
6. Click **Import**.
7. Click **Close** when the import is complete.

NOTE: The PME/EBO Integration is also known as Energy Expert, or Power Manager. These names refer to the same solution.

4. Installing PME

See New system install for details on how to install and license PME.

5. Installing ETL (only for Architecture 1 solutions)

The ETL is only used with Architecture 1, where it copies historical data from Building Operation to PME. The ETL installer is included in the PME/EBO Integration Toolkit.

NOTE: On Windows Operating Systems with restricted permissions, the ETL tool might not initialize and load its plugins on start up. This is due to limited write permission on the ETL default install folder (`...\Program Files\...`). A possible solution is to install ETL to a custom folder with write permission (for example, `C:\ETL`).

To install the ETL

1. In File Explorer, navigate to where you extracted the PME/EBO Integration Toolkit.
2. Navigate to **PME_EBO Integration Tools**, and run the `Energy Expert ETL.exe` to open the installer.
3. Follow the install pages and instructions, using the default settings where possible, until you have completed the installation.

NOTE: The PME/EBO Integration is also known as Energy Expert. Both names refer to the same solution.

System update

Use the links in the following table to find the content you are looking for.

Topic	Content
Types of updates	Provides information on the different types of updates, such as cumulative update, hotfix, and so on.
Before updating the software	Provides information and reminders for you to consider before starting the update.
Updating the software	Provides detailed information on the installation of the different types of updates.
After updating the software	Provides procedures for you to complete after the update.
PME 2020 Cumulative Update 1 - Release Notes	Provides details of this Cumulative Update and information on its content.

Types of updates

Cumulative Update (CU)

A CU is a PME software update that provides general product improvements. There can be more than one CU release for a particular software version. The latest CU for a software version includes the improvements of any previous CUs. You only need to install the latest CU; it is not necessary to install older CUs or install them in the order in which they were released.

The following is true for a CU:

- It is a general update that is released to all PME users.
- It applies to all systems of that version of the software.
- It applies to all language versions of the software.
- It is covered by the existing licensing of the system.
- It does not change the existing trial license status on the system.
- It contains the improvements of the previous CUs for this version of the software.
- It consists of a single, executable installer.

NOTE: We recommend that you install available CUs for your version of the software. Check the Exchange Community for information on available updates. See Resources for a link to the Exchange Community.

NOTE: To find out which CU version is installed on your system, check **Help** > **About** in any of the Engineering applications, or check the Windows registry at `HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Schneider Electric\Power Monitoring Expert\2020\CumulativeUpdate`.

Hotfix

A hotfix is a PME software update that provides specific product improvements for certain installations or applications. A hotfix is not a general product update.

The following is true for a hotfix:

- It is a specific update that is released to a targeted set of PME users.
- It applies to specific, selected systems.
- It is covered by the existing licensing of the system.
- It does not change the existing trial license status on the system.
- It can be a single file or a number of files of different types.
- It does not include an installer, it includes manual install instructions instead.

NOTE: Technical Support will help determine if a hotfix is needed for a system.

Add-on device driver

PME is installed with pre-configured support for a large number of device types, also known as device drivers. Many more device drivers are available as downloadable add-on device drivers.

The following is true for an add-on device driver:

- It might be a general update for all PME users, or targeted at specific installations or applications.
- It might be covered by the existing licensing of the system, or require additional licensing.
- It does not change the existing trial license status on the system.
- It consists of a compressed archive file or an executable installer file.
- The file includes the device driver and related resources, such as diagrams, measurement mapping information, and release notes.
- It includes an installer.

NOTE: Only users with a need for the specific device type support should install an add-on device driver on their system.

Before updating the software

Download the update

Download the update from the official download location. Do not use updates that you received from an unknown source. Download the update in advance if you are updating a system without internet connection.

Verify the update file integrity and authenticity

Verifying the update file integrity helps identify unexpected changes in the file caused by download issues or by tampering with the file.

NOTE: Do not use an update file for which the integrity cannot be confirmed. In that case, download the update again and check its integrity. Repeat this process until you have a correctly downloaded update file with confirmed integrity.

For details on how to verify the update file integrity, see Verifying file integrity and authenticity.

Confirm system compatibility

Confirm that the update is intended for your PME system before installing the update. It must be designed for or compatible with your software version and your system must meet any other compatibility requirements that are listed for the update.

NOTE: You cannot uninstall a Cumulative Update after it has been installed.

Review release notes

Review the release notes for the update. The release notes provide high level information on the software changes included in the update.

Updating the software

Installing a Cumulative Update (CU)

CUs provide product improvements. See Cumulative Update (CU) for more information.

NOTE: Check the digital signature on the CU install file and confirm that it is OK and shows **Schneider Electric** as the signer. Do not install the CU if the signer name is different, for example Unknown. See Verify the update file integrity and authenticity for more information.

NOTE: PME services are stopped during the installation of a CU. This can affect communications and data processing.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Before installing the update, verify that the system is not performing critical control actions that may affect human or equipment safety.
- Verify correct system operation after the update.

Failure to follow these instructions can result in death or serious injury.

⚠ WARNING

INACCURATE DATA RESULTS

- Before installing the update, verify that the system data results are not used for critical decision making that may affect human or equipment safety.
- Verify correct system data results after the update.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

To install a CU:

1. On the PME application server computer, log in with the local Administrator Windows user account or with an account that is a member of the Administrators group.
2. Take PME out of service by informing system users of the outage and disabling any automated system control or third-party interactions.
3. Close all Engineering Client applications (Management Console, Vista, Designer, any Management Console tools).

   NOTE: Web client applications can remain open but might experience a service interruption during the update.
4. Run the CU install file.
5. Follow the steps in the installer to install the update.
6. If your system includes secondary PME application servers or Engineering Clients, then you need to install the CU on each of these servers and clients.

   To install the CU on secondary servers and Engineering Clients:

   a. Log into each server or client with the local Administrator Windows user account or with an account that is a member of the Administrators group.

   b. Run the CU install file.

   c. Follow the steps in the installer to install the update.
7. After the installation of the CU, verify the correct operation of the PME system and put the system back into service.
8. Restart any Web client applications that experienced a service interruption during the update.

Installing a Hotfix

A hotfix provides specific product improvements for certain installations or applications. See Hotfix for more information.

NOTE: PME communications and data processing might be affected during the installation of a hotfix. Review the information provided with the hotfix for more information.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Before installing the update, verify that the system is not performing critical control actions that may affect human or equipment safety.
- Verify correct system operation after the update.

Failure to follow these instructions can result in death or serious injury.

⚠ WARNING

INACCURATE DATA RESULTS

- Before installing the update, verify that the system data results are not used for critical decision making that may affect human or equipment safety.
- Verify correct system data results after the update.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

To install a hotfix, follow the instructions provided with the hotfix. A hotfix includes updates for individual files that need to be manually installed on the system.

NOTE: Take the PME system out of service, if the hotfix instructions indicate that the system availability is impacted during the installation. To take the system out of service, inform system users of the outage and disable any automated system control or third party interactions.

Installing an add-on device driver

Add-on device drivers provide additional device type support for PME. See Add-on device driver for more information.

NOTE: PME services are stopped during the installation of a CU. This can affect communications and data processing.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Before installing the update, verify that the system is not performing critical control actions that may affect human or equipment safety.
- Verify correct system operation after the update.

Failure to follow these instructions can result in death or serious injury.

⚠ WARNING

INACCURATE DATA RESULTS

- Before installing the update, verify that the system data results are not used for critical decision making that may affect human or equipment safety.
- Verify correct system data results after the update.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

To install an add-on device driver:

1. On the PME application server computer, log in with the local Administrator Windows user account or with an account that is a member of the Administrators group.
2. Take PME out of service by informing system users of the outage and disabling any automated system control or third party interactions.
3. On the PME application server, extract the downloaded add-on device driver archive file to a location of your choice, for example a temporary folder.
4. Open the folder with the extracted files and double-click the `.udf` file. This will start the driver installer.

   NOTE: Review the release notes that are included with the driver files for any additional information and install instructions.

5. Complete the steps in the driver install wizard.
6. Close the driver installer.
7. Done.

After updating the software

After installing a Cumulative Update (CU)

After you have installed a CU, do not simply use the Reconfigure function of the original installer of your PME software anymore.

To reconfigure the software, after installing CUs, you must run the Reconfigure function of the original installer first, and then run the Reconfigure function of each CU installer in sequential order. For example, if you have installed CU1 and CU2 on your system, you must run Reconfigure on the original PME installer, then Reconfigure on the CU1 installer, and then Reconfigure on the CU2 installer. See Reconfigure for information on this function.

System upgrade

Use the links in the following table to find the content you are looking for.

Topic	Content
Before upgrading the software	Provides information and reminders for you to consider before starting the upgrade.
In-Place upgrade	Provides detailed information on the In-Place upgrade of the PME software.
Side-by-Side upgrade	Provides detailed information on the Side-by-Side upgrade of the PME software.
After upgrading the software	Provides procedures for you to complete after the upgrade.
PME 2020 Upgrade notes	Provides release notes related to the upgrade of PME 2020.

Before upgrading the software

Review the prerequisites

Before starting the upgrade, review the Planning chapter in this guide and confirm that your system meets all the relevant prerequisites. In particular, review the upgrade planning, computer hardware, operating environment, network connectivity, and licensing requirements including Upgrade licenses. Also review the PME 2020 Upgrade notes, which provide information regarding upgrades that is specific to the latest version of the software.

Backup the databases

Backup the ION_Data, ION_Network, ION_SystemLog, and ApplicationModules databases before starting the upgrade. Keep the backups in a secure and safe location. Use these backups to restore the original databases in case data is deleted or lost, accidentally, during the upgrade.

NOTICE

LOSS OF DATA

- Back up the database at regular intervals.
- Back up the database before upgrading or migrating the system.
- Back up the database before trimming it.
- Back up the database before making manual database edits.
- Verify correct database behavior after making database or system changes.

Failure to follow these instructions can result in permanent loss of data.

Cybersecurity

Review the cybersecurity information. See Cybersecurity for details.

Upgrade Path

An upgrade path describes from which older system to which newer system PME is upgraded. There are many possible upgrade paths, but only some are supported by the In-Place and Side-by-Side upgrade tools and procedures. See Determine your upgrade path for information on how to determine your upgrade path.

Upgrade Type

There are two different upgrade types, **In-Place Upgrade** and **Side-by-Side (SBS) Upgrade**. Each type uses different tools and has different prerequisites. See Determine the upgrade type for information on upgrade types.

Service Packs

The In-Place and SBS upgrade tools require the latest service pack versions of the older PME systems to be installed before the upgrade. For example, PME 2020 can upgrade a PME 7.2.2 system, but it cannot upgrade a PME 7.2.0 system. If you have PME 7.2.0, you must apply the service pack first to get the system to PME 7.2.2 before you can do an upgrade.

Your upgrade path determines if your old system requires a service pack installation before the upgrade. See Determine your upgrade path for more information. See Upgrade tools and resources for information on where to get the latest service packs for older versions of PME.

Operating Environment

A requirement for in-place upgrades is that the Operating System and Database Server versions are supported by the new PME system. The Upgrade Map tool, in Determine your upgrade path, identifies any Operating Environment perquisites for your upgrade path.

Licensing

Product licensing might have changed between the old version of PME and the new version. Review Licensing and in particular Important notes on licensing for more information, and make sure you have the correct licenses for the new system before starting the upgrade.

Windows Integrated Authentication for SQL Server

If you are planning to upgrade PME to use Windows Integrated Authentication, then complete the following before starting the upgrade:

NOTE: Windows Integrated Authentication is not supported for PME systems with Secondary Servers.

Standalone architecture

On the PME application server:

- Add the Windows account for the user who is upgrading the software to the local Administrator group.
- Add the Windows account for the upgrade user to the SQL database logins with a sysadmin Server Role.

> **NOTE**: You can remove this account from the SQL database logins after PME is upgraded.

- Add the Windows account that is used by PME to access the databases to the local Administrator group.
- Set the 'Logon As A Service' privilege for the database access account.

Distributed Database architecture

On the Windows Domain, in the Active Directory:

- Add an account for the user who is upgrading PME. This only needs to be a domain user account, not a domain admin account.
- Add an account that PME will use to access the databases. This only needs to be a domain user account, not a domain admin account.

On the PME application server:

- Add the account for the upgrade user to the local Administrator group.
- Add the database access account for PME to the local Administrator group.
- Set the 'Logon As A Service' privileges for the database access account.

On the database server:

- Add the account for the upgrade user to the local Administrator group.
- Add the account for the upgrade user to the SQL database logins with a sysadmin Server Role.

> **NOTE**: You can remove this account from the SQL database logins after PME is upgraded.

> **NOTE**: When PME is installed with Windows Integrated Authentication, the Windows account that is used to access the database is also used to run the PME services and the IIS Application Pools.

Upgrade troubleshooting

Rolling back an unsuccessful PME in-place upgrade

Under certain circumstances the database upgrades, which are part of the system upgrade, might not be successful. Use the following steps to rollback an upgrade where the database upgrades were not successful. After completing these steps, your system should be back in the state it was in before the upgrade.

To rollback an in-place upgrade with unsuccessful database upgrades:

1. Close the PME installer.
2. Restore the PME databases from backup, using Microsoft SQL Server Management Studio.

   > **NOTE**: Backing up the databases was an optional, recommended step in the in-place upgrade workflow of the software installer.

3. Open the Windows Service panel and start all ION services. Also, re-enable and start the Application Modules services as follows:

NOTE: The installer stopped the ION services and disabled the Application Module services during the upgrade.

- ION Application Modules Alarm Service Host (Startup Type = Manual)
- ION Application Modules Core Services Host (Startup Type = Automatic)
- ION Applications Modules Data Services Host (Startup Type = Automatic)
- ION Applications Modules Provider Engine Host (Startup Type = Automatic)

4. Open Internet Information Services Manager (IIS Manager) and start the PME application pools:
   - Application Modules AppPool
   - ION AppPool
   - WebReporterAppPool
5. Verify that the system is operating as expected.

In-Place upgrade

Use an In-Place upgrade to upgrade an older version of PME to the latest version on the same computer. An In-Place upgrade is done with the PME installer. The installer automatically detects an existing, older PME installation and performs an In-Place upgrade instead of a new install.

The installer completes the following steps during an in-place upgrade:

1. (Optional) Backing up the existing PME databases.

   RECOMMENDATION: We strongly recommend that you back up the databases. Database backups are required for rolling back an unsuccessful upgrade.

2. Saving the system settings and configuration.
3. Upgrading the databases.
4. Uninstalling the old PME software.
5. Installing the new PME software.
6. Installing the old system settings and configuration.

NOTE: The same PME installer is used to upgrade a Standalone Server, Application Server, or Engineering Client. The installer automatically detects which older components are installed and runs the upgrade accordingly.

Upgrade instructions

NOTE: The PME system will be unavailable, after you start the upgrade, until the upgrade is complete and the new system has been put into service.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Before installing the upgrade, verify that the system is not performing critical control actions that may affect human or equipment safety.
- Verify correct system operation after the upgrade.

Failure to follow these instructions can result in death or serious injury.

⚠ WARNING

INACCURATE DATA RESULTS

- Before installing the upgrade, verify that the system data results are not used for critical decision making that may affect human or equipment safety.
- Verify correct system data results after the upgrade.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

To upgrade the system:

1. On the PME application server computer, log in with the local Administrator Windows user account or with an account that is a member of the Administrators group.
2. Take PME out of service by informing system users of the outage and disabling any automated system control or third party interactions.
3. Close all PME Engineering Client applications (Management Console, Vista, Designer, any Management Console tools).

   NOTE: Web client applications can remain open but will experience a service interruption. You need to restart web clients after the upgrade.

4. Follow the steps for Installing the PME software. Some of the installer pages differ slightly for system upgrades and new installs. Some pages are not applicable to upgrades and will not be shown. Simply follow the instructions on the installer pages
5. After the upgrade, verify the correct operation of the PME system and put the system back into service.
6. Restart any web client applications that experienced a service interruption during the upgrade.

Upgrades for Distributed Database architectures

The installer upgrade workflow includes a step which provides the option to automatically back up the databases for Standalone architectures. This option is not available for Distributed Database architectures. For Distributed Database architectures, you need to back up the databases manually on the database server.

Side-by-Side upgrade

Use a Side-by-side (SBS) upgrade to copy the configuration of an old PME system to a new system on a different computer. SBS upgrades are performed manually with the Configuration Manager tool.

NOTE: SBS upgrades only apply to Standalone Servers and Application Servers. There is no SBS upgrade for Engineering Clients.

Upgrading a configuration from an old system to a new system using Configuration Manager is accomplished in six steps and must be done in the following order:

- Step 1 – Prepare both systems
- Step 2 - Transfer the Configuration
- Step 3 - Initialize the Configuration
- Step 4 - Manually Recreate Customizations
- Step 5 - Service the System
- Step 6 - Perform a Post-upgrade System Check

See Estimated task time for SBS upgrades for information on the expected upgrade time.

NOTE: The old PME system can keep running while the configuration is upgraded. However, you might experience some performance degradation if two systems are working with the same monitoring devices.

Step 1 – Prepare both systems

Before upgrading, it is important to understand the operational state of both the old and the new systems.

Assess the old system

Assess the old system by completing the following procedures:

1. Review the old PME system to see if Devices, Vista Diagrams, Reports, Web Applications, and any other configurations are working as expected.
2. Check the system log for errors. Correct any items in error or note them down so you can address them on the new system after the migration.
3. Look for database archives that need to be migrated.

   NOTE: Verify that the database archives you want to include for upgrade are compatible with the old PME version. Database archives that are not compatible will not be written to the new system.

4. Check the size of the databases and consider what is needed in the new system. Upgrading large amounts of historical data can be time consuming. Trim large databases to avoid long upgrade times.
5. Determine whether the old report packs have been upgraded to work on the new system. Report packs must be upgraded to be compatible with the new version of PME before they can be installed on the new system.
6. Run the Diagnostic Tool that is found at `...\Power Monitoring Expert\Diagnostics Tool\Diagnostics Tool.exe`.

   The Diagnostics Tool output provides a snapshot of the current state of the system. Reviewing this helps in identifying current or potential issues. It is advised that you select all the commands to run to get a full view of this system. Unzip the files (if compressed) and open the HTML page by clicking on `index.html` for an overview of the results. Fix any issues as needed before upgrading.
7. (Only for PME versions 8.2 and newer) Have a copy of the system key for the old system.

NOTE: The migration of the ION_Data database is often the most time consuming part of the system migration. You can expect this process to take about 1 hour for each 15 GB in database size. It is often better to trim the database or archive portions that are no longer needed before the migration. This is especially important for large database sizes. Plan this part of the migration carefully.

Install and assess the new system

NOTE: The procedures in this document assume that the new PME system is installed correctly on the new computer, and that it is in a factory default configured state. Any custom configuration that exists on the new system will be overwritten by the procedures in this document. Any custom configuration that exists might cause the migration to fail in unexpected ways.

Install the new version of PME. See New system install for more information. After the installation is complete, assess the new system:

1. Check a few of the basic functions such as the system log for errors, and inspect the System Configuration Report.
2. Open the Web Applications and ensure that there are no Dashboards and that the default Web Reports are available.
3. Run the Diagnostics Tool at `...\Power Monitoring Expert\Diagnostics Tool\Diagnostics Tool.exe`.
4. Ensure that the remaining trial license period is sufficient for transferring the source configuration and validating the new system.

NOTE: You should have at least four times the size of the old PME databases in free hard disk space on the new system to allow for: backups, disk usage during the database upgrade process, and increase in the database size after the migration. Before writing a saved configuration to a system, Configuration Manager performs a disk space check to ensure there is sufficient disk space for the configuration and databases. If there is not enough free disk space, Configuration Manager will display a warning.

Step 2 - Transfer the Configuration

Use Configuration Manager to transfer the configuration from the source system to the target system.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Before writing a configuration verify that the system is not performing critical control actions that may affect human or equipment safety.
- Verify correct system operation after writing a configuration.
- Verify that you are writing to the correct new, factory installed target system.
- Avoid introducing malicious software into your system.

Failure to follow these instructions can result in death or serious injury.

⚠ WARNING

INACCURATE DATA RESULTS

- Before writing a configuration verify that the system data results are not used for critical decision making that may affect human or equipment safety.
- Verify correct system data results after writing a configuration.
- Do not introduce malicious software into your system.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

NOTICE

LOSS OF DATA

- Back up the system configuration before writing a new configuration.
- Verify the correctness of a configuration before writing it to the system.

Failure to follow these instructions can result in irreversible database changes.

Distributed systems

For a distributed system, the target system database server and PME server must be in the same domain.

To run the Configuration Manager on the target PME server, log into Windows with a domain account that meets the following conditions:

- It is a member of the administrators group on the PME server.
- It has been added as a Login in SQL Server with sysadmin role in the PME database instance

NOTE: The configuration transfer will not succeed if the above conditions are not met.

To transfer the configuration:

1. On the PME application server of the old system:
   a. Open Configuration Manager.
   b. Click **Read from System**.
   c. After the operation completes, review the log for errors. Correct errors that could cause problems on the new system.
   d. (Optional) Repeat steps b. and c. until the errors and warnings have been eliminated or have a known recovery process that will be applied on the destination system.
   e. (Optional) Add explanatory notes or attach files to the configuration.
   f. Click **Save to Archive** to save the configuration to archive.
   g. (Only for PME versions 8.2 and newer) Export the PME system key. This can be done through the PME installer.

      NOTE: The system key of the old source system is required to write the configuration to the new target system. Make sure this key is available when writing the configuration with the Configuration Manager.

   h. Copy the archive file for transfer to the new system.
   i. Create a backup of the ION_Data, ION_Network, and ApplicationModules databases on the DB server using SQL Server Management Studio
   j. Create a backup of any historical database archives that you want to use on the new system.
   k. Copy the database backup files for transfer to the new system.

   NOTE: Keep the configuration archive and database backups secure during and after the transfer to prevent unauthorized access.

   ⚠ WARNING

   POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

   Use cybersecurity best practices to help prevent unauthorized access to the software.

   Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

   Work with facility IT System Administrators to ensure that the system adheres to the site-specific cybersecurity policies.

2. On the new PME system:
   a. Delete the existing ION_Data, ION_Network, and ApplicationModules databases on the DB server.

b. Restore the databases (ION_Data, ION_Network, ApplicationModules) and historical database archives from the old system onto the new database server.

c. Log into the new PME application server Windows operating system with a domain account that meets the conditions described above.

d. Open Configuration Manager.

e. Click **Load from Archive** to load the archived configuration from the old system.

f. Click **Write to System** to write the configuration to the new system.

> **NOTE**: During the write to system, the Configuration Manager will prompt for the system key from the old source system, if that system was PME version 8.2 or newer.

g. Review the log for errors. Correct any errors that will cause problems on the new system.

> **NOTE**: The new PME system is NOT operational yet. You must manually complete the upgrade. See the following sections for detailed information on how to complete the upgrade

Standalone systems

To transfer the configuration:

1. On the old system:
   a. Open Configuration Manager.
   b. Click **Read from System**.
   c. After the operation completes, review the log for errors. Correct errors that could cause problems on the new system.
   d. (Optional) Repeat steps b. and c. until the errors and warnings have been eliminated or have a known recovery process that will be applied on the destination system.
   e. (Optional) Add explanatory notes or attach files to the configuration.
   f. Click **Save to Archive**. You can optionally save the historical data.
   g. (Only for PME versions 8.2 and newer) Export the PME system key. This can be done through the PME installer.

   > **NOTE**: The system key of the old source system is required to write the configuration to the new target system. Make sure this key is available when writing the configuration with the Configuration Manager.

   h. Copy the archive file for transfer to the new system.
2. On the new PME system:
   a. Open Configuration Manager.
   b. Click **Load from Archive** to load the archived configuration from the old system.
   c. Click **Write to System** to write the configuration to the new system.

   > **NOTE**: During the write to system, the Configuration Manager will prompt for the system

key from the old source system, if that system was PME version 8.2 or newer.

d. Review the log for errors. Correct any errors that will cause problems on the new system.

NOTE: The new PME system is NOT operational yet. You must manually complete the upgrade. See the following sections for detailed information on how to complete the upgrade

Step 3 - Initialize the Configuration

After you use Configuration Manager to write the configuration to the new PME system, the system is NOT in an operational state yet. You must manually initialize the new system.

Carefully review the topics in this section to initialize the new system.

Reconfigure the System

The PME installer configures many settings when installing the software. During the configuration transfer using Configuration Manager, some of these settings are affected and must be reconfigured when Write to System completes.

Run the PME installer in Reconfigure mode on the target system after Write to System completes to ensure that all application settings are configured correctly. See PME Installer for information on Reconfigure mode.

NOTE: If manual changes to the Web Applications web.config file are required, then make those edits before reconfiguring the system. See Step 4 - Manually Recreate Customizations and Web Application web.config for more information.

Install Missing Drivers

PME is installed with a large number of pre-configured device types. Many more device types are available as downloadable add-on drivers from the Exchange community. See Default device type support for information on pre-configured device types in PME.

TIP: Configuration Manager flags missing device drivers as warnings in the Log, and indicates whether there are newer versions that should be installed. The tool also logs warnings for drivers that do not match the expected default for the version of PME. These could be drivers that were installed after the release of PME, or that were modified after the install.

NOTE: Review any device driver warnings in the Configuration Manager Log. Install missing device drivers and updated drivers to the latest versions if necessary.

For information on where to find the required device drivers, see Resources.

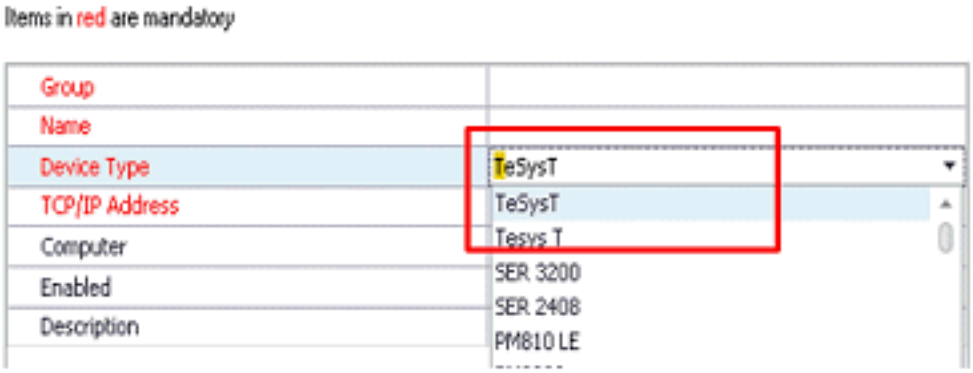
Custom Device Drivers

Custom device drivers that are detected by Configuration Manager on the source system will be saved to the configuration archive. During the Write to System, the driver packages (UDF files) are copied to the CM Migration Files folder on the target system. Review the UDF driver packages in the CM Migration Files folder on the target system after Write to System and determine if any of them need to be installed on the new system. To install a driver on the new system, double click the UDF file to start the PME Driver Package installer.

SE driver replacements for older LE drivers

Some LE device drivers (drivers that were downloaded) from the old PME system may have become Standard Edition (SE) drivers (i.e. default drivers) in the newest version. This results in two entries in the device type list for the same type.

You can see these device type entries in the Management Console: one is an LE type carried over from the earlier version; the other is the SE version that was installed during upgrade.



Manually changing the device type can unlink previously logged data. Therefore, an upgrade to SE should be performed.

The original LE device type might work on the target system but it might not be as fully-featured as the natively-released version.

NOTE: A possible consequence of upgrading the device type is that any custom diagrams may no longer work correctly.

To upgrade the driver:

1. In Management Console right-click on the device instance to be upgraded, and select **Upgrade LE Device**.

   A warning message is displayed asking to confirm that it is okay to stop and restart PME Services.

2. Click **OK** if this is acceptable.

   Clicking OK executes the device upgrade. A message is displayed when the upgrade is finished.

After you close the Upgrade status window, the device type of the instance will change.

This procedure applies to both CE and LE drivers listed below. The list of drivers that need to be upgraded include:

Device Type	PME 7.2.2	PME 8.x and higher
Altivar 61	CE	Native
CM100-200	CE and SE Installer	Native
EM3460	LE	Native
Enercept	CE and SE Installer	Native
PM5300, 5100, 5500	Native	Native
PM600	CE and Native	Native
TeSysT	CE	Native
Varlogic NRC12	CE and SE Installer	Native

For information on where to find downloadable device drivers, see Resources.

Reports Database

Verify that the correct reporting database is selected.

To verify the reports database:

1. Open Management Console.
2. Under **Tools > Reports Configuration**, click **Location of report data** in the **Reports** tab and confirm that it is set to the database that you want to report on.

Web report subscriptions

Since the system was moved from one computer to another, it is possible that file paths that were previously configured for saving reports as part of a subscription need to be changed. See Subscribing to a report for more information.

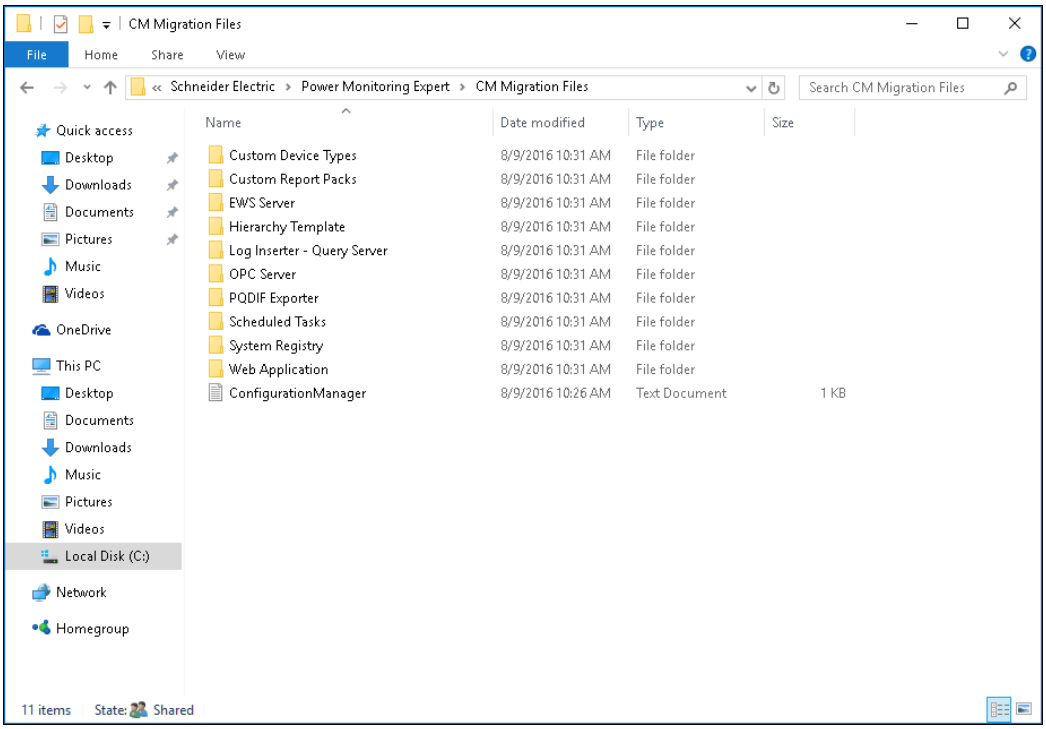
Step 4 - Manually Recreate Customizations

Configuration Manager copies all configuration files to the target system, however, it does not install all configuration files on the new target system because:

1. The source system contains customizations that cannot be automatically transferred by Configuration Manager.
2. The target system contains new default values and changes that should not be overwritten.

Configuration Manager copies all customized configuration files that are not automatically installed in the system to `...\Power Monitoring Expert\CM Migration Files`

For example:



Review this folder and decide which customizations you want to recreate on the new system.

The topics that comprise this section consist of all possible configuration customizations. However, most systems in the field only use a small subset of these.

Alert Monitor

NOTE: The Alert Monitor feature is no longer available in PME, starting with version 2020.

Custom Report Templates

Report templates must be compatible with the version of PME that they are running on. Older versions of custom report templates are not compatible with newer versions of PME.

To upgrade the templates to versions that are supported on the new PME system:

Copy compatible templates onto the target system and install them after Configuration Manager has finished the Write to System.

Default Device Drivers

It is possible to customize device drivers in PME, for example by adding software logging with the Device Type Editor. The customizations are stored in the ION and XML translator files under `...\config\translators`.

To recreate default device driver customizations from the source system:

1. Navigate to `...\Power Monitoring Expert\CM Migration Files`.
2. Determine whether the files copied to the CM Migration Files folder were customized.
3. Manually recreate any desired customizations on the target system by customizing the new version of the driver.

NOTE: Since this process may need to be followed for any future PME upgrades, note the customizations for future upgrades.

Dial Out Modems

Any modems—physical or WinModem—that were used on the source system to connect to remote devices, or equivalent hardware resources, need to be setup and configured on the target computer or operating system.

Check the communication port mappings as they may be different.

Test each modem or serial port to verify that everything works as expected.

EWS User

If you are upgrading from PME 7.2.2, you must create an EWS user account on the new systems.

NOTE: EWS server must be enabled in PME for the user account configuration UI to be visible in the Web Applications Settings.

To create an EWS user account in PME:

1. Ensure EWS server is enabled.
2. Open the Web Applications.
3. Under **SETTINGS** > **Integrations** > **EWS Login**, click **Set Credentials**.
4. Enter a User name and Password and click **Save**.

NOTE: Update all EWS clients with the new account details.

EWS Server Settings

It is possible to customize EWS configuration parameters, create custom device type extension files, and customize default device type extension files.

To recreate customized EWS configuration parameters:

1. In Windows Explorer, navigate to `...Power Monitoring Expert\Applications\EWS\web.config`.
2. Compare the target default file to the source files in the `CM Migration Files` folder.
3. Manually recreate the settings you want to use on the target system.

To recreate custom device type extension files for EWS:

1. In Windows Explorer, navigate to `...Power Monitoring Expert\system\WebServices\Extensions\`.
2. Compare the target default files to the source files in the `CM Migration Files` folder.
3. Copy the custom device type definition XML files that you want to include to the new system.

To recreate customized default device type extension files:

1. In Windows Explorer, navigate to `...Power Monitoring Expert\system\WebServices\Extensions\`.
2. Compare the target default files to the source files in the `CM Migration Files` folder.
3. Recreate the customized default device type definitions you want to use on the target system.

Update EWS Server

In Management Console, select **Tools** > **System** > **Update EWS Server** to initialize the EWS server. (This step is only needed if EWS is used in the target system.)

LogInserter and Query Server

LogInserter and Query Server in PME are controlled by the settings and configuration of the Log Acquisition and Query modules.

NOTE: Customization to these files is quite rare. Determine whether PME performance enhancements require the recreation the LogInserter and Query Server customizations.

To recreate the module customizations:

1. In Windows Explorer, navigate to `...Power Monitoring Expert\config\cfg\logsrv\` and open the module configuration files.
2. Compare the target default files to the source files in the `CM Migration Files` folder.
3. In ION Designer, open LogInserter and edit the Log Acquisition and Query modules to include the source customizations.

OPC Server Settings

It is possible to create custom device type definitions, or customize the default device type definitions for OPC, and customize `DefaultMeasurements.xml`.

To recreate custom device type definitions from the source system:

1. Check the `CM Migration Files` folder to see if there are any custom device type definitions for OPC.
2. In Windows Explorer, navigate to `...Power Monitoring Expert\system\IONServices\DefaultMeasurementsExt\` and copy the custom device type definition XML files that you want to include to the new system.

To recreate customized default device type definitions from the source system:

1. In Windows Explorer, navigate to `...Power Monitoring Expert\system\IONServices\DefaultMeasurementsExt\`.
2. Check the default device type extension XML files from the source in the `CM Migration Files` folder.
3. Recreate the customized default device type definitions that you want to include to the new system.

To recreate customizations in `DefaultMeasurements.xml`:

1. Check the `DefaultMeasurements.xml` copied to the `CM Migration Files` folder to see if it was customized.
2. In Windows Explorer, navigate to `...Power Monitoring Expert\system\IONServices\`.
3. From a sub directory, duplicate an existing OPC `ext.xml` file.

   NOTE: These files are merged in memory into the master `DefaultMeasurements.xml` file without needing to modify the master file.

4. Open the file, delete the content of the original device and then replace it with the new device content.
5. Save the file.

Update OPC Server

In Management Console, select **Tools** > **System** > **Update OPC Server** to initialize the OPC server. (This step is needed only if OPC is used in the target system.)

PQDIF Exporter

Configuration Manager does not automatically install the PQDIF configuration files because the older files are not compatible with the newer version of PME.

To update the PQDIF configuration files:

1. In Windows Explorer, navigate to `...Power Monitoring Expert\config\exporters\PQDIF\`.
2. Compare the target default files to the source files in the `CM Migration Files` folder.
3. Recreate the customized PQDIF configuration files that you want to include to the new system.

Update PQDIF Exporter Database Connection

To update the PQDIF exporter database connection:

1. In Windows Explorer, navigate to `...Power Monitoring Expert\config\exporters\PQDIF\config\`.
2. Open `PQDIFExporterConfig.xml` and edit the file to specify database connection settings.

PME Registry Keys

Configuration Manager installs the `NetworkDiagram` key, any custom `DeviceInfo` keys, and the Cloud Agent keys (if the source system was registered) on the target system. Any other customizations to the registry must be recreated manually.

To recreate PME registry keys:

1. Review the source registry keys in the `CM Migration FilesSystem Registry\system\Registry\Registry.xml`.
2. Recreate any customized registry keys on that you want to use on the target system.

PME Services

Configuration Manager does not transfer customizations in services settings from the source to the target.

Recreate PME Services settings customizations in service settings using Microsoft Windows Services.

Additionally, custom VIPs need to be manually started after Configuration Manager completes the Write to System and the system is ready to be put into service.

Scheduled Jobs

Configuration Manager does not automatically install scheduled jobs from the source system to the target system.

To recreate scheduled jobs on the new system:

1. In the `CM Migration Files` folder, check the copied files or review the scheduled jobs on the source system and then compare it to the target system configuration.
2. Recreate any desired customizations manually on the target system.

NOTE: Ensure that the user permissions for Windows Task Scheduler are set correctly on the target system.

Web Application Custom Tabs

Configuration Manager does not automatically recreate any custom tabs or links on the target system. If you used custom tabs in the source system, you need to manually recreate those tabs in the target system. See Customizing the Web Applications links and Adding idle detection to custom Web Application links for more information.

Web Application web.config

Configuration Manager does not automatically install the source system `web.config` file on the target system because there could be settings in the file that are incompatible between source and target system.

To recreate `web.config` customizations:

1. In the `CM Migration Files` folder, check the copied `web.config` file and compare it to the target system default `web.config` file in `...\Applications\SystemDataService\`.
2. Back up `web.config` on the target system and then edit the file as needed.

NOTE: You must reconfigure the system after editing the Web Applications web.config file. That means you have to return to Step 3 - Initialize the Configuration in the workflow.

Web Report Packs

Report packs must be compatible with the version of PME they are running on; older versions of custom report packs are not compatible with newer versions of PME. Upgrade the report packs to versions that are supported on the newer PME system before installing them.

Step 5 - Service the System

After manually recreating configuration customizations, the system is ready to be put into service. Review the steps in this section to finalize the system transfer.

System reboot

At this point, many configuration changes are complete and it is recommended that you reboot the system.

PME Hotfixes

If the target system had any hotfixes applied to it before you ran the Reconfigure step, they need to be reinstalled after you reboot the system.

Clear browser cache

Following a configuration transfer, it is recommended that you:

1. Delete the browser cache.

   This will clear any old configurations or cached pages that might have been on the system before the transfer. If you are unsure about how to do this, an Internet search can help you find out how to delete the cache on every supported browser.

2. Re-run saved Web reports and re-save them.

   This ensures that the reports can be read correctly on the new system.

Enable Server, Sites, and Devices

Configuration Manager leaves the server, sites, and devices in a disabled state after Write to System. This is a safety precaution to ensure that the PME system does not go into service until it is ready and its correct configuration has been verified.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Do not use the software or devices for critical control or protection applications where human or equipment safety relies on the operation of the control action.
- Do not use the software to control time-critical functions.
- Do not use the software to control remote equipment without proper access control and status feedback.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Perform all required manual tasks, especially installing missing device drivers, and then enable the server, sites, and devices through the Management Console.

Test that each device can display the default diagram. If communication problems exist, address them before proceeding.

Step 6 - Perform a Post-upgrade System Check

Verify that the new system is configured correctly. Use the checklist below to do a system walk-through. For each item in the checklist, make sure the system behaves the way you expect.

For example:

- Are all devices configured and communicating?
- Is all the information present?
- Are measurements being displayed and are they updating?
- Are reports running and returning the expected data?

NOTE: You might have to configure some of the new features, that did not exist in the old version of PME, before they can be used.

Checklist

NOTE: The following list is intended to be a starting point for your system check. Each system configuration is different. Your system might require additional checks to verify the correct configuration. Test your system carefully to ensure it is functioning as expected.

To perform a walk-through on your new system:

1. Check the system log in the Management Console for errors.
2. Check the Devices, Sites, and other settings in Management Console.
3. Check the availability of the archived databases for reporting in Reports Configuration in the Management Console.
4. Log into Vista, verify the network diagram, real time data, and data logs.
5. Verify that Vista diagram links function.
6. Check the data and functions provided by the VIPs.
7. Log into the Web Applications.
8. Run the Dashboards, Diagrams, Trends, Alarms, and Reports.
9. In Web Reporter, run saved/custom reports and verify the report subscription.
10. Check any scheduled tasks.
11. Review the user accounts and passwords to ensure they meet your cybersecurity requirements.
12. Review the alarm configuration.
13. Review the Software Modules configuration.

After upgrading the software

Perform the following procedures after you upgrade the PME software.

(Recommended) Restart the system

Restart (reboot) your system.

Activate software licenses

NOTICE

LOSS OF COMMUNICATION

- Activate product and component licenses prior to the expiry of the trial license.
- Activate sufficient licenses for the servers and devices in your system.
- Export the existing hierarchy template out of Power Monitoring Expert before importing a new template. The new template can overwrite the existing template, which can permanently remove all information contained in the original.
- Backup or archive any SQL Server database data before adjusting any database memory options.
- Only personnel with advanced knowledge of SQL Server databases should make database parameter changes.

Failure to follow these instructions can result in loss of data.

For In-Place upgrades:

Upgraded systems do not have a trial license. Purchase the required upgrade licenses and have them ready when the system is upgraded. The upgraded system is not operational until valid, purchased upgrade licenses are activated.

For SBS upgrades:

The newly installed software includes a 90-day trial license for all features of the product. You must activate valid purchased software licenses within 90 days, otherwise some software functionality is disabled.

After you are satisfied with the new system, return your old licenses and then activate the licenses on the new PME system.

NOTE: After you return the licenses, the old system is no longer functional.

For information on how to activate licenses, see Licensing configuration. For general information on licensing, see Licensing.

Verify correct database behavior

Verify that the system can access the databases by checking configuration settings and historical data logs. Confirm that the amount of historical data in the database is as expected. Use the database backups to restore any data that might have been deleted or lost, accidentally, during the upgrade.

NOTICE

LOSS OF DATA

- Back up the database at regular intervals.
- Back up the database before upgrading or migrating the system.
- Back up the database before trimming it.
- Back up the database before making manual database edits.
- Verify correct database behavior after making database or system changes.

Failure to follow these instructions can result in permanent loss of data.

Cybersecurity

Review the cybersecurity information. See Cybersecurity for details.

Install a security certificate for TLS 1.2

See Install a security certificate for TLS 1.2 in the Install section of this guide for details.

Windows Integrated Authentication for SQL Server

If you upgraded PME to use Windows Integrated Authentication, then you need to manually add the Windows accounts for Engineering tool users to the SQL database server. This is needed for using the tools on the PME server or on Engineering clients. Engineering tools include applications such as Vista, Designer, Management Console, and Management Console tools.

We recommend that you:

- Create a Windows group for PME Engineering Client users.
- Add the Windows group to PME as a User. See Adding a Windows group for details.
- Add the Windows group to the SQL database server with db_owner role for the PME databases. (See work flow steps below)
- Add all users who need to access to Engineering client applications to the Windows group. All members of this Windows group now have the required permissions to access PME and the database through the Engineering Client applications.
- Remove the Windows account for the upgrade user from the SQL database logins. See Before upgrading the software for more information on this account.

To add a Windows group to the SQL database server,

1. Start Microsoft SQL Server Management Studio on the database server.
2. Connect with an account with sysadmin privileges.
3. Navigate to **Security > Logins**, right-click Logins, and select **New Login** from the context menu. This opens the Login - New window.
4. In Login - New, select **Windows authentication**, click **Search**, and locate the Windows group you want to add.
5. In the Select a page pane on the left, select **User Mapping**.

6. In User Mapping, select all 4 PME databases (ApplicationModules, ION_Data, ION_Network, ION_Systemlog), then select db_owner as database role membership.
7. Click **OK**.

If you don't want to create a Windows group:

To add an individual Windows user account to the SQL database server,

1. Start Microsoft SQL Server Management Studio on the database server.
2. Connect with an account with sysadmin privileges.
3. Navigate to **Security > Logins**, right-click Logins, and select **New Login** from the context menu. This opens the Login - New window.
4. In Login - New, select **Windows authentication**, click **Search**, and locate the Windows user you want to add.
5. In the Select a page pane on the left, select **User Mapping**.
6. In User Mapping, select all 4 PME databases (ApplicationModules, ION_Data, ION_Network, ION_Systemlog), then select db_owner as database role membership.
7. Click **OK**.

NOTE: When PME is installed with Windows Integrated Authentication, the Windows account that is used to access the database is also used to run the PME services and the IIS Application Pools.

Check services

Open the Windows Services dialog and ensure that all of the necessary ION services are started. The services run under the Local System account, by default. You can change the **Log On As** attribute of a service by specifying the account and password. Use the **Log On** tab on the service properties dialog to do this. The **Log On As** account must have read/write permissions on the product's installation directory, which by default is `...\Schneider Electric\Power Monitoring Expert`.

For more information on the ION Windows Services, see PME Windows services.

(For Standalone architecture only) Review Windows Task Scheduler

The Windows Task Scheduler has preconfigured scheduled jobs for performing backups, maintenance, size notification, trims, and archiving (on the ION_Data database) on the PME databases. Review these schedules and make any modifications that you require.

For more information on Database Manager and Windows Task Scheduler, see Database Manager.

Check IIS

Confirm that Internet Information Services (IIS) is working by typing the URL `http://localhost/` in the address field of your browser to display an IIS image. In some cases, security restrictions may block access to this web page.

(Optional) Configure first time Alarms processing

After the upgrade, the Alarms Web application processes existing Power Quality data the first time it starts up. This processing can be very time consuming. You can control how much of the existing data is processed to reduce the processing time. See Configuring first time Alarms processing for more information.

Set up Web Clients

Set up Web Client access in your browser, by entering the fully qualified domain name of the server hosting PME, or its IP address, followed by the path name. The path name is configurable during the install of the software. The default path name is `/Web` . Example: `https://ServerName/Web` or `https://10.152.35.18/Web`. For more information on Web Clients, see Client types.

System migration

Use the links in the following table to find the content you are looking for.

Topic	Content
Before migrating the software	Provides information and reminders for you to consider before starting the migration.
System migration	Provides detailed information on the migration of the PME software.
After migrating the software	Provides procedures for you to complete after the migration.

Before migrating the software

Review the prerequisites

Before starting the migration, review the Planning chapter in this guide and confirm that your system meets all the relevant prerequisites. In particular, review the computer hardware, operating environment, network connectivity, and licensing requirements, including System migration and license returns. Also review the PME 2020 Install notes and PME 2020 Upgrade notes, which provide information that is specific to the latest version of the software.

Backup the databases

Backup the ION_Data, ION_Network, ION_SystemLog, and ApplicationModules databases before starting the migration. Keep the backups in a secure and safe location. Use these backups to restore the original databases in case data is deleted or lost, accidentally, during the migration.

NOTICE

LOSS OF DATA

- Back up the database at regular intervals.
- Back up the database before upgrading or migrating the system.
- Back up the database before trimming it.
- Back up the database before making manual database edits.
- Verify correct database behavior after making database or system changes.

Failure to follow these instructions can result in permanent loss of data.

Cybersecurity

Review the cybersecurity information. See Cybersecurity for details.

Windows Integrated Authentication for SQL Server

If you are planning to install PME with Windows Integrated Authentication on the new system, see Windows Integrated Authentication for SQL Server for up-front configuration steps.

NOTE: Windows Integrated Authentication is not supported for PME systems with Secondary Servers.

System migration

Use a system migration to copy the configuration of one PME system to another PME system on a different computer. System migrations are performed manually with the Configuration Manager tool.

NOTE: System migration only applies to Standalone Serves and Application Servers. There is no migration for Engineering Clients.

Migrating a configuration from an old system to a new system using Configuration Manager is accomplished in six steps and must be done in the following order:

- Step 1 – Prepare both systems
- Step 2 - Transfer the Configuration
- Step 3 - Initialize the Configuration
- Step 4 - Manually Recreate Customizations
- Step 5 - Service the System
- Step 6 - Perform a Post-migration System Check

See Estimated task time for SBS upgrades for information on the expected upgrade time.

NOTE: The old PME system can keep running while the configuration is migrated. However, you might experience some performance degradation if two systems are working with the devices.

Step 1 – Prepare both systems

Before migrating, it is important to understand the operational state of both the old and the new systems.

Assess the old system

Assess the old system by completing the following procedures:

1. Review the old PME system to see if Devices, Vista Diagrams, Reports, and any other configurations are working as expected.
2. Check the system log for errors. Correct any items in error or note them down so you can address them on the new system after the migration.
3. Check the size of the historical data database (ION_Data) and look for database archives that need to be migrated.
4. Check the size of the databases and consider what is needed in the new system. Transferring large amounts of historical data can be time consuming. Trim large databases to avoid long transfer times.
5. Run the Diagnostic Tool that is found at `...\Power Monitoring Expert\Diagnostics Tool\Diagnostics Tool.exe`.

   The Diagnostics Tool output provides a snapshot of the current state of the system. Reviewing this helps in identifying current or potential issues. It is advised that you select all the commands to run to get a full view of this system. Unzip the files (if compressed) and open the HTML page by clicking on `index.html` for an overview of the results. Fix any issues as needed before upgrading.
6. Have a copy of the system key for the old system.

NOTE: The migration of the ION_Data database is often the most time consuming part of the system migration. You can expect this process to take about 1 hour for each 15 GB in database size. It is often better to trim the database or archive portions that are no longer needed before the migration. This is especially important for large database sizes. Plan this part of the migration carefully.

Install and assess the new system

NOTE: The procedures in this document assume that the new PME system is installed correctly on the new computer, and that it is in a factory default configured state. Any custom configuration that exists on the new system will be overwritten by the procedures in this document. Any custom configuration that exists might cause the migration to fail in unexpected ways.

Install the new version of PME. See New system install for more information. After the installation is complete, assess the new system:

1. Check a few of the basic functions such as the system log for errors, and inspect the System Configuration Report.

2. Open the Web Applications and ensure that there are no Dashboards and that the default Web Reports are available.
3. Run the Diagnostics Tool at `...\Power Monitoring Expert\Diagnostics Tool\Diagnostics Tool.exe`.
4. Ensure that the remaining trial license period is sufficient for transferring the source configuration and validating the new system.

NOTE: You should have at least four times the size of the old PME databases in free hard disk space on the new system to allow for: backups, disk usage during the database upgrade process, and increase in the database size after the migration. Before writing a saved configuration to a system, Configuration Manager performs a disk space check to ensure there is sufficient disk space for the configuration and databases. If there is not enough free disk space, Configuration Manager will display a warning.

Step 2 - Transfer the Configuration

Use Configuration Manager to transfer the configuration from the source system to the target system.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Before writing a configuration verify that the system is not performing critical control actions that may affect human or equipment safety.
- Verify correct system operation after writing a configuration.
- Verify that you are writing to the correct new, factory installed target system.
- Avoid introducing malicious software into your system.

Failure to follow these instructions can result in death or serious injury.

⚠ WARNING

INACCURATE DATA RESULTS

- Before writing a configuration verify that the system data results are not used for critical decision making that may affect human or equipment safety.
- Verify correct system data results after writing a configuration.
- Do not introduce malicious software into your system.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

NOTICE

LOSS OF DATA

- Back up the system configuration before writing a new configuration.
- Verify the correctness of a configuration before writing it to the system.

Failure to follow these instructions can result in irreversible database changes.

Distributed systems

For a distributed system, the target system database server and PME server must be in the same domain.

To run the Configuration Manager on the target PME server, log into Windows with a domain account that meets the following conditions:

- It is a member of the administrators group on the PME server
- It has been added as a Login in SQL Server with sysadmin role in the PME database instance

NOTE: The configuration transfer will not succeed if the above conditions are not met.

To transfer the configuration:

1. On the old system:
   a. Open Configuration Manager.
   b. Click **Read from System**.
   c. After the operation completes, review the log for errors. Correct errors that could cause problems on the new system.
   d. (Optional) Repeat steps b. and c. until the errors and warnings have been eliminated or have a known recovery process that will be applied on the destination system.
   e. (Optional) Add explanatory notes or attach files to the configuration.
   f. Click **Save to Archive** to save the configuration to archive.
   g. Export the PME system key. This can be done through the PME installer.

      NOTE: The system key of the old source system is required to write the configuration to the new target system. Make sure this key is available when writing the configuration with the Configuration Manager.

   h. Copy the archive file for transfer to the new system.
   i. Create a backup of the ION_Data, ION_Network, and ApplicationModules databases on the DB server using SQL Server Management Studio
   j. Create a backup of any historical database archives that you want to use on the new system.
   k. Copy the database backup files for transfer to the new system.

   NOTE: Keep the configuration archive and database backups secure during and after the transfer to prevent unauthorized access.

   ⚠ WARNING

   POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

   Use cybersecurity best practices to help prevent unauthorized access to the software.

   Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

   Work with facility IT System Administrators to ensure that the system adheres to the site-specific cybersecurity policies.

2. On the new PME system:
   a. Delete the existing ION_Data, ION_Network, and ApplicationModules databases on the DB server.

b. Restore the databases (ION_Data, ION_Network, ApplicationModules) and historical database archives from the old system onto the new database server.

c. Log into the new PME server Windows operating system with a domain account that meets the conditions described above.

d. Open Configuration Manager.

e. Click **Load from Archive** to load the archived configuration from the old system.

f. Click **Write to System** to write the configuration to the new system.

> **NOTE**: During the write to system, the Configuration Manager will prompt for the system key from the old source system.

g. Review the log for errors. Correct any errors that will cause problems on the new system.

Standalone systems

To transfer the configuration:

1. On the old system:
   a. Open Configuration Manager.
   b. Click **Read from System**.
   c. After the operation completes, review the log for errors. Correct errors that could cause problems on the new system.
   d. (Optional) Repeat steps b. and c. until the errors and warnings have been eliminated or have a known recovery process that will be applied on the destination system.
   e. (Optional) Add explanatory notes or attach files to the configuration.
   f. Click **Save to Archive**. You can optionally save the historical data.
   g. Export the PME system key. This can be done through the PME installer.

   > **NOTE**: The system key of the old source system is required to write the configuration to the new target system. Make sure this key is available when writing the configuration with the Configuration Manager.

   h. Copy the archive file for transfer to the new system.
2. On the new PME system:
   a. Open Configuration Manager.
   b. Click **Load from Archive** to load the archived configuration from the old system.
   c. Click **Write to System** to write the configuration to the new system.

   > **NOTE**: During the write to system, the Configuration Manager will prompt for the system key from the old source system.

   d. Review the log for errors. Correct any errors that will cause problems on the new system.

> **NOTE**: The new PME system is NOT operational yet. You must manually complete the migration. See the following sections for detailed information on how to complete the migration

Step 3 - Initialize the Configuration

After you use Configuration Manager to write the configuration to the new PME system, the system is NOT in an operational state yet. You must manually initialize the new system.

Carefully review the topics in this section to initialize the new system.

Reconfigure the System

The PME installer configures many settings when installing the software. During the configuration transfer using Configuration Manager, some of these settings are affected and must be reconfigured when Write to System completes.

Run the PME installer in Reconfigure mode on the target system after Write to System completes to ensure that all application settings are configured correctly. See PME Installer for information on Reconfigure mode.

Install Missing Drivers

PME is installed with a large number of pre-configured device types. Many more device types are available as downloadable add-on drivers from the Exchange community. See Default device type support for information on pre-configured device types in PME.

TIP: Configuration Manager flags missing device drivers as warnings in the Log, and indicates whether there are newer versions that should be installed. The tool also logs warnings for drivers that do not match the expected default for the version of PME. These could be drivers that were installed after the release of PME, or that were modified after the install.

NOTE: Review any device driver warnings in the Configuration Manager Log. Install missing device drivers and updated drivers to the latest versions if necessary.

For information on where to find the required device drivers, see Resources.

Reports Database

Verify that the correct reporting database is selected.

To verify the reports database:

1. Open Management Console.
2. Under **Tools > Reports Configuration**, click **Location of report data** in the **Reports** tab and confirm that it is set to the database that you want to report on.

Web report subscriptions

Since the system was moved from one computer to another, it is possible that file paths that were previously configured for saving reports as part of a subscription need to be changed. See Subscribing to a report for more information.

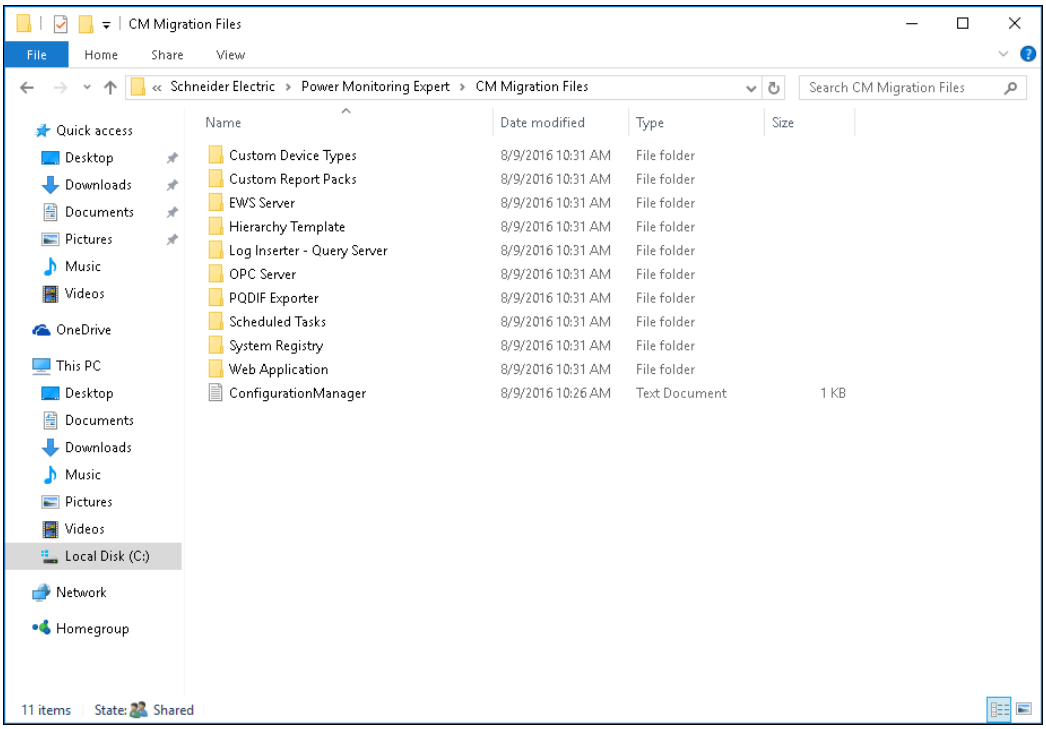
Step 4 - Manually Recreate Customizations

Configuration Manager copies all configuration files to the target system, however, it does not install all configuration files on the new target system because:

1. The source system contains customizations that cannot be automatically transferred by Configuration Manager.
2. The target system contains new default values and changes that should not be overwritten.

Configuration Manager copies all customized configuration files that are not automatically installed in the system to `...\Power Monitoring Expert\CM Migration Files`

For example:



Review this folder and decide which customizations you want to recreate on the new system.

The topics that comprise this section consist of all possible configuration customizations. However, most systems in the field only use a small subset of these.

Alert Monitor

NOTE: The Alert Monitor feature is no longer available in PME, starting with version 2020.

Dial Out Modems

Any modems—physical or WinModem—that were used on the source system to connect to remote devices, or equivalent hardware resources, need to be setup and configured on the target computer or operating system.

Check the communication port mappings as they may be different.

Test each modem or serial port to verify that everything works as expected.

Update EWS Server

In Management Console, select **Tools** > **System** > **Update EWS Server** to initialize the EWS server. (This step is only needed if EWS is used in the target system.)

LogInserter and Query Server

LogInserter and Query Server in PME are controlled by the settings and configuration of the Log Acquisition and Query modules.

NOTE: Customization to these files is quite rare. Determine whether PME performance enhancements require the recreation the LogInserter and Query Server customizations.

To recreate the module customizations:

1. In Windows Explorer, navigate to `...Power Monitoring Expert\config\cfg\logsrv\` and open the module configuration files.
2. Compare the target default files to the source files in the `CM Migration Files` folder.
3. In ION Designer, open LogInserter and edit the Log Acquisition and Query modules to include the source customizations.

Update OPC Server

In Management Console, select **Tools** > **System** > **Update OPC Server** to initialize the OPC server. (This step is needed only if OPC is used in the target system.)

Update PQDIF Exporter Database Connection

To update the PQDIF exporter database connection:

1. In Windows Explorer, navigate to `...Power Monitoring Expert\config\exporters\PQDIF\config\`.
2. Open `PQDIFExporterConfig.xml` and edit the file to specify database connection settings.

PME Registry Keys

Configuration Manager installs the `NetworkDiagram` key, any custom `DeviceInfo` keys, and the Cloud Agent keys (if the source system was registered) on the target system. Any other customizations to the registry must be recreated manually.

To recreate PME registry keys:

1. Review the source registry keys in the `CM Migration FilesSystem Registry\system\Registry\Registry.xml`.
2. Recreate any customized registry keys on that you want to use on the target system.

PME Services

Configuration Manager does not transfer customizations in services settings from the source to the target.

Recreate PME Services settings customizations in service settings using Microsoft Windows Services.

Additionally, custom VIPs need to be manually started after Configuration Manager completes the Write to System and the system is ready to be put into service.

Scheduled Jobs

Configuration Manager does not automatically install scheduled jobs from the source system to the target system.

To recreate scheduled jobs on the new system:

1. In the `CM Migration Files` folder, check the copied files or review the scheduled jobs on the source system and then compare it to the target system configuration.
2. Recreate any desired customizations manually on the target system.

NOTE: Ensure that the user permissions for Windows Task Scheduler are set correctly on the target system.

Step 5 - Service the System

After manually recreating configuration customizations, the system is ready to be put into service. Review the steps in this section to finalize the system transfer.

System reboot

At this point, many configuration changes are complete and it is recommended that you reboot the system.

PME Hotfixes

If the target system had any hotfixes applied to it before you ran the Reconfigure step, they need to be reinstalled after you reboot the system.

Clear browser cache

Following a configuration transfer, it is recommended that you:

1. Delete the browser cache.

   This will clear any old configurations or cached pages that might have been on the system before the transfer. If you are unsure about how to do this, an Internet search can help you find out how to delete the cache on every supported browser.

2. Re-run saved Web reports and re-save them.

   This ensures that the reports can be read correctly on the new system.

Enable Server, Sites, and Devices

Configuration Manager leaves the server, sites, and devices in a disabled state after Write to System. This is a safety precaution to ensure that the PME system does not go into service until it is ready and its correct configuration has been verified.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Do not use the software or devices for critical control or protection applications where human or equipment safety relies on the operation of the control action.
- Do not use the software to control time-critical functions.
- Do not use the software to control remote equipment without proper access control and status feedback.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Perform all required manual tasks, especially installing missing device drivers, and then enable the server, sites, and devices through the Management Console.

Test that each device can display the default diagram. If communication problems exist, address them before proceeding.

Step 6 - Perform a Post-migration System Check

Verify that the new system is configured correctly. Use the checklist below to do a system walk-through. For each item in the checklist, make sure the system behaves the way you expect.

For example:

- Are all devices configured and communicating?
- Is all the information present?
- Are measurements being displayed and are they updating?
- Are reports running and returning the expected data?

Checklist

NOTE: The following list is intended to be a starting point for your system check. Each system configuration is different. Your system might require additional checks to verify the correct configuration. Test your system carefully to ensure it is functioning as expected.

To perform a walk-through on your new system:

1. Check the system log in the Management Console for errors.
2. Check the Devices, Sites, and other settings in Management Console.
3. Check the availability of the archived databases for reporting in Reports Configuration in the Management Console.
4. Log into Vista, verify the network diagram, real time data, and data logs.
5. Verify that Vista diagram links function.
6. Check the data and functions provided by the VIPs.
7. Log into the Web Applications.
8. Run the Dashboards, Diagrams, Trends, Alarms, and Reports.
9. In Web Reporter, run saved/custom reports and verify the report subscription.
10. Check any scheduled tasks.
11. Review the user accounts and passwords to ensure they meet your cybersecurity requirements.
12. Review the alarm configuration.
13. Review the Software Modules configuration.

After migrating the software

Perform the following procedures after you migrate the PME software.

(Recommended) Restart the system

Restart (reboot) your system.

Activate software licenses

NOTICE

LOSS OF COMMUNICATION

- Activate product and component licenses prior to the expiry of the trial license.
- Activate sufficient licenses for the servers and devices in your system.
- Export the existing hierarchy template out of Power Monitoring Expert before importing a new template. The new template can overwrite the existing template, which can permanently remove all information contained in the original.
- Backup or archive any SQL Server database data before adjusting any database memory options.
- Only personnel with advanced knowledge of SQL Server databases should make database parameter changes.

Failure to follow these instructions can result in loss of data.

The installed software includes a 90-day trial license for all features of the product. You must activate valid purchased software licenses within 90 days, otherwise some software functionality is disabled.

After you are satisfied with the new system, return your old licenses and then activate the licenses on the new PME system.

NOTE: After you return the licenses, the old system is no longer functional.

For information on how to activate licenses, see Licensing configuration. For general information on licensing, see Licensing.

Verify correct database behavior

Verify that the system can access the databases by checking configuration settings and historical data logs. Confirm that the amount of historical data in the database is as expected. Use the database backups to restore any data that might have been deleted or lost, accidentally, during the migration.

NOTICE

LOSS OF DATA

- Back up the database at regular intervals.
- Back up the database before upgrading or migrating the system.
- Back up the database before trimming it.
- Back up the database before making manual database edits.
- Verify correct database behavior after making database or system changes.

Failure to follow these instructions can result in permanent loss of data.

Cybersecurity

Review the cybersecurity information. See Cybersecurity for details.

Windows Integrated Authentication for SQL Server

If you installed the new PME system with Windows Integrated Authentication, see Windows Integrated Authentication for SQL Server for post-install configuration steps.

Check services

Open the Windows Services dialog and ensure that all of the necessary ION services are started. The services run under the Local System account, by default. You can change the **Log On As** attribute of a service by specifying the account and password. Use the **Log On** tab on the service properties dialog to do this. The **Log On As** account must have read/write permissions on the product's installation directory, which by default is `...\Schneider Electric\Power Monitoring Expert`.

For more information the ION Windows Services, see PME Windows services.

(For Standalone architecture only) Review Windows Task Scheduler

The Windows Task Scheduler has preconfigured scheduled jobs for performing backups, maintenance, size notification, trims, and archiving (on the ION_Data database) on the PME databases. Review these schedules and make any modifications that you require.

For more information on Database Manager and Windows Task Scheduler, see Database Manager.

Check IIS

Ensure that Internet Information Services (IIS) is working by typing the URL `http://localhost/` in the address field of your browser to display an IIS image. In some cases, security restrictions may block access to this web page.

Set up Web Clients

Set up Web Client access in your browser, by entering the fully qualified domain name of the server hosting PME, or its IP address, followed by the path name. The path name is configurable during the install of the software. The default path name is `/Web` . Example: `https://ServerName/Web` or `https://10.152.35.18/Web`. For more information on Web Clients, see Client types.

Cybersecurity

This section provides information on how to help secure your system during the Installing and Upgrading phase.

Install antivirus and application whitelisting software

Install the antivirus and application whitelisting software.

NOTE: Application whitelisting software can prevent a legitimate application from executing, if not configured correctly. See Configure application whitelisting software for more information.

Verify install file integrity and authenticity

⚠ WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

Use cybersecurity best practices to help prevent unauthorized access to the software.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

Work with facility IT System Administrators to ensure that the system adheres to the site-specific cybersecurity policies.

Verify the file integrity and authenticity for software updates and other components before installing them in the system. Do not install files for which the integrity and authenticity cannot be confirmed.

For details on how to verify file integrity and authenticity, see Verifying file integrity and authenticity.

Protect the System Key

During the installation of PME, a system key is generated and a copy of this key is exported as a `.key` file. This system key is the encryption key used by the software to encrypt user and system credentials. A PME server retains the original key in the registry. The exported copy is needed for the installation of Engineering clients and Secondary servers. It is also needed in case of a future side-by-side system upgrade or migration.

As long as the PME server has the original key stored in the registry, it is possible to use the installer to export a copy at any time. However, if the original key is deleted from the server, it cannot be recreated or exported. In that case, you can use the exported copy to restore the system key in the registry. Without the system key, PME user accounts can no longer be accessed.

NOTE: Protect the exported system key in a location accessible only to authorized users. An unauthorized user might be able to use the system key to gain access to your power monitoring software and devices.

Install latest updates for OS and SQL Server

Install the latest updates for the operating system and the SQL Server.

Check computer for cybersecurity issues

Check the pre-existing computer hardware and software for malware and other potential cybersecurity issues.

For example,

- Scan the system with up-to-date antivirus/antimalware tool
- Check the Windows user accounts and access permissions
- Verify firewall settings to ensure least-access
- Verify computer hardware integrity

Install your network security measures

Install the network security hardware and software measures for your IT and device networks.

Tools

Information on tools used for installing and upgrading PME.

Use the links in the following table to find the content you are looking for.

Topic	Content
PME Installer	Provides information on the PME installer and the following installer tasks: Reconfigure, Reset Accounts, Export System Key, Import System Key, Uninstall.
Configuration Manager	Provides information on the Configuration Manager tool that is used for Side-by-Side upgrades and system migrations.

PME Installer

Overview

Use the PME installer to:

- Install PME on a new system. See New system install for more information.
- Upgrade PME on an existing system. See System upgrade for more information.
- Perform system maintenance and repair tasks. See below for more information.

Installer Operation

The installer:

- Runs pre-installation checks
- Installs the required .NET Framework (if needed)
- Provides the option to install SQL Server Express
- Allows users to set the PME, Windows, and SQL Server account passwords.
- Allows users to export or import the PME system key.
- Installs and configures all PME application files and services.

The installer produces a detailed installation log file which is saved inside the PME folder structure on the PME server.

Installer system maintenance tasks

You use the installer for the following maintenance tasks:

- Reconfigure
- Reset Accounts
- Export System Key
- Import System Key
- Uninstall

To restart the Installer:

1. Open the Control Panel and select **Programs and Features**.
2. Select PME within the list of programs.
3. Click **Change** in the header area of the list of programs. This opens the installer in maintenance mode.

Reconfigure

Reconfigure lets you rerun the configuration part of the PME install process. **Reconfigure** reverts many of the system settings and components to the install defaults.

Typically, you would use **Reconfigure** to repair or troubleshoot a damaged system. Consult with Technical Support before running a reconfigure if you are not familiar with the details of this operation.

NOTE: If your system is installed with Windows Integrated Authentication, you can use **Reconfigure** to change which account is used. To only update the password for the account, run **Reset Accounts**.

Reset Accounts

As part of the initial installation of PME, you were given the option to set or change the default passwords for the supervisor account, the Windows accounts, and the database accounts. **Reset Accounts** lets you change those passwords.

The dialog sequence is as follows: (1) Supervisor Account page, (2) Windows Accounts page, (3) Database Accounts page, (4) Database Software page, (5) Reset Accounts progress dialog.

NOTE: If your system is installed with Windows Integrated Authentication, you can use **Reset Accounts** to update the password for the Integrated Authentication Windows account. To change which account is used, run **Reconfigure**.

You can rerun **Reset Accounts** as often as required, and you can use it to change none, some, or all of the passwords.

Export System Key

As part of the initial installation of PME, you had to export the system key. **Export System Key** lets you export the system key again in case the originally exported key has been lost.

The system key is required for the installation of an Engineering Client, or if you need to uninstall and then reinstall PME.

Import System Key

Import System Key lets you import a key into an existing PME system.

Typically, you would import a system key during a side-by-side upgrade or migration of the PME server.

Uninstall

Uninstall removes system files and components and prepares the computer for a re-installation of PME. Uninstall does not remove all files from the system. It also does not remove the databases. To remove all files and components you must decommission the system. You risk disclosing your power system data, system configuration, user information, and passwords if you don't decommission the system at the end of its life. See Decommissioning for more details.

NOTICE

UNAUTHORIZED OR UNINTENDED ACCESS TO CONFIDENTIAL DATA

- Decommission the system at the end of its life by following the instructions provided with the software.

Failure to follow these instructions can result in unauthorized or unintended access to sensitive or secure data.

Typically, you would use Uninstall to repair or troubleshoot a damaged system.

NOTE: As part of the uninstall workflow, you have the option to leave the databases attached to the database server, making it easier to re-install the software.

Consult with Technical Support before performing an uninstall if you are not familiar with the details of this operation.

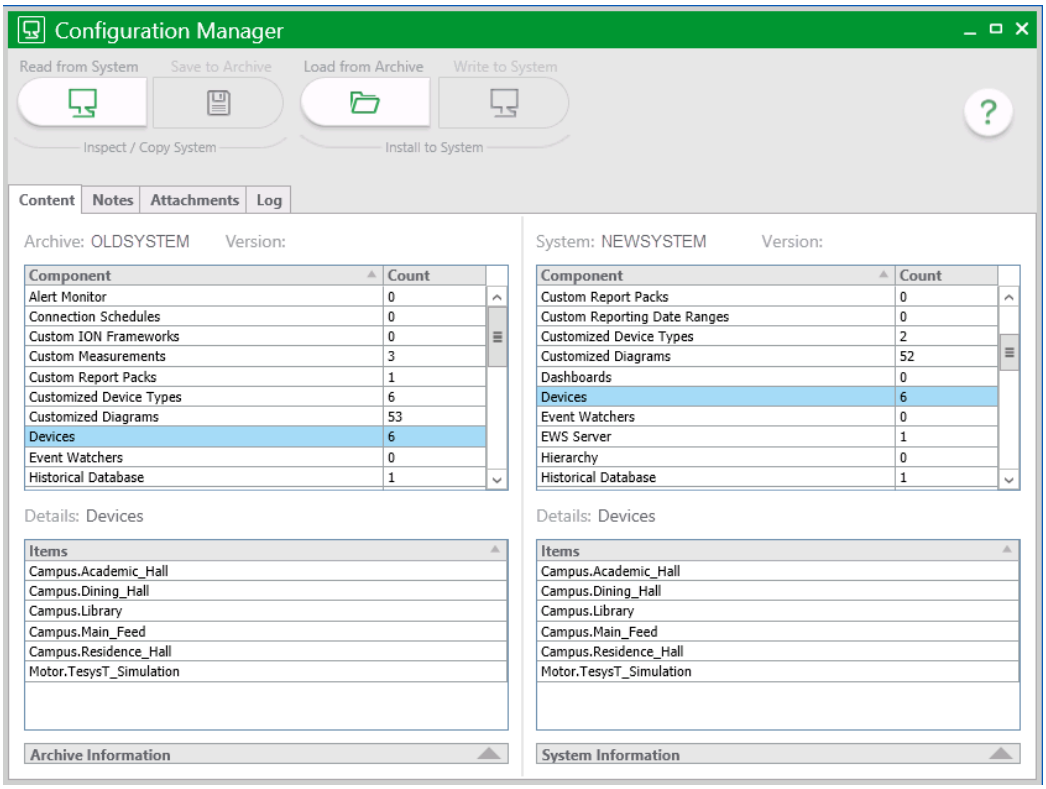
Configuration Manager

EcoStruxure™ Power Monitoring Expert (PME) configuration can be modified or added to during the commissioning phase and throughout the lifetime of the software.

Because configuration information is stored in the software in various places such as the database, the Windows Registry, the file system, and configuration files, managing a PME configuration is a complex, time consuming operation.

Configuration Manager reduces the time it takes to work with PME configurations by reading and displaying a system's configuration information. Once read, you can inspect and save the configuration information to an archive file. You can then transfer the archived configuration information to other systems.

NOTE: Configuration Manager is an add-on tool for PME. It is not included in the software install. See Resources for Configuration Manager download information.



This help file contains information to help you understand:

- Off-site configuration
- Using the Tool

See Configuration Manager for more information on the Configuration Manager Configuration Manager User Interface.

Requirements

To use the Configuration Manager, your Windows user account must have administrative rights on Windows and must exist as a Login in SQL Server with sysadmin role in the database instance.

Supported configurations

Configuration Manager 2020 supports configurations for systems with Standalone and Distributed Database architecture. It supports all language versions of PME. The following upgrade and migration paths are supported:

Source System	Target System	Architectures *	Languages **	Editions ***
PME 7.2.2	PME 2020	All	All	All
PME 8.x	PME 2020	All	All	All
PME 9.0	PME 2020	All	All	n/a
PME 2020	PME 2020	All	All	n/a

* Architectures = Standalone and Distributed Database architectures
** Languages = The localized versions of PME
*** Editions = Standard Editions, Healthcare (HC) Edition, Data Center (DC) Edition, Buildings (BD) Edition

Limitations:

- Changing languages between source and target system is not supported.
- Archived configurations saved with an earlier version of Configuration Manager are not compatible with this release of the tool.

SQL Server Editions

If your archived configuration does not include historical data, you can migrate a system using any SQL Server edition combination. However, if your archived configuration includes historical data, migrate a system using the following:

Source SQL Server Edition	Target SQL Server Edition
Express	Express
Express	Standard
Standard	Standard

NOTE: You cannot restore data or configuration from a newer version of SQL to an older version. For example, if the source system uses SQL Server 2016, you cannot restore the configuration to a target system using SQL Server 2012.

Localization

The Configuration Manager is available in English only; it cannot be localized into other languages.

Version History

The following shows the tool release history:

Version	Release	Release Date	Source Systems	Target Systems
CM 2020	Latest	Nov 2019	PME 2020 PME 9.0 PME 8.x PME 7.2.2	PME 2020
CM 9.0	Release 5	Aug 2018	PME 9.0 PME 8.2 PME 7.2.2	PME 9.0
CM 2.1.0	Release 4	Apr 2017	ION Enterprise 6.0.1 PME 7.2.2 PME 8.2	PME 8.2
CM 2.0.0	Release 3	Aug 2016	ION Enterprise 6.0.1 PME 7.2.2 PME 8.1	PME 8.1
CM 1.1.0	Release 2	Apr 2015	PME 7.2.2	PME 7.2.2
CM 1.0.0	Release 1	Nov 2014	PME 7.2.2	PME 7.2.2

Getting Started

See the following to get started quickly:

- Review the Tool Design section to get a good idea of how the Configuration Manager is designed as well as its capabilities before you use it.
- Review the Using the Tool section to understand how to perform the most common tasks using Configuration Manager.

Basic Steps

Here are the basic steps for using the Configuration Manager:

NOTE: Run Configuration Manager as Administrator user. To do this, right-click the Configuration Manager program icon and select **Run as administrator** from the context menu.

On the source machine:

1. Open the tool and select **Read from System**.
2. (Optional) Review the log and correct any system errors.
3. (Optional) Add descriptive notes or attach resource files that you want to save with the configuration.
4. Select **Save to Archive** to save the configuration to an archive.

On the target machine:

1. Open the tool and select **Load from Archive**.
2. Navigate to and then select the archived configuration.
3. Select **Write to System** to write the configuration to the system.

Tool Design

The Configuration Manager reads and displays a PME system's configuration information. Configuration Manager can be used to save and then write a saved configuration and optional historical data to a PME system.

Before using the Configuration Manager, carefully review the topics in this section.

How the tool works

Configuration Manager consists of a number of jobs that read and write power monitoring system configuration components and databases.

Read from System

When Configuration Manager reads a source system, it determines the installed power monitoring system version on the source machine, and then compares the source system to a default configuration of that version. Configuration Manager considers non-default values to be customized; when Read from System completes these values are displayed in the tool as customizations.

Configuration Manager also scans the system for compatible historical database archives. You can choose to include these to be saved to archive with the configuration.
Configuration Manager does not display source historical database archives that were saved using an unsupported power monitoring system version. These historical database archives cannot be saved with the configuration. To include unsupported historical database archives with the configuration, upgrade them to a supported version before using Configuration Manager.

Save to Archive

When Configuration Manager saves a configuration to archive, it copies the customized values, files, and configuration databases into a single archive folder in a user selected location. The historical database and historical database archives can optionally be included in the archive. Any notes or attachments created in the Configuration Manager are also included in the archive folder.

Load from Archive

When Configuration Manager loads an archived configuration, it retrieves and displays the content of the archive, including notes and attachments. Once open, you can inspect the configuration, add notes and attachments, and write it to a target system.

Write to System

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Before writing a configuration verify that the system is not performing critical control actions that may affect human or equipment safety.
- Verify correct system operation after writing a configuration.
- Verify that you are writing to the correct new, factory installed target system.
- Avoid introducing malicious software into your system.

Failure to follow these instructions can result in death or serious injury.

⚠ WARNING

INACCURATE DATA RESULTS

- Before writing a configuration verify that the system data results are not used for critical decision making that may affect human or equipment safety.
- Verify correct system data results after writing a configuration.
- Do not introduce malicious software into your system.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

⚠ WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

Use cybersecurity best practices to help prevent unauthorized access to the software.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

Work with facility IT System Administrators to ensure that the system adheres to the site-specific cybersecurity policies.

NOTICE

LOSS OF DATA

- Back up the system configuration before writing a new configuration.
- Verify the correctness of a configuration before writing it to the system.

Failure to follow these instructions can result in irreversible database changes.

When Configuration Manager writes a saved archive to a target system, it scans the target version to verify that it is the supported version of PME. It then copies all customized configuration values to the target. If replacing the default values is compatible with the target system, Configuration Manager copies the customized files directly to the PME system. Configuration components that cannot be automatically updated due to overwriting issues are copied to the following folder: `...\Power Monitoring Expert\CM Migration Files`. You must add these components manually. See Side-by-Side upgrade or System migration for detailed information on how to perform a system upgrade or migration with the Configuration Manager.

NOTE: Configuration Manager is designed to write to a newly-installed PME system. Writing a configuration to a system that was previously customized could negatively impact the system configuration. See Writing to a Customized PME System for details.

When to use the tool

The Configuration Manager reduces the time it takes to manage configuration information by automating many of the required steps. Review the following scenarios to understand when to use the tool.

NOTE: To use the Configuration Manager to upgrade or migrate an existing power monitoring system, you must install it on both the source and target power monitoring systems that you want to work with.

NOTE: Configuration Manager does not read, save, or write all component customizations. See Side-by-Side upgrade or System migration for detailed information on how to perform a system upgrade or migration with the Configuration Manager.

NOTE: Configuration Manager does not transfer PME licenses, nor does it provide warnings about licensing issues.

Off-site configuration

Perform the off-site configuration of a PME system, and then transfer the configuration information into a new, non-configured PME system.

Version Upgrade

You can use the Configuration Manager to transfer the configuration of an older PME system into a newly installed PME system. See Requirements for supported upgrade paths.

Configuration Manager does not read, save, or write all component customizations. See Side-by-Side upgrade or System migration for detailed information on how to perform a system upgrade or migration with the Configuration Manager.

Backup and restore

You can use Configuration Manager to back up and restore a configuration from an archived configuration. For example, you can recover a newly-deployed system that crashes shortly after you deploy it.

Server Migration

You can use Configuration Manager to move a PME configuration from a system on one computer to a system on a different computer. For example, to upgrade to a newer, more powerful server computer or a newer operating system.

Configuration Library

You can use the Configuration Manager to create a set of system configurations that can be used as templates for PME deployments. Doing so simplifies and speeds up the deployment by providing a base configuration that can then be customized and built upon.

Security

Transferring sensitive PME configuration information between systems and IT networks introduces security risks.

⚠ WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

Use cybersecurity best practices to help prevent unauthorized access to the software.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

Work with facility IT System Administrators to ensure that the system adheres to the site-specific cybersecurity policies.

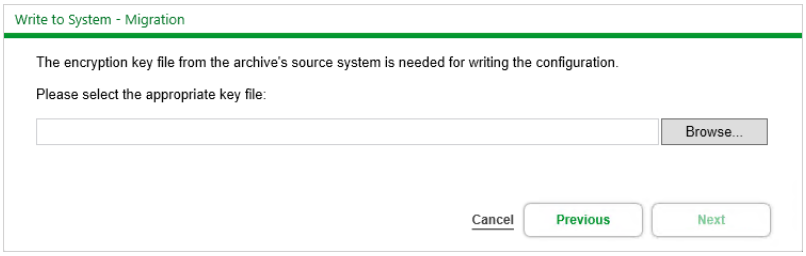
Carefully review the following information to understand the potential security risks that are introduced when you use the Configuration Manager, and how to minimize these risks.

NOTE: The information contained in this topic is not exhaustive; if you are uncertain about security protocols, consult your IT department.

Managing the PME system key

(The following applies to PME version 8.2 and newer)

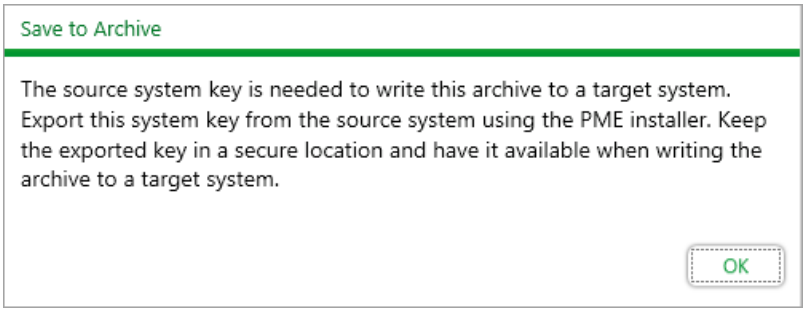
In order to write a source system archive to a PME target system, a copy of the source system key is required. During the write to system work flow, you are prompted to enter the source system key:



The source system key can be exported from the source system using the PME installer.

NOTE: Keep the system key in a secure location, protected from unauthorized access.

The Configuration Manager displays a reminder for the need to export the key at the end of a save to archive for a PME configuration:



NOTE: No system key is required for writing PME 7.2.2 archives.

NOTE: The Configuration Manager cannot determine if the provided key is correct for the source system configuration. If an incorrect key is provided, the write to system will continue without warnings. However, the following Reconfigure step in the migration process will fail and the target system will not be functional. To correct the situation see Reconfigure fails after Write to System.

Attaching files to an archive

The following table lists the potential security risks that could arise when you attach files to an archive:

Configuration Manager Behavior	Security Risk
Files can be added to a configuration as attachments.	An attached file could introduce malicious software or viruses into a configuration archive.
Configuration Manager runs in an Administrator level Windows account.	Malicious software or viruses would have the same level of access to the server.
Configuration Manager uses PME supervisor-level account access.	Malicious software or viruses would have the same level of access to PME.
PME is typically installed on a server type computer in a customer network.	Malicious software or viruses loaded into PME might infect the entire network.

To minimize the risk of someone using the Configuration Manager to introduce malicious software or viruses into a PME system or an IT network:

- Virus scan all files before attaching them to a configuration.
- Be certain that you know where an archived configuration comes from before you write it to a system.
- Virus scan all attached files that are written to the target machine.
- Follow all corporate security policies.

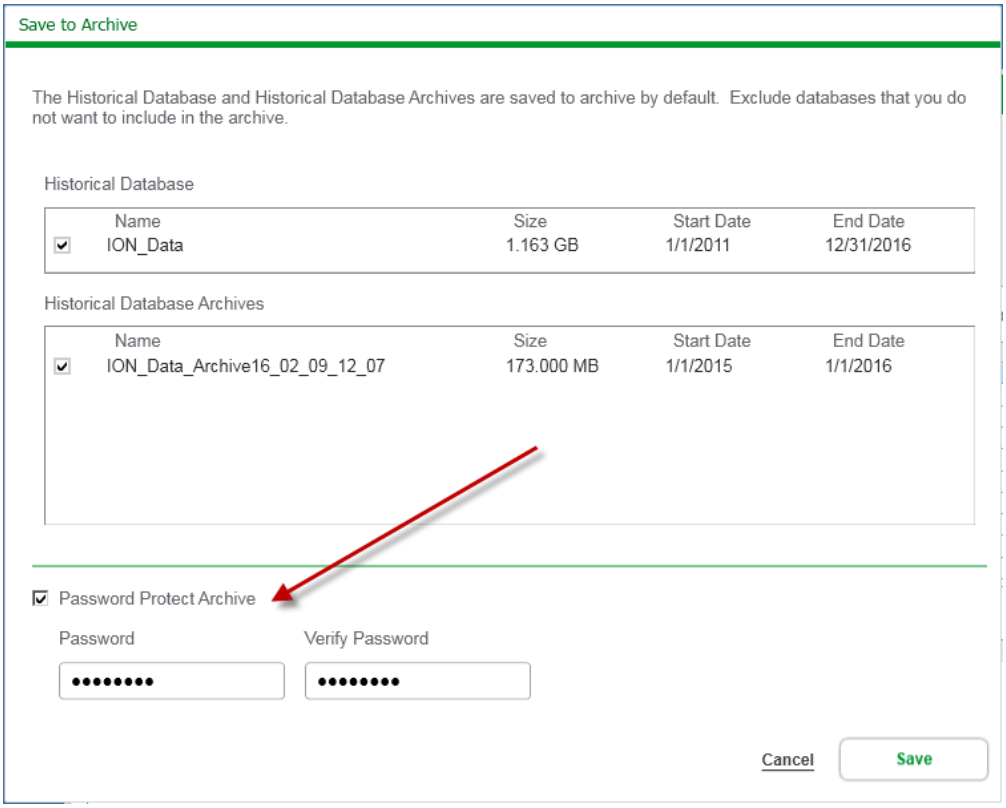
Adding a password when saving an archive

An archive contains detailed and sensitive information about a PME system. Unauthorized individuals might gain access to this information.

Given this security risk, consider using the following safety precautions when working with the Configuration Manager:

- Add a password when you save a configuration to an archive
- Do not share a saved configuration archive
- Follow all corporate security policies.

When you save a configuration to an archive, you are prompted to enter a password:



A password-protected archive cannot be loaded into Configuration Manager without providing the correct password. Additionally, files in a password-protected archive cannot be opened or copied without providing the password:

Smart Disk Space

If disk drives that are relevant to PME or other applications on the computer run out of free space it could negatively impact the computer operation. The Configuration Manager includes a free disk space check to prevent this from happening.

Before the Configuration Manager saves a configuration to an archive or writes a configuration to a new PME system, it calculates the disk space required to complete the operation, as well as the free disk space that would remain after the operation is complete.

The tool also checks whether the configuration is being written to a local disk, a network drive, or a removable disk. If it is a local disk, the tool uses a minimum threshold to determine whether or not to display a disk space warning. The default warning threshold value is 10 GB. If the expected remaining free disk space is less than this threshold, you are warned that there may not be sufficient free space left after the configuration is written.

NOTE: The Configuration Manager does not perform threshold checks on network drives or removable disks.

Required disk space estimation

The Configuration Manager uses the following logic to estimate the required disk space:

NOTE: The Configuration Manager looks at both the .mdf and .ldf file sizes and adds them up for the estimation.

Save to Archive

2x historical data (ION_Data + ION_Data archives) + 2x (unzipped archive + attachments)

Write to System

Upgrades:

Drive	Required Disk Space Calculation
PME Install	1x historical data (ION_Data + ION_Data archives) + 2x unzipped archive folder
SQL Server Temp DB	1x historical data (ION_Data + ION_Data archives)
PME Database	1x historical data (ION_Data + ION_Data archives)

Migrations:

Drive	Required Disk Space Calculation
Drive - PME Install	1x historical data (ION_Data + ION_Data archives) + 2x unzipped archive folder
Drive - SQL Server Temp DB	1x historical data (ION_Data + ION_Data archives)

Changing the warning threshold value

You can change the default threshold value by editing the Configuration Manager's configuration file.

NOTE: Lowering the threshold value can render the disk space warning feature ineffective in preventing the system from running out of disk space.

To change the threshold value:

1. Close the Configuration Manager.
2. Navigate to the `...\<Configuration Manager extraction location>\Configuration Manager\bin\` folder and then open `ConfigurationManager.Settings.xml` with an XML or text editor.

3. In the `DiskSpaceManagementThresholdsInBytes` tag, edit the `Warning` threshold value as required. Threshold values are in bytes.
4. Save and close the file.
5. Restart the Configuration Manager.

Using the Tool

You can use the Configuration Manager to read, inspect, copy, and transfer a PME configuration between systems.

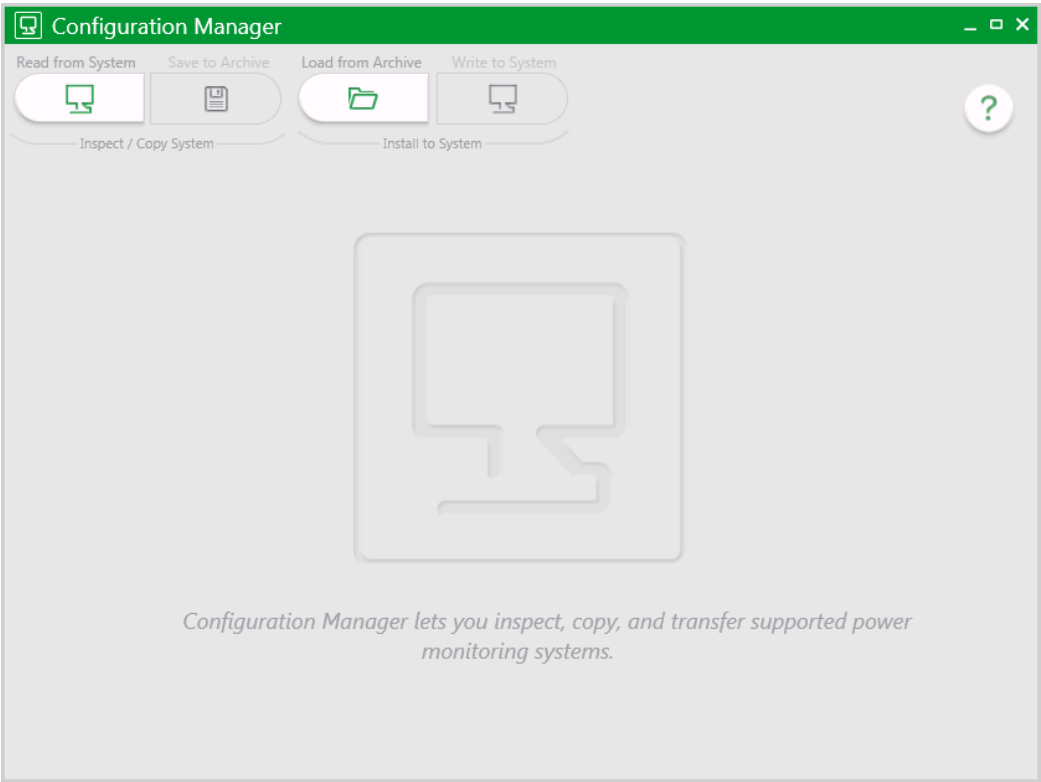
Before using the Configuration Manager, review the requirements to make sure that your PME system meets the minimum requirements. Also review Tool Design to understand the Configuration Manager capabilities and limitations.

See Side-by-Side upgrade or System migration for detailed information on how to perform a system upgrade or migration with the Configuration Manager.

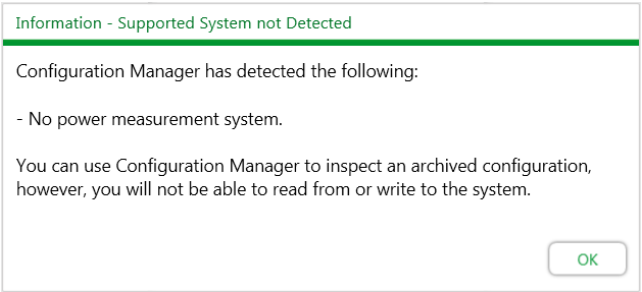
Starting Configuration Manager

To start the Configuration Manager:

1. Navigate to the `...<Configuration Manager extraction location>\ConfigurationManager` folder (typically this folder is on your desktop) and then open `ConfigurationManager.exe`.



If your system does not meet the Configuration Manager Requirements, functionality will be limited. For example, if you run Configuration Manager on a machine that does not host a power monitoring system, the following message appears:



Next steps:

- Reading a System
- Loading a Configuration from an Archive

See Configuration ManagerConfiguration Manager User Interface for a description of the controls and options available in the tool.

Reading a System

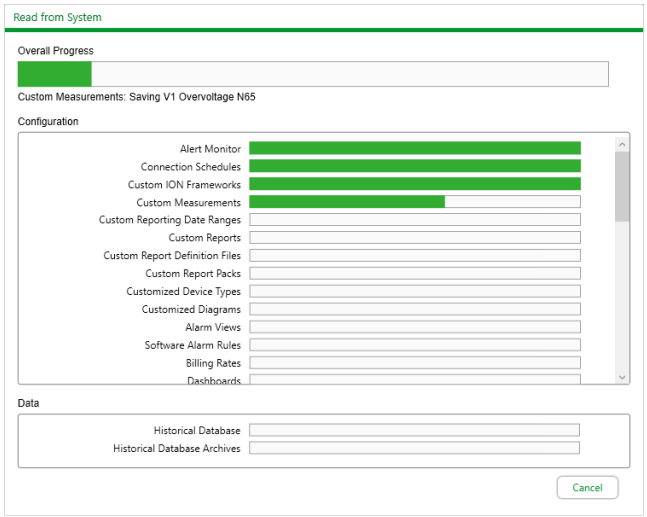
Reading a system provides you with configuration information about the power monitoring system that is installed and configured on your system. Once the Configuration Manager reads a configuration, you can inspect the configuration to see its component information and resolve any problems that are written to the log. You can also copy the configuration by saving it as an archive file.

To read a system:

1. Review the requirements and open the Configuration Manager.
2. Click **Read from System**.

   NOTE: If there is no system on the machine from which you open the Configuration Manager, or your system is not supported by the tool, you will not be able to read a system.

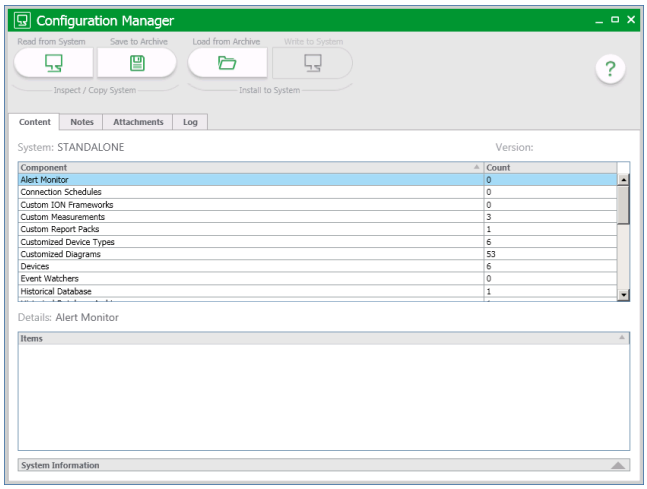
3. The configuration loads:



   NOTE: Read from system will continue even if errors occur. Review the log after reading from system for possible warnings or errors.

4. Click **OK** when the **Read from System** process completes successfully.

5. Scroll through the components to see the number of instances of each system component.



TIP: Click a column header to sort components alphabetically. Right-click and click **Clear Sort** to display the default sort.

Next, you can:

- Add notes or and attachments to the configuration
- Export the configuration by saving the configuration to an archive file.

Adding Attachments to a Configuration

You can add attachments to a configuration to provide supporting resources to the configuration. Attachments can be: restore and validate procedures, checklists, knowledge base articles, deployment documents, customer order forms, graphics, and so on.

⚠ WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

Use cybersecurity best practices to help prevent unauthorized access to the software.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

Work with facility IT System Administrators to ensure that the system adheres to the site-specific cybersecurity policies.

NOTE: Adding attachments can introduce malicious software or viruses to the configuration. See Configuration Manager security for details on how to minimize potential security risks.

To attach a file to a configuration:

1. Read a system.
2. Click the **Attachments** tab.

3. Click **Add**.
4. Navigate to and select the files that you want to attach and then click **Open**.

   The file is attached to the configuration. The file name, type, size, date added to the configuration, and date modified are displayed.
5. Click **Save to Archive**.

   The attached files are saved with the configuration.

   NOTE: Attachments that you add to a configuration are lost if you do not save the configuration to an archive.

TIP: If you want to reread from a system, you do not need to re-add attachments. Attachments that you add prior to rereading a system are retained in memory and will be loaded again.

To open an attachment, in the attachment row click (**Open**).

To download an attachment, in the attachment row click (**Save As**).

To delete an attachment, in the attachment row click (**Delete**).

Adding Notes to a Configuration

You can add notes to a configuration to provide additional information about the configuration. Examples of notes are: hand-off instructions, tips, reminders, and known issues.

TIP: You can prevent others from seeing sensitive notes by adding a password to the archive when you save it.

To add a note to a configuration:

1. Read a system.
2. Click the **Notes** tab.
3. Click **Add**.

   The note is given a time stamp.
4. Enter a subject, your name, and the note.

   The note is automatically added to the configuration as you type.
5. Click **Save to Archive**.

   The notes are saved with the configuration.

   NOTE: Notes that you add to a configuration are lost if you do not save the configuration to an archive.

TIP: If you want to reread from a system, you do not need to re-add notes. Notes that you add prior to rereading a system are retained in memory and will be loaded again.

To add another note, click **Add**.

To delete a note, highlight the note that you want to delete and then click **Delete**.

> **TIP**: To delete multiple notes press either **Shift** or **Ctrl**, click the notes that you want to delete to highlight them, and then click **Delete**.

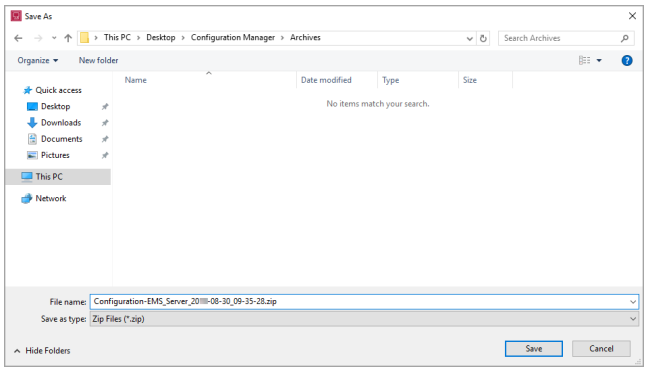
Saving to Archive

Saving a configuration to an archive file lets you copy the system that is loaded in the Configuration Manager and save it as a ZIP file. You can then use the Configuration Manager to load and write the archived configuration and historical data to the new system.

To save a configuration to an archive file:

1. Read a system into Configuration Manager.
2. (Optional) Add any pertinent notes or attachments to the configuration.
3. Click **Save to Archive**.

   The **Save As** dialog opens with the file name format: `Configuration-<SOURCE_SERVER_NAME-SourceVersion_yyyy-mm-dd_hh-mm-ss>.zip`.

4. Navigate to the location where you want to save the archive file and click **Save**.

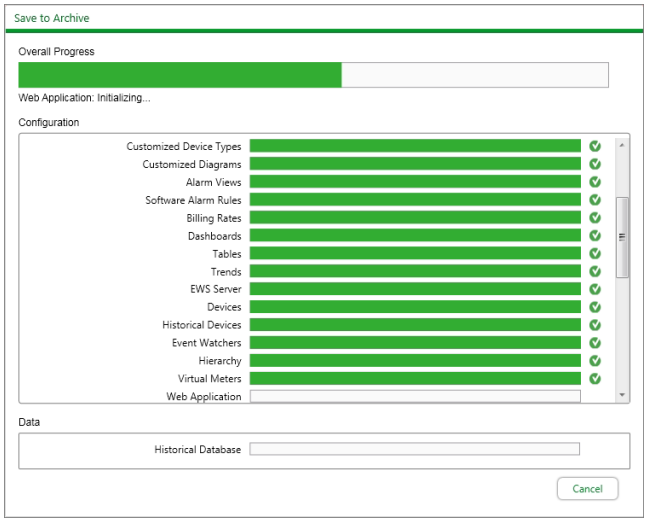
   > **NOTE**: You cannot save an archive to a network drive. To save an archive to a network location save it to a local drive and then copy it to the network location.

5. (Optional) Exclude the historical database and historical database archives from the archive by de-selecting them.

   > **TIP**: Exclude the historical database or historical database archives if disk space is a concern or if you do not want to overwrite the historical data on the target system.

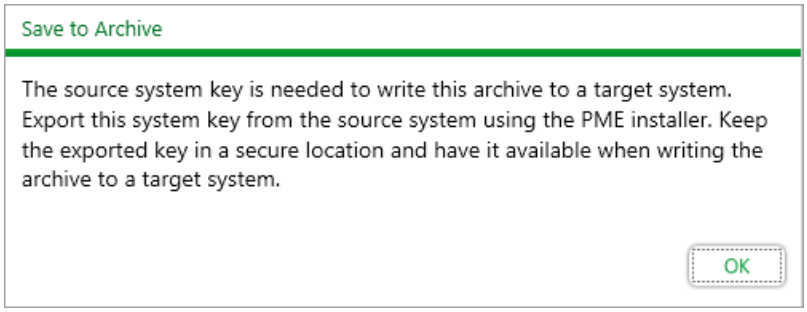
6. (Optional) Enter a password for the archive.
7. Click **Save**.

   The Configuration Manager copies the system and saves it to an archive file.



NOTE: Save to archive will continue even if errors occur. Review the log to determine whether you need to correct them and then save to archive again.

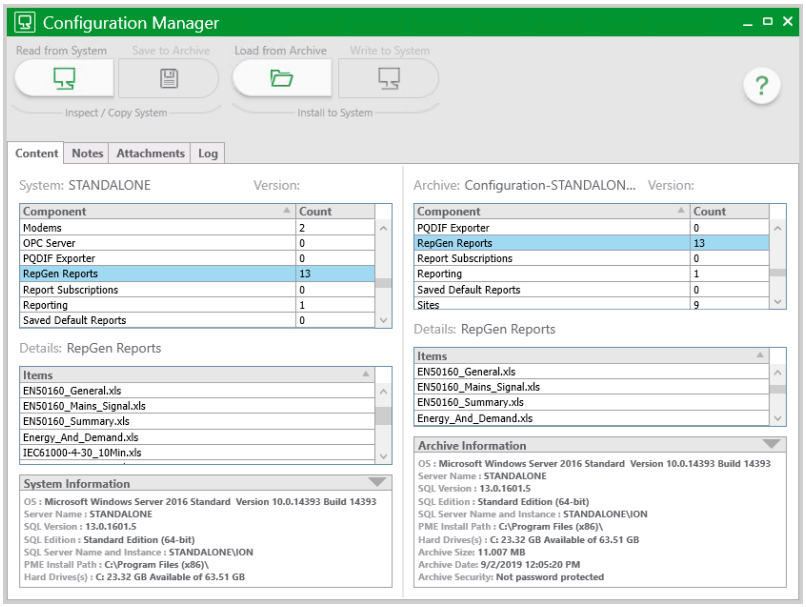
For PME version 8.2 and newer configurations, Configuration Manager displays a reminder for the need to export the system key (see Security for more details):



8. When the **Save To Archive** operation completes, click **OK**.

The archive is saved to the `...\<Configuration Manager extraction location>\Archives` folder and is named `Configuration-<SOURCE_SERVER_NAME-SourceVersion_yyyy-mm-dd_hh-mm-ss>.zip`.

The saved archive configuration information appears beside the source system:



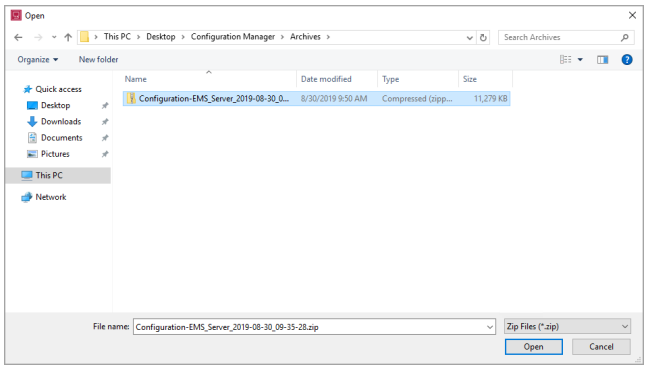
Copy the saved archive file to another file location on a local or mapped network drive, an external drive, or the target system.

Loading a Configuration from an Archive

Loading a configuration from an archive lets you open a previously saved configuration archive into the Configuration Manager. Once open, you can inspect the configuration, add notes and attachments, and write it to a target system.

To load an archived configuration:

1. Review the requirements.
2. Click **Load from Archive**.
3. Navigate to the location of the archive (default is `...\<Configuration Manager extraction path>\Archives`), select the saved configuration archive file, and then click **Open**.



4. (Optional) If the archive is password-protected, enter the password and then click **OK**.

The archived configuration is loaded in the Configuration Manager.

You can inspect the configuration, add notes and attachments (which will be automatically saved), or write it to the target system.

NOTE: Configuration Manager saves new notes and attachments into the loaded archive automatically when they are added. No additional user action is required.

Writing a Configuration to a System

Writing a configuration to a system transfers an archived source system to the target system. Perform this task to upgrade or migrate a customized configuration to a new PME system. Configuration Manager is designed to write to a newly-installed PME system. Writing a configuration to a system that was previously customized could negatively impact the system configuration. See Writing to a Customized PME System for details.

Writing a configuration to a target system overwrites the existing target configuration; once started, the operation cannot be canceled or rolled back.

NOTE: After a configuration is successfully written to a system, the system is not in an operational state; you must manually complete the configuration. See Side-by-Side upgrade or System migration for detailed information on how to perform a system upgrade or migration with the Configuration Manager.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Before writing a configuration verify that the system is not performing critical control actions that may affect human or equipment safety.
- Verify correct system operation after writing a configuration.
- Verify that you are writing to the correct new, factory installed target system.
- Avoid introducing malicious software into your system.

Failure to follow these instructions can result in death or serious injury.

⚠ WARNING

INACCURATE DATA RESULTS

- Before writing a configuration verify that the system data results are not used for critical decision making that may affect human or equipment safety.
- Verify correct system data results after writing a configuration.
- Do not introduce malicious software into your system.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

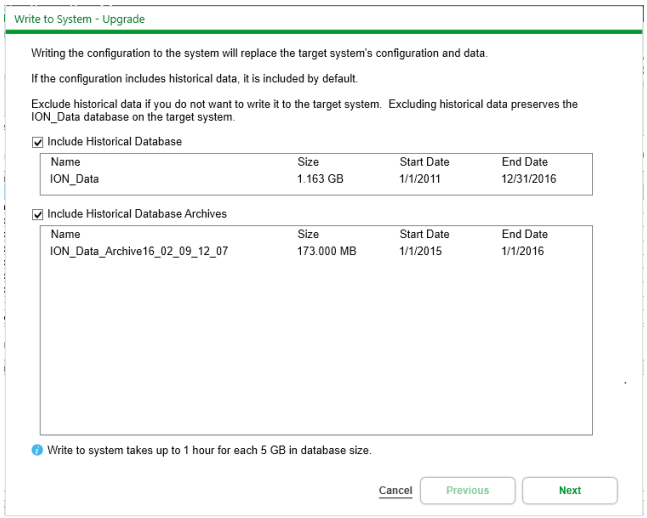
To write an archived system configuration to a target system:

1. Review the requirements.
2. Read the target system first to verify that you are writing to the correct system.

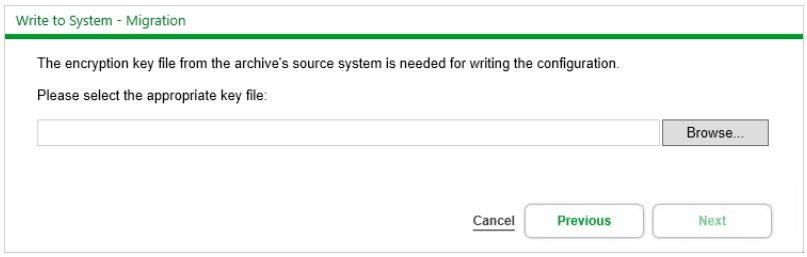
TIP: Prior to writing an archive to a target system, backup the target configuration by saving it to an archive.

NOTICE
LOSS OF DATA • Back up the system configuration before writing a new configuration. • Verify the correctness of a configuration before writing it to the system. **Failure to follow these instructions can result in irreversible database changes.**

3. Load an archived configuration into the Configuration Manager.
4. Click **Write to System**.
5. (Optional) Include the historical database and historical database archives then click **Next**.

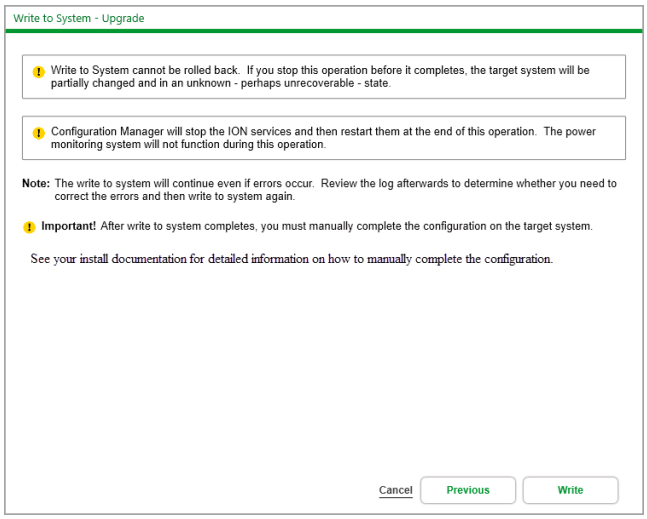


For PME version 8.2 and newer configurations, Configuration Manager prompts to enter the source system key (see Security for more details):



NOTE: The Configuration Manager cannot determine if the provided key is correct for the source system configuration. If an incorrect key is provided, the write to system will continue without warnings. However, the following Reconfigure step in the migration process will fail and the target system will not be functional. To correct the situation see Reconfigure fails after Write to System.

6. Review how the Write to System operation will impact the target system and then click **Write**.



NOTE: Write to system will continue even if errors occur. Review the log to determine whether you need to correct errors in the target system.

7. Complete the manual configuration tasks. See Side-by-Side upgrade or System migration for detailed information on how to perform a system upgrade or migration with the Configuration Manager.

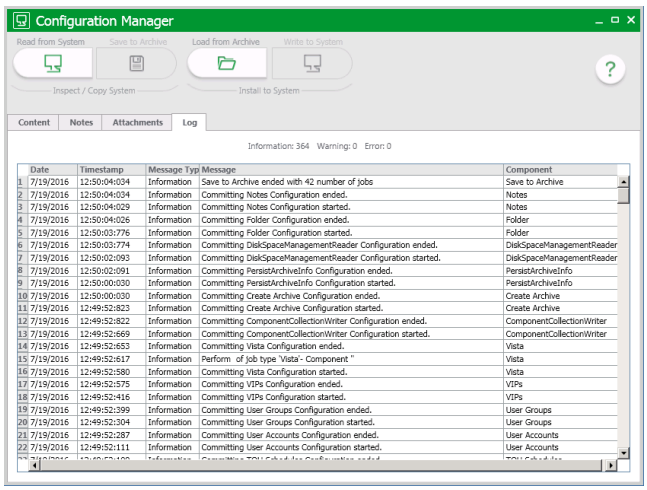
Reviewing the Log

When you use the Configuration Manager to interact with a PME system or an archived configuration, the Configuration Manager captures the information in the log.

Review the log and resolve any problems in the configuration prior to saving a system to an archive or writing it to another system.

To review the log:

1. Read a system or load a saved configuration from an archive before proceeding.
2. Click **Log** to view the log messages.



TIP: Click a column header to sort the entries.

NOTE: The log is not saved with the archive; it is retained while the tool is running only. Restarting the tool erases the log.

For each Configuration Manager session, Configuration Manager saves a copy of the log in `...\<Configuration Manager extraction location>\Configuration Manager\Logs\`. There will be a new file for each CM tool session.

TIP: If you are saving a configuration to archive, attach the latest log file to the configuration and then save it.

If you encounter problems with the configuration and you want to resolve them before you save or write the configuration:

1. Close the Configuration Manager.
2. Resolve any problems in the configuration.
3. Read the configuration again to verify that the problems were resolved.
4. Save the configuration to an archive or write the configuration to the system.

Manual Tasks

Configuration components that cannot be automatically updated due to overwriting issues are copied to the following folder on the target system: `...\Power Monitoring Expert\CM Migration Files`. You must add these components manually. See Side-by-Side upgrade or System migration for detailed information on how to perform a system upgrade or migration with the Configuration Manager.

Configuring

This chapter describes the different tools and tasks for configuring Power Monitoring Expert (PME).

The chapter is organized by functions, software modules, and configuration tools.

Use the information in the following tables to find the content you are looking for:

Main functions:

Function	Task
Alarms configuration	Configure alarm and incident views in Web Applications.
Cybersecurity	Provides recommended actions to help secure your system.
Dashboards configuration	Configure Dashboards and Slideshows in Web Applications.
Database maintenance	Configure and schedule tasks such as backup, archive, and trim.
Diagrams configuration	Configure Diagrams in Web Applications.
Duplicate Data logging	Enable the logging of duplicate historical data records.
Licensing configuration	Configure the software and device licenses.
Reports configuration	Configure Reports in Web Applications.
Software Alarms	Configure Software Alarms.
System integration	Integrate PME with other EcoStruxure™ systems.
System performance	Customize system parameters to optimize performance.
Time synchronization	Configuring time synchronization for monitoring devices.
Trends configuration	Configure Trends in Web Applications.

Software modules:

Module	Application
Backup Power Module configuration	Generator and Uninterruptible Power Supply (UPS) performance monitoring and reporting, including battery health.
Breaker Performance Module configuration	Circuit breaker aging and breaker settings monitoring.
Capacity Management Module configuration	Generator and Uninterruptible Power Supply (UPS) capacity monitoring and reporting. Includes transformer and UPS loss monitoring.
Energy Analysis Dashboard Module configuration	Gadgets for identifying consumption patterns and anomalies and for comparing different consumers over time.
Energy Analysis Reports Module configuration	Reports for energy consumption monitoring and modeling, including energy usage by process area or by product output.
Energy Billing Module configuration	Energy-based billing and reporting, including consumption monitoring and reporting at the branch circuit level.

Module	Application
Event Notification Module configuration	Notifications of power system events via email or SMS.
Insulation Monitoring Module configuration	Monitoring for isolated power systems, such as the ones found in hospital operating rooms.
Power Quality Performance Module configuration	Analysis of power quality events and disturbances and their impact on the monitored system.

Configuration tools and other functions:

Tool	Task
Breaker Configuration Tool	Configure the Breaker Aging Module and the Breaker Settings report.
Designer	Configure ION devices and the VIP.
Device Manager	Add and manage devices and sites.
Device Type Editor	Create device drivers for Modbus and OPC devices.
Downstream Device Assistant	Manage downstream devices.
Event Watcher Manager	Define events to trigger report subscriptions.
Generator Performance Configuration Tool with EPSS Test Module	Configure the Multi-Source Management Module.
Generator Power Configuration Utility	Configure the Multi-Source Management Module.
Hierarchy Configuration Utility	Bulk configure Hierarchies.
Hierarchy Manager	Configure and maintain Hierarchies, Apportioned Meters, Virtual Meters.
Installer	Perform the following tasks: Reconfigure, Reset Accounts, Export System Key, Import System Key, Uninstall
Insulation Monitoring Configuration Tool for ANSI	Configure the Insulation Monitoring Module for ANSI applications.
Insulation Monitoring Configuration Tool for IEC	Configure the Insulation Monitoring Module for IEC applications.
Log Viewer	View system events for troubleshooting and auditing.
Logical Device editors	Create logical device types and logical devices.
Management Console	Setup the device network, create Managed Circuits, configure Connection Schedules.
Manual Data Editor	Manually edit logged measurement data to correct incorrect data or add new data.

Tool	Task
OPC Server Support	Define which measurements to expose to the OPC server.
Power Losses Configuration Utility	Configure the Power Efficiency Module.
PQDIF Exporter	Export Power Quality data to PQDIF format.
Rate Editor	Configure rates for billing reports.
Remote Modem Setup	Configure dial-up modems that will be connected to meters at remote locations.
Software Logging	Add or edit software based data logging for Modbus device types.
System use notification	Set up a system use notification to be displayed before users can log into the system.
Time of Use Editor	Define Time of Use schedules for reports.
Update EWS Server	Update EWS measurement mappings.
Update OPC Server	Update OPC measurement mappings.
UPS Configuration Tool	Configure the Multi-Source Management Module.
UPS Power Configuration Utility	Configure the Multi-Source Management Module.
User Manager	Configure Users and User Groups.
Virtual Processor service (VIP)	Configure the VIP to perform data processing and control functions.
Virtual Processor setup	Configure the VIP service.
Web Applications settings	Configure Web apps localization, EcoStruxure Web Services Login, Diagnostics and Usage, Report Themes, Alarm Viewer, Annunciator and more.

References:

Topic	Content
Configuration References	Links to reference information related to the content of the Configuring chapter.

Alarms configuration

TIP: You can open the alarm viewer from the **ALARMS** link in the Web Applications banner.

Use the Alarms application to view incidents, alarms and events. You access the information in the Alarms application through views which are saved in the view library. PME comes with several pre-configured system views. These system views cannot be deleted or modified, but you can create additional views and customize them to meet your needs.

⚠ WARNING

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Do not use the software to control time-critical functions.
- Do not use the software to control remote equipment without proper access control and status feedback.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

For information on how to configure the Alarms application, see:

- Adding a new Alarms view
- Copying an Alarms view
- Editing an Alarms view
- Sharing an Alarms view
- Moving an Alarms view
- Deleting an Alarms view
- Setting a default Alarms view
- Changing the alarm viewer settings
- Deactivating alarms

For reference information see:

- Alarms UI

For information on how to use Alarms, see Alarms.

Adding a new Alarms view

Add new Alarms views to access certain types of alarms, incidents, or events. For example, create views to only see unacknowledged alarms, high priority alarms, or power quality incidents. You can also create views that only include certain sources, and so eliminate information you are not interested in.

To add a completely new Alarms view:

1. In the alarm viewer, open the view library and navigate to the folder where you want to create the view.

   (Optional) Add a new folder by clicking **Add Folder** at the bottom of the library panel, or by clicking **Add Folder** in the **Options** menu at the top of the library.

   NOTE: The System Views folder is read-only. You cannot add folders or alarm views to the System Views folder.

2. In the view library, at the bottom of the panel, click **Add View**, or click **Add View** in the **Options** menu at the top of the library. This creates a new view and opens the view settings.

3. In View Settings, enter a view name, select a location where to save the view in the library, set access permissions, and select the view type.

   NOTE: A public item is visible to all users in your user group. A private item is visible to you and any user in your user group with Edit permissions on this item type. See Default User Access Level Privileges and Customizing Access Level Privileges for details.

4. Adjust the filter settings for Priority, State, Sources, and Categories to customize the view if necessary.

   NOTE: Not all of these filters are available for all view types.

5. **Save** the view.

To add a copy of an existing Alarms view:

1. In the alarm viewer, open the view library and navigate to the view you want to copy.

2. Right-click the view name or click **Options** for this view and select **Duplicate** to create a copy in the same folder. Select **Copy To** to create a copy in a different folder.

3. (Optional) In the view library, select the new view, right-click the view name or click **Options** for this view, and select **Edit** to open View Settings. You can also open View Settings by double-clicking the view name. Change the view name, location, access permissions and view type, and adjust the filter settings for Priority, State, Sources, and Categories to customize the view if necessary.

   NOTE: A public item is visible to all users in your user group. A private item is visible to you and any user in your user group with Edit permissions on this item type. See Default User Access Level Privileges and Customizing Access Level Privileges for details.

NOTE: Not all of these filters are available for all view types.

4. **Save** the view.

NOTE: To add a copy of a system view, use **Copy To** to create a copy in a different location. You can also open the System View for Edit and then click **Save as New** in the view settings to create a copy in View Library > Home. You cannot use **Duplicate** because the System Views folder is read-only.

Related topics:

- Adding a new Alarms view
- Copying an Alarms view
- Editing an Alarms view
- Sharing an Alarms view
- Moving an Alarms view
- Deleting an Alarms view
- Setting a default Alarms view
- Changing the alarm viewer settings
- Deactivating alarms

For reference information see:

- Alarms UI

For information on how to use Alarms, see Alarms.

Copying an Alarms view

Copy Alarms views to quickly create new views that are the same as, or similar to existing views. For example, create a copy of a view to experiment with the view settings without affecting the original view. You can also use a copy of a view as a starting point for a new view that shares many of the settings of the original view.

To copy an Alarms view:

1. In the alarm viewer, open the view library and navigate to the view you want to copy.
2. Right-click the view name or click **Options** for this view and select **Duplicate** to create a copy in the same folder. Select **Copy To** to create a copy in a different folder.
3. (Optional) In the view library, select the new view, right-click the view name or click **Options** for this view, and select **Edit** to open View Settings. You can also open View Settings by double-clicking the view name. Change the view name, and adjust the filter settings for Priority, State, Sources, and Categories to customize the view if necessary.

   NOTE: Not all of these filters are available for all view types.
4. **Save** the View.

NOTE: You cannot **Duplicate** a system view because the System Views folder is read-only. Use **Copy To** instead to create a copy in a different location.

Related topics:

- Adding a new Alarms view
- Copying an Alarms view
- Editing an Alarms view
- Sharing an Alarms view
- Moving an Alarms view
- Deleting an Alarms view
- Setting a default Alarms view
- Changing the alarm viewer settings
- Deactivating alarms

For reference information see:

- Alarms UI

For information on how to use Alarms, see Alarms.

Editing an Alarms view

Edit Alarms views to update the view name, the filter settings, or the location of the view in the view library.

NOTE: You cannot overwrite system views. If you edit the settings of a system view and click **Save as New**, a copy of the view is created in View Library > Home.

To edit an Alarms view:

1. In the alarm viewer, open the view library and navigate to the view you want to edit.
2. Right-click the view name or click **Options** ⋮ for this view and select **Edit** to open View Settings. You can also open View Settings by double-clicking the view name. Change the view name, location, access permissions and view type, and adjust the filter settings for Priority, State, Sources, and Categories to customize the view as necessary.

   NOTE: A public item is visible to all users in your user group. A private item is visible to you and any user in your user group with Edit permissions on this item type. See Default User Access Level Privileges and Customizing Access Level Privileges for details.

   NOTE: Not all of these filters are available for all view types.
3. **Save** the view.

Related topics:

- Adding a new Alarms view
- Copying an Alarms view
- Editing an Alarms view
- Sharing an Alarms view
- Moving an Alarms view
- Deleting an Alarms view
- Setting a default Alarms view
- Changing the alarm viewer settings
- Deactivating alarms

For reference information see:

- Alarms UI

For information on how to use Alarms, see Alarms.

Sharing an Alarms view

Share Alarms views with other user groups.

NOTE: For Sharing to be enabled, at least one user group, in addition to the Global group, must be configured. To share an item with another user group, you must be a member of that group. The item to be shared must be marked as Public, not Private.

To share an Alarm view:

1. In the alarm viewer, open the view library and navigate to the view you want to share.
2. Right-click the view name or click **Options** for this view and select **Share**. This opens the Share View window.
3. In Share View, select the user groups you want to share this view with.
   (Optional) Specify a name for the shared view. The groups you are sharing this view with will see this name. The name of the original view remains unchanged.
4. Click **OK** to share this view.

NOTE: When you share an item with another user group, it appears in the **Shared** folder of this group. You cannot share a shared item.

Related topics:

- Adding a new Alarms view
- Copying an Alarms view
- Editing an Alarms view
- Sharing an Alarms view
- Moving an Alarms view
- Deleting an Alarms view
- Setting a default Alarms view
- Changing the alarm viewer settings
- Deactivating alarms

For reference information see:

- Alarms UI

For information on how to use Alarms, see Alarms.

Moving an Alarms view

Move Alarms views to a different location in the view library to make them easier to find or easier to manage.

To move an Alarms view:

1. In the alarm viewer, open the view library and navigate to the view you want to move.
2. Right-click the view name or click **Options** ⋮ for this view and select **Move To**. This opens the Select Location window.
3. In Select Location, select the location you want to move this view to.
4. Click **OK** to move the view.

NOTE: You cannot move system views or the System Views folder.

Related topics:

- Adding a new Alarms view
- Copying an Alarms view
- Editing an Alarms view
- Sharing an Alarms view
- Moving an Alarms view
- Deleting an Alarms view
- Setting a default Alarms view
- Changing the alarm viewer settings
- Deactivating alarms

For reference information see:

- Alarms UI

For information on how to use Alarms, see Alarms.

Deleting an Alarms view

Delete Alarms views that are no longer needed.

To delete an Alarms view:

1. In the alarm viewer, open the view library and navigate to the view you want to delete.
2. Right-click the view name or click **Options** for this view, and select **Delete**
3. In Delete Content, click **Yes**, to delete the view from the view library.

NOTE: You cannot delete system views or the System Views folder.

Related topics:

- Adding a new Alarms view
- Copying an Alarms view
- Editing an Alarms view
- Sharing an Alarms view
- Moving an Alarms view
- Deleting an Alarms view
- Setting a default Alarms view
- Changing the alarm viewer settings
- Deactivating alarms

For reference information see:

- Alarms UI

For information on how to use Alarms, see Alarms.

Setting a default Alarms view

The default Alarms view is the view that opens when you first open the Alarms application. You can set a default for your own workspace or the entire system.

NOTE: Access to this application or function is controlled by user privileges. See Default User Access Level Privileges and Customizing Access Level Privileges for details.

To set a default Alarms view:

1. In the alarm viewer, open the view library and navigate to the view you want to set as default.
2. Right-click the view name or click **Options** for this view and select **Set as default**. This opens the Configure Default Item dialog.
3. In Configure Default Item, enable **Set as my default** or **Set as system default**.
4. Click **OK** to save the default settings.

Related topics:

- Adding a new Alarms view
- Copying an Alarms view
- Editing an Alarms view
- Sharing an Alarms view
- Moving an Alarms view
- Deleting an Alarms view
- Setting a default Alarms view
- Changing the alarm viewer settings
- Deactivating alarms

For reference information see:

- Alarms UI

For information on how to use Alarms, see Alarms.

Deactivating alarms

Active alarms can continue to appear in the Alarms viewer if, for example, an alarm dropout has not been configured, or a device has been removed from the network after an alarm was issued. In such cases you can use the Deactivate Alarms utility to remove these permanently active alarms from the Alarms viewer.

⚠ WARNING

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

NOTE: There can be a time delay between submitting a deactivation request with this utility and when the alarm is deactivated in the system.

To use the Deactivate Alarms utility:

1. Open **Management Console** and select **Tools > Deactivate Alarms** to open the dialog.
2. Select a date for the **Show Active Alarms older than** field if you want to change the default date.
3. Click **Load Active Alarms** to display a list of the active alarms that are older than the date specified.
4. Use the **Select** column to select the alarms that you want to set to an inactive state. You can also click **Select All** to select all the alarms displayed in the grid. Use Select None to clear the selection of any alarms listed.
5. Click **Set Selected Alarms to Inactive**.

   NOTE: The **Active** column displays **N** for all alarms set to the inactive state.

   NOTE: Allow a few minutes of time for the alarm to be deactivated in the system. There can be a time delay between submitting a deactivation request with this utility and when the alarm is deactivated in the system.

6. Click **Done** to close the Deactivate Alarms dialog and then close Management Console.

When you log in to **Management Console** again and open the **Deactivate Alarms** dialog, the number of alarms shown in the **Alarms Displayed** field matches the number in the **Alarms Displayed** field in the **All Active Alarms** view in the **Alarms** application. (The Alarms application is available in the Web Applications component.)

Related topics:

- Adding a new Alarms view
- Copying an Alarms view
- Editing an Alarms view
- Sharing an Alarms view
- Moving an Alarms view
- Deleting an Alarms view
- Setting a default Alarms view
- Changing the alarm viewer settings
- Deactivate alarms

For reference information see:

- Alarms UI

For information on how to use Alarms, see Alarms.

Cybersecurity

This section provides information on how to help secure your system during the Configuring phase.

Install security certificate

PME is installed with a self-signed certificate and a self-signed certificate is configured automatically. We recommend that you replace this with a security certificate from a Certificate Authority (CA).

See Data encryption for information on data encryption, at rest and in transit, in PME.

Set up encrypted database communication for Distributed Database architectures

We recommend that the connections between PME and the SQL database server, in Distributed Database architecture installations, are encrypted using at least Transport Layer Security (TLS) 1.2. This requires a certificate from a public certification authority for the SQL Server computer and the configuration of both servers to use encrypted connections.

NOTE: Only the communication between the PME application server and the database server will be encrypted, not the data in the database.

NOTE: The use of self-signed certificates is supported but we recommend that you use a certificate from a certification authority.

High level configuration steps:

1. Install a Server Authentication certificate from a public certification authority on the SQL Server computer.
2. Take PME out of service by informing system users of the outage and disabling any automated system control or third-party interactions.
3. Stop all PME services.
4. Configure the SQL server to force encrypted connections.
5. Configure PME to use encryption on database connections. See Configure database connection encryption for more information.
6. Confirm that the PME application server computer can verify the ownership of the certificate used by the SQL Server computer.
7. Restart PME, verify the correct operation of the system, and put the system back into service.

Detailed configuration information:

- See Enable Encrypted Connections to the Database Engine, a Microsoft document, for information on certificate requirements, as well as detailed installation and configuration instructions.
- See TLS 1.2 support for Microsoft SQL Server, a Microsoft document, for information on TLS 1.2 support in different versions of SQL Server.

Configure application whitelisting software

Application whitelisting software, such as McAfee Application Control, is used to prevent unauthorized applications from running on your system.

When you deploy whitelisting software to help protect a system, it scans the system and creates a whitelist of all executable binaries and scripts present on the system. The whitelist also includes hidden files and folders.

The whitelist includes all authorized files and determines trusted or known files. In Enabled mode, only files that are present in the whitelist can execute. All files in the whitelist are protected and cannot be changed or deleted. An executable binary or script that is not in the whitelist is said to be unauthorized and is prevented from running.

Consider the following when using whitelisting software with PME:

- Complete the system configuration before setting up and enabling the whitelisting software.
- Any program or script that should be able to update the system will need to be configured as an updater.
- After solidification, no updates or extensions, such as add-on device drivers, may be installed.
- Disable the whitelisting software when making changes to the PME system. Enable it again after the change.
- Follow the instructions of the software vendor for installing, configuring, and operating the whitelisting software.

NOTE: Verify the correct operation of your PME system after you enable the whitelisting software.

Configure antivirus software on your SQL Server

We recommend that you run antivirus software on your SQL server. Follow the recommendations described in Microsoft Support article (ID: 309422). See Resources for link information.

NOTE: Antivirus software can have a significant impact on system performance if it is not set up correctly. Consider the following:

- SQL Server performance can be affected if data and log files are not excluded from on-access scans.
- Special configuration of the antivirus software might be required.
- Follow the instructions of the software vendor for installing, configuring, and operating the antivirus and whitelisting software.

Configure PME users and user groups

There are no pre-configured user accounts or user groups in a newly installed system. One supervisor account is created, with a user defined password, during the installation of the software. Create additional user accounts and groups after installation. PME supports Windows users and groups for integration with Windows and Active Directory.

RECOMMENDATION: Use Windows users instead of standard users in your PME system to improve cybersecurity. Windows offers advanced user management functions, such as enforcing password strength and limiting the number of invalid login attempts. These functions are required for IEC 62443 compliance, the global standard for industrial automation control system security.

For information on creating users and user groups, and on setting user access levels, see User Manager.

Customize user account privileges

You can configure user account privileges in **Web Applications** > **Settings** > **Users** > **System Users** > **User Manager**. See Customizing Access Level Privileges for details.

Restrict Windows login permissions for the PME server

We recommend that you restrict the Windows login permissions for the PME server computer to PME system administrators only. Preventing non-administrator users from logging into the server reduces the risk of unauthorized system changes and increases the cybersecurity of your system.

Change the SQL Server Express sa account password

If SQL Server Express is installed, with SQL Server authentication, through the PME installer, change the sa account password after the installation is complete.

Configure session timeout settings

You can configure session timeout settings in **Web Applications** > **Settings** > **Security** > **Session Timeout**. See Session timeout for information on this feature. See Configure Session Timeout for configuration details.

Configure system integration security settings

You can configure system integration settings in **Web Applications** > **Settings** > **Security** > **Authorized Hosts**. See System integration security for information on this feature. See Configure Authorized Hosts for configuration details.

Do not install or use a web browser on the server computer

Using a web browser on a server computer increases the vulnerability of the server and the network. Access PME web clients on client computers only, not on the server.

RECOMMENDATION: Remove the PME Web Applications shortcuts from the server.

Set up your network security

Set up the network security measures for your IT and device networks.

Disable unused IP ports

Disable or block IP ports that are not required for the operation of your system. See IP Ports for details on PME port requirements.

Disable unused hardware ports

Computer ports and inputs, such as USB ports or DVD drives are not required for PME to function correctly. These inputs can be permanently disabled if necessary. The same applies to the AutoRun and AutoPlay functionality which can also be disabled without affecting the operation of the software.

Dashboards configuration

Use the Dashboards application to view high level historical and real-time data, for example Key Performance Indicators (KPIs). The information in the Dashboards application is accessed through dashboards with gadgets. Dashboards are saved in the Dashboard Library. In addition to viewing individual dashboards, you can create slideshows to automatically display a sequence of dashboards.

⚠ WARNING

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

Power Monitoring Expert (PME) does not provide any pre-configured dashboards or slideshows. Configure your own dashboards, gadgets, and slideshows to meet your needs.

Open the Dashboards application from the **Dashboards** link in the Web Applications banner.

For information on how to configure the Dashboards application, see:

Dashboards:

- Adding a new dashboard
- Editing a dashboard
- Sharing a dashboard
- Moving a dashboard
- Deleting a dashboard
- Set default options for a dashboard
- Configuring a slideshow

Gadgets:

- Adding a gadget to a dashboard
- Editing a gadget
- Moving or resizing a gadget on a dashboard

For reference information see Dashboards user interface (UI).

For information on how to use Dashboards, see Dashboards.

Adding a new dashboard

Add new dashboards to view high level historical and real-time data, for example in the form of Key Performance Indicators (KPIs).

To add a completely new dashboard:

1. In Dashboards, open the Dashboard Library and navigate to the folder where you want to create the dashboard.
2. (Optional) Add a new folder by clicking **Add Folder** at the bottom of the library panel, or by clicking **Add Folder** in the **Options** menu at the top of the library.
3. In the Dashboard Library, at the bottom of the panel, click **Add Dashboard** . This creates a new dashboard and opens the Dashboard Settings.
4. In Dashboard Settings, enter a dashboard name, select a location and set the access permissions to Public or Private.

   NOTE: A public item is visible to all users in your user group. A private item is visible to you and any user in your user group with Edit permissions on this item type. See Default User Access Level Privileges and Customizing Access Level Privileges for details.

5. (Optional) Click **Styling** to open the Dashboard Styling window. In Dashboard Styling, select a background image or background color for the dashboard and set the default opacity for the gadgets. See Styling a dashboard for more details.
6. (Optional) You can add gadgets to the dashboard now or save the empty dashboard and add gadgets later. See Adding a gadget to a dashboard for more details.
7. **Save** the dashboard.

To add a copy of an existing dashboard to the Library:

1. In Dashboards, open the Dashboard Library and navigate to the dashboard you want to copy. (Optional) Add a new folder by clicking **Add Folder** at the bottom of the library panel, or by clicking **Add Folder** in the **Options** menu at the top of the library.
2. Right-click the dashboard name or click **Options** for this dashboard and select **Duplicate** to create a copy in the same folder. Select **Copy To** to create a copy in a different folder.
3. (Optional) In the Dashboard Library, select the new dashboard, right-click the dashboard name or click **Options** for this dashboard, and select **Edit** to open the Dashboard Settings. Change the dashboard name, Location, and access permissions.

   NOTE: A public item is visible to all users in your user group. A private item is visible to you and any user in your user group with Edit permissions on this item type. See Default User Access Level Privileges and Customizing Access Level Privileges for details.

4. **Save** the modified Dashboard Settings.

Related topics:

Dashboards:

- Adding a new dashboard
- Editing a dashboard
- Sharing a dashboard
- Moving a dashboard
- Deleting a dashboard
- Set default options for a dashboard
- Configuring a slideshow

Gadgets:

- Adding a gadget to a dashboard
- Editing a gadget
- Moving or resizing a gadget on a dashboard

For reference information see:

- Dashboards user interface (UI)

For information on how to use Dashboards, see Dashboards.

Editing a dashboard

Edit dashboards to update the dashboard name, add new gadgets, change the dashboard styling, change the access permissions or change the location of the dashboard in the Dashboard Library.

To edit a dashboard:

1. In Dashboards, open the Dashboard Library and navigate to the dashboard you want to edit.
2. Right-click the dashboard name or click **Options** for this dashboard and select **Edit** to open the Dashboard Settings. Change the dashboard name, add gadgets, change the dashboard styling, change the access permissions, or change the location of the dashboard in the Library. For dashboard styling, see Styling a dashboard for more details.

   NOTE: A public item is visible to all users in your user group. A private item is visible to you and any user in your user group with Edit permissions on this item type. See Default User Access Level Privileges and Customizing Access Level Privileges for details.

3. **Save** the modified dashboard settings.

Related topics:

Dashboards:

- Adding a new dashboard
- Editing a dashboard
- Sharing a dashboard
- Moving a dashboard
- Deleting a dashboard
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Gadgets:

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For reference information see:

- Dashboards user interface (UI)

For information on how to use Dashboards, see Dashboards.

Sharing a dashboard

Share dashboards with other User Groups.

NOTE: For Sharing to be enabled, at least one user group, in addition to the Global group, must be configured. To share an item with another user group, you must be a member of that group. The item to be shared must be marked as Public, not Private.

To share a dashboard:

1. In Dashboards, open the Dashboard Library and navigate to the dashboard you want to share.
2. Right-click the dashboard name or click **Options** ⋮ for this dashboard and select **Share**. This opens the Share Dashboard window.
3. In Share Dashboard, select the User Groups you want to share this dashboard with.
4. (Optional) Specify a name for the shared dashboard. The groups you are sharing this dashboard with will see this name. The name of the original dashboard remains unchanged.
5. Click **OK** to share this dashboard.

NOTE: When you share an item with another user group, it appears in the **Shared** folder of this group. You cannot share a shared item.

Related topics:

Dashboards:

- Adding a new dashboard
- Editing a dashboard
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- Configuring a slideshow

Gadgets:

- Adding a gadget to a dashboard
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For reference information see:

- Dashboards user interface (UI)

For information on how to use Dashboards, see Dashboards.

Moving a dashboard

Move dashboards to a different location in the Dashboard Library to make them easier to find or easier to manage.

To move a dashboard:

1. In Dashboards, open the Dashboard Library and navigate to the dashboard you want to move. (Optional) Add a new folder by clicking **Add Folder** at the bottom of the library panel, or by clicking **Add Folder** in the **Options** menu at the top of the library.
2. Right-click the dashboard name or click **Options** for this dashboard and select **Move To...**. This opens the Select Location window.
3. In Select Location, select the location where you want to move this dashboard.
4. Click **OK** to move the dashboard.

Related topics:

Dashboards:

- Adding a new dashboard
- Editing a dashboard
- Sharing a dashboard
- Moving a dashboard
- Deleting a dashboard
- Set default options for a dashboard
- Configuring a slideshow

Gadgets:

- Adding a gadget to a dashboard
- Editing a gadget
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For reference information see:

- Dashboards user interface (UI)

For information on how to use Dashboards, see Dashboards.

Deleting a dashboard

Delete dashboards that are no longer needed.

To delete a dashboard:

1. In Dashboards, open the Dashboard Library and navigate to the dashboard you want to delete.
2. Right-click the dashboard name or click **Options** for this dashboard, and select **Delete**
3. In Delete Content, click **Yes**, to delete the dashboard from the Dashboard Library.

Related topics:

Dashboards:

- Adding a new dashboard
- Editing a dashboard
- Sharing a dashboard
- Moving a dashboard
- Deleting a dashboard
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- Configuring a slideshow

Gadgets:

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For reference information see:

- Dashboards user interface (UI)

For information on how to use Dashboards, see Dashboards.

Set default options for a dashboard

The default dashboard is the one that is displayed when you first open Dashboards. You can set a dashboard to be your own personal default, or the default for the system.

NOTE: For each user, **Set as my default** supersedes **Set as system default**. For example, if a user with supervisor-level access sets a dashboard as the system default dashboard, and another user sets a different dashboard as their default dashboard, that user's default dashboard takes priority over the system default dashboard, but only for them.

To set the default options for a dashboard:

1. In Dashboards, open the Dashboard Library and navigate to the dashboard you want to set as default.
2. Right-click the dashboard name or click **Options** for this dashboard and select **Set as default** to open the Configure Default Item dialog.
3. Turn on one or both of **Set as my default** and **Set as system default**.
4. Click **OK** to save the modified Dashboard Settings.

Related topics:

Dashboards:

- Adding a new dashboard
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Gadgets:

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For reference information see:

- Dashboards user interface (UI)

For information on how to use Dashboards, see Dashboards.

Configuring a slideshow

Use the Slideshow Manager to create, edit, or delete a slideshow.

NOTE: Anyone with access to the PME web server can view a slideshow using the slideshow URL. No user authentication is required. Restrict network access and access to the URL to authorized users for slideshows containing confidential information.

Creating a slideshow

To create a slideshow:

1. In Dashboards, open the Dashboard Library, and click **Slideshow Manager** in the **Settings** menu at the top of the library
2. In Slideshow Manager, click **Add Slideshow** to open the Add New Slideshow dialog.
3. Type a name for the slideshow in the **Name** field.
4. Click any of the dashboards in the **Shared Dashboards** list to add them to the **Dashboard Playlist** area on the right. Alternatively, begin typing in the **Search** field to filter the list for selection.

   The dashboards are listed in the Playlist area in the order that you selected them.
5. To modify the list of dashboards in the **Dashboard Playlist**, click the dashboard name to display the edit options, then:
   a. Click the **Delete** icon to remove the dashboard from the Playlist.
   b. Click the **Up** or **Down** arrow to move the dashboard to an earlier or later sequence in the Playlist, respectively.
6. Select the speed for the transition from dashboard to dashboard in the **Select Transition Time** list.
7. Click **OK** to save your slideshow.
8. Click **Close** to close the Slideshow Manager.

Editing an existing slideshow

To edit an existing slideshow:

1. In Dashboards, open the Dashboard Library, and click **Slideshow Manager** in the **Settings** menu at the top of the library
2. In Slideshow Manager, click the slideshow you want to edit, then click **Edit** to open the Edit Slideshow dialog.
3. Change the name of slideshow, modify the dashboards in the play list, change the slide caption for the slideshow, or adjust the slide transition time.
4. Click **OK** to save your changes and to return to the Slideshow Manager.
5. Click **Close** to close the Slideshow Manager.

Deleting a slideshow

To delete a slideshow:

1. In Dashboards, open the Dashboard Library, and click **Slideshow Manager** in the **Settings** menu at the top of the library
2. In Slideshow Manager, click the slideshow you want to delete, then click **Delete** to open the Delete Slideshow dialog.
3. Click **OK** to permanently delete the slideshow and to return to the Slideshow Manager.
4. Click **Close** to close the Slideshow Manager.

Sharing a slideshow

To share a slideshow:

1. In Dashboards, open the Dashboard Library, and click **Slideshow Manager** in the **Settings** menu at the top of the library
2. In Slideshow Manager, click the slideshow you want to share, then click **Share** to open the Share Slideshow URL dialog.

   The dialog includes the URL for the slideshow, which you can copy and distribute so that others can access the slideshow.

   NOTE: The client browser must have access to the URL to view the slideshow.
3. Click **Close** to close the Slideshow Manager.

Related topics:

Dashboards:

- Adding a new dashboard
- Editing a dashboard
- Sharing a dashboard
- Moving a dashboard
- Deleting a dashboard
- Set default options for a dashboard
- Configuring a slideshow

Gadgets:

- Adding a gadget to a dashboard
- Editing a gadget
- Moving or resizing a gadget on a dashboard

For reference information see:

- Dashboards user interface (UI)

For information on how to use Dashboards, see Dashboards.

Adding a gadget to a dashboard

Add gadgets to a dashboard to display historical and real-time data. Without gadgets, a dashboard does not display any data.

NOTE: Gadgets that require special licensing only appear in the list after the correct licensing has been installed.

To add a gadget to the dashboard:

1. Click **Add Gadget** to open the Gadget Setup dialog.
   By default, all gadgets are included in the dialog. To filter the gadgets by category, click one of the categories on the left, for example **Common** or **Comparison**.
2. Select the gadget that you want to add to the dashboard and click **Next**.
   Gadget settings are specific to each gadget. For example, some gadgets require a data series consisting of sources and measurements, while other gadgets have no such requirement.

   See Configuring Gadgets for a description of the settings.
3. Click **Next** to proceed through the pages of the Gadget Setup dialog.
4. Click **Finish** to close the Gadget Setup dialog and to add the gadget to the dashboard.
5. Repeat the process to add additional gadgets to your dashboard.

Related topics:

Dashboards:

- Adding a new dashboard
- Editing a dashboard
- Sharing a dashboard
- Moving a dashboard
- Deleting a dashboard
- Set default options for a dashboard
- Configuring a slideshow

Gadgets:

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For reference information see:

- Dashboards user interface (UI)

For information on how to use Dashboards, see Dashboards.

Editing a gadget

To edit the settings for a gadget:

1. Click Settings in the gadget and select **Edit** to open the Gadget Setup.
2. In Gadget Setup, change any of the settings on the tabs.

   See Configuring Gadgets for more details.
3. Click **Save** to update the gadget settings and to close the Gadget Setup dialog.

TIP: In gadgets where a time range has been specified when the gadgets are configured, the time range selection is included on the gadgets in the dashboard. You can quickly change the time range for the gadget by selecting another period of time from the list in the time range field. The time range is applied to the gadget only while you continue to view the dashboard. If you navigate to another dashboard and then come back to this dashboard, the time range on the gadget reverts to the value that you set when you configured the gadget.

Related topics:

Dashboards:

- Adding a new dashboard
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- Configuring a slideshow

Gadgets:

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For reference information see:

- Dashboards user interface (UI)

For information on how to use Dashboards, see Dashboards.

Moving or resizing a gadget on a dashboard

You can move or resize a gadget on a dashboard when the dashboard is in edit mode.

Moving a gadget

1. Right-click a dashboard name in the **Dashboard Library**, then click **Edit** in the menu.
2. Position the mouse pointer in the title area of the gadget that you want to move.

   The pointer changes to the **Move** shape (an image with 4 arrows).
3. Drag and drop the gadget to another position on the dashboard.

   Other gadgets on the dashboard are re-positioned if additional space is required.
4. Click **Finish** in **Dashboard Controls** to save your change.

Resizing a gadget

1. Right-click a dashboard name in the **Dashboard Library**, then click **Edit** in the menu.
2. Position the mouse pointer at the lower right corner of the gadget.

   A small triangular shape indicates that you can drag the corner.
3. Drag the corner to increase or reduce the size of the gadget.

   Other gadgets on the dashboard are re-positioned if additional space is required.
4. Click **Finish** in **Dashboard Controls** to save your change.

Related topics:

Dashboards:

- Adding a new dashboard
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- Configuring a slideshow

Gadgets:

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- Dashboards user interface (UI)

For information on how to use Dashboards, see Dashboards.

Database maintenance

PME uses databases to store information such as system configuration, data logs, and system event log messages. These databases must be maintained to preserve performance, manage disk space use, and guard against data loss in case of database failure.

NOTICE

LOSS OF DATA

- Back up the database at regular intervals.
- Back up the database before upgrading or migrating the system.
- Back up the database before trimming it.
- Back up the database before making manual database edits.
- Verify correct database behavior after making database or system changes.

Failure to follow these instructions can result in permanent loss of data.

The following table shows the PME databases and the recommended database maintenance tasks for each:

Database	Type of Data	Maintenance Tasks*
ApplicationModules	Web Applications related configuration data and system event log entries.	Backup, Maintenance, Trim
ION_Data	Historical power system data such as interval data logs, waveforms and alarms.	Archive, Backup, Maintenance, Size Notification**
ION_Network	Device network and other system configuration data	Backup, Maintenance
ION_SystemLog	Non-Web Applications related system event log entries.	Maintenance, Trim

* See Database maintenance task definitions for basic task definitions.
** Size Notification is only used for systems with SQL Server Express, which has a maximum database size limit of 10 GB.

In Standalone PME systems, the database maintenance tasks are pre-configured and scheduled to run automatically by default. For Distributed Database PME systems, you need to configure the tasks and set up the schedules manually.

NOTE: It is best to automate the maintenance tasks, but you can run them manually on demand using Database Manager and Microsoft SQL Server Management Studio.

The following table shows the default database maintenance task schedules for Standalone PME systems:

Database	Task	Enabled	Trigger Time
ApplicationModules	Backup	Yes	Daily at 01:30
ApplicationModules	Maintenance	Yes	Daily at 03:30
ApplicationModules	Trim	Yes	Daily at 02:30
ION_Data	Archive*	**No****	Annually, on Jan 3 at 01:00
ION_Data	Backup	Yes	Weekly, Fridays at 00:00
ION_Data	Maintenance	Yes	Daily at 02:00
ION_Data	Size Notification***	Yes	Daily at 03:00
ION_Network	Backup	Yes	Daily at 01:00
ION_Network	Maintenance	Yes	Daily at 07:30
ION_SystemLog	Maintenance	Yes	Daily at 07:05
ION_SystemLog	Trim	Yes	Daily at 04:00

* The PME archive task does not trim the database, it only copies data to the archive.
** You need to edit the Windows user account settings before enabling the archive task. See the Note on the ION_Data archive task for more details.
*** Size Notification is only used for systems with SQL Server Express, which has a maximum database size limit of 10 GB.

For more information on the default task settings see Default maintenance task settings.

Managing database maintenance tasks for Standalone PME systems

In Standalone systems, the database maintenance tasks are pre-configured and scheduled to run automatically by default. The scheduling and execution of the tasks is done with Task Scheduler in Windows. The database interaction specific steps of the tasks are defined as Windows PowerShell scripts.

Note on the ION_Data archive task:

NOTE: The archive task for the ION_Data database is disabled by default. The Windows user account that is used to run this task must have a sysadmin server role in the SQL Server database server. The Windows user account that is used by default, IONMaintenance, does not have a sysadmin server role. To enable and run the scheduled archive task successfully, you need to add the sysadmin role to IONMaintenance, or change the user account that is used to run this task to an account with sysadmin role. See Database maintenance account requirements for more information on account requirements.

To edit the task schedule settings (enable or disable tasks, set trigger times):

NOTE: The database maintenance tasks in Task Scheduler are configured to run using the **IONMaintenance** Windows user account. To save any changes to the task settings in Task Scheduler, you need to enter the password for the **IONMaintenance** account. See Using IONMaintenance for database maintenance tasks for information on where to find the password.

1. On the PME application server, open Task Scheduler in Windows.
2. In the Task Scheduler Library, open the **Schneider Electric** > **Power Monitoring Expert** folder to see the configured database maintenance tasks.
3. Edit the tasks as required:
   a. To enable or disable a task, select it and use the **Actions** pane in Task Scheduler.
   b. To edit task settings, double-click a task and make the desired changes in the **Job Properties** dialog box.
4. (Optional) Select **Enable All Tasks History** in the **Actions** pane in Task Scheduler. This turns on event recording for the scheduled tasks, which is useful for auditing and troubleshooting.
5. Close Task Scheduler.

To edit the task script settings (change backup and archive location, set the data to keep on trim, size notification threshold):

1. On the PME application server, open the `...\Power Monitoring Expert\config\cfg\DbScheduledTasks\Support\Configuration.ps1` script file in a text editor.
2. Change the values of the variables in the script file for the settings you want to change. The following settings can be customized:

   NOTE: Follow the instructions in the script file on formatting and syntax.

Setting	Variable	Default Value	Comments
Backup folder location	$locationForBackupFiles	...\Power Monitoring Expert \Database\Backup	Sets the folder to which the database backups are saved. The backup script will create the following subfolders in this location: ...\Data for ION_Data ...\Network for ION_Network ...\SystemLog for ION_SystemLog ...\Applications for ApplicationModules NOTE: IONMaintenance needs Read and Write permissions on this folder.
Archive folder location	$locationForArchiveDBFiles	...\Power Monitoring Expert \Database\Archive	Sets the folder to which the database archives are saved. NOTE: IONMaintenance needs Read and Write permissions on this folder.
Data to keep when trimming	$diagnosticsDaysToKeep	30	Sets how many days' worth of data is left in the database after trimming.
Database size (max)	$maximumDatabaseSizeIn Gigabytes	9	Sets the maximum database size. This value is used by the size notification task to assess what percentage of database space has been used. The maximum size for a SQL Express database is 10GB. The maximum size in the script is set to 9GB to allow for a 1GB warning buffer before the database stops logging data.
Database size notification limit	$databaseSizeNotification ThresholdPercentage	85	Sets the threshold for when a database size notification will be issued.

3. Save the script file changes and close the text editor.

Setting up database maintenance tasks for Distributed PME systems

In Distributed systems, the database maintenance tasks are not pre-configured. You need to set up these tasks manually. The scheduling and execution of the tasks is done with Task Scheduler in Windows. The database interaction specific steps of the tasks are defined as Windows PowerShell scripts. Setting up the database maintenance tasks includes the following high-level steps:

NOTE: The following sections describe how to set up the different database maintenance tasks, except for the archive task for ION_Data. See Setting up the ION_Data archive task for Distributed PME systems for instructions on how to set up this task.

Step 1: Creating a Windows user account to run the maintenance tasks. See Database maintenance account requirements for more information on the account requirements.

Step 2: Installing the Microsoft SQL Server Data-Tier Application Framework.

NOTE: This requires downloading the framework installer from Microsoft or copying it from the PME installation DVD/ISO.

Step 3: Installing and configuring the Windows PowerShell script files.

NOTE: This requires copying files from the PME application server to the database server.

Step 4: Setting up task schedules in Task Scheduler.

Step 1: Creating a Windows user account to run the maintenance tasks:

1. On the database server, create a new Windows user as a member of the Users group, for example *PMEMaintenance*.

   NOTE: You will need the password for this account during the initial task setup, and later if you want to edit the tasks in Task Manager in the future.

2. Open the Local Security Policy tool in Windows.
3. In the Local Security Policy tool, open the policy settings list in **Security Settings** > **Local Policies** > **User Rights Assignment**.
4. Add the new Windows user to the following policies: **Deny log on locally** and **Log on as a batch job**.
5. Close the Local Security Policy tool.
6. Open Microsoft SQL Server Management Studio.
7. Add the new Windows user as a database Login with the following roles and mappings:

   Server Role: **public**
   User Mapping:

Database	Role
ApplicationModules	db_backupoperator; db_ddladmin; Maintenance; public

Database	Role
ION_Data	db_backupoperator; db_ddladmin; Maintenance; public
ION_Network	db_backupoperator; db_ddladmin; Maintenance; public
ION_SystemLog	db_backupoperator; db_ddladmin; Maintenance; public

8. Close Microsoft SQL Server Management Studio.

NOTE: You will need the password for this account if you want to edit the tasks in Task Manager in the future, after the initial setup.

Next, install the Microsoft SQL Server Data-Tier Application Framework.

Step 2: Installing the Microsoft SQL Server Data-Tier Application Framework:

1. Check if the framework is already installed on the database server. To do this, find the following registry key: `HKEY_LOCAL_MACHINE\SOFTWARE\WOW6432Node\Microsoft\Microsoft SQL Server\`.
   If this key includes a `Data-Tier Application Framework` key, then the framework is installed. Continue with Step 3 - Installing and configuring the Windows PowerShell script files.
   If this key does not include a Data-Tier Application Framework key, then the framework is not installed. Continue with the installation of the framework.
2. On the database server, download the framework installer (`DacFramework.msi`) from Microsoft. See Resources for the framework installer download link.

   NOTE: You can also find the framework installer (`DacFramework.msi`) on the PME DVD/ISO under `Setup\SetupSupport\database`.
3. On the database server, install `DacFramework.msi`.

Next, install and configure the Windows PowerShell script files.

Step 3: Installing and configuring the Windows PowerShell script files:

1. On the database server, create a new folder. You can choose the location and folder name, for example `C:\PME_Database_Maintenance`.
2. Copy the **DbScheduledTasks** folder from `...\Power Monitoring Expert\config\cfg\`, on the PME application server, into this new folder.
3. Open the `<New Folder Path>\DbScheduledTasks\Support\DatabaseHelper.ps1` script file in a text editor.
4. Change the values of the folder path variables in the script file to the new folder path as follows:
   a. Change the value of **$customUserDirectory** (line 28 in the script) to `<New Folder Path>\dbScheduledTasks\Support`, for example `C:\PME_Database_Maintenance\dbScheduledTasks\Support`. The default value is `C:\PMEDBs\dbScheduledTasks\Support`.
   b. Change the value of **$customSystemDirectory** (line 29 in the script) to `<New Folder Path>`, for example `C:\PME_Database_Maintenance`. The default value is `C:\PMEDBs`.

c. (Only if you are using Windows Integrated Authentication) Change the value of **$pmeUsingIntegratedAuth** (line 32 in the script) to `1`. The default value is `0`.

5. Save the script file changes.
6. Open the `<New Folder Path>\DbScheduledTasks\Support\Configuration.ps1` script file in a text editor.
7. Change the value of the backup and archive folder path variables in the script file to the new folder path as follows:
   a. Change the value of **$locationForBackupFiles** (line 46 in the script) to `<New Folder Path>\Backups\`, for example `C:\PME_Database_Maintenance\Backups\`. The default value is `..\Database\Backup\`.
   b. Change the value of **$locationForArchiveDBFiles** (line 54 in the script) to `<New Folder Path>\Archives\`, for example `C:\PME_Database_Maintenance\Archives\`. The default value is `..\Database\Archives\`.
8. Save the script file changes and close the text editor.

Next, set up task schedules in Task Scheduler.

Step 4: Setting up task schedules in Task Scheduler:

1. On the database server, open Task Scheduler in Windows.
2. (Optional) In the Task Scheduler Library, create a new folder for the PME database maintenance tasks, for example Task Scheduler Library > Power Monitoring Expert.
3. Create scheduled database maintenance tasks:

   NOTE: For setting up the archive task for ION_Data, see Setting up the ION_Data archive task for Distributed PME systems

   Use the following information to create the tasks. Replace the variables with the specific settings shown in the task settings table below.

   Name: *<task_name>*
   Security options: Set the Windows user account created in Step 1 to run the task.
   Security options: Select **Run whether user is logged on or not**.
   Trigger: *<trigger_time>*
   Action: Select **Start a program**.
   Action: Program/script:
   C:\Windows\syswow64\WindowsPowerShell\v1.0\powershell.exe
   Action: Arguments: **-noninteractive -nologo -file "*<New Folder Path>*\DbScheduledTasks***<*script_name*>**" -DatabaseIdentifier** <*DB ID*>

   NOTE: The "<New Folder Path>\DbScheduledTasks\<script_name>" path must be an absolute path, not a relative path.

   NOTE: Valid settings for the *<task_name>*, *<trigger_time>*, *<script_name>*, and *<DB ID>* variables are given in the Task Settings table below.

Example: ApplicationModules backup task

Name: [ApplicationModules] - Backup - Job
Security options: Set the Windows user account created in Step 1 to run the task.
Security options: Select Run whether user is logged on or not.
Trigger: Daily at 01:30 (1:30 AM)
Action: Select Start a program
Action: Program/script: C:\Windows\syswow64\WindowsPowerShell\v1.0\powershell.exe
Action: Arguments: -noninteractive -nologo -file "<New Folder Path>\DbScheduledTasks\Backup.ps1" -DatabaseIdentifier APPS

Task settings table:

NOTE: The task names and trigger times shown in the table are recommendations. You can choose different names or triggers if necessary.

Task	Settings
ApplicationModules backup	Task Name: **[ApplicationModules] - Backup - Job** Trigger Time: Daily at 01:30 (1:30 AM) Action: Arguments: Script Name: **Backup.ps1**, DB ID: **APPS**
ApplicationModules maintenance	Task Name: **[ApplicationModules] - MAINTENANCE - Job** Trigger Time: Daily at 03:30 (3:30 AM) Action: Arguments: Script Name: **DatabaseMaintenance.ps1**, DB ID: **APPS**
ApplicationModules trim	Task Name: **[ApplicationModules] - TRIM - Job** Trigger Time: Daily at 02:30 (2:30 AM) Action: Arguments: Script Name: **TrimDiagnostics.ps1**, DB ID: **APPS**
ION_Data backup	Task Name: **[ION_Data] - BACKUP - Job** Trigger Time: Weekly at 00:00 (12:00 AM) on Fridays Action: Arguments: Script Name: **Backup.ps1**, DB ID: **ION**
ION_Data maintenance	Task Name: **[ION_Data] - MAINTENANCE - Job** Trigger Time: Daily at 02:00 (2:00 AM) Action: Arguments: Script Name: **DatabaseMaintenance.ps1**, DB ID: **ION**
ION_Network backup	Task Name: **[ION_Network] - BACKUP - Job** Trigger Time: Daily at 01:00 (1:00 AM) Action: Arguments: Script Name: **Backup.ps1**, DB ID: **NOM**
ION_Network maintenance	Task Name: **[ION_Network] - MAINTENANCE - Job** Trigger Time: Daily at 07:30 (7:30 AM) Action: Arguments: Script Name: **DatabaseMaintenance.ps1**, DB ID: **NOM**
ION_SystemLog maintenance	Task Name: **[ION_SytemLog] - MAINTENANCE - Job** Trigger: Daily at 07:05 (7:05 AM) Action: Arguments: Script Name: **DatabaseMaintenance.ps1**, DB ID: **SYSLOG**
ION_SystemLog trim	Task Name: **[ION_SytemLog] - TRIM - Job** Trigger Time: Daily at 04:00 (4:00 AM) Action: Arguments: Script Name: **TrimDiagnostics.ps1**, DB ID: **SYSLOG**

The completed task list should look like this:

Name	Status	Triggers
[ApplicationModules] - BACKUP - Job	Ready	At 1:30 AM every day
[ApplicationModules] - MAINTENANCE - Job	Ready	At 3:30 AM every day
[ApplicationModules] - TRIM - Job	Ready	At 2:30 AM every day
[ION_Data] - BACKUP - Job	Ready	At 12:00 AM every Friday of every week, starting 12/12/2019
[ION_Data] - MAINTENANCE - Job	Ready	At 2:00 AM every day
[ION_Network] - BACKUP - Job	Ready	At 1:00 AM every day
[ION_Network] - MAINTENANCE - Job	Ready	At 7:30 AM every day
[ION_SystemLog] - MAINTENANCE - Job	Ready	At 7:05 AM every day
[ION_SystemLog] - TRIM - Job	Ready	At 4:00 AM every day

4. (Optional) Manually run each task to verify its correct operation.
5. Close Task Scheduler.

To edit the task script settings (for example to change the backup and archive location or to set the amount of data to keep in the database on trim), open the `Configuration.ps1` script file, as described in Step 3 and change the values of the variables.

Configurable variables in `Configuration.ps1`:

Setting	Variable	Default Value	Comments
Backup folder location	$locationForBackupFiles	As defined in the script file; see Step 3.	Sets the folder to which the database backups are saved. The backup script will create the following subfolders in this location: ...\Data for ION_Data ...\Network for ION_Network ...\SystemLog for ION_SystemLog ...\Applications for ApplicationModules NOTE: The Windows user account used to run the backup task needs Read and Write permissions on this folder.
Data to keep when trimming	$diagnosticsDaysToKeep	30	Sets how many days' worth of data is left in the database after trimming.

Diagrams configuration

Use the Diagrams application to view historical and real-time data in one-line and graphics diagrams.

Open the Diagrams application from the **Diagrams** link in the Web Applications banner.

NOTE: To display the correct local time for monitoring device data in the Diagrams application, you must configure the TZ Offset, DST Start, DST End, and DST Offset settings on the device.

⚠ WARNING

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Do not use the software to control time-critical functions.
- Do not use the software to control remote equipment without proper access control and status feedback.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

For information on how to configure the Diagrams application, see:

- Configuring Devices diagrams
- Configuring a network diagram
- Creating custom diagrams
- Set default options for a diagram
- Set Diagrams control options
- Diagram Library
- Diagrams registry settings
- Configuring a custom network diagram for direct browser access
- Configuring Power Quality Performance diagrams

For information on how to use Diagrams, see Diagrams.

Configuring Devices diagrams

Devices diagrams are device type specific diagrams for each configured device in the system. Devices diagrams are created automatically when a new device is added to the system.

NOTE: You cannot delete Devices diagrams.

NOTE: The device type specific diagrams are the same as the ones used in the default Vista network diagram.

NOTE: It takes time for the system to generate the diagrams when you add a new device. Restart Diagrams after adding a new device to see the new device diagrams.

Related topics:

- Configuring Devices diagrams
- Configuring a network diagram
- Creating custom diagrams
- Set default options for a diagram
- Set Diagrams control options
- Diagram Library
- Diagrams registry settings
- Configuring a custom network diagram for direct browser access
- Configuring Power Quality Performance diagrams

For information on how to use Diagrams, see Diagrams.

Configuring a network diagram

Before you can view the network diagram in the Diagrams application, you must generate a network diagram (`network.dgm`) in Vista. The Diagrams application uses the network diagram generated in Vista for display in the browser. The network diagram is automatically added to the Diagram Library, all you need to do is generate the network diagram in Vista, save it in the default location, and then restart the Diagrams application.

Note that the Vista component is installed with Power Monitoring Expert on a primary server or Engineering Client.

To generate a default network diagram in Vista:

1. Start Vista.
2. Click **File > Generate network diagram**.
3. Click **File > Save**.

Related topics:

- Configuring Devices diagrams
- Configuring a Network diagram
- Creating custom diagrams
- Set default options for a diagram
- Set Diagrams control options
- Diagram Library
- Diagrams registry settings
- Configuring a custom network diagram for direct browser access
- Configuring Power Quality Performance diagrams

For information on how to use Diagrams, see Diagrams.

Creating custom diagrams

You create a custom diagram for the Diagrams application with Vista. After you created the diagram, you must add it to the Diagram Library in the Diagrams application to make it available for viewing.

To create a diagram:

1. Open Vista and create a new diagram. Use the Vista tools to create display objects and embedded graphics as applicable.
2. Save the diagram to `...\Power Monitoring Expert\config\diagrams\ud` or any subfolder in this location.

Related topics:

- Configuring Devices diagrams
- Configuring a network diagram
- Creating custom diagrams
- Set default options for a diagram
- Set Diagrams control options
- Diagram Library
- Diagrams registry settings
- Configuring a custom network diagram for direct browser access
- Configuring Power Quality Performance diagrams

For information on how to use Diagrams, see Diagrams.

Set default options for a diagram

The default diagram is the one that is displayed when you first open Diagrams. You can set a diagram to be your own personal default, or the default for the system.

NOTE: For each user, **Set as my default** supersedes **Set as system default**. For example, if a user with supervisor-level access sets a diagram as the system default diagram, and another user sets a different diagram as their default diagram, that user's default diagram takes priority over the system default diagram, but only for them.

To set the default options for a diagram:

1. In Diagrams, open the Diagram Library and navigate to the diagram you want to set as default.
2. Right-click the diagram name or click **Options** for this diagram and select **Set as default** to open the Configure Default Item dialog.
3. Turn on one or both of **Set as my default** and **Set as system default**.
4. Click **OK** to save the modified Diagram Settings.

Related topics:

- Configuring Devices diagrams
- Configuring a network diagram
- Creating custom diagrams
- Set default options for a diagram
- Set Diagrams control options
- Diagram Library
- Diagrams registry settings
- Configuring a custom network diagram for direct browser access
- Configuring Power Quality Performance diagrams

For information on how to use Diagrams, see Diagrams.

Set Diagrams control options

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Do not use the software to control time-critical functions.
- Do not use the software to control remote equipment without proper access control and status feedback.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

You can enable or disable the ability to perform manual control actions in Diagrams. Manual control actions include actions such as resetting values on devices or changing device configuration settings. You can also set the confirmation method that is used by the software to confirm a control action request before carrying it out.

Control in Diagrams is disabled by default.

NOTE: The required user access permissions for performing a control action are configured individually for each control object in a diagram. This is done at design time in Vista. However, to perform any control action in Diagrams you need at least controller-level access or higher (operator-level, supervisor-level). This is true even if the permissions for a control object in a diagram are set to user-level or view only-level. Only through Vista can users with user-level or view only-level access perform control actions on such a control object. To view or change the permissions on a control object, open the diagram in Vista. See Controlling system functions in Vista for information on control object configuration.

NOTE: Control in Diagrams is only available when a HTTPS connection is used between the PME server and the Web Applications client.

To enable or disable control in Diagrams:

1. Open the Settings page from the **SETTINGS** link in the Web Applications banner.
2. In the Settings Library select **Security** > **Diagrams Control Options**.

   NOTE: Only supervisor-level users can access the Diagrams Control Options settings.

3. In Diagrams Control Options, enable or disable manual control in Diagrams.
4. Click **Save**.

To set the confirmation method:

NOTE: Control in Diagrams must be enabled for the confirmation method settings to be displayed.

1. Open the Settings page from the **SETTINGS** link in the Web Applications banner.
2. In the Settings Library select **Security** > **Diagrams Control Options**.

   NOTE: Only supervisor-level users can access the Diagrams Control Options settings.

3. In Diagrams Control Options, select the confirmation method - **Dialog Box without Password** or **Dialog Box with Password**.

   NOTE: Control objects in diagrams can be configured, at design time, to always require password confirmation. This configuration has priority over the confirmation method settings above. See Controlling system functions in Vista for information on control object configuration.

4. Click **Save**.

Confirmation settings priority:

Control Object Setting	Diagrams Setting	Behavior
No Confirmation	Confirmation	Confirmation
No Confirmation	Password	Password
Confirmation	Confirmation	Confirmation
Confirmation	Password	Password
Password	Confirmation	Password
Password	Password	Password

Related topics:

- Configuring Devices diagrams
- Configuring a network diagram
- Creating custom diagrams
- Set default options for a diagram
- Set Diagrams control options
- Diagram Library
- Diagrams registry settings
- Configuring a custom network diagram for direct browser access
- Configuring Power Quality Performance diagrams

For information on how to use Diagrams, see Diagrams.

Diagram Library

Use the Diagram Library to access all the diagrams that you can view in the Diagrams application. You can add diagrams to the library, edit them, share them, or delete them.

NOTE: You cannot add, edit, share, or delete Devices diagrams. See Configuring Devices diagrams for details.

NOTE: A network diagram is automatically added to the library when it is generated in Vista. See Configuring a network diagram for details.

To add a diagram to the library:

1. In Diagrams, open the Diagram Library and navigate to the folder where you want to create the diagram.

   (Optional) Add a new folder by clicking **Add Folder** at the bottom of the library panel, or by clicking **Add Folder** in the **Options** menu at the top of the library.

2. In the Diagram Library, at the bottom of the panel, click the **Add Diagram** icon . This opens the Diagram Settings.
3. In Diagram Settings, enter a diagram name, select a location, and select the diagram you want to add.
4. **Save** the diagram.

To add a copy of an existing diagram to the library:

1. In Diagrams, open the Diagram Library and navigate to the diagram you want to copy.
2. Right-click the diagram name or click the **Options** icon for this diagram and select **Duplicate** to create a copy in the same folder. Select **Copy To...** to create a copy in a different folder.

   (Optional) Add a new folder by clicking **Add Folder** at the bottom of the library panel, or by clicking **Add Folder** in the **Options** menu at the top of the library.

3. (Optional) In the Diagram Library, select the new diagram, right-click the diagram name or click the **Options** icon for this diagram and select **Edit** to open the Diagram Settings. Change the diagram name.
4. **Save** the modified diagram settings.

To edit an existing diagram in the library:

1. In Diagrams, open the Diagram Library and navigate to the diagram you want to edit.
2. Right-click the diagram name or click the **Options** icon for this diagram and select **Edit** to open the Diagram Settings. Change the diagram name or location.
3. **Save** the modified Diagram Settings.

To share an existing diagram in the library:

1. In Diagrams, open the Diagram Library and navigate to the diagram you want to share.
2. Right-click the diagram name or click the **Options** icon for this diagram and select **Share...**. This opens the Share Diagram window.
3. In Share Diagram, select the user groups you want to share this diagram with.

   (Optional) Specify a name for the shared diagram. The groups you are sharing this diagram with will see this name. The name of the original diagram remains unchanged.
4. Click **OK** to share this diagram.

NOTE: When you share a diagram with another user group, it appears in the **Shared** folder of this group. You cannot share a shared diagram.

To move an existing diagram to a different location in the library:

1. In Diagrams, open the Diagram Library and navigate to the diagram you want to move.

   (Optional) Add a new folder by clicking **Add Folder** at the bottom of the library panel, or by clicking **Add Folder** in the **Options** menu at the top of the library.
2. Right-click the diagram name or click the **Options** icon for this diagram and select **Move To...**. This opens the Select Location window.
3. In Select Location, select the location you want to move this diagram to.
4. Click **OK** to move the diagram.

To delete a diagram from the library:

1. In Diagrams, open the Diagram Library and navigate to the diagram you want to delete.
2. Right-click the diagram name or click the **Options** icon for this diagram and select **Delete**
3. In Delete Content, click **Yes**, to delete the diagram from the Diagram Library.

Related topics:

- Configuring Devices diagrams
- Configuring a network diagram
- Creating custom diagrams
- Set default options for a diagram
- Set Diagrams control options
- Diagram Library
- Diagrams registry settings
- Configuring a custom network diagram for direct browser access
- Configuring Power Quality Performance diagrams

For information on how to use Diagrams, see Diagrams.

Diagrams registry settings

NOTICE

IRREVERSIBLE OPERATING SYSTEM DAMAGE OR DATA CORRUPTION

Before making any changes, back up your Windows Registry in a network folder or other remote location.

Failure to follow these instructions can result in irreparable damage to the operating system of the computer and all existing data.

NOTE: Registry edits must be performed only by qualified and experienced personnel.

The registry keys are in HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Schneider Electric\Power Monitoring Expert\2020\WebReach.

The following table lists the default Diagrams registry entries and settings.

Default Entries	Default Settings	Description
AutoDiagramTimeout	20000 milliseconds	Timeout period for the autodiagram components to communicate with the device and determine the appropriate template to open.
ExpireTimeLimit	600 seconds	Time limit for a diagram subscription to update its timestamp. If the subscription is not updated within this time period, it is considered expired and is removed.
HTTPRefreshInterval	10 seconds	The web page refresh rate.
SubscriptionObject	pmlitem:webreachstore:	The name (tag) that the subscription service uses to find Diagrams-related information.
VirtualDirectory	ION	The part of the Web address that points to the Diagrams-generated Vista diagrams for displaying in the browser.
XMLRefreshInterval	3000 milliseconds	The real time data update rate on the web page.

The following table lists the optional registry entries you can set for custom functionality. Modifying system registry keys without the required knowledge or experience in these procedures can damage the computer's operating system and all existing data.

Optional Entries	Default Settings	Description
NetworkDiagram	x-pml:/diagrams/ud/network.dgm	This value specifies the network diagram to display as the homepage for Diagrams. The value can be a relative path, such as the default setting, or it can be an absolute file path (e.g.: D:\customdiagrams\ud\networkB.dgm).
QueryTimeout	See description.	This value determines how long Diagrams waits for the results of a query to return from the database before timing out. If this registry entry is not created or no QueryTimeout value is specified, Diagrams times out after 60 seconds.
		This optional registry entry is useful if you know that a query will take more than 60 seconds to return its results and you do not want Diagrams to time out before then. Specify a value that gives you enough time to get your query results.

Related topics:

- Configuring Devices diagrams
- Configuring a network diagram
- Creating custom diagrams
- Set default options for a diagram
- Set Diagrams control options
- Diagram Library
- Diagram registry settings
- Configuring a custom network diagram for direct browser access
- Configuring Power Quality Performance diagrams

For information on how to use Diagrams, see Diagrams.

Configuring a custom network diagram for direct browser access

If you access the Diagrams pages directly from a browser, without the Web Applications framework, you will not have access to the Diagram Library. In this case, Diagrams will automatically display the default network diagram generated with Vista.

NOTE: If you access Diagrams from outside the Web Applications framework, through a browser using the URL `https://server_name/ion` (where *server_name* is the fully-qualified name of the server or its IP address), you are prompted to log in using your Power Monitoring Expert credentials.

If you have a custom network diagram on the primary server that you want to use instead of the automatically generated network diagram, you need to modify the registry settings of the computer where you run the Diagrams application to specify the location of the custom network diagram.

Modifying system registry keys without the required knowledge or experience in these procedures can damage the computer's operating system and all existing data.

NOTICE

IRREVERSIBLE OPERATING SYSTEM DAMAGE OR DATA CORRUPTION

Before making any changes, back up your Windows Registry in a network folder or other remote location.

Failure to follow these instructions can result in irreparable damage to the operating system of the computer and all existing data.

NOTE: Registry edits must be performed only by qualified and experienced personnel.

1. Start Windows Registry Editor and navigate to:

   `HKEY_LOCAL_MACHINE\SOFTWARE\Schneider Electric\Power Monitoring Expert\2020\WebReach`

   If the Diagrams application is run on a 64-bit operating system, navigate to:
   `HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Schneider Electric\Power Monitoring Expert\2020\WebReach`
2. Right-click to add a new string value and name it “NetworkDiagram”.
3. Right-click **NetworkDiagram**, select **Modify**, then type the path and name of your custom network diagram in the **Value data** field.
4. Click **OK**.
5. Restart IIS on your computer to apply the changes.

For more information, refer to the **NetworkDiagram** item in the table under Diagrams registry settings. If there is no NetworkDiagram entry in the registry, then the default value “x-pml:/diagrams/ud/network.dgm” is used.

The Network Diagram navigation button located on the date range page and the results page is automatically updated to link to the custom network diagram you specified. However, the Network Diagram button that exists in each meter user diagram uses a hard-coded link to “x-pml:/diagrams/ud/network.dgm”. Use Vista to manually update the Network Diagram link in the meter user diagrams. If you do not have access to Vista, contact your system administrator to change the link for the grouping object in the network diagram as described below.

Changing the link for the grouping object in the network diagram

1. Start Vista and select **Options > Show Toolbox** to switch to Edit mode.
2. Right-click the grouping object in the network diagram to open the Grouping Object Configuration dialog.
3. Select the **Action** tab and select **Open User Diagram**.
4. Click **Browse** to locate your custom network diagram. Select the diagram filename, then click **Open**.
5. Click **OK** to save your changes.

Related topics:

- Configuring Devices diagrams
- Configuring a network diagram
- Creating custom diagrams
- Set default options for a diagram
- Set Diagrams control options
- Diagram Library
- Diagrams registry settings
- Configuring a custom network diagram for direct browser access
- Configuring Power Quality Performance diagrams

For information on how to use Diagrams, see Diagrams.

Configuring Power Quality Performance diagrams

NOTE: These diagrams are part of the Power Quality Performance Module. This Module requires a separate license.

Before you can use these diagrams, you must first configure the Power Quality Performance module. You must complete the following tasks, as part of the Power Quality Performance module configuration:

- Deploy the VIP framework for Power Quality Performance using Designer.
- Deploy and configure the Power Quality Performance Indicator and Equipment Vista diagrams.
- Configure which devices to include and exclude for each type of power quality event and disturbance.

Related topics:

- Configuring Devices diagrams
- Configuring a network diagram
- Creating custom diagrams
- Set default options for a diagram
- Set Diagrams control options
- Diagram Library
- Diagrams registry settings
- Configuring a custom network diagram for direct browser access
- Configuring Power Quality Performance diagrams

For information on how to use Diagrams, see Diagrams.

Duplicate Data logging

Data records are considered duplicates if more than one record exists for the same measurement on the same source at the same time. There are different possible causes for duplicate data in a system, such as faulty devices, incorrect device configuration, or incorrect device time synchronization.

By default, PME does not log duplicate data records in the historical database. It logs one of the duplicate records in the database, and removes the other records.

Under certain circumstances, for example for audit reasons, or billing applications, it might be desirable to log all duplicate records. For these applications, PME provides the option to enable duplicate data logging.

NOTICE
LOSS OF DATA Back up the database before making manual database edits. **Failure to follow these instructions can result in permanent loss of data.**

To enable duplicate data collection, set the `SaveDuplicates` parameter, in the `dbo.Registry` table in the ION_Data database, to `1`.

NOTE: The duplicate entries are stored in the `DataLog2Duplicate` table in the ION_Data database. You can access this data through the following reports, or through direct database access: Trend Report, Tabular Report, Data Export - Standard, and Data Export - Extended.

Licensing configuration

Power Monitoring Expert (PME) is a proprietary software that uses licensing to control its use and distribution. To use PME, you must purchase software licenses and activate them in the system. PME uses a modular licensing structure where different licenses enable different functions in the software. Some of these functions are optional, others are required. The licenses are cumulative, meaning that you can add additional licenses to a system, to enable additional functionality.

NOTICE

LOSS OF COMMUNICATION

- Activate product and component licenses prior to the expiry of the trial license.
- Activate sufficient licenses for the servers and devices in your system.
- Export the existing hierarchy template out of Power Monitoring Expert before importing a new template. The new template can overwrite the existing template, which can permanently remove all information contained in the original.
- Backup or archive any SQL Server database data before adjusting any database memory options.
- Only personnel with advanced knowledge of SQL Server databases should make database parameter changes.

Failure to follow these instructions can result in loss of data.

For information on how to configure licensing in PME, see:

- Activating a license
- Returning a license
- Deleting the trial license
- Viewing which licenses have been activated on a system

For information related to license planning, see the Licensing section in the Planning chapter of this guide.

Activating a license

Activate a license to enable the use of the system after a new install, an upgrade, or a migration. Activate licenses to enable additional features, such as software modules, or additional monitoring devices.

You can activate licenses online, directly from the PME server if it has an Internet connection. You can also activate licenses offline, from an alternate internet connected computer or smartphone. In both cases you use Floating License Manager to activate licenses.

TIP: Search for "Floating License Manager" in the Windows Start menu to find this tool on the PME server.

NOTE: When you start the license activation process in Floating License Manager, it first checks for an internet connection. If Floating License Manager detects an internet connection, it automatically enters the online activation workflow. If it does not detect an internet connection, it enters the offline activation workflow. You can force an offline activation by setting the value of **CheckConnectivityTimeout** (DWORD, default f) to 0. You can find this key in the Windows registry under `HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Schneider Electric\Common\License`.

NOTICE

IRREVERSIBLE OPERATING SYSTEM DAMAGE OR DATA CORRUPTION

Before making any changes, back up your Windows Registry in a network folder or other remote location.

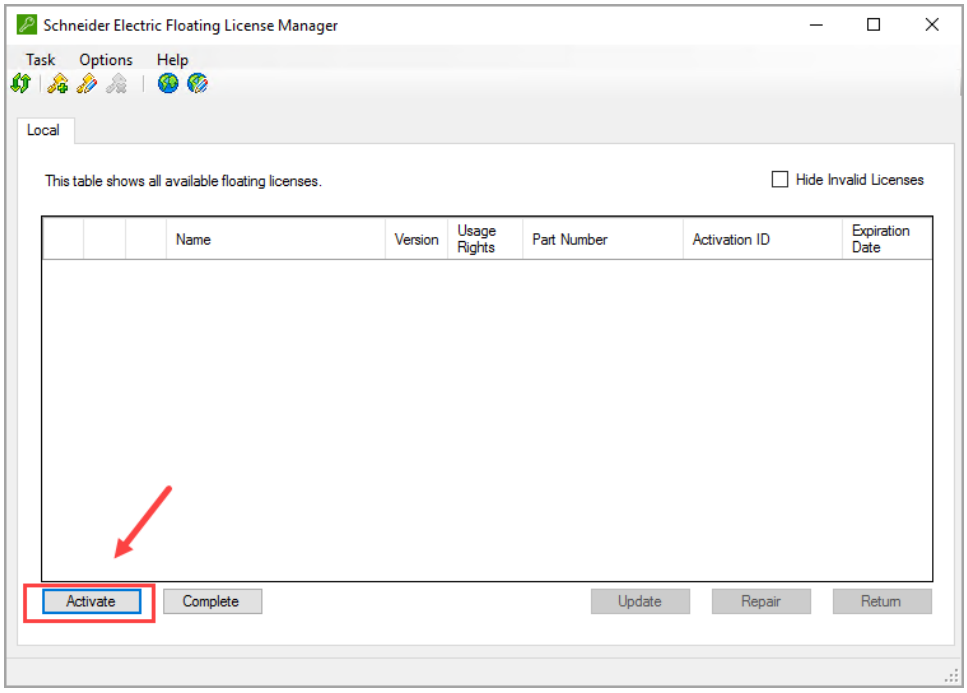
Failure to follow these instructions can result in irreparable damage to the operating system of the computer and all existing data.

NOTE: Registry edits must be performed only by qualified and experienced personnel.

NOTE: You must have a valid Activation ID to activate a license. See Licensing process for more information.

To activate a license online:

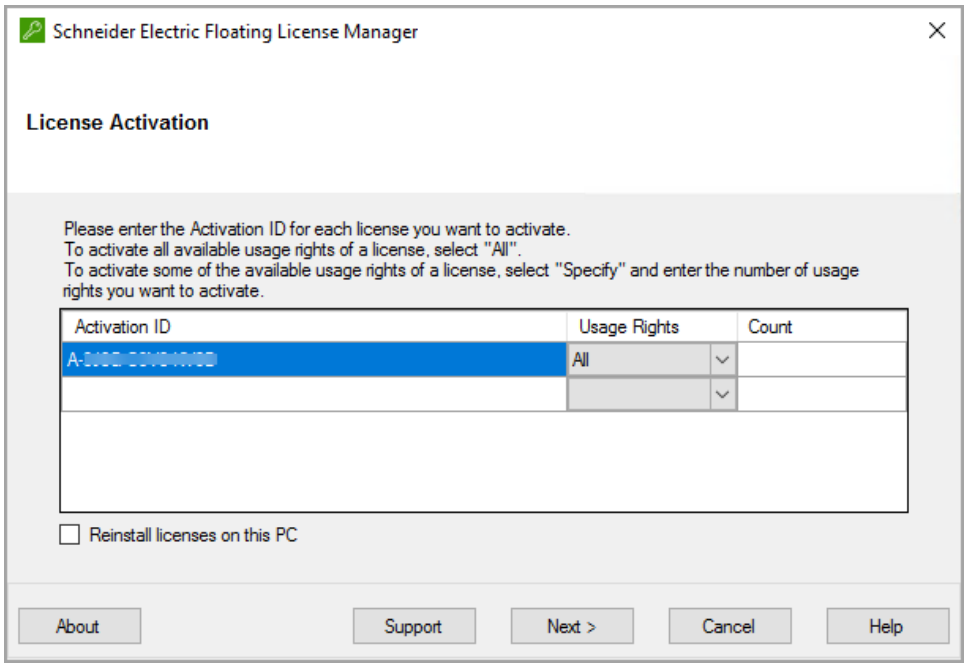
1. On the PME server, open the Floating License Manager, and then click **Activate**.



This opens the license activation page.

2. On the license activation page, enter your Activation IDs, and then click **Next**.

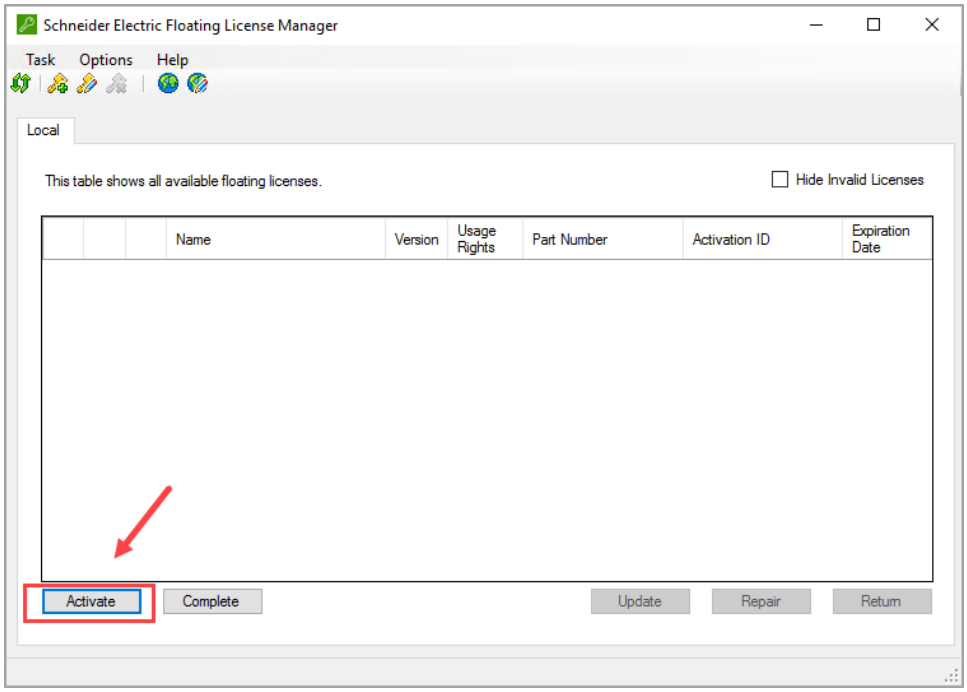
NOTE: You can enter more than one Activation ID and activate all of them at the same time.



3. The licenses appear in the Floating License Manager. Close the Floating License Manager.

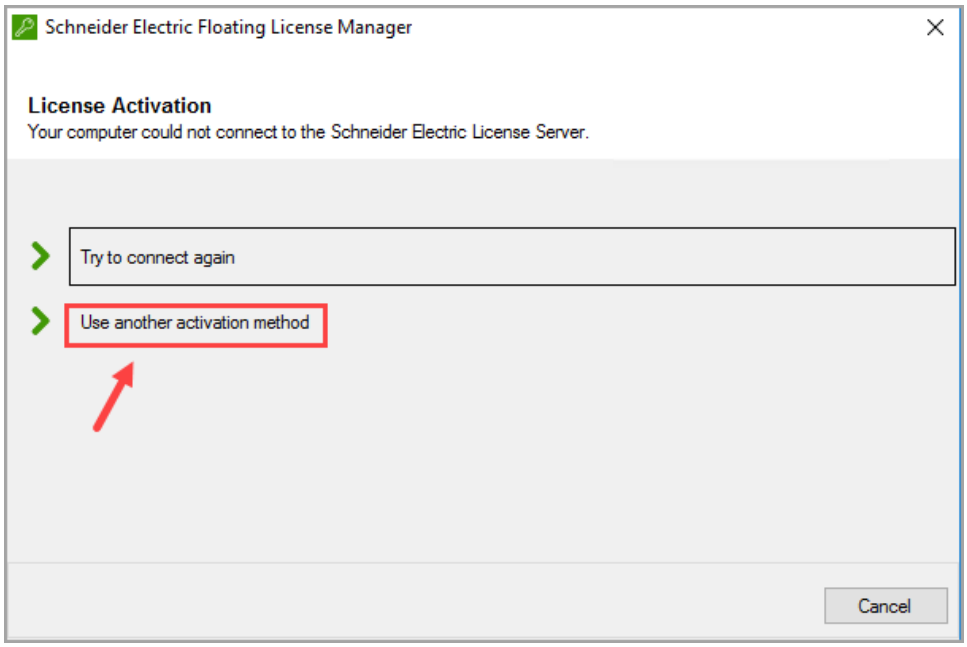
To activate a license offline:

1. On the PME server, open Floating License Manager and then click **Activate**.



This opens the license activation page.

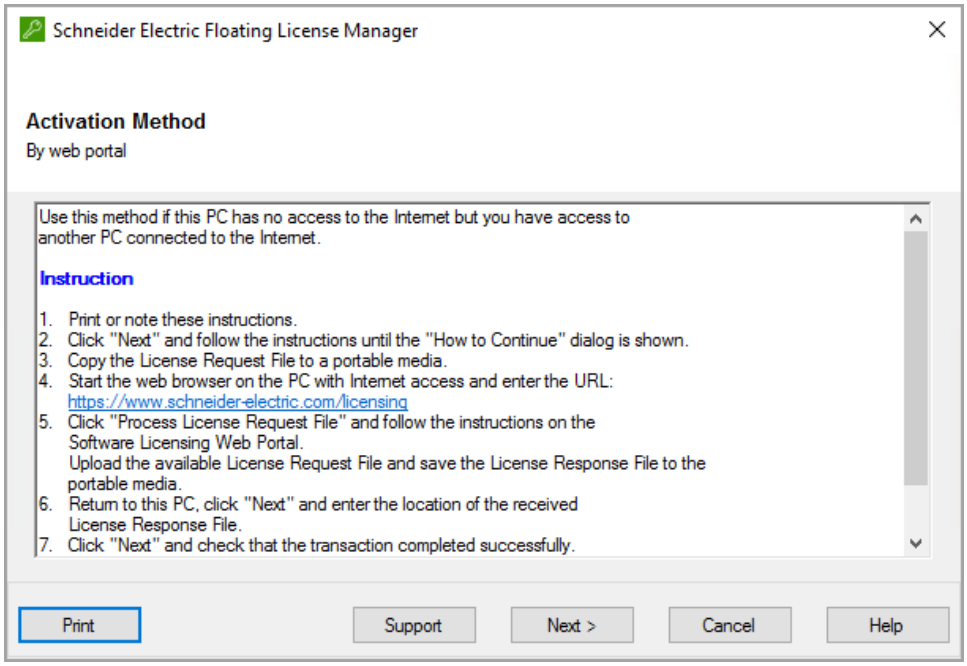
2. On the license activation page, click **Use another activation method**.



This opens the activation method page.

3. On the activation method page, click **Next**.

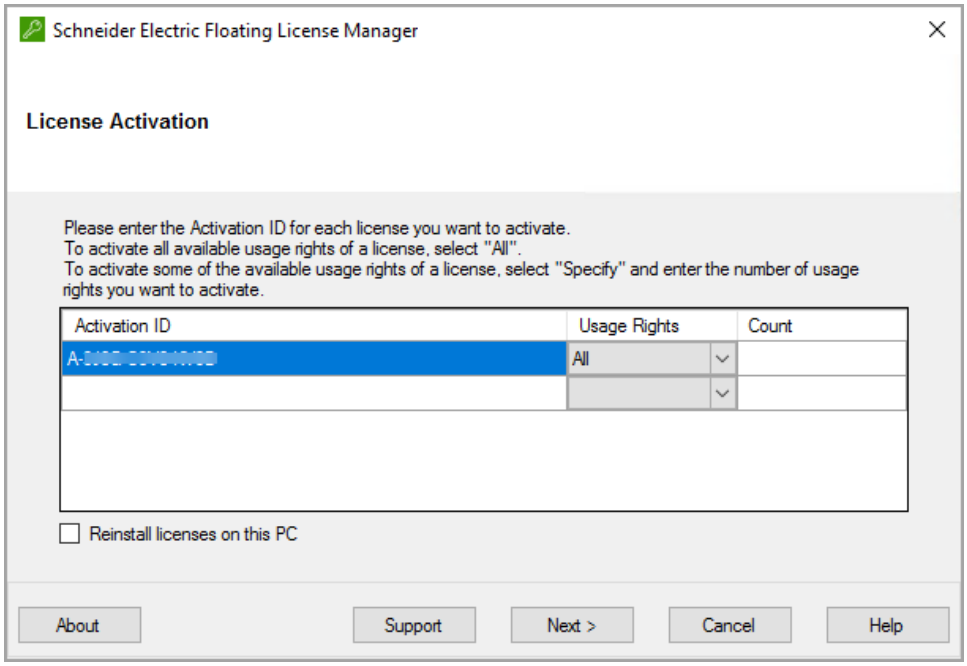
NOTE: The instructions shown on the activation method page are the same as the instructions provided here, in this document.



This opens the license activation page.

4. On the license activation page, enter your Activation IDs, and then click **Next**.

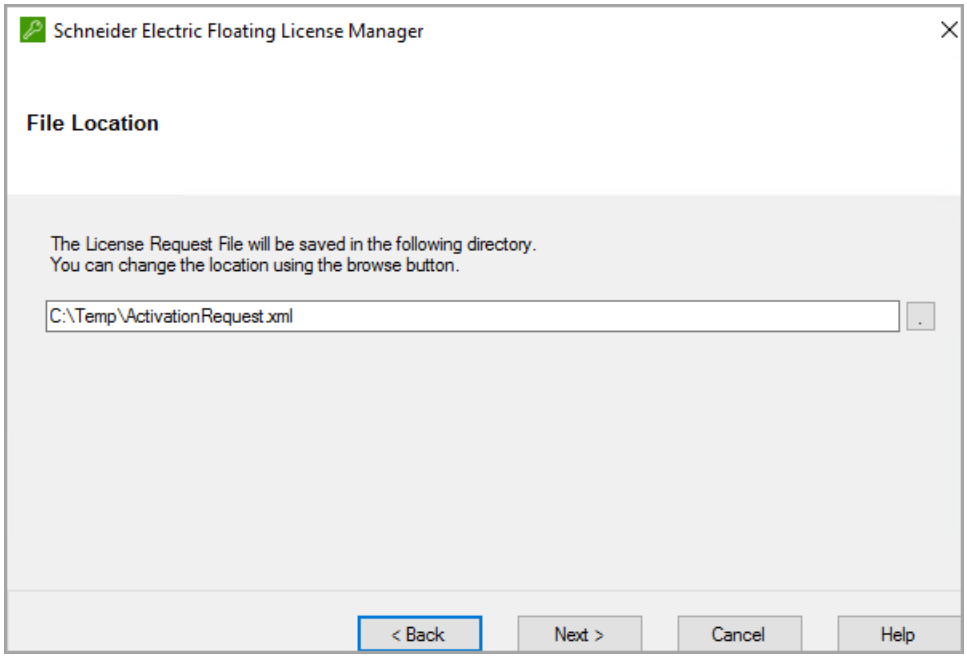
NOTE: You can enter more than one Activation ID and activate all of them at the same time.



This opens the file location page.

5. On the file location page, enter a location to save the activation request file. The file name for the activation request file should be `ActivationRequest.xml`. Click **Next**.

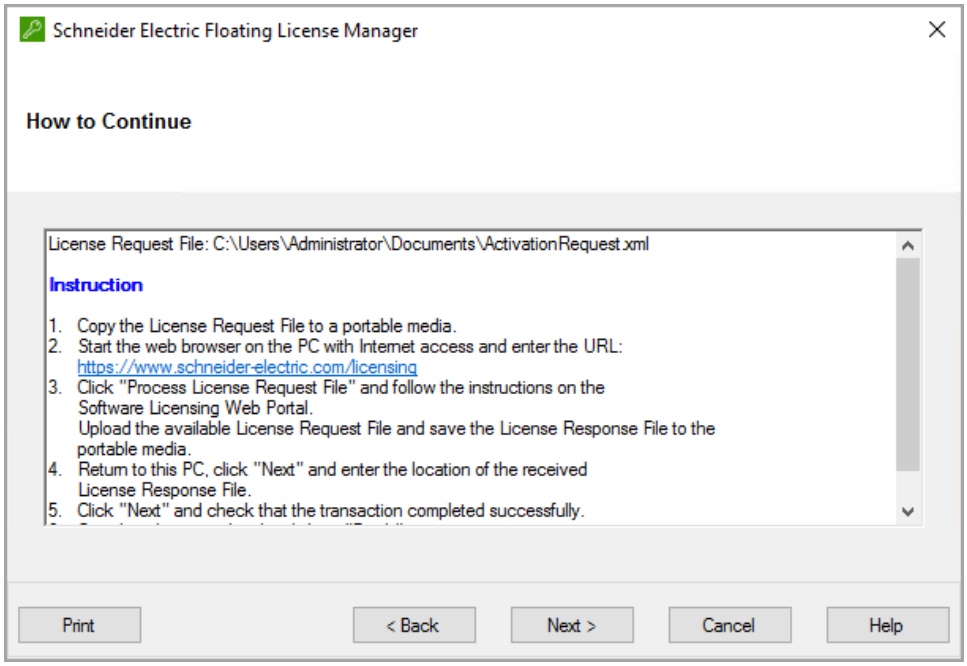
NOTE: You need the activation request file in a following step.



This opens the **How to Continue** page.

6. On the How to Continue page, click **Cancel**. Continue with step 7.

NOTE: You must first complete steps 7-12 below before you can continue the activation process in the Floating License Manager. You will return to Floating License Manager in step 13 to complete the activation.



7. Copy the `ActivationResponse.xml` file, generated in step 5, to a computer or a web enabled device such as a smartphone with Internet access.

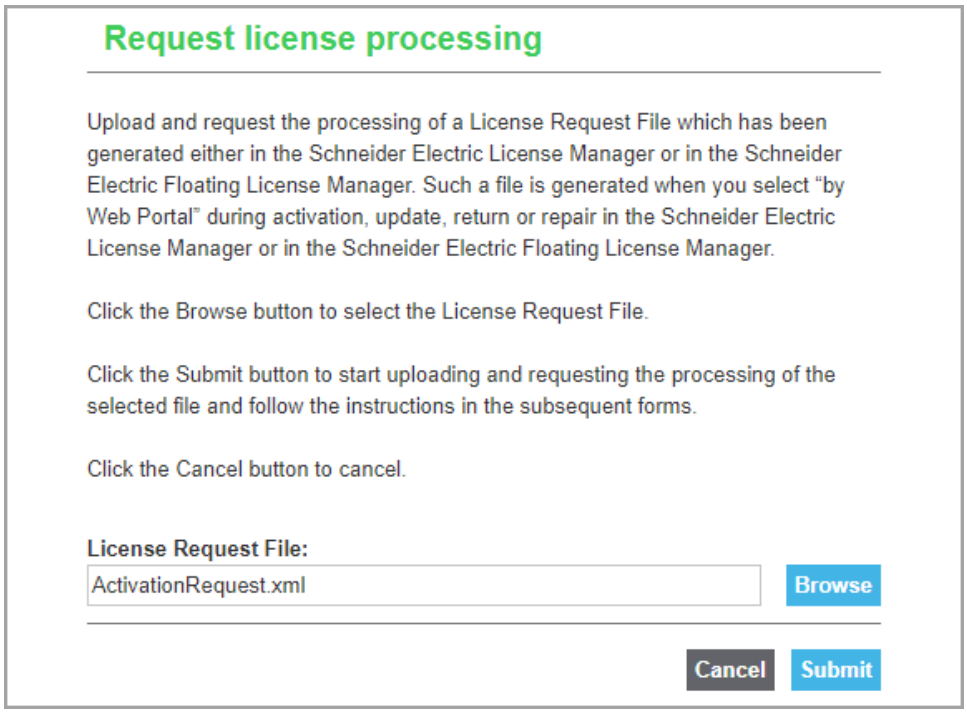
8. On the Internet-connected computer or device, open a Firefox or Chrome browser.

NOTE: Internet Explorer is not supported.

9. Browse to the Software Licensing Web Portal (https://www.schneider-electric.com/sites/corporate/en/support/software-licensing/software-licensing-na.page). Click **Process license request file**, and then click **Request Processing**.

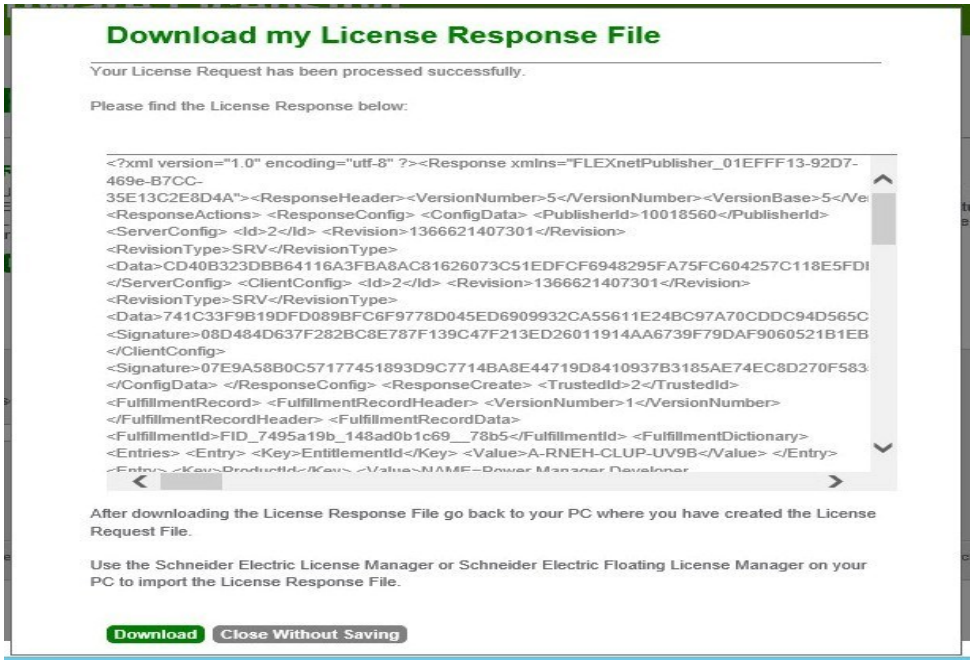
This opens the Request license processing window.

10. In Request License Processing, click **Browse**, and then select your `ActivationResponse.xml` file, and click **Submit**.



This opens the Download my License Response File window.

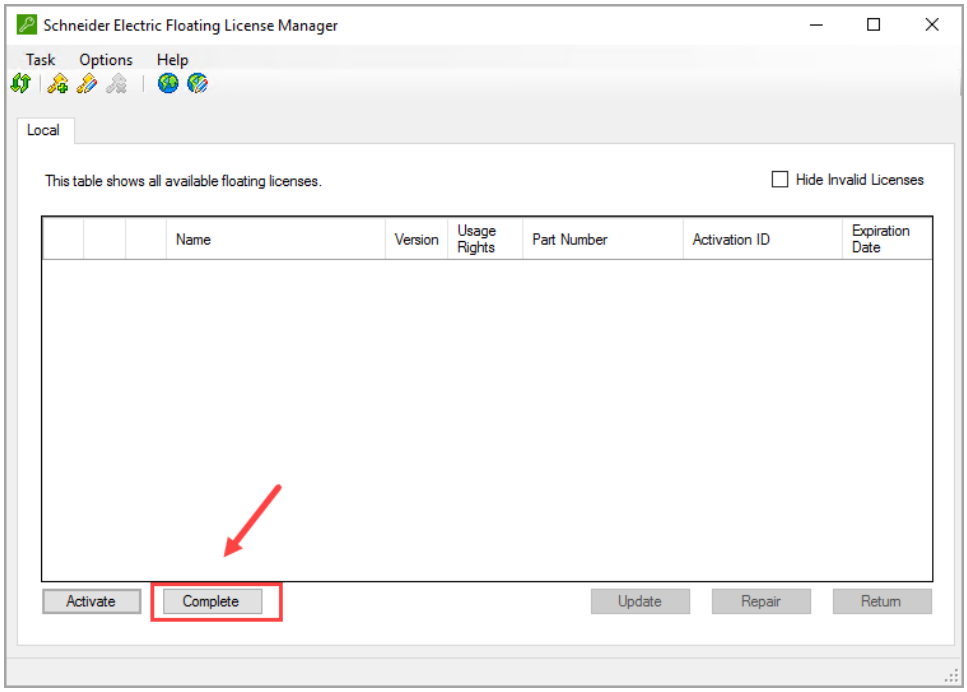
11. In Download my Response File, click **Download** to save the `ActivationResponse.xml` file.



12. Copy the `ActivationResponse.xml` file to the PME server computer.

TIP: If you are using a smartphone, try using a USB cable to copy the file.

13. On the PME server, open Floating License Manager and then click **Complete**.



14. Navigate to your `ActivationResponse.xml` file, and click **Next** to activate the licenses.
15. Close the Floating License Manager.

Related topics:

- Activating a license
- Returning a license

- Deleting the trial license
- Viewing which licenses have been activated on a system

Returning a license

Return a license before migrating a system. When you migrate a system, you must first return the license on the old system before you can activate it again on the new system. This includes the case where you re-install Power Monitoring Expert (PME) on the same server after the operating system has been reinstalled.

You can return licenses online, directly from the PME server, if it has an Internet connection, or offline, from an alternate Internet connected computer or smartphone. You use the Floating License Manager to return licenses.

TIP: Search for "Floating License Manager" in the Windows Start menu to find this tool on the PME server.

NOTE: Write down the Activation IDs of the licenses before you return them. You need the IDs to activate the licenses again on the new system. There is a limit on the number of license returns that are allowed per calendar year. See System migration and license returns for more details.

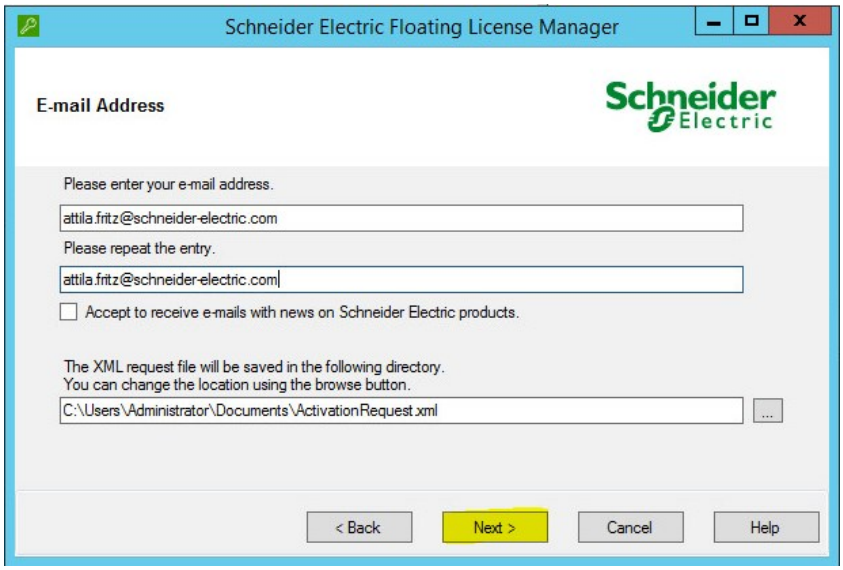
To return a license online, on the PME server computer:

1. On the PME server, open the Floating License Manager, select the licenses you want to return, and then click **Return**.
2. Choose the **By web** return method, click **Next**.
3. The licenses are returned and disappear from the Floating License Manager.

   Close the Floating License Manager.

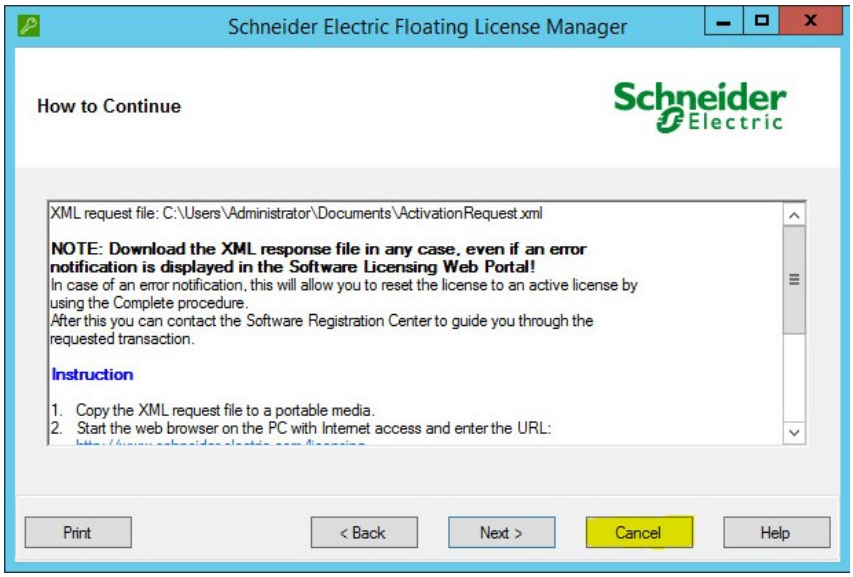
To return a license offline, on an alternate computer or smartphone:

1. On the PME server, open the Floating License Manager, select the licenses you want to return, and then click **Return**.
2. Choose the **By web portal** return method.
3. In the E-mail Address window, enter your email address and a location where the return request file will be saved, and then click **Next**.



NOTE: After the return request file is generated, a **How to Continue** dialog window opens. Click **Cancel** in this dialog, see step 6. You will return to this dialog and continue with this step after you receive the response file.

4. In the How to Continue window, click **Cancel**.



5. Find the generated `ActivationResponse.xml` file in the location specified in step 3, and copy it to a computer or smartphone with Internet access.

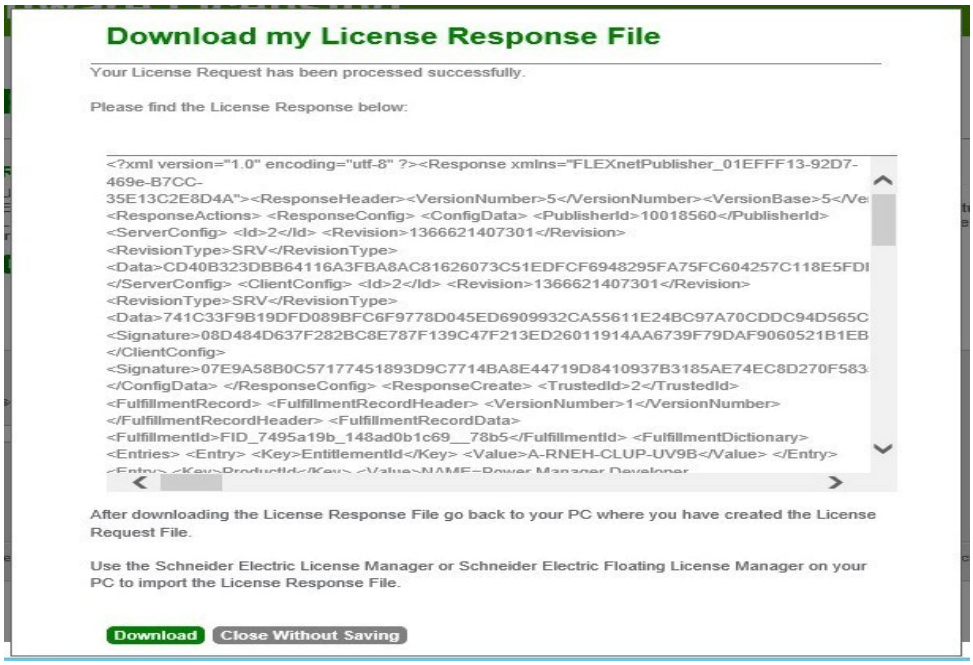
6. On the Internet-connected computer or smartphone, open Firefox or Chrome

NOTE: Note: Internet Explorer is not supported.

7. Browse to the Software Licensing Web Portal (https://www.schneider-electric.com/sites/corporate/en/support/software-licensing/software-licensing-na.page), click **Process license request file**, and then click **Request Processing**. This opens the **Request license processing** window.

8. In Request License Processing, click **Browse**, and then select your `ActivationResponse.xml` file, and click **Submit**. This opens the **Download my License Response File** window.

9. In Download my Response File, click **Download** to save the `ActivationResponse.xml` file.



10. Copy the `ActivationResponse.xml` file to the PME server computer.

TIP: If you are using a smartphone, use a USB cable to copy the file.

11. On the PME server, open the Floating License Manager, return to the **How to Continue** window from step 6, and click **Next**.
12. Navigate to your `ActivationResponse.xml` file, and click Next to return the licenses.

Related topics:

- Activating a license
- Returning a license
- Deleting the trial license
- Viewing which licenses have been activated on a system

Deleting the trial license

Delete the trial license after you activated the purchased licenses in the system. You use the License Manager to delete the trial license.

TIP: Search for "License Manager" in the Windows Start menu to find this tool on the PME server.

To delete the trial license on the PME server computer:

1. On the PME server, open the License Manager.
2. In the license table, right-click the trial license, and select **Delete** from the context menu.

   Close the License Manager.

NOTE: A trial license cannot be reinstalled after it has been deleted.

Related topics:

- Activating a license
- Returning a license
- Deleting a trial license
- Viewing which licenses have been activated on a system

Viewing which licenses have been activated on a system

Find out which licenses have been activated to plan for system expansions or upgrades. You can view license information, in the Management Console and in the Floating License Manager.

TIP: Search for "Floating License Manager" in the Windows Start menu to find this tool on the PME server.

To find licensing information in the Management Console:

1. On the PME server, open the Management Console.
2. In Management Console, click **Help** > **About**. This opens the **About Application** window.
3. In About Application, view the licensing information.
4. In About Application, click **OK** to close the window.

To find licensing information in the Floating License Manager:

1. On the PME server, open Floating License Manager.
2. In Floating License Manager, view the licensing information.
3. Close the Floating Licensing Manager.

You can also see Client Access license information in the User Manager. See Viewing Web Applications user license information for more details.

Related topics:

- Activating a license
- Returning a license
- Deleting the trial license
- Viewing which licenses have been activated on a system

Reports configuration

TIP: You can open Reports from the **REPORTS** link in the Web Applications banner.

Use the Reports application to generate historical data reports. The reports are saved in the Report Library. PME comes with many default report templates. Use these default templates to create new reports or upload your own custom templates. Set up subscriptions to automatically generate and distribute reports based on a schedule or an event.

⚠ WARNING

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

For information on how to configure the Reports application, refer to the following topics:

Reports:

- Setting Reports prerequisites
- Meeting individual report requirements
- Adding a new report
- Copying a report
- Editing a report
- Moving a report
- Deleting a report
- Sharing a report

Subscriptions:

- Subscribing to a report
- Changing a report subscription
- Deleting a report subscription

Other

- Changing the Reports theme
- Uploading a Report Template

- Configuring the Energy Modeling report
- Reports UI

For information on how to use Reports, see Reports.

Setting Reports prerequisites

Before you can use Reports, you need to specify the database to use for reporting, and you need to configure the delivery options for report subscriptions. These settings are defined in Management Console.

To set the prerequisites:

1. Open Management Console and select **Tools > Reports Configuration** to open the dialog.
2. Click the **Reports** tab to configure general reporting options:
   - From the dropdown list in the **Reports Database** section, select the database on which to run reports. Only those databases and database archives compatible with Reports are listed.
   - (Optional) Use the slider in the **Report Timeout** section to set the time (in seconds) after which Reports stops trying to complete a report generation task.
3. Click the **Subscriptions** tab to configure the settings for report subscriptions:
   - **SMTP Server**: Enter the IP address of your SMTP server, or the fully-qualified network server name from which the report subscriptions are emailed.
   - **Port**: Type the port address used by your SMTP server.
   - **Use SSL**: Select this option to encrypt your user credentials.
   - **Username**: If required by your SMTP server, enter the Windows user name used to configure the SMTP server settings.
   - **Password**: If required by your SMTP server, enter the password associated with the Windows user name.
   - **“From” Display Name**: (Optional) Type the name that you want to appear in the “From” field of an emailed report.
   - **“From” Email Address**: Type the email address that you want to appear in the “From” field of the emailed report.
4. Click **OK** to save your changes.

Related topics:

Reports:

- Setting Reports prerequisites
- Meeting individual report requirements
- Adding a new report
- Copying a report
- Editing a report
- Moving a report
- Deleting a report
- Sharing a report

Subscriptions:

- Subscribing to a report
- Changing a report subscription
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Other

- Changing the Reports theme
- Uploading a Report Template
- Configuring the Energy Modeling report
- Reports UI

For information on how to use Reports, see Reports.

Meeting individual report requirements

Different reports have different data requirements. These requirements must be met before you can generate the report. For details on specific report requirements, see Report descriptions.

Related topics:

Reports:

- Setting Reports prerequisites
- Meeting individual report requirements
- Adding a new report
- Copying a report
- Editing a report
- Moving a report
- Deleting a report
- Sharing a report

Subscriptions:

- Subscribing to a report
- Changing a report subscription
- Deleting a report subscription

Other

- Changing the Reports theme
- Uploading a Report Template
- Configuring the Energy Modeling report
- Reports UI

For information on how to use Reports, see Reports.

Adding a new report

Add new reports to meet your needs for reporting on specific data or for specific report formats. For example, create reports for power quality, energy consumption, power demand, breaker monitoring, and many other applications.

To add a new report:

1. In Reports, open the Report Library and navigate to the folder where you want to add the report.

   (Optional) Add a new folder by clicking **Add Folder** at the bottom of the library panel, or by clicking **Add Folder** in the **Options** menu at the top of the library.

2. In the Report Library, click **Add Report** at the bottom of the panel, or click **Add Report** in the Options menu at the top of the Library. This opens Add Report - Report Template Selection.

3. In Add Report - Report Template Selection, find and select the report template you want to use for the new report, and click **OK**. This opens the report template and the Report Settings for the new report.

4. In the report template, enter and select the input parameters that you want to use for the new report.

   NOTE: The number and type of input parameters are report template specific.

5. (Optional) Click **Generate Report** to test the report output and adjust the input parameters if necessary.

6. In Report Settings, enter a report Name, select a Location and access permissions, and select which report inputs you want to save with the report.

   NOTE: Saved inputs are stored with the report and reused every time the report is generated. To change saved input values for an existing report, see Editing a report. Inputs that are not saved must be entered every time the report is generated.

   NOTE: A public item is visible to all users in your user group. A private item is visible to you and any user in your user group with Edit permissions on this item type. See Default User Access Level Privileges and Customizing Access Level Privileges for details.

7. Click **Save** in Report Settings to save the report.

Related topics:

Reports:

- Setting Reports prerequisites
- Meeting individual report requirements
- Adding a new report
- Copying a report
- Editing a report

- Moving a report
- Deleting a report
- Sharing a report

Subscriptions:

- Subscribing to a report
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Other

- Changing the Reports theme
- Uploading a Report Template
- Configuring the Energy Modeling report
- Reports UI

For information on how to use Reports, see Reports.

Copying a report

Copy reports to quickly create new reports that are the same as, or similar to existing reports. For example, create a copy of a report to experiment with the input parameters without affecting the original report. You can also use a copy of a report as a starting point for a new report that shares many of the input settings of the original report.

To copy a report:

1. In Reports, open the Report Library and navigate to the report you want to copy.
2. Right-click the report name or click **Options** ⋮ for this report and select **Duplicate** to create a copy in the same folder. Select **Copy To** to create a copy in a different folder.
3. (Optional) In the Report Library, select the new report, right-click the report name or click **Options** ⋮ for this report and select **Edit** to open Report Settings. You can also open Report Settings by double-clicking the report name. Change the report Name, Location and access permissions, and the saved Report Inputs to customize the report if necessary.
4. **Save** the report.

NOTE: You cannot copy report templates.

Related topics:

Reports:

- Setting Reports prerequisites
- Meeting individual report requirements
- Adding a new report
- Copying a report
- Editing a report
- Moving a report
- Deleting a report
- Sharing a report

Subscriptions:

- Subscribing to a report
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Other

- Changing the Reports theme
- Uploading a Report Template
- Configuring the Energy Modeling report
- Reports UI

For information on how to use Reports, see Reports.

Editing a report

Edit reports to update the report name, Location and access permissions, and the saved report Inputs.

To edit a report:

1. In Reports, open the Report Library and navigate to the report you want to edit.
2. Right-click the report name or click **Options** for this report and select **Edit** to open Report Settings. You can also open Report Settings by double-clicking the report name.
3. Change the report Name, Location and access permissions, and the saved Report Inputs to customize the report as necessary.

   NOTE: A public item is visible to all users in your user group. A private item is visible to you and any user in your user group with Edit permissions on this item type. See Default User Access Level Privileges and Customizing Access Level Privileges for details.

4. **Save** the report.

Related topics:

Reports:

- Setting Reports prerequisites
- Meeting individual report requirements
- Adding a new report
- Copying a report
- Editing a report
- Moving a report
- Deleting a report
- Sharing a report

Subscriptions:

- Subscribing to a report
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- Changing the Reports theme
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- Configuring the Energy Modeling report
- Reports UI

For information on how to use Reports, see Reports.

Moving a report

Move reports to a different location in the Report Library to make them easier to find or easier to manage.

To move a report:

1. In Reports, open the Report Library and navigate to the report you want to move.
2. Right-click the report name or click **Options** for this report and select **Move To**. This opens the Select Location window.
3. In Select Location, select the location you want to move this report to.
4. Click **OK** to move the report.

Related topics:

Reports:

- Setting Reports prerequisites
- Meeting individual report requirements
- Adding a new report
- Copying a report
- Editing a report
- Moving a report
- Deleting a report
- Sharing a report

Subscriptions:

- Subscribing to a report
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- Deleting a report subscription

Other

- Changing the Reports theme
- Uploading a Report Template
- Configuring the Energy Modeling report
- Reports UI

For information on how to use Reports, see Reports.

Deleting a report

Delete reports that are no longer needed.

To delete a report:

1. In Reports, open the Report Library and navigate to the report you want to delete.
2. Right-click the report name or click **Options** ⋮ for this report, and select **Delete**
3. In Delete Content, click **Yes**, to delete the report from the Report Library.

NOTE: You cannot delete report templates.

Related topics:

Reports:

- Setting Reports prerequisites
- Meeting individual report requirements
- Adding a new report
- Copying a report
- Editing a report
- Moving a report
- Deleting a report
- Sharing a report

Subscriptions:

- Subscribing to a report
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- Changing the Reports theme
- Uploading a Report Template
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- Reports UI

For information on how to use Reports, see Reports.

Sharing a report

Share saved reports with other User Groups.

NOTE: For Sharing to be enabled, at least one user group, in addition to the Global group, must be configured. To share an item with another user group, you must be a member of that group. The item to be shared must be marked as Public, not Private.

To share a saved report:

1. In Reports, open the Report Library and navigate to the report you want to share.
2. Right-click the report name or click **Options** ⋮ for this report and select **Share**. This opens the Share Report window.
3. In Share Report, select the User Groups you want to share this report with.
   (Optional) Specify a name for the shared report. The groups you are sharing this report with will see this name. The name of the original report remains unchanged.
4. Click **OK** to share this report.

NOTE: When you share an item with another user group, it appears in the **Shared** folder of this group. You cannot share a shared item.

Related topics:

Reports:

- Setting Reports prerequisites
- Meeting individual report requirements
- Adding a new report
- Copying a report
- Editing a report
- Moving a report
- Deleting a report
- Sharing a report

Subscriptions:

- Subscribing to a report
- Changing a report subscription
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Other

- Changing the Reports theme
- Uploading a Report Template
- Configuring the Energy Modeling report
- Reports UI

For information on how to use Reports, see Reports.

Subscribing to a report

Subscribe to reports to receive scheduled report outputs or automatically generate reports based on system events. For example, you can configure a subscription so that a report is generated monthly and sent via email to a group of people.

NOTE: You can only create a subscription for a report that has all its inputs saved.

To subscribe to an individual report:

1. In Reports, open the Report Library and navigate to the report you want to subscribe to.
2. Right-click the report name or click **Options** for this report and select **Subscribe** to open Add New Subscription.
3. Continue with step 4 in "To subscribe to multiple reports" below.

To subscribe to multiple reports:

1. In Reports, open the Report Library and select **Manage Subscriptions** from the Options menu at the top of the Library. This opens Manage Subscriptions.
2. In Manage Subscriptions, click **Add Subscriptions**. This opens the reports list in Add New Subscription.
3. From the reports list In Add New Subscription, select the reports you want to subscribe to. Click **Next**.

   NOTE: This creates subscriptions for all the selected reports.

4. In Add New Subscription, enter a name for the subscription in the **Subscription Name** field.

   NOTE: This is the name that is displayed in the list when you open **Manage Subscriptions** from the Options menu at the top of the Library.

5. Under **Output Format**, select one of the formats for the report that will be generated.
6. Under **Delivery Mode**, select one of the following delivery options:
   - **Email**: Click **Recipients** to open the Distribution List dialog.
     The dialog has two tabs: **Users/Groups** and **Manual Entry**. You can use both tabs to select and type email addresses, respectively. They are not mutually exclusive.

     Users/Groups tab
     The names listed on this tab are the users and groups that have been created in User Manager. They are listed in alphabetical order. Select **Order by Type** to order the list alphabetically by group then by user.
     Ensure that email addresses are defined in User Manager for the users.
     Select the users or groups that you want as the recipients of the generated report.
     Click **OK** when you complete your selections.

     Manual Entry tab
     If you click the **Manual Entry** tab, type the email address of a recipient and click **Add** to include the recipient's email address in the **Current subscription recipients** area.
     Repeat this step for each recipient.

To remove an email address from the **Current subscription recipients** area, click an address and then click **Remove**.
Click **OK** when the list is complete.

Email Subject field
(Optional) Type the text you want to include as the subject line in the email that is sent to the recipients.

> **NOTE**: The limit for the number of email recipients in a subscription is 100.

- **File share**: Type the location of the computer and folder where you want the report to be saved. You must type the absolute pathname to the folder (including the drive letter). The Windows user account “IONUser” must be configured with valid credentials to read and write to that fileshare. See your system administrator for assistance. To overwrite an existing report (if one exists in the folder), select **Overwrite existing file**. To leave an existing file in the folder and save the report with a new name, clear **Overwrite existing file**.
- **Printer**: From the dropdown list, select the printer to which you want to send the report.

> **NOTE**: For printed subscriptions, the printer must be a local printer on the Primary Server. For information on setting a network printer as a local printer, consult your server's documentation.

7. In the **Subscription Schedule** section, select when you want the report to be generated and delivered. (You can type the date and time in the respective fields without using the calendar or dropdown lists). The following items include descriptions for using the calendar and dropdown lists.
   - **On Trigger**: Select this option to configure the subscription to run when an event occurs. Select the event from the **Deliver report on trigger** list that you want to use to trigger the subscription. To use this option, you must first configure an Event Watcher. See the *Event Watcher* topic in the online help for Management Console Tools for information on creating an Event Watcher.
   - **Once**: Select this option to run the report once at the specified date and time. Click the **Date** field or calendar icon to open a calendar and select the date. You can specify the hours and minutes by typing over the entries or using the dropdown lists. You can also click **Now** to set the date and time to the current server time.
   - **Hourly**: Select this option to run the report every hour. Select the time from the **Deliver Report** dropdown list (for example, on the hour, 15 minutes after the hour, and so on).
   - **Daily**: Select this option to run the report once per day at the specified time. Click the **Time of Day** field to open the Choose Time dialog, and either type the hours and minutes in the respective fields or use the dropdown lists to select the hours and minutes. You can also click **Now** to set the time to the current server time.
   - **Weekly**: Select this option to run the report once per week, on the day of the week and at the time that you specify. Select the day from the dropdown list for **On**. Click the **Time of Day** field to open the Choose Time dialog, and either type the hours and minutes in the

respective fields or use the dropdown lists to select the hours and minutes. You can also click **Now** to set the time to the current server time.

- **Monthly — Absolute Monthly**: Select **Monthly** then select **Absolute Monthly** to run the report on selected days in the calendar month at a specified time. Type the days in the **On calendar day(s)** field. Separate multiple dates with a comma. To select a range of contiguous days, separate the first and last day in the range with a hyphen. For example, to schedule the report to run on the 1st, 10th to 15th, and 20th days of the month, type 1, 10-15, 20. After you have entered the days, click the **Time of Day** field to open the Choose Time dialog, and either type the hours and minutes in the respective fields or use the dropdown lists to select the hours and minutes. You can also click **Now** to set the time to the current server time.
- **Monthly — Relative Monthly**: Select **Monthly** then select **Relative Monthly** to run the report on a specific day of the week in a selected week of the month at a specified time. For example, to set the subscription to run on the Monday of the last week of the month, select **Last** and **Monday** from the dropdown lists. Click the **Time of Day** field to open the Choose Time dialog, and either type the hours and minutes in the respective fields or use the dropdown lists to select the hours and minutes. You can also click **Now** to set the time to the current server time.

8. (Optional) Click **Test Now** to test that the report subscription is functioning.

   Note that the button is disabled for the **Email** or **Printer** delivery options if configuration errors are detected.

9. Click **Save** to save the subscription.

Related topics:

Reports:

- Setting Reports prerequisites
- Meeting individual report requirements
- Adding a new report
- Copying a report
- Editing a report
- Moving a report
- Deleting a report
- Sharing a report

Subscriptions:

- Subscribing to a report
- Changing a report subscription
- Deleting a report subscription

Other

- Changing the Reports theme
- Uploading a Report Template
- Configuring the Energy Modeling report
- Reports UI

For information on how to use Reports, see Reports.

Changing a report subscription

Change report subscriptions to update the subscription properties such as subscription name, output format, delivery mode, or subscription schedule.

To change a report subscription:

1. In Reports, open the Report Library and select **Manage Subscriptions** from the Options menu at the top of the Library. This opens Manage Subscriptions.
2. In Manage Subscriptions, find the subscription you want to change. All existing subscriptions are displayed in the subscriptions table.
3. To view the options for the subscription, click **Edit Subscription** to open the Modify Subscription dialog.
4. In Modify Subscription, change the options in the dialog and click **Save** to update the subscription.
5. Click **Close**.

Related topics:

Reports:

- Setting Reports prerequisites
- Meeting individual report requirements
- Adding a new report
- Copying a report
- Editing a report
- Moving a report
- Deleting a report
- Sharing a report

Subscriptions:

- Subscribing to a report
- Changing a report subscription
- Deleting a report subscription

Other

- Changing the Reports theme
- Uploading a Report Template
- Configuring the Energy Modeling report
- Reports UI

For information on how to use Reports, see Reports.

Deleting a report subscription

Delete report subscriptions that are no longer needed.

To delete a report subscription:

1. In Reports, open the Report Library and select **Manage Subscriptions** from the Options menu at the top of the Library. This opens Manage Subscriptions.
2. In Manage Subscriptions, find the subscription you want to delete. All existing subscriptions are displayed in the subscriptions table.
3. Click **Delete Subscription** to delete the subscription. Click **OK** in the confirmation dialog.
4. Click **Close**.

Related topics:

Reports:

- Setting Reports prerequisites
- Meeting individual report requirements
- Adding a new report
- Copying a report
- Editing a report
- Moving a report
- Deleting a report
- Sharing a report

Subscriptions:

- Subscribing to a report
- Changing a report subscription
- Deleting a report subscription

Other

- Changing the Reports theme
- Uploading a Report Template
- Configuring the Energy Modeling report
- Reports UI

For information on how to use Reports, see Reports.

Uploading a Report Template

Upload custom Report Templates to generate Reports that are not available by default in the software.

NOTE: Information on how to create custom Report Templates is not provided in this document. Contact your local Schneider Electric representative for information on custom Report Templates.

To upload a Report Template:

1. In Reports, open the Report Library and select **Upload Report Template** from the Options menu ☰ at the top of the Library. This opens Upload Report Template.
2. In Upload Report Template, click **Choose File** to navigate to the location of the .rdl file.
3. Select the file, click **Open**, and then click **Install**.

   The uploaded report is in ...\ Power Monitoring Expert\web\ReportDepot\ION Reports\ION Single Reports

NOTE: After you uploaded the Report Template, you can access it, together with the default templates, in the Report Library.

Related topics:

Reports:

- Setting Reports prerequisites
- Meeting individual report requirements
- Adding a new report
- Copying a report
- Editing a report
- Moving a report
- Deleting a report
- Sharing a report

Subscriptions:

- Subscribing to a report
- Changing a report subscription
- Deleting a report subscription

Other

- Changing the Reports theme
- Uploading a Report Template
- Configuring the Energy Modeling report
- Reports UI

For information on how to use Reports, see Reports.

Software Alarms configuration

TIP: You can open Software Alarms rom the **SETTINGS > Alarms > Software Alarms** page in Web Applications or from **Management Console > Tools > Web Tools > Alarm Configuration**.

Use Software Alarms to set up software-based alarms in PME. For software-based alarms, the alarm conditions are defined and monitored in the software instead of on the device. PME provides Alarm Templates to simplify the configuration of software-based alarms. Software based alarms can be defined for real-time data or for logged data.

Real-time Alarms

These Alarms are based on real-time data coming from monitoring devices. Reliable communication links to the devices are required for these Alarms to function correctly. Use real-time Alarms for alarming on power system operational parameters such as currents and voltages.

The following real-time Alarm Templates are available:

Template	Notes
Breaker Status	Use this alarm to monitor the breaker trip status. Alarms generated by this template are categorized as **Protection** alarms.
Communication Status	Use this alarm to monitor communications between the software and devices. Alarms generated by this template are categorized as **Communication Status** alarms.
Over Current	Use this alarm to monitor phase currents. Alarms generated by this template are categorized as **Over Current** alarms.
Over Voltage (Line to Line)	Use this alarm to monitor line to line phase voltages. Alarms generated by this template are categorized as **Over Voltage** alarms.
Over Voltage (Line to Neutral)	Use this alarm to monitor line to neutral phase voltages. Alarms generated by this template are categorized as **Over Voltage** alarms.
Realtime Digital Setpoint	Use this alarm to monitor Boolean (True/False) values. Alarms generated by this template are categorized as **General Setpoint** alarms.
Realtime Setpoint	Use this alarm to monitor analog values. Alarms generated by this template are categorized as **General Setpoint** alarms.
Under Voltage (Line to Line)	Use this alarm to monitor line to line phase voltages. Alarms generated by this template are categorized as **Under Voltage** alarms.
Under Voltage (Line to Neutral)	Use this alarm to monitor line to neutral phase voltages. Alarms generated by this template are categorized as **Under Voltage** alarms.

See Real-time Alarms UI for information on Real-time Alarms configuration.

Logged Data Alarms

These Alarms are based on data that has been logged to the database. Logging of the required data must be configured, and data logs must be in the database for these Alarms to function correctly. Use logged data Alarms for alarming on consumption type parameters, such as energy or WAGES.

PME provides two types of logged data Alarms: Fixed Setpoint Alarms and Smart Setpoint Alarms.

Fixed Setpoint Alarms

Fixed Setpoint Alarms use pre-defined, fixed threshold values for the Active and Inactive conditions. For example, you can configure an Over Demand Alarm that goes Active when the Demand exceeds 800 kW and goes Inactive when the Demand falls below 600 kW. The following Fixed Setpoint Alarm templates are available:

Template	Notes
Demand	Set up Alarms for over or under demand. Demand data logs are required for this Alarm. Alarms generated by this template are categorized as **Demand** alarms.
Water Consumption	Set up Alarms for water consumption. Water volume data logs are required for this Alarm. Alarms generated by this template are categorized as **Water** alarms.
Air Consumption	Set up Alarms for compressed air monitoring. Air volume data logs are required for this Alarm. Alarms generated by this template are categorized as **Air** alarms.
Gas Consumption	Set up Alarms for fuel gas monitoring. Gas volume data logs are required for this Alarm. Alarms generated by this template are categorized as **Gas** alarms.
Electricity Consumption	Set up Alarms for electric consumption. Electric energy data logs are required for this Alarm. Alarms generated by this template are categorized as **Electricity** alarms.
Steam Consumption	Set up Alarms for steam monitoring. Steam volume data logs are required for this Alarm. Alarms generated by this template are categorized as **Steam** alarms.
Datalog Setpoint	Set up Alarms for any logged analog measurement in your system. Data logs for the measurement are required for this Alarm.
Datalog Digital Setpoint	Set up Alarms for any logged digital measurement in your system. Data logs for the measurement are required for this Alarm.

See Logged Data Alarms UI (Fixed Setpoint) for information on fixed setpoint logged data Alarm configuration.

Smart Setpoint Alarms

Smart Setpoint Alarms use threshold values for Active and Inactive conditions that are based on data of the monitored input measurement itself. For example, you can configure an Over Demand Alarm that goes Active when the Demand is the "Highest Value in last 30 days", or when the value is "Abnormally High for the day of the week". The following Smart historical Alarm Templates are available:

Template	Notes
Demand (Smart Setpoint)	Set up Alarms for over or under demand. Demand data logs are required for this Alarm. Alarms generated by this template are categorized as **Demand** alarms.
Water Consumption (Smart Setpoint)	Set up Alarms for water consumption. Water volume data logs are required for this Alarm. Alarms generated by this template are categorized as **Water** alarms.
Air Consumption (Smart Setpoint)	Set up Alarms for compressed air monitoring. Air volume data logs are required for this Alarm. Alarms generated by this template are categorized as **Air** alarms.
Gas Consumption (Smart Setpoint)	Set up Alarms for fuel gas monitoring. Gas volume data logs are required for this Alarm. Alarms generated by this template are categorized as **Gas** alarms.
Electricity Consumption (Smart Setpoint)	Set up Alarms for electric consumption. Electric energy measurement data logs are required for this Alarm. Alarms generated by this template are categorized as **Electricity** alarms.
Steam Consumption (Smart Setpoint)	Set up Alarms for steam monitoring. Steam volume data logs are required for this Alarm. Alarms generated by this template are categorized as **Steam** alarms.
Datalog Setpoint (Smart Setpoint)	Set up Alarms for any logged analog measurement in your system. Data logs for the measurement are required for this Alarm.

See Logged Data Alarms UI (Smart Setpoint) for information on fixed setpoint logged data Alarm configuration.

Software Alarms considerations

Take the following into account when using Software Alarms:

- Configuring many Alarm Rules with short update intervals can affect overall system performance.
- Alarm state is not evaluated if a device is disabled. For example, a communication loss is not triggered ON or OFF for a disabled device. Activities like maintenance on a meter can be done without the need to change the Alarm Rule.
- Communication Loss Alarms are only applied to physical devices. Any logical devices or downstream devices are removed from the Alarm Rule.
- The Alarm Rule name must be unique in the system. That means you cannot have two Alarm Rules defined with the same name.

- The Alarm Name must be unique for a source. That means you cannot enable two Alarms with the same Alarm Name for the same source.

To configure software Alarms, see:

- Adding a new Alarm Rule
- Enabling or disabling an Alarm Rule
- Editing an Alarm Rule
- Duplicating an Alarm Rule
- Deleting an Alarm Rule
- Using the Setpoint Calculator
- Adding a Schedule

For reference information see:

- Schedules
- Software Alarms UI
- Add Alarm Rule UI
- Schedules Configuration UI

Adding a new Alarm Rule

Add a new Alarm Rule to monitor and alarm on specific conditions in your power system.

To add a new Alarm Rule:

1. In Software Alarms, select the **Alarm Rules** tab, and then click **Add Alarm Rule** to open the Add Alarm Rule window.
2. In Add Alarm Rule, select the Alarm Template that best matches the Alarm you want to create. Click **Next**.
3. Select the measurements to alarm on. Click **Next**.

   NOTE: Some Alarm Templates have preselected, recommended measurements. You can accept these recommended measurements, or select your own.

4. Specify an Alarm Name, the Input Evaluation, Active Condition, Inactive Condition, and Advanced settings. Click **Next**.

   NOTE: For Smart Alarms, specify the Smart Setpoint conditions instead of the Input Evaluation.

5. Select the sources to which you want to apply this Alarm Rule. Click **Next**.

   NOTE: Source selection is optional for adding a new alarm rule. However, the alarm rule cannot be enabled until the sources are selected.

6. (Optional) Select an Alarm Schedule that you want to use for this Alarm Rule. Click **Next**.

   You can Add a new Schedule by clicking Add Schedule. See Adding a Schedule for more information

7. Specify an Alarm Rule name, enable or disable the Rule, and enable or disable real-time Alarm Status measurements.

   NOTE: By default, real-time Alarm Status measurements are disabled, which means that information about the state of the Alarm is only available through the Alarms application. Enable real-time Alarm Status measurements if you want to access Alarm state information in Diagrams, Trends, or other real-time applications in PME. These status measurements are not currently available in the VIP/Designer.

8. Click **Finish**.

Related topics:

- Adding a new Alarm Rule
- Enabling or disabling an Alarm Rule
- Editing an Alarm Rule
- Duplicating an Alarm Rule
- Deleting an Alarm Rule
- Using the Setpoint Calculator

- Adding a Schedule
- Software Alarms configuration

For reference information see:

- Schedules
- Software Alarms UI
- Add Alarm Rule UI
- Schedules Configuration UI

Enabling or disabling an Alarm Rule

Enable an alarm rule to start monitoring the alarm conditions defined in the rule for the linked sources. Disable an alarm rule to stop monitoring the alarm conditions defined in the rule for the linked sources.

To enable or disable an Alarm Rule:

1. In Software Alarms, select the **Alarm Rules** tab.
2. In the Alarm Rules table, find the row of the Rule which you want to enable or disable , and then turn **Enabled** on or off in this row.

Related topics:

- Adding a new Alarm Rule
- Enabling or disabling an Alarm Rule
- Editing an Alarm Rule
- Duplicating an Alarm Rule
- Deleting an Alarm Rule
- Using the Setpoint Calculator
- Adding a Schedule
- Software Alarms configuration

For reference information see:

- Schedules
- Software Alarms UI
- Add Alarm Rule UI
- Schedules Configuration UI

Editing an Alarm Rule

Edit an existing Alarm Rule to add or remove sources and measurements, or to modify the Alarm Rule parameters such as Active and Inactive conditions.

To edit an Alarm Rule:

1. In Software Alarms, select the **Alarm Rules** tab.
2. In the Alarm Rules table, find the row of the Rule which you want to edit, and then click **Edit** in this row to open the Edit Alarm Rule window.

   TIP: You can also open the Edit Alarm Rule window by double-clicking the Alarm Rule in the table or through the **Edit** command in the right-click context menu.

3. In Edit Alarm Rule, select the tab that contains the settings you want to change.
4. Update the settings.
5. Click **Save**.

Related topics:

- Adding a new Alarm Rule
- Enabling or disabling an Alarm Rule
- Editing an Alarm Rule
- Duplicating an Alarm Rule
- Deleting an Alarm Rule
- Using the Setpoint Calculator
- Adding a Schedule
- Software Alarms configuration

For reference information see:

- Schedules
- Software Alarms UI
- Add Alarm Rule UI
- Schedules Configuration UI

Duplicating an Alarm Rule

Duplicate an existing Alarm Rule to save time when creating a new Rule that is similar to an existing Rule.

To duplicate an Alarm Rule:

1. In Software Alarms, select the **Alarm Rules** tab.
2. In the Alarm Rules table, find the row of the Rule which you want to duplicate, and then click **Duplicate** in this row to open the Edit Alarm Rule window.

   TIP: You can also duplicate an Alarm Rule through the **Duplicate** command in the right-click context menu.

3. In Edit Alarm Rule, review the Rule settings in the different tabs and update the settings for the duplicated Rule as needed.
4. Click **Save**.

Related topics:

- Adding a new Alarm Rule
- Enabling or disabling an Alarm Rule
- Editing an Alarm Rule
- Duplicating an Alarm Rule
- Deleting an Alarm Rule
- Using the Setpoint Calculator
- Adding a Schedule
- Software Alarms configuration

For reference information see:

- Schedules
- Software Alarms UI
- Add Alarm Rule UI
- Schedules Configuration UI

Deleting an Alarm Rule

Delete Alarm Rules that are no longer needed.

To delete an Alarm Rule:

1. In Software Alarms, select the **Alarm Rules** tab.
2. In the Alarm Rules table, find the row of the Rule which you want to delete, and then click **Delete** in this row. This opens the Delete Alarm Rule confirmation box.

   TIP: You can also delete an Alarm Rule through the **Delete** command in the right-click context menu.

3. Click **Delete**.

Related topics:

- Adding a new Alarm Rule
- Enabling or disabling an Alarm Rule
- Editing an Alarm Rule
- Duplicating an Alarm Rule
- Deleting an Alarm Rule
- Using the Setpoint Calculator
- Adding a Schedule
- Software Alarms configuration

For reference information see:

- Schedules
- Software Alarms UI
- Add Alarm Rule UI
- Schedules Configuration UI

Using the Setpoint Calculator

Use the Setpoint Calculator to calculate values for the `Active` and `Inactive` Alarm conditions.

1. Click Calculate Values in the Add Alarm Rule - Details window for a new Alarm Rule, or the Details tab in the Edit Alarm Rule window for an existing Alarm Rule. This opens Setpoint Calculator.
2. In Setpoint Calculator, enter a baseline value for the measurement you want to monitor in the **Baseline** entry field.

   For example, for an **Over Voltage** alarm, assume you enter a baseline value of `480`.
3. Enter a percentage value in the **On Setpoint** entry field to calculate when the alarm is set `ON`.

   Using the voltage baseline of `480`, if you enter a `105` as the percentage value for **On Setpoint**, the calculated value is `504`, which displays below the entry field.

   Initially, the **On Setpoint** and **Off Setpoint** entry fields are linked. That is, the value you enter in **On Setpoint** is automatically duplicated in the **Off Setpoint** entry field.
4. To set a different value for **Off Setpoint** , click the link button to disable the linking of the entry fields, and then enter a percentage value in the **Off Setpoint** entry field.

   The off setpoint value is calculated and displays below the entry field. For example, using the voltage baseline of `480`, if you enter `95` as the percentage value for **Off Setpoint**, the calculated value is `456`, which displays below the entry field.
5. Click **Apply** to add your setpoint values to the respective **Active Condition** and **Inactive Condition** fields, or click **Cancel** to discard your entries and to close the Setpoint Calculator.

Related topics:

- Adding a new Alarm Rule
- Enabling or disabling an Alarm Rule
- Editing an Alarm Rule
- Duplicating an Alarm Rule
- Deleting an Alarm Rule
- Using the Setpoint Calculator
- Adding a Schedule
- Software Alarms configuration

For reference information see:

- Schedules
- Software Alarms UI
- Add Alarm Rule UI
- Schedules Configuration UI

Adding a Schedule

Add a Schedule to be used for controlling when Alarm Rules are active and inactive. The new Schedule will be available in the **Select Alarm Schedule** selection box in the Add Alarm Rule - Schedule window for a new Alarm Rule, or the Schedule tab in the Edit Alarm Rule window for an existing Alarm Rule.

To add a Schedule:

1. Click **Add Schedule**.

   You can access this control in the:

   - Schedules tab of the main Software Alarms user interface
   - Add Alarm Rule - Schedule window (when adding a new Alarm Rule)
   - Edit Alarm Rule > Schedule tab (when editing an existing Alarm Rule)
2. Enter a Schedule Name.
3. Define the active and inactive days and times of the Schedule.
4. Click **Save**.

Related topics:

- Adding a new Alarm Rule
- Enabling or disabling an Alarm Rule
- Editing an Alarm Rule
- Duplicating an Alarm Rule
- Deleting an Alarm Rule
- Using the Setpoint Calculator
- Adding a Schedule
- Software Alarms configuration

For reference information see:

- Schedules
- Software Alarms UI
- Add Alarm Rule UI
- Schedules Configuration UI

Schedules

Use Schedules to control when an alarm rule is applied or not. Schedules are based on the time of day and the day of the week. For example, you can set up an Over Demand Alarm with certain threshold conditions for weekdays, and another Over Demand Alarm with different threshold conditions for weekends.

The following rules apply to schedules:

- Schedules are applied in the timezone of each source. If an alarm rule has sources from different timezones, then it is possible for a schedule to be active for some sources, and inactive for other sources at the same time.
- If an alarm is in the active state when a schedule transitions to inactive, then the alarm is deactivated.
- Real-time measurement alarms and communication status alarms are only evaluated when the schedule is active.
- Historical measurement alarms are only evaluated against data that was logged when the schedule was active.

  NOTE: A historical data log timestamp marks the end of the logging interval. For example, a data log with a 15 minute logging interval and timestamp of 17:00 represents data for the time interval of 16:45 - 17:00.

Related topics:

- Adding a new Alarm Rule
- Enabling or disabling an Alarm Rule
- Editing an Alarm Rule
- Duplicating an Alarm Rule
- Deleting an Alarm Rule
- Using the Setpoint Calculator
- Adding a Schedule
- Software Alarms configuration

For reference information see:

- Schedules
- Software Alarms UI
- Add Alarm Rule UI
- Schedules Configuration UI

System integration

This section provides information on how to integrate Power Monitoring Expert with other EcoStruxure™ systems.

Use the links in the following table to find the content you are looking for:

Topic	Content
Integration with PSO	References to Power SCADA Operation documentation with integration configuration information.
Integration with EBO	Detailed configuration information on the integration of PME with EcoStruxure Building Operation.

Integration with EcoStruxure™ Power SCADA Operation

The goal of this integration is to combine the PME Reports and Dashboards features with the Power SCADA Operation SCADA functionality. In the integrated system, Power SCADA Operation shows PME reports and dashboards embedded in the Power SCADA Operation user interfaces for a seamless user experience.

For configuration information on this integration see the *Power SCADA Operation System Guide*.

Integration with EcoStruxure Building Operation - Configuring

Configuring the PME/EBO Integration solution includes the following steps:

1. Configuring server settings
2. Configuring communications
3. Configuring PME Web Applications
4. Integrating PME Web applications in Building Operation
5. Setting up Graphics in Building Operation
6. Configuring Dashboards and Slideshows

NOTE: These steps are required for both solution architectures, unless specifically called out in the workflow steps.

See the following sections for details.

1. Configuring server settings

PME server

Install a security certificate for TLS 1.2

PME uses Transport Layer Security (TLS) 1.2 for an encrypted, authenticated connection using HTTPS between the server and the Web clients.

A security certificate must be installed on the PME server and must be bound to the Default Web Site, which is used by PME. By default, if no bound certificate is detected, PME is installed with a self-signed certificate.

RECOMMENDATION: We strongly recommend that you replace the self-signed certificate with an authority issued certificate.

Set SQL Server memory options

Set the SQL Server memory options to optimize system performance.

NOTE: Setting the SQL Server memory options applies only to full, standard editions of SQL Server. It does not apply to SQL Server Express editions.

See Setting SQL Server memory options for details.

See After installing the software for additional recommended post-installation configuration steps.

Building Operation server

Add PME server as Trusted site in Internet Options

Building Operation and PME can be installed on the same server (operating system) or on two separate servers.

When installing on separate servers, you must configure Internet Explorer on the Building Operation computer to add the PME server URL as a Trusted site.

To add the PME server URL as a Trusted site:

1. Open Internet Explorer and navigate to **Tools > Internet Options**, then click **Security**.
2. Select **Local intranet**, and then click **Sites**. The Local intranet dialog appears.
3. (For IE 11) In Local intranet, click **Advanced**.
4. In the **Add this website to the zone** field, enter your PME server site address, and then click **Add**. Your PME server site is now added as a Local intranet site zone.
5. Click **OK**. Your system can now authenticate your Power Monitoring Expert server.

2. Configuring Communications

The configuration of the software and device communications is dependent on the solution architecture. The following describes the configuration required for Architecture 1 and 2.

⚠ WARNING

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

Architecture 1

Configuring communications for Architecture 1 includes the following steps:

1. Adding devices to Building Operation
2. Configuring EWS settings in Building Operation
3. Configuring the ETL

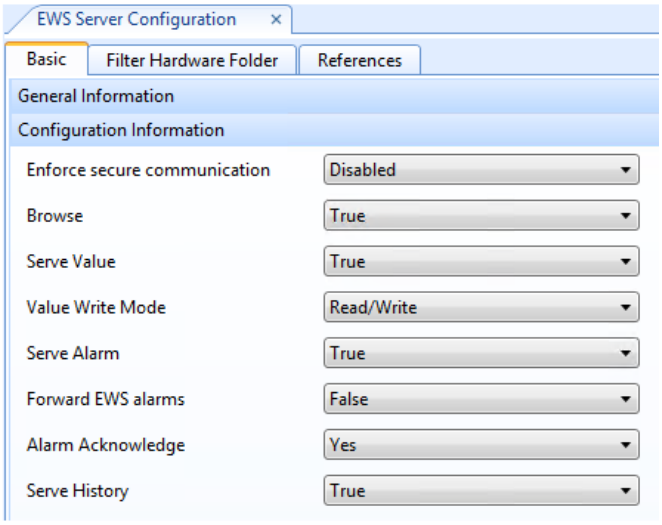
See the following sections for details.

Adding devices to Building Operation

Add the power devices to Building Operation. For information on how to add devices to Building Operation, see the *EcoStruxure Building Operation Technical Reference Guide*.

Configuring EWS settings in Building Operation

In Building Operation Workstation, navigate to `<Your server name>\System\EcoStruxure Web Services` and check to see that the EWS Server settings match the following:



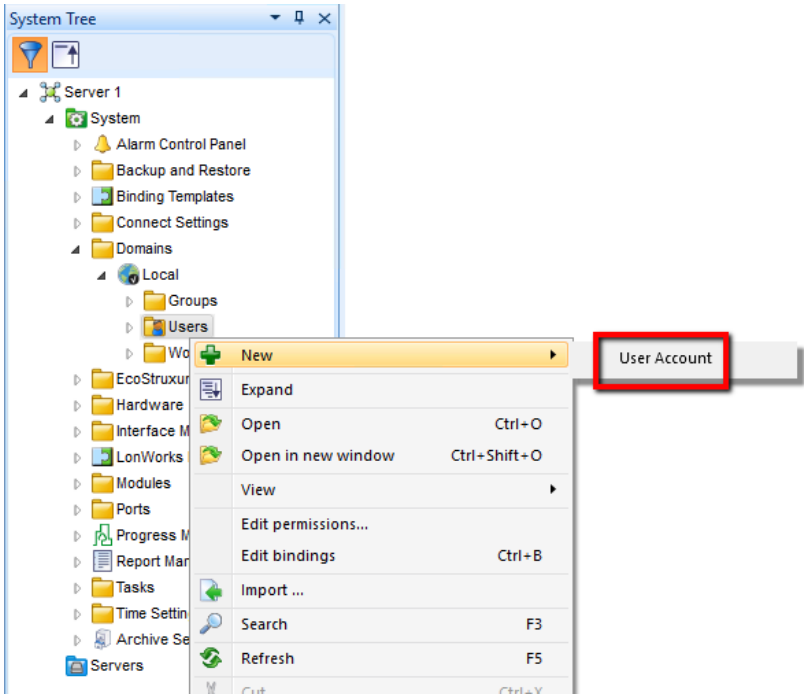
Confirm that:

- **Enable EWS Server** is set to "True"
- **Ensure secure communication** is set to “Disabled”
- **Server Value** is set to “True.”

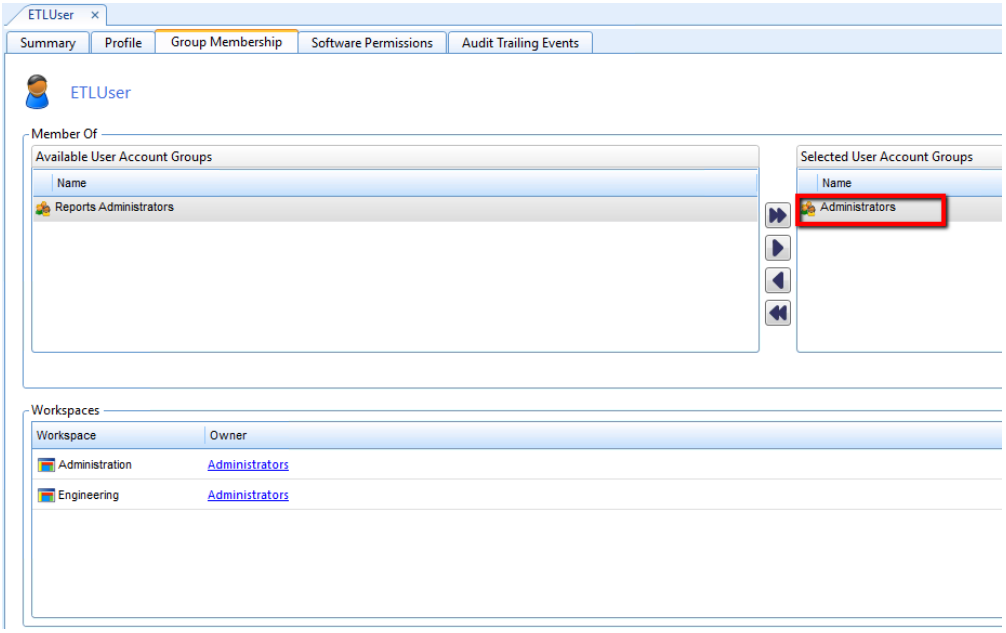
We recommended you setup a dedicated **ETLUser** account for EWS in Building Operation.

To create an account:

1. Navigate to `<Your Server name>\System\Domains\Local\Users\` and click **New > User Account**.



2. Make sure ETLUser is a member of “Administrators” account group:



Configuring the ETL

The ETL tool connects to the Building Operation EWS server, reads out the required historical data (Trend logs), and inserts that data into the PME database. Within the ETL, the task descriptions required to complete the data copy process are organized into Jobs.

An ETL Job contains the following:

- An Extract task to read out the data from a server (in this case, Building Operation)
- (Optional) A Transform task to edit the data
- A Load task to write the data to the new location (in this case, the PME database).

TIP: When creating a new job in ETL, you can clone an existing job, rather than making a job from scratch. To clone a job, select an existing job from the Job Management drop down and click **Edit**. In the Job tab, change the name to reflect the new job. Click the **Task** tab and edit the new job as necessary. Click **Apply** or **OK** from any tab location to save the job with the new name.

The following sections describe how to configure an ETL Job for the PME/EBO Integration solution, Architecture 1 implementation.

Prerequisites

Before configuring the ETL, confirm that:

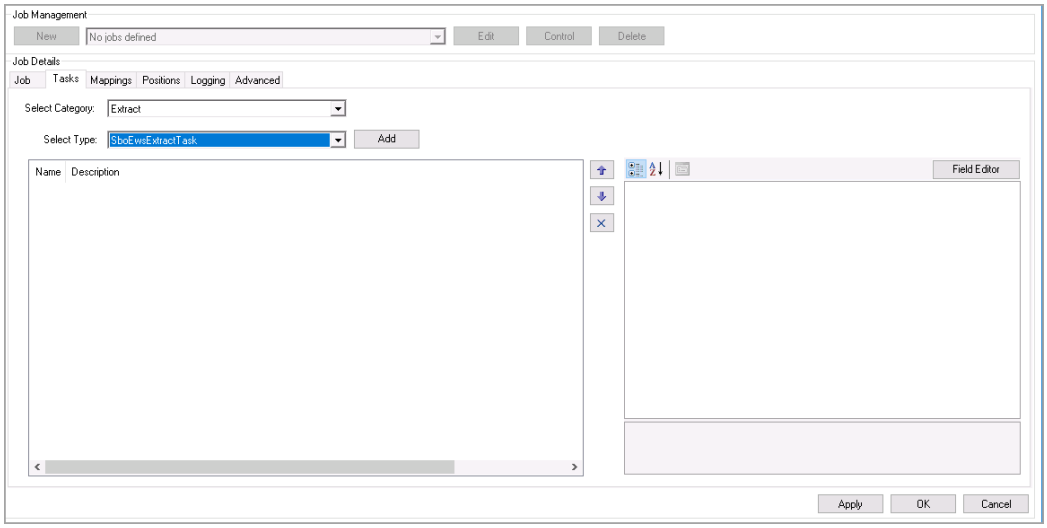
- Building Operation is installed and configured.
- Trend logs and Extended Trend logs are setup and ready to use in Building Operation. For information regarding Trend logs, refer to the "Trend log" section in the *EcoStruxure Building Operation System Reference Guide*
- PME is installed and configured

- The EWS server in Building Operation is functioning correctly.
- ETL is installed correctly

Creating an ETL job

To create an ETL job:

1. On your desktop, double-click the shortcut EcoStruxure ETL (Building Operation to PME) - ETL Administration Tool. The ETL Engine Job Configuration Tool dialog appears.
2. Click **New**. The Job tab appears.
3. Enter the name of the job in the Name field. If you are running the job as a service, review and change the **Sleep Time Between Execution** value, if necessary. This value determines the length of time between jobs when a job is run as a service. The default value is 3600 seconds.
4. Click the **Tasks** tab. The Tasks pane appears.

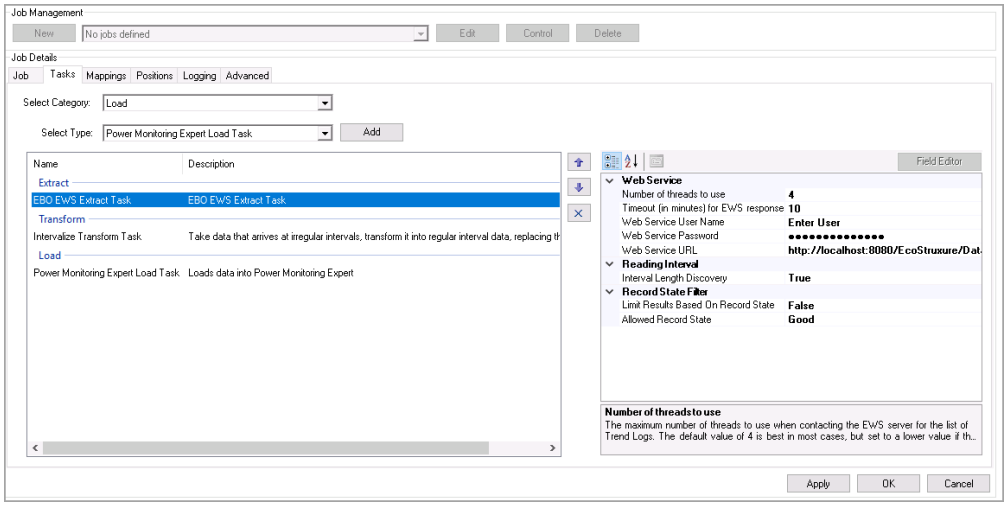


TIP: See ETL tips and tricks for information such as batch edits, sorting and searching data grids, running a job manually or as a service, editing job tasks.

Adding and configuring the Extract task

To add and configure the Extract task:

1. From the **Select Category** drop-down, select **Extract**.
2. From the **Select Type** drop-down, select **EBO EWS Extract Task**, and then click **Add**. The EBO EWS Extract Task appears in the pane below.

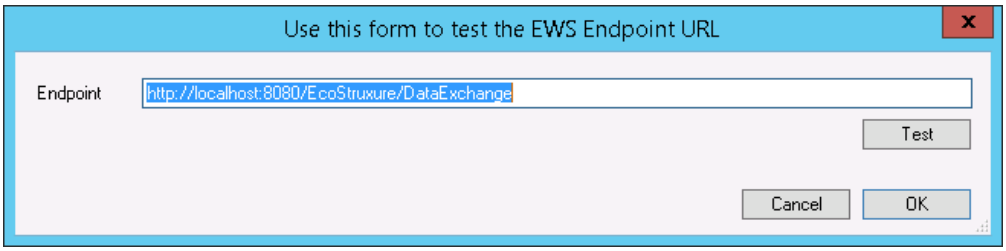


3. Select the task to show the task settings in the right pane.
4. Complete all fields as necessary for the task. Complete at least the following fields:
   - **Web Service User Name** – The Building Operation EWS user name (for example: admin)
   - **Web Service Password** – The Building Operation EWS password
   - **Web Service URL** – Replace localhost:8080 with your <server name>:<http port number>

NOTE: The ETL does not support secure HTTP (HTTPS) URLs. Do not use HTTPS URLs with the Building Operation EWS server.

NOTE: The ETL does not support the SHA-256 Cryptographic Hash Algorithm for authentication. You must enable the MD5 Cryptographic Hash Algorithm for authentication in Building Operation for the PME/EBO Integration solution. The option can be found in **WorkStation Control Panel > Security Settings > Disable MD5 Hash**.

To test your EWS connection, click the Web Service URL row to display an ellipsis button. Click the ellipsis button. Enter your Web Service URL and then click **Test**.



Refer to Extract task: Setting parameters and recommended values in the Reference section to see a complete list of parameters and recommended values for each setting.

(Optional) Adding and configuring the Transform task

A Transform task is not required for the PME/EBO Integration solution. However, it is possible to improve the data quality for the display in PME Dashboards and Reports by correcting irregular timestamps for interval logged data. The **IntervalizeDataTransformTask** task in the ETL can be used for this purpose. It is designed to adjust the log timestamps to a pre-defined interval.

Below is an example of a 15-minute interval data log with irregular timestamps, before and after the transform:

Before Transforming		After Transforming (15 min. interval)	
Value	**Timestamp**	**Value**	**Timestamp**
1.23	23:58:12	1.23	00:00:00
2.34	00:07:11	n/a	n/a
3.45	00:13:13	3.45	00:15:00
4.56	00:31:14	3.45	00:30:00
5.67	00:43:17	5.67	00:45:00

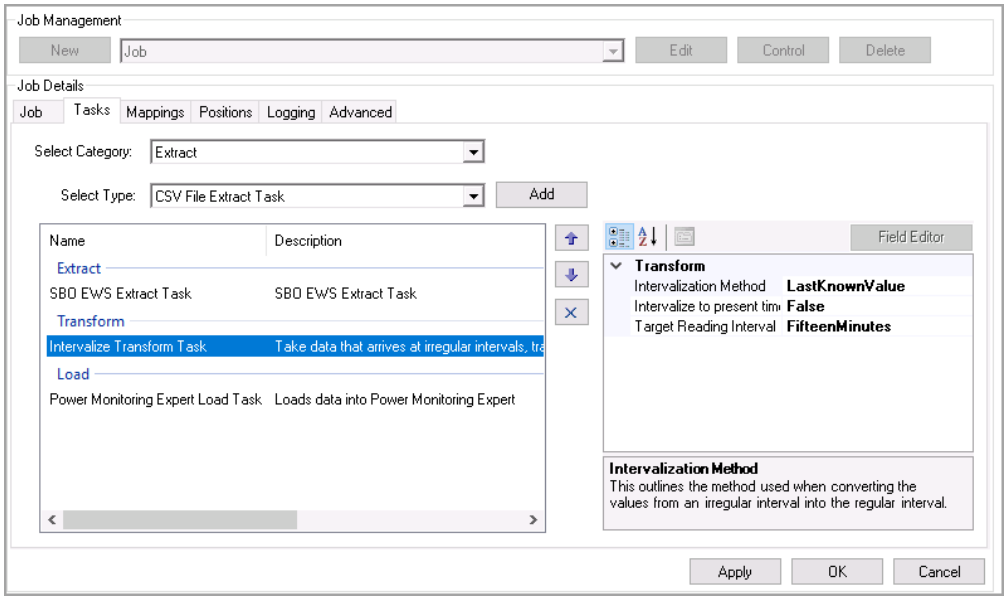
NOTE: The transform only corrects the timestamps, not the logged data values for the intervals. This can introduce inaccuracies in the logged data.

DO NOT use this transform task,

- for Change of Value (COV) data logs
- when timestamp consistency between the data in Building Operation and PME is important

To add and configure the Intervalize Data Transform task:

1. From the **Select Category** drop-down, select **Transform**.
2. from the **Select Type** drop-down, select **IntervalizeDataTransformTask** and then click **Add**. The Intervalize Transform Task appears in the pane below.



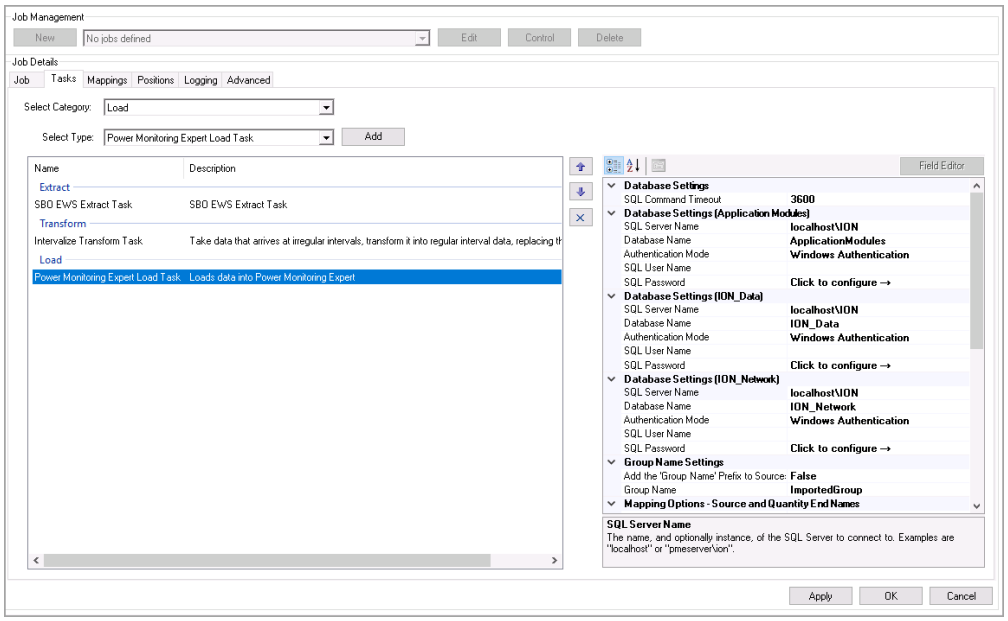
3. Select the task to show the task settings in the right pane.
4. Complete all fields as necessary for the task. Complete at least the following field:
   - **Target Reading Interval** – Set this value to your Trend log logging interval (default is fifteen minutes).

Refer to Transform task: Setting parameters and recommended values in the Reference section to see a complete list of parameters and recommended values for each setting.

Adding and configuring the Load task

To add and configure the Load task:

1. From the Select Category drop down, select Load .
2. Select Power Monitoring Expert Load Task from the Select Type drop-down menu, and then click Add. The Power Monitoring Expert Load Task appears in the pane below.



3. Select the task to show the task settings in the right pane.
4. Complete all fields as necessary for the task. Complete at least the following fields:
   - **Database Settings** – Make sure all 3 database settings are correct.
   - **Enable Recorder and Channel Creation** – Set this value to True.

   NOTE: If you plan to use the Energy Cost Report or Load Profile Report, review the **Enable Recorder and Channel Creation** setting in Load task: Setting parameters and recommended values.

5. After you finish configuring all necessary tasks, click Apply to save your changes without exiting the job, or click OK to save and exit the job.

Refer to Load task: Setting parameters and recommended values in the Reference section to see a complete list of parameters and recommended values for each setting.

Mapping Building Operation tags to PME measurements

Building Operation is a tag-based system, while PME is a Device/Measurement-based system. Therefore, you must use the Mappings tab to manually map the tags to the corresponding Device/Measurements.

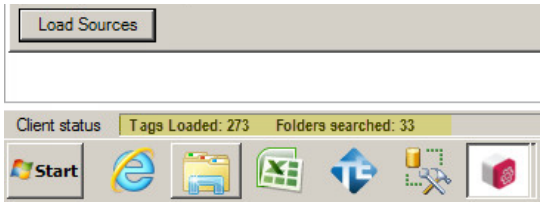
TIP: See ETL tips and tricks for information such as batch edits, sorting and searching data grids, running a job manually or as a service, editing job tasks.

To map tags to measurements:

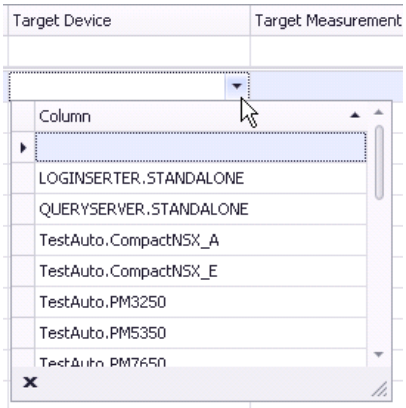
1. In the ETL tool, select the job you created for the PME/EBO Integration solution.
2. Click the **Mappings** tab. The Mappings dialog appears.
3. Click **Load Sources**. Trend logs from Building Operation load and appear in the Mappings pane.

   Depending on the size and the design of your system, the Trend logs may take some time (up to 30 minutes) to load.

   After you click Load Sources, the Client status details appear at the lower left of the dialog and show the number of tags loaded and folders searched.

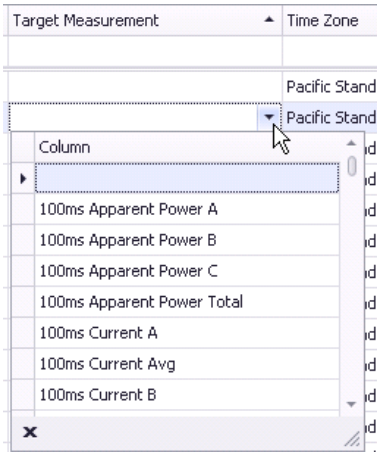


4. Once loaded, identify the rows containing the Trend logs that you want to import into PME.
5. For each row, do the following:
   - Complete the Target Device field by selecting an existing device from the drop-down list, or by entering a new name for a device.



> **NOTE**:
> If you create a new device, your new device name must match the PME naming convention. The following limitations apply:
> - Names cannot contain spaces or the following characters: \ / : * ? " < > { } . , ' & @ | % #
> - Do not use names such as CON, AUX, COM1, and LPT1 when naming sites and devices.

   - Complete the **Target Measurement** field by selecting an existing measurement from the drop-down list.



Refer to Measurement mapping for ETL in the Reference section to learn about the most common, supported measurements used in PME and how to link to typical Building Management tags.

- Select the **Time Zone** from the dropdown list.
- Change the value for the scale, if necessary.
- Select the checkbox in the **Included** column at the left to include the Trend log in this job.

6. After you have mapped all desired Trend logs, click **Apply** to save the job.

Troubleshooting missing Trend logs

All Building Operation Trend logs should appear in the Trend log list. If Trend logs do not appear, check the following:

- Missing bindings: Values that have not been bound to the graphics.
- Trend log status is not Started: If the Trend log status is not “Started” in Building Operation through the EWS server, the Trend logs will not be exposed in the ETL tool, and therefore, those Trend logs will not be returned or displayed in the ETL tool. All Trend logs should be exposed in the ETL tool and appear in the Mappings tab when you click Load Sources. Before you run an ETL job, in Building Operation, check to make sure that the Trend log status is set to “Started”;
- Meters/servers offline: The Trend logs are connected to devices or servers that are offline.
- Extended Trend log link not broken: Trend logs that are being monitored by Extended Trend logs where the connection is not broken.

Architecture 2

Configuring communications for Architecture 2 includes the following steps:

1. Adding devices to PME
2. Updating the PME EWS server

See the following sections for details.

Adding devices to PME

NOTE: Device licenses are required for all devices connected to PME. The PME trial license, that is part of the PME/EBO Integration solution, includes an unlimited device license for the first 90 days. You must activate valid purchased licenses within 90 days, otherwise some software functionality is disabled.

NOTICE

LOSS OF COMMUNICATION

- Activate product and component licenses prior to the expiry of the trial license.
- Activate sufficient licenses for the servers and devices in your system.

Failure to follow these instructions can result in loss of data.

Use Management Console in PME to add, remove or configure system components, such as Ethernet or serial metering devices, in your system.

NOTE: Run Management Console as Administrator user. To do this, right-click the Management Console program icon and select **Run as administrator** from the context menu. If you do not run it as Administrator, then certain tools such as **Update EWS Server** are not functional.

NOTE: Access to this application or function is controlled by user privileges. See Default User Access Level Privileges and Customizing Access Level Privileges for details.

NOTICE

NETWORK INOPERABILITY

Do not make unauthorized changes in the network configuration.

Failure to follow these instructions can result in an unstable or unusable network.

See Setting up your network in Management Console or Device Manager for details on how to add devices.

Updating the EWS Server

After adding the devices or making any changes to the device configuration in the PME, you must update the EWS server through the **Update EWS Server** tool in the Management Console.

NOTE: Run Management Console as Administrator user. To do this, right-click the Management Console program icon and select **Run as administrator** from the context menu. If you do not run it as Administrator, then certain tools such as **Update EWS Server** are not functional.

To update EWS Server:

1. Open Management Console.
2. Select **Tools > System > Update EWS Server**. A dialog box appears indicating that the update to the EWS server configuration was successful.
3. Click **OK** when the Update EWS Server confirmation dialog appears.

3. Configuring PME Web Applications

Configuring the PME Web applications may include the following settings and tools:

- Personal Preferences
- Report Theme
- System Language
- System Theme
- Diagnostics and Services
- Registration
- Diagrams Control Options
- Login Options
- Security Options
- Session Timeout
- Authorized Hosts
- Billing Rates
- Devices
- Hierarchies
- Modeling
- System Users

See Web Applications settings for details.

4. Integrating PME Web applications in Building Operation

Integrating PME Web applications in Building Operation includes the following steps:

- Configuring Diagrams, Reports, Dashboards, and EWS integration options with the Integration Utility
- Generating the configuration import file for Building Operation
- Importing the configuration file into Building Operation
- Setting up EWS credentials in PME (server) and Building Operation (client)
- Enabling embedded content in PME and Building Operation

See the following sections for details.

Prerequisites

Before using the PME/EBO Integration Utility, complete the following tasks:

- Install and configure PME.
- Install and configure Building Operation.
- (Only for Architecture 2 solutions) Add devices to PME.
- (Only for Architecture 2 solutions) Update the EWS Server.
- (Optional) Configure PME and Building Operation to use Windows Active Directory users and user groups.
- (Optional) Install and configure an authority issued security certificate on the PME server.

Configuring Diagrams, Reports, Dashboards, and EWS integration options

You use the Integration Utility, on the PME server, to configure Diagrams, Reports, Dashboards, and EWS integration options for integration into Building Operation. As a result of the configuration, the utility creates a configuration file, that is then imported into Building Operation.

NOTE: The Integration Utility is part of the PME/EBO Integration Toolkit. You need to run this utility on the PME computer. If Building Operation and PME are installed on separate computers, then copy or download the Toolkit to the PME computer and extract its contents. See 1. Downloading the PME/EBO Integration Toolkit for more information.

To configure Diagrams, Reports, Dashboards, and EWS integration options:

1. Navigate to the Integration Utility folder where you extracted the PME/EBO Integration Toolkit files.
2. Run the **IntegrationUtility** application.
3. Login to the utility with a supervisor-level account. The Integration Utility dialog appears.
4. Select and configure the options in each tab. See below for details on the tab options.
5. Click **Export**, after you have completed all applicable tabs, to start the process of generating the configuration file for Building Operation.
6. Continue with Generating the configuration import file for Building Operation for details on how to generate the file.

⚠ WARNING

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

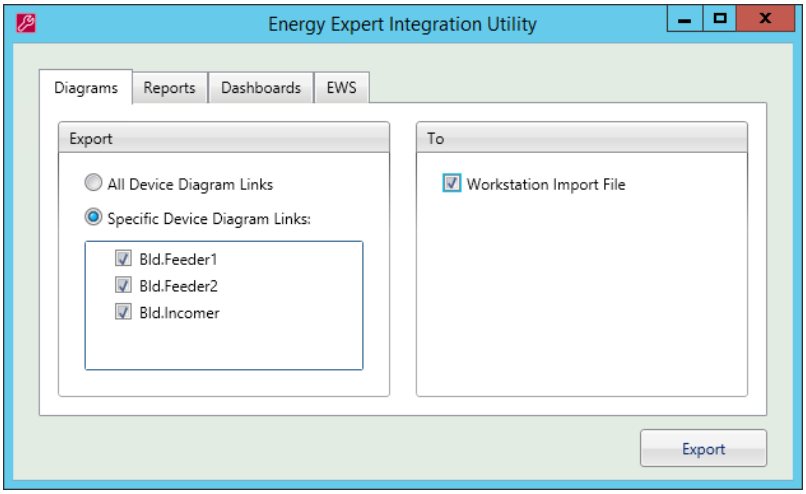
Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

NOTE: The PME/EBO Integration is also known as Energy Expert. Both names refer to the same solution.

Tab option details:

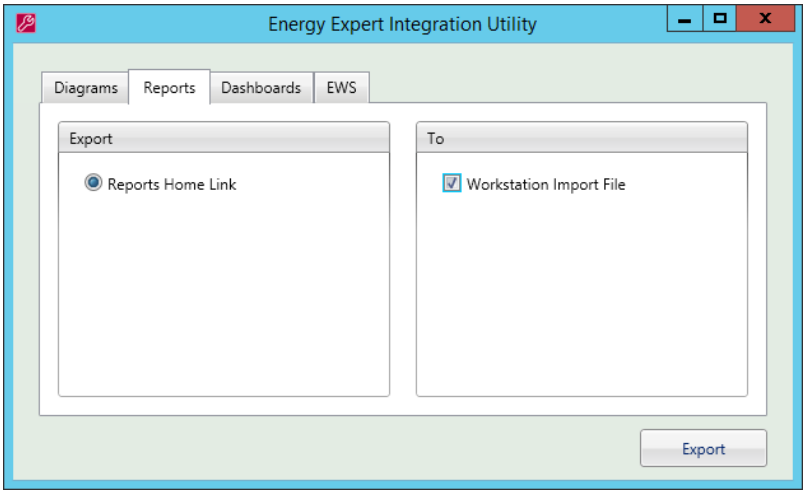
Diagrams tab (only for Architecture 2 solutions)

1. From the Export pane, select one of the following options:
   - **All Device Diagram Links** - This creates device diagram links for every device in the system.
   - **Specific Device Diagram Links** - Allows you to select from the list all devices that you want to include in the import file.
2. From the To pane, select the **Workstation Import File** option.



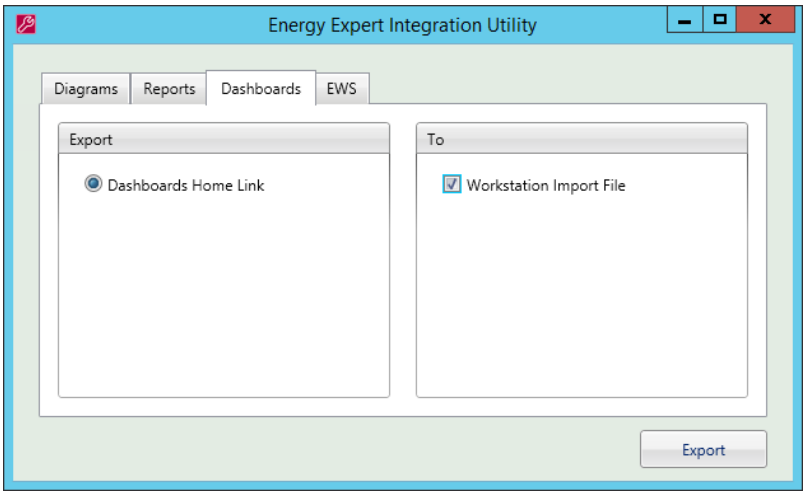
Reports tab

1. From the To pane, select the **Workstation Import File** option.



Dashboards tab

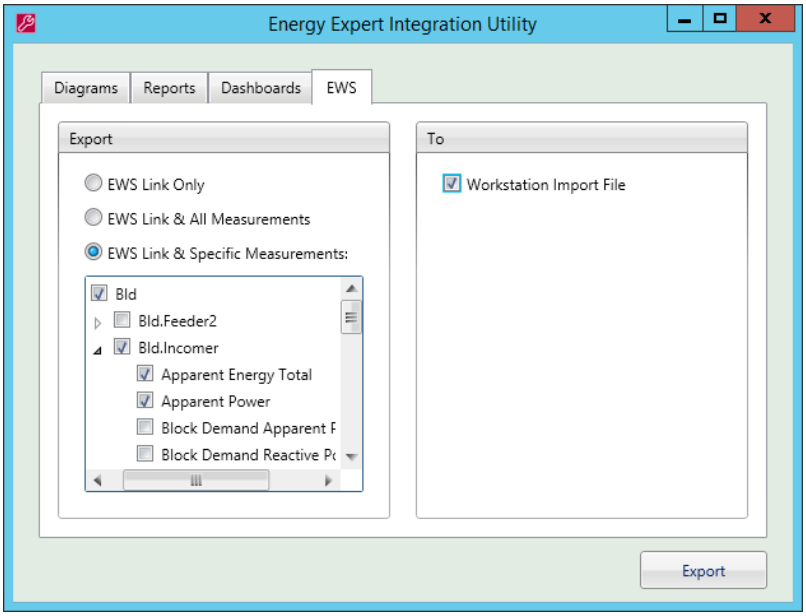
1. From the To pane, select the **Workstation Import File** option.



EWS tab (only for Architecture 2 solutions)

1. Click the **EWS** tab. Allow time for this screen to load.
2. From the Export pane, select one of the following options:
   - **EWS Link Only** – This creates the EWS Interface in Building Operation without any pre-hosted Sources or measurements coming from PME. Sources and Measurements need to be hosted manually by the user. This manual process can take a long time when hosting large number of Source Measurement pairs.
   - **EWS Link & All Measurements** – (Use this option if you are not sure what to select) – This creates the EWS Interface in Building Operation and also pre-hosts all PME Sources with all their respective exposed Measurements. Exposed measurement can be changed at a later point, see Hosting EWS values in Building Operation for details.
   - **EWS Link & Specific Measurements** – Allows you to define what Source and what Measurement will be pre-hosted in the EWS Interface created in Building Operation.

3. (If you selected EWS Link & Specific Measurements) Select the sources and measurements to be exposed through EWS.
4. From the To pane, select the **Workstation Import File** option.



Generating the configuration import file for Building Operation

After configuring Diagrams, Reports, Dashboards, and EWS integration options, the next step is to generate the configuration file for Building Operation. The workflow below is a continuation of the Configuring Diagrams, Reports, Dashboards, and EWS integration options step described in the previous section.

To create the import file:

1. In the PME/EBO Integration Utility dialog, click **Export**. This opens the Authentication Method dialog.
2. In Authentication Method, select the authentication method you want to use for accessing PME content in Building Operation. The following options are available:

NOTICE
UNAUTHORIZED OR UNINTENDED ACCESS TO CUSTOMER DATA • Personnel setting up the PME/EBO Integration third-party authentication must be aware that links to data are not secure. • Do not setup access links to sensitive or secure data. **Failure to follow these instructions can result in unauthorized or unintended access to sensitive or secure customer data.**

   - **Manual PME Authentication** – Prompts the user for PME credentials when a hyperlink to a PME web application is opened. The user is only prompted for PME credentials the first time they open a link during a Building Operation session.

- **Automatic PME Authentication** (less secure) – Creates unique hyperlinks to PME web applications with embedded, encrypted PME credentials. The links open without prompting the user for credentials. This method provides a seamless user experience within Building Operation, but it is less secure than the Manual PME Authentication method because the hyperlinks could be captured and used to access PME applications from any computer that has access to the PME server.
- **Windows Authentication** (more secure) – Logs the user into PME using their current Windows credentials. This method provides a seamless user experience with Building Operation and is more secure.

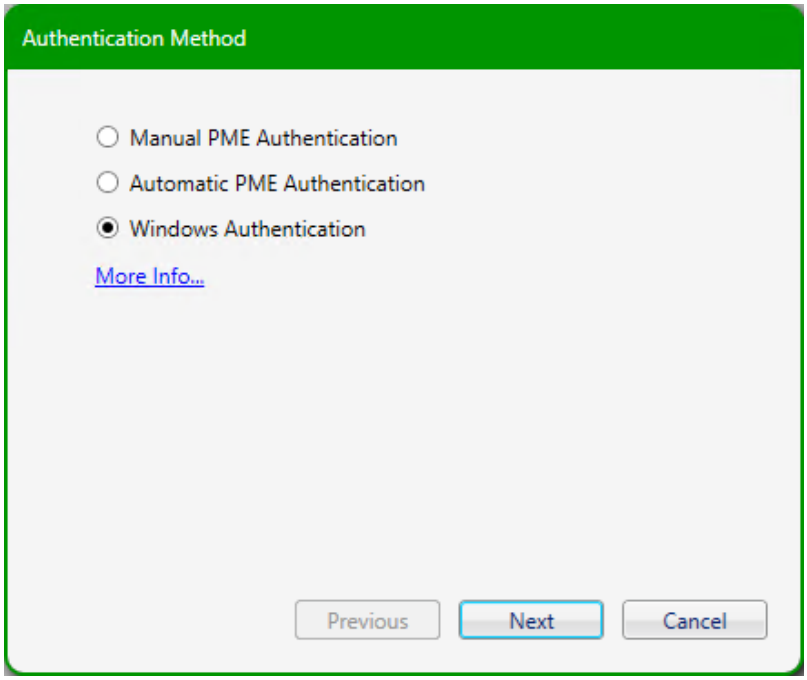
  RECOMMENDATION: Use Windows Authentication whenever possible.

  To use Windows Authentication:

  - Configure Building Operation and PME to use Windows Active Directory users and user groups.
  - Add the Windows account that is used for Windows Authentication to PME as a Windows user with Operator access level or higher.
  - Enable One-Click Login in PME. See Login Options for details.

  For information on setting up user authentication with Windows Active Directory in PME, see Adding a Windows user and Adding a Windows group.

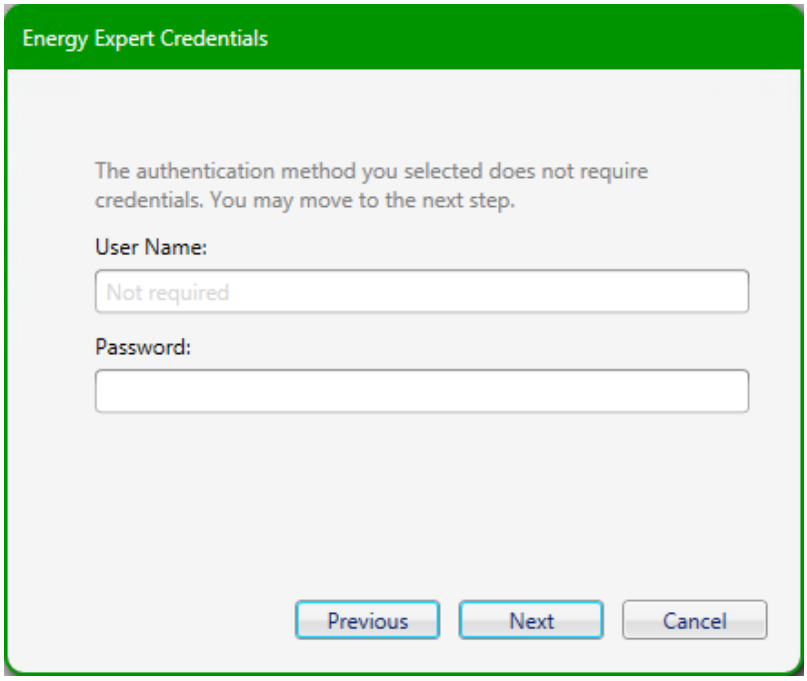
  For information on Building Operation and Active Directory, see Setting Up User Authentication with Windows Active Directory in Building Operation.



3. Click **Next**. This opens the PME/EBO Integration Credentials dialog.
4. In PME/EBO Integration Credentials:
   - If you selected **Manual PME Authentication** or **Windows Authentication** in the previous step, leave the **User Name** and **Password** boxes empty and continue with step

5.

- If you selected **Automatic PME Authentication** in the previous step, then enter a **User Name** and **Password** for a PME user account with operator access level. These credentials will be encrypted and embedded in the hyperlinks.



5. Click **Next**. This opens the Transport Method dialog
6. In Transport Method, configure the following fields:
   - **PME Server Name** - Enter the name of the PME server. If you are using HTTPS to connect to PME, then this server name must exactly match the name in the security certificate used for the PME server.

     NOTE: A name resolution mechanism for the server name must be in place for both the PME and Building Operation servers. If that is not possible, then you must add the necessary entries to the host files on both servers.

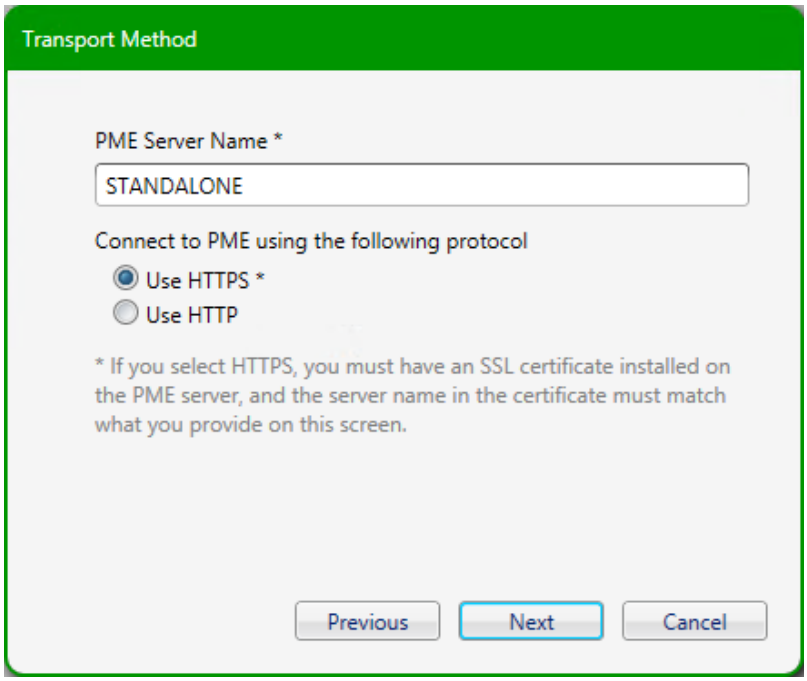
   - **Use HTTPS** (more secure) – This protocol provides data encryption and identification of the website and Web server it is connecting to.

     NOTE: You must have a security certificate installed on the PME server, and the server name in the certificate must match the name in the PME Server Name field of this dialog.

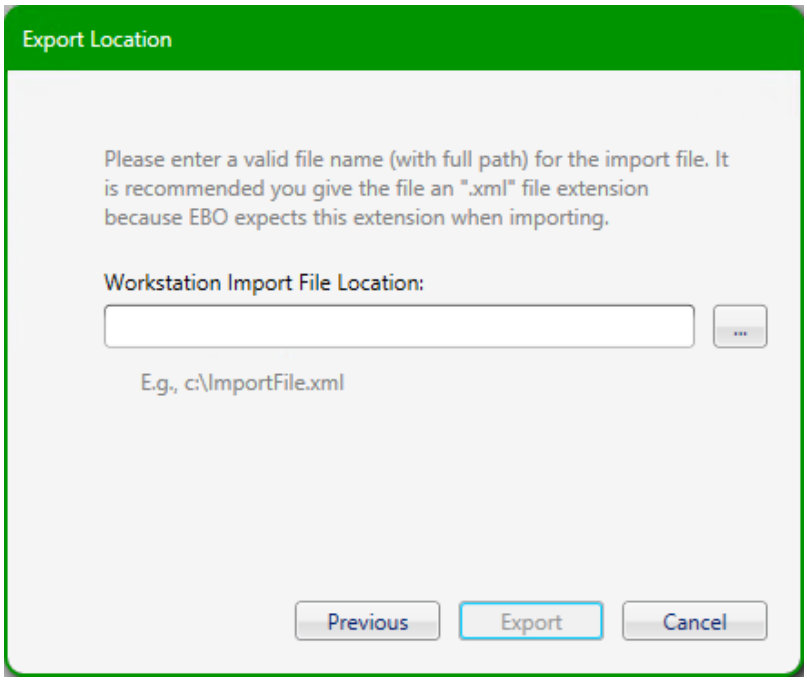
     NOTE: When using HTTPS, enter the fully-qualified domain name of the PME server in the **PME Server Name** box. A fully qualified domain name includes the host name and the domain name, for example `ServerName.MyDomain.org`.

     NOTE: By default, the EWS server in PME is configured for HTTP client connections. Follow the steps in Configuring the PME EWS server for HTTPS to enable HTTPS client connections.

– **Use HTTP** (less secure) – This protocol does NOT provide data encryption or identification of the website and Web server it is connecting to.



7. Click **Next**.
8. In the Export Location dialog, click ... to navigate to your export location. Enter a file name, and then click **Save**.



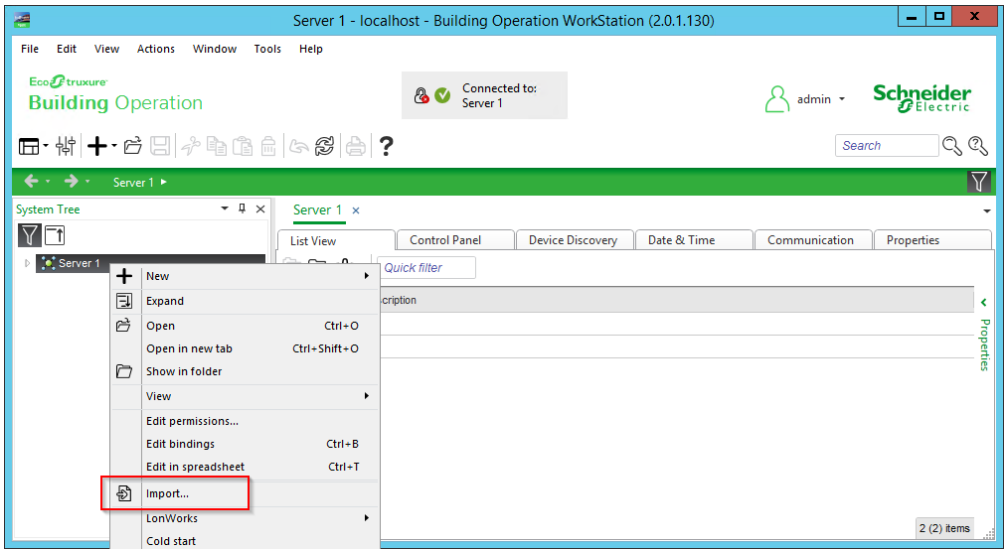
9. Click **Export**. The Integration Utility exports the configuration import file in `.xml` format.

Importing the configuration file into Building Operation

The configuration file, that was created in the previous step, needs to be imported into Building Operation. To prepare for the import, copy the file to a location that is accessible from the Building Operation server.

To import the configuration file into Building Operation:

1. Open Building Operation and log into WorkStation.
2. Right-click the Enterprise server (the highest level in the System Tree) and select **Import...**.



3. Navigate to and select the configuration file.
4. Click **Import**. The file import process completes. A new folder called “PME/EBO Integration” appears in the System Tree.

NOTE: You can run the Integration Utility more than once. However, importing the configuration file multiple times without deleting the previously imported folder will create a duplicate entry in the target Building Operation system.

Setting up EWS credentials in PME (server) and Building Operation (client)

EWS credentials must be set for both the PME EWS server and the Building Operation EWS client.

To set the credentials for the PME EWS server:

1. Open PME Web Applications and select **SETTINGS** > **Integrations** > **EWS Login**.

   NOTE: EWS must be enabled in PME for this setting to be visible.

   TIP: Access Web Applications through the **Web Applications** shortcut in the Power Monitoring Expert desktop folder on the PME server. Or, to go directly to the EWS configuration page, open the following URL: `https://<server_name>/Web/#Settings/Ews`

2. Click **Change Credentials** or **Set Credentials**, if this is the first time the account is configured and enter a **User name** and **Password**.

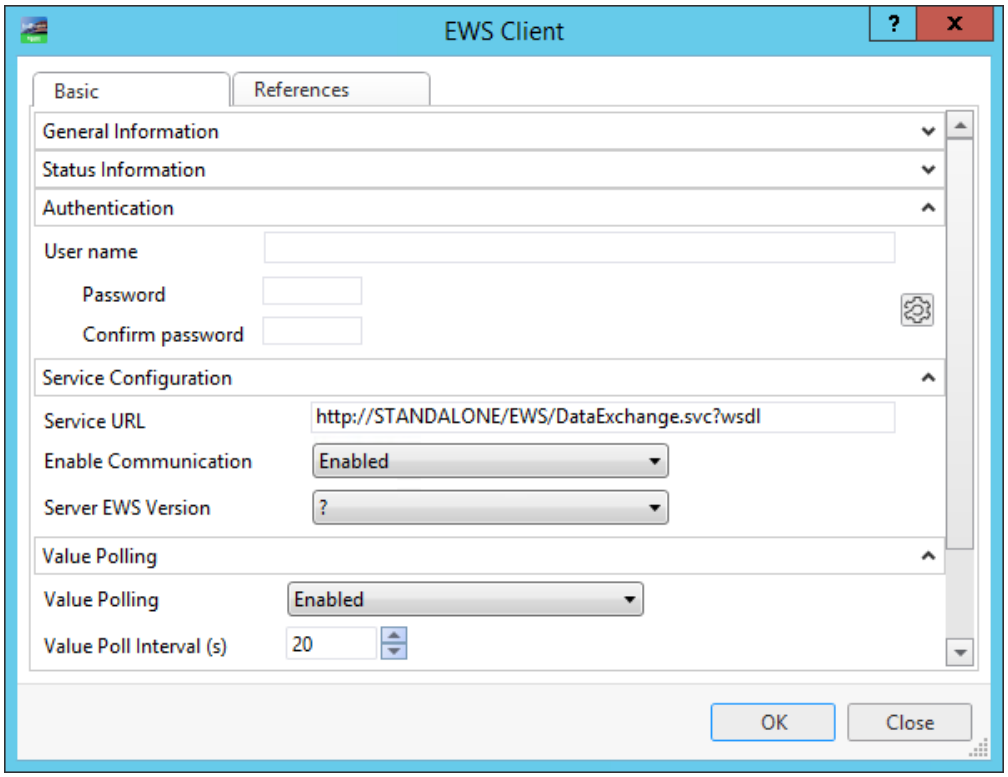
> **⚠ WARNING**
>
> **POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY**
>
> Use cybersecurity best practices for password creation and management.
>
> **Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.**

Cybersecurity policies that govern user accounts and access - such as least privilege, separation of duties - vary from site to site. Work with the facility IT System Administrator to ensure that user access adheres to the site-specific cybersecurity policies.

3. Click **Save**.

To set the credentials for the Building Operation EWS client:

1. In WorkStation, open the PME/EBO Integration folder.
2. Right-click the EWS Client and click **Properties**.



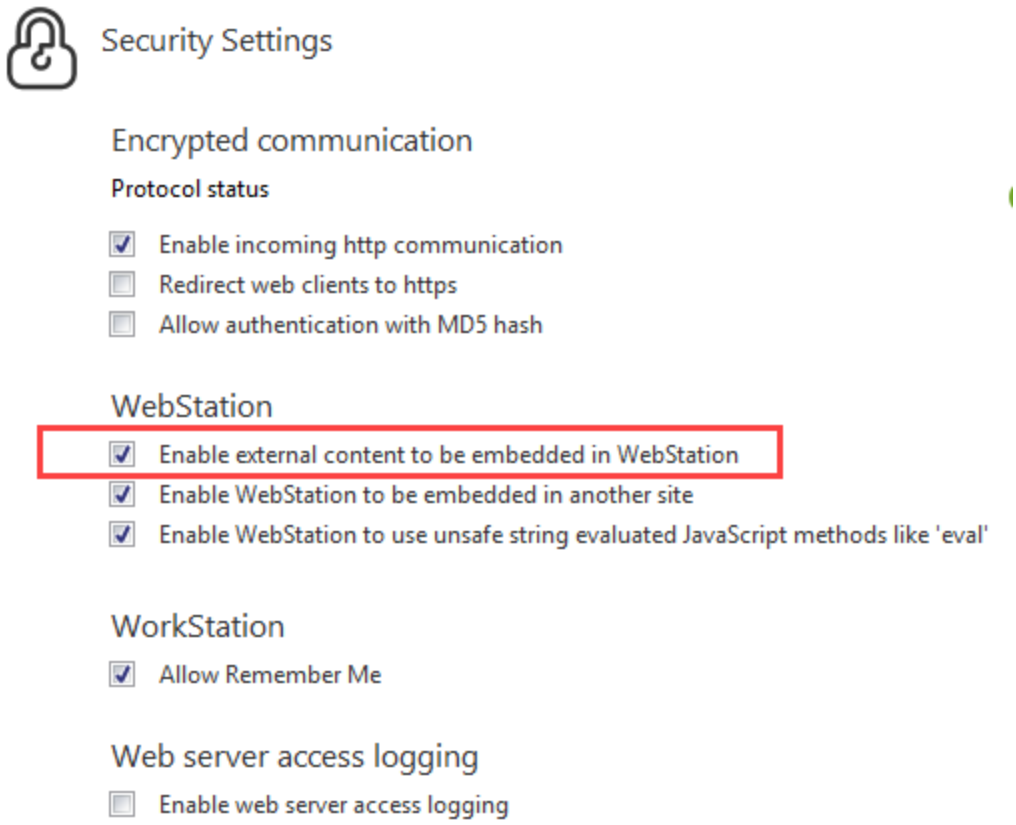
3. Enter the **user name** and **password** in the Authentication field.
4. Click **OK**.

Enabling embedded content in PME and Building Operation

PME does not allow other applications to embed its Web Applications content by default. Building Operation does not allow external web content from another application to be embedded in its UI by default. For the Energy Expert integration, both of these must be enabled.

To allow Building Operation to receive and embed web content from PME:

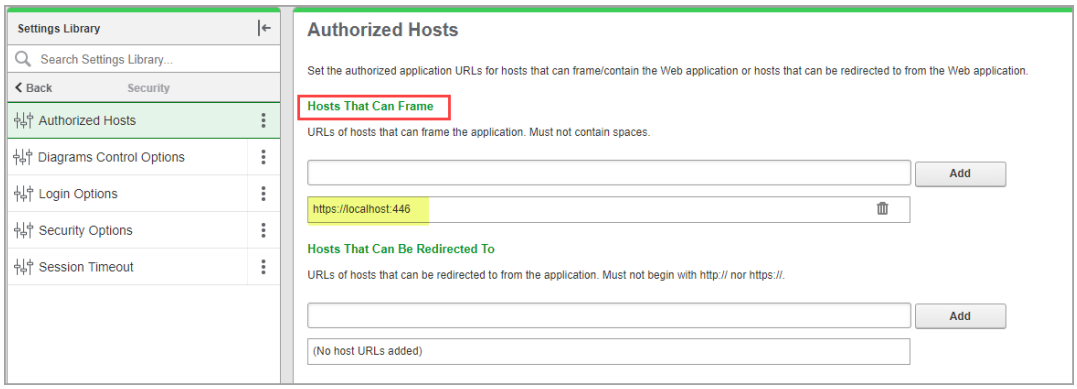
1. Log into Building Operation Workstation and select **Tools** > **Control Panel** > **Security and Communication** > **Security Settings**.
2. In Security Settings, under WebStation, select **Enable external content to be embedded in WebStation**.



To allow PME Web Applications to be embedded in Building Operation:

1. Open PME Web Applications and select **SETTINGS** > **Security** > **Authorized Hosts**.
2. Add the Building Operation server URL to the **Hosts That Can Frame** list.

   Below is an example for a Building Operation server host URL of `https://localhost:446`



3. Click **Save**.
4. Reset Internet Information Services (IIS) on the PME server.

5. Setting up Graphics in Building Operation

Building Operation Components and Snippets

The Integration Toolkit includes components and snippets for the creation of Graphics in Building Operation.

NOTE: These components and snippets were installed on the Building Operation server in a previous step. See 3. Installing the components, snippets, and binding template for details.

Components

Animated Components for ANSI and IEC

The Integration Toolkit includes a set of animated Components that are based on the American National Standards Institute (ANSI) and International Electrotechnical Commission (IEC) symbol standards. These can be used by the Building Operation Graphics Editor.

Static device images

The Integration Toolkit includes a library of device images that can be used in the Building Operation Graphics Editor. Use the images represent the devices and equipment present in your system. They can be added to a diagram by selecting the device from the Meter Graphics category and dragging the image to the work area.

The library contains images for the following devices:

- ION6200
- ION7550/7650
- PM700 Series
- PM800 Series
- PM3200 Series
- PM5000 Series
- EM3500 Series
- Acti 9 iEM 3000 Series
- Veris E50 Series

NOTE: Device images are available for: a). meters that are bound and show data, and b). meters that are not bound and show no data. Choose the device images that best represent your system.

Snippets

The Integration Toolkit includes a Building Operation snippet that is designed to be used with the ANSI and IEC components.

Advanced Tooltip Snippet

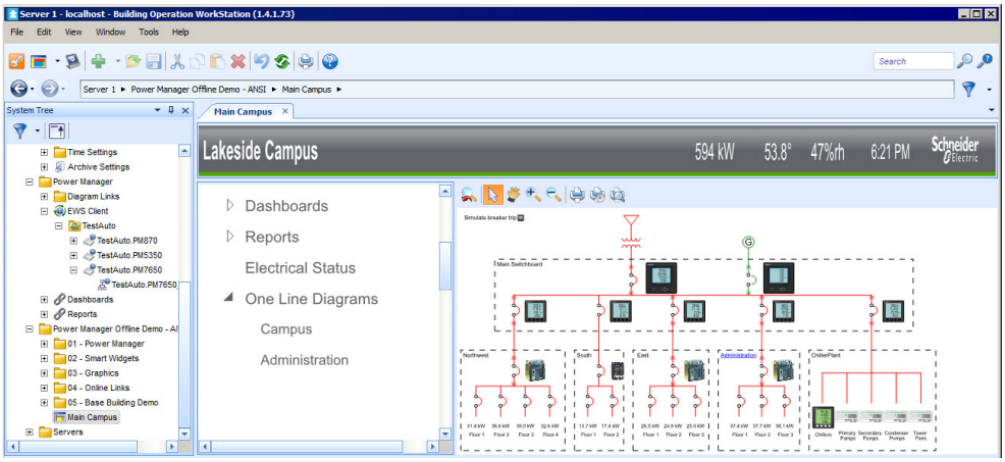
The Advanced Tooltip Snippet provides information regarding a specific device when the pointer hovers over it. The display text of the tool tip can be customized, and the following properties can be defined:

- Font size
- Font color
- Number of decimal places to display
- Measurements to show

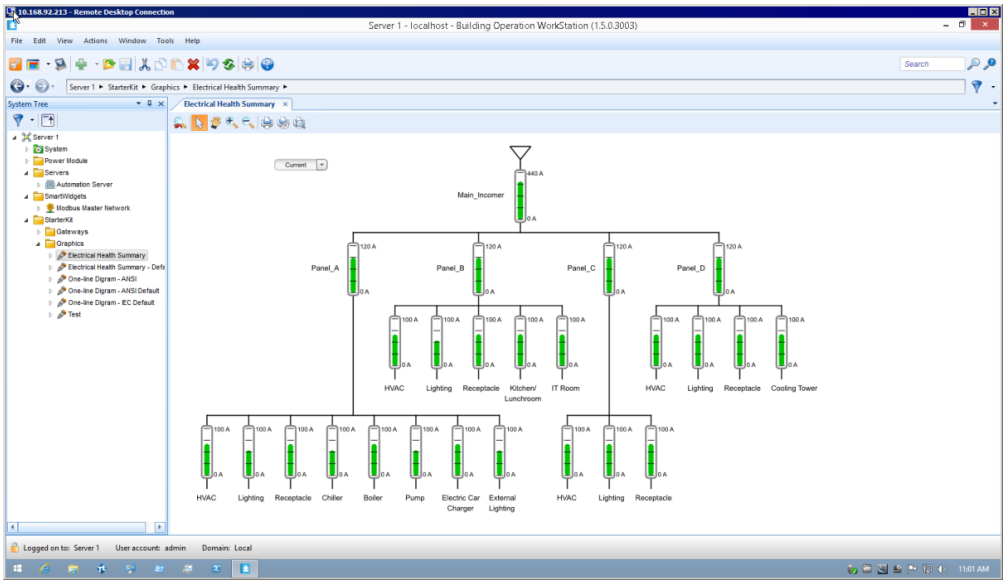
Setting up Electrical Network Graphics

Use the Building Operation Graphics Editor to create Graphics that represents an electrical network. For example, a one-line Graphic, that includes all of the metering devices and circuits, or an Electrical Health Summary Graphic that shows the loading of the metered circuits in the system.

Example of a one-line Graphic, created with the Building Operation Graphics Editor:



Example of an Electrical Health Summary graphic, created with the Building Operation Graphics Editor:



Basic instructions for setting up Electrical Network Graphics

⚠ WARNING

INACCURATE DATA RESULTS

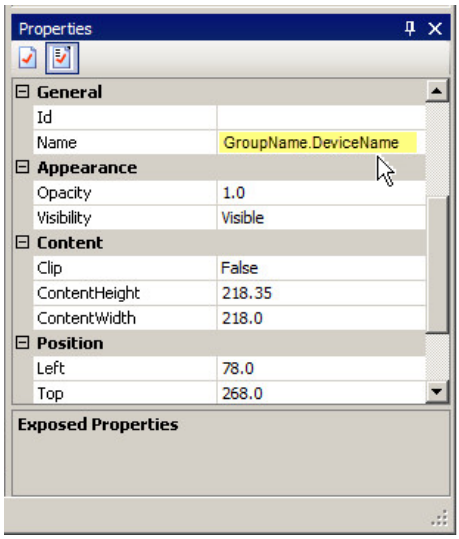
- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

To set up an Electrical Network Graphic:

1. Open the Building Operation Graphics Editor.
2. Create an electrical network diagram by dragging and dropping graphics onto your new file from the imported graphics libraries (meter graphics, symbols, controls, and so on) in the left pane.
3. For the IntegrationToolkit components that you drag and drop into the graphic, select the component, and then modify the component Name, in the General section of the Properties pane. The Name must match the PME “GroupName.DeviceName” or the SmartWidget Name of the device for which you want to display data.

   NOTE: This Name is used by the binding template for measurement binding. See Binding Graphics to measurements for details.



For more details on how to use the Graphics Editor, see the *EcoStruxure Building Operation Technical Reference Guide* and the Building Operation Graphics Editor Web help.

Binding Graphics to measurements

The Integration Toolkit includes a binding template to automate the binding of Building Operation graphics components to device measurements.

When you create the EWS interface in Building Operation Workstation, a connection is made between Building Operation and PME. The PME/EBO Integration folder in Building Operation Workstation then contains all the device names and measurements from PME. Any graphics components that have the correct PME device name set up will be bound to their device counterpart when the binding template is applied. Since the binding template also contains the Modbus Point name often used in SmartWidgets, it can also be used to bind graphics to values from the SmartWidgets.

NOTE: This binding template was installed on the Building Operation server in a previous step. See 3. Installing the components, snippets, and binding template for details.

Prerequisites

Before applying the binding template, confirm the following:

- The EWS interface has been established
- The components in the Building Operation Graphics Editor diagram have been correctly configured
- The binding template has been imported into Building Operation Workstation

Applying the binding template

⚠ WARNING

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To apply the binding template:

1. In Building Operation Workstation, in the System Tree pane, right-click the graphic item for which you want to use the binding template.
2. Select **Edit Bindings** from the list. The Binding point list appears in the work area.
3. Drag and drop the PME/EBO Integration folder or the folder that contains the SmartWidgets to the Energy Expert- Basic binding template. The Confirm Binding dialog appears.

4. Confirm that the binding and binding points are correct.
5. Click **File > Save** when finished.

NOTE: The PME/EBO Integration binding template can only be used for an English version of the PME/EBO Integration solution. For non-English systems, you need to manually bind the EWS values or create a custom binding template.

NOTE: The PME/EBO Integration is also known as Energy Expert, or Power Manager. These names refer to the same solution.

6. Configuring Dashboards and Slideshows

See Dashboards configuration for details on how to configure dashboards and slideshows.

System performance

PME is installed with a number of factory default settings that should be acceptable for most installations. However, the needs of individual systems can be different from one another and there are several parameters that can be used to fine-tune PME.

Device communications

See Network performance for information on how to optimize device communications.

Operating conditions

There are two operating conditions that PME experiences when communicating with devices in the network:

- **System start-up** (when first connecting to devices).
- **Steady-state** (during normal operation of the software).

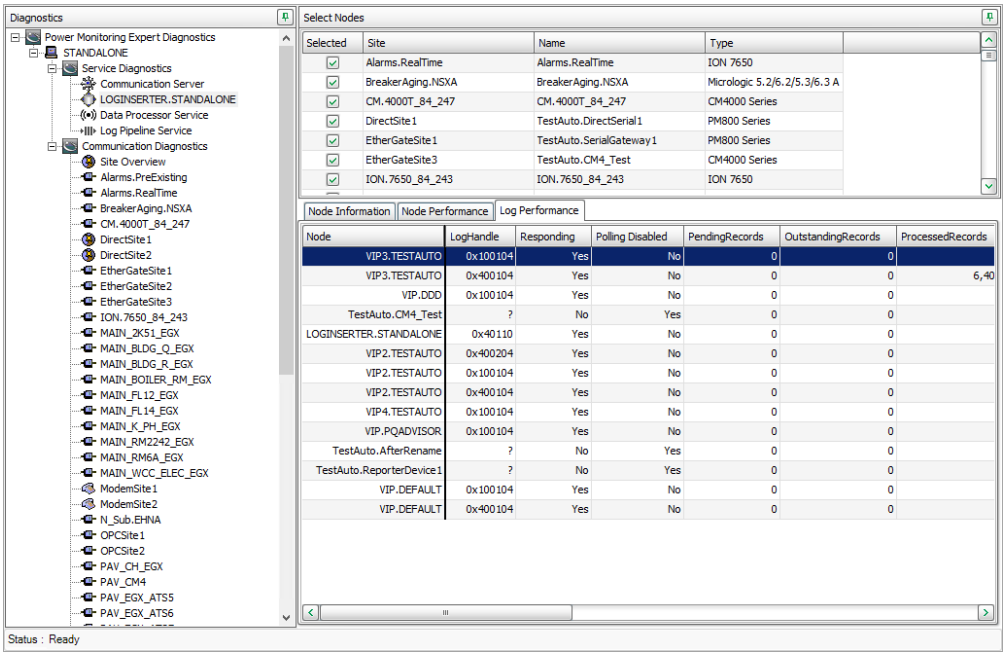
System Start-up

During system start-up it is normal for the software to perform slowly as it communicates to devices in the network and downloads the available historic logs. Depending on how long the devices have been in service there could be over a month of historic logs, PQ events, and waveforms to download. This behavior is particularly noticeable on long daisy chains that include meters with a high quantity of on-board logged data.

After the system has downloaded the available logs from devices, the performance of PME can be measured and, if necessary, appropriate action can be taken to improve it. The Diagnostics Viewer in Management Console should be used to determine when the historic logs have been downloaded from devices.

1. In Diagnostics Viewer expand **Service Diagnostics** and click

   LOGINSERTER.<server_name>.
2. Select the available devices in the **Select Nodes** list.
3. Select the **Log Performance** tab to display the status of the historic logs in the devices.
4. Scroll to the right to show the **CaughtUp** column.



During system start-up the **CaughtUp** column displays **No**, indicating that there are historic logs on the devices that have not yet been downloaded to the database. As the logs are downloaded the individual rows change to **Yes**. Continue to monitor this column for several minutes to verify that the logs have been completely downloaded. At this point the software is in steady-state operation.

Steady State

After the system has completely started up, you can use the Diagnostics Viewer to diagnose and tune the field-level communication.

1. Ensure that all of the devices on the daisy chain to be tested are enabled.
2. Apply the desired test load to the devices on the daisy chain (for example VIP, Vista, OPC, Diagrams, or Log Inserter).
3. In the Diagnostics Viewer, expand **Communications Diagnostics** and select the site of the associated daisy chain.
4. Select the **Communication Status** tab.
5. Right-click the **Communication Status** pane and select **Reset**.
6. Let the system gather metrics. For real-time data loads, a few minutes is usually enough. For logging, it is better to leave it for an hour or more, depending on logging intervals.

For each site (either a daisy chain with a gateway or an Ethernet device), the Time Util (%) column indicates how utilized the communication channel is:

Time Util (%)	Description
0 - 70	Increase the real-time and historical requests to the site without losing performance. Still have bandwidth for periods of heavy usage.

Time Util (%)	Description
70 - 99	Heavy usage. Potential to saturate the bandwidth if more clients connect or power quality events occur.
100	Communication channel is saturated.

A value at 100% indicates that the daisy chain is saturated and may not be providing responses as quickly as all requesting clients are configured to meet. For example, this could mean that instead of 5 second updates in Vista, you may see it as 6 or more seconds depending on how saturated the site is.

Conversely, a low percentage indicates room for more data requests. The user can set the software components (Real-time clients, LogInserter) to poll more quickly to achieve better user experience, or put more devices on the same daisy chain.

See Diagnostics Viewer for more information.

Performance related settings

PME is installed with a number of factory default settings that should be acceptable for most installations. However, the needs of individual systems can be different from one another and there are several parameters that can be used to fine-tune PME.

⚠ WARNING

INACCURATE DATA RESULTS

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Registry Settings

The registry keys below can be used to adjust PME performance. These keys are located under HKEY_LOCAL_ MACHINE\SOFTWARE\Schneider Electric\Power Monitoring Expert in the registry. If the impact of the change is not well understood, then consider an alternate fix or consult Technical Support for guidance.

ConnectedThreadPoolSize (DWORD; default 200): The number of sites ION SiteServer service sends requests to simultaneously. Ideally, this value is equal to or greater than the number of sites in the system (that is, serial sites, Ethernet gateway sites, and Ethernet devices) up to a maximum of 400.

LI_PollingPeriod_s (DWORD; default 30): The minimum time (in seconds) between polls for a historic log position of a given log. This is a global setting used to adjust the amount of Log Inserter driven communication traffic for the entire system.

LI_MaxPollingPeriod_s (DWORD; default 60): This is the maximum value that LI_PollingPeriod_s can be set to. If you increase LI_PollingPeriod_s beyond 60, you also need to increase this setting.

NOTE: Other performance tuning settings may be available. Contact a Technical Support representative to look at your specific needs.

Scheduled Log Upload

PME has an xml file that can be used to control how and when the Log Inserter uploads logged data from the devices to the database. It is possible to define which device logs are uploaded on a per-device basis. and when they are uploaded. By reducing Log Inserter-generated communications traffic, real-time performance can be improved.

This control is achieved by editing the **LogAcquisitionControl.xml** file. The file includes examples of required syntax and possible configurations. Note that this feature is for advanced users only.

LogAcquisitionControl.xml is located in the \config\cfg\logsrv folder in PME.

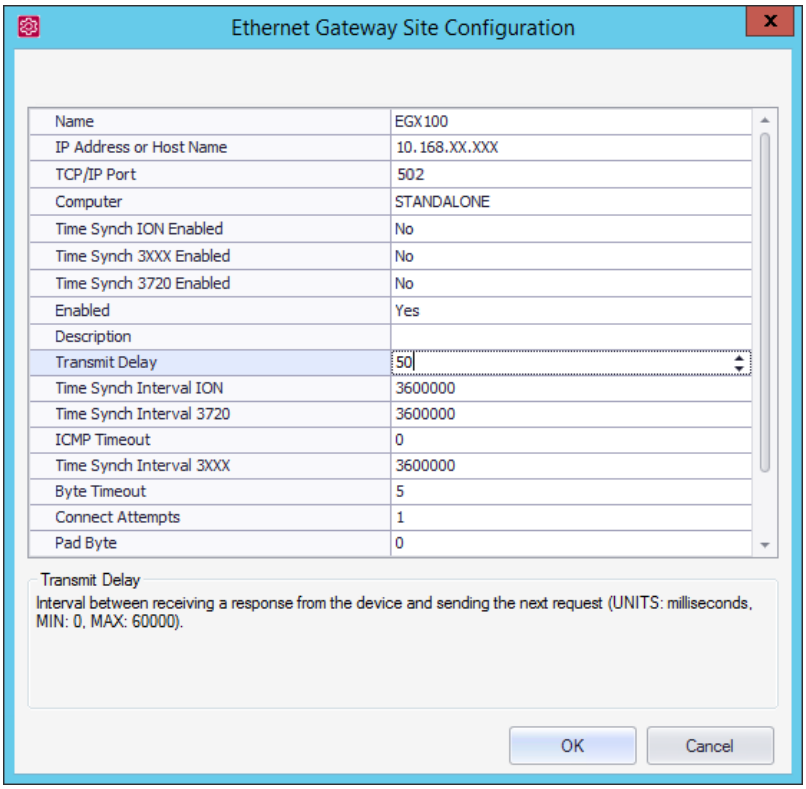
To begin, open the control file **LogAcquisitionControl.xml**. It specifies:

- Which device types or device instances you want to exclude from the device polling list. Excluding a device from the polling list has the same effect as disabling it as far as Log Inserter is concerned. If a device is disabled in this file, the Log Inserter will no longer check it for current log position counters or other device properties that Log Inserter usually cares about (aggregate setup counter, device type, and serial number).
- It is possible to exclude specific recorders from specific devices from the polling ION request.
- Polling intervals can be set for any device type or device instance. They can also be set to change based on a schedule. The schedules used by this feature are defined using the TOU Editor tool that is available from the **Tools** menu in Management Console.

Gateway Transmit Delay

The transmit delay for gateways (for example, an EGX100 site) can be reduced from the default of 50ms to 0ms in some cases. Check the % error rate in Diagnostics Viewer to help ensure that problems have not been introduced. Note that some devices, CM2000 in particular, should not have the transmit delay set lower than 50ms to avoid over- loading the device and potentially resulting in bad logged data.

Example of the transmit delay setting in Management Console:



Time synchronization for ION meters

You can synchronize the internal clocks of all networked PowerLogic™ ION™ meters and devices through the Management Console component of Power Monitoring Expert. When they are synchronized, all data logs have time stamps that are relative to a uniform time base.

NOTE: This information is specific to ION devices. It is not applicable to devices that are not based on ION architecture.

Time synchronization signals are broadcast periodically over the network; each meter continually assesses its ability to remain synchronized with the incoming broadcasts. Over a brief period, each meter learns how its internal timing differs from that of the broadcast source and adjusts its timekeeping to compensate. Very accurate time synchronization is achieved with this method.

Meters at modem sites are synchronized each time they are connected. The longer the duration between connections, the larger the error in time synchronization. In the extreme case, this can result in missing or duplicated logs. If this occurs, you can increase the frequency of connections through the Power Monitoring Expert software connection.

NOTE: This information assumes that you are using the time synchronization function in Power Monitoring Expert. Although other methods of time synchronization are available, such as with ION Setup, a Network Time Protocol (NTP) server, a Global Positioning System (GPS) receiver, or 3rd party protocols, it is important that you use only one method of time synchronization on each network. If you use multiple methods, the timestamps will differ for the sites and devices that are using separate time synchronizing methods.

Before you configure time synchronization on your network, you should familiarize yourself with the Clock module settings. Once you have done this, you can decide which synchronization method you want to use.

Enabling and configuring time synchronization

Time synchronization in Power Monitoring Expert is initially disabled and needs to be enabled and configured through Management Console. The communications port and protocol used for communications between the software and the networked ION devices is automatically used to send time synchronization signals to all connected ION devices. The software sends a time sync packet and the time is set when the packet is received.

When reviewing time synchronization messages in the system log, remember that the time in the message is not the time to which the meter was time synced, but rather it is the time the message was posted to the system log. The message is posted after the meter is time synced.

Note that ION time synchronization only uses the UTC setting; the LOCAL setting cannot be used.

Time synchronization values are set when sites or Ethernet devices are defined in a Power Monitoring Expert network. Enable time synchronization or set custom intervals for supported devices in any site through Management Console as follows:

1. Start Management Console.
2. Select **Sites** or **Devices** on the System Setup pane:
   - Select **Sites** if you want to customize a particular serial, modem, or Ethernet Gateway site.
   - Select **Devices** if you want to customize an individual Ethernet device.
3. Right-click the device or site and select **Configure Device** or **Configure Site** to open the related configuration dialog.
4. Right-click inside the dialog and select **Advanced Properties**.
5. Configure the **Time Synch ION Enabled** or **Time Synch Ethernet Enabled**, and **Time Synch Interval Ethernet** fields as required for your system.
6. Click **OK** to save you changes.

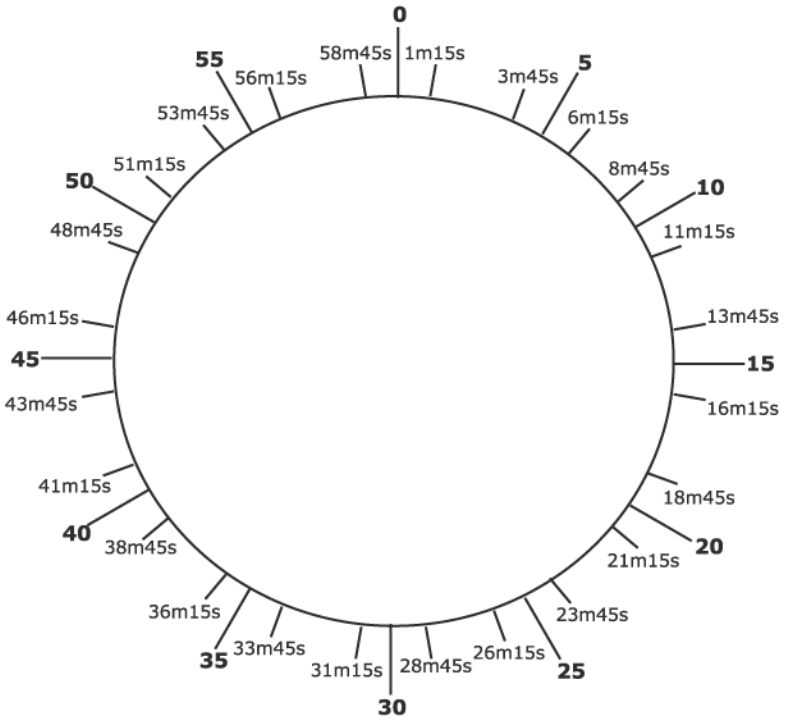
   The default time synchronization interval of 3600 seconds (displayed in milliseconds) is acceptable in most software installations.

NOTE: You need appropriate permissions to configure meters on your network. Refer to the *ION System Security* technical note for details on software and meter security.

Time synchronization blackout

Time synchronization blackout is defined as a period when time synchronization cannot occur. Utilities often record power usage at regular, predetermined intervals. For example, the utility may schedule a recording every five minutes during an hour period (that is, 5, 10, 15, 20,..., 55, 60). If a time sync moves the meter clock forward, the meter may miss one of the recording intervals. If a time sync moves the meter clock backwards, the meter may get two records with the same timestamp. The time synchronization blackout feature seeks to protect the time before and after these recording intervals by not sending out any time sync signals at those times.

Power Monitoring Expert has time synchronization blackouts enabled automatically even though time syncing is disabled by default in Power Monitoring Expert. The blackout intervals are every five minutes as follows: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55. Each blackout is 2 minutes and 30 seconds in duration. This duration is distributed evenly before and after the interval. The diagram below illustrates the time synchronization blackout feature in Power Monitoring Expert.



If a regularly scheduled time sync is not sent because of a blackout interval, the software continues trying to send the time synchronization signal every 15 seconds until the blackout period expires and the time sync is sent.

Changing default blackout settings

To change the default settings for the interval or the blackout duration, you must edit the registry of the computer where Power Monitoring Expert is installed. Changing the default registry settings should be performed only by personnel with a thorough knowledge of their computer's operating system and registry entries.

NOTICE
IRREVERSIBLE OPERATING SYSTEM DAMAGE OR DATA CORRUPTION Before making any changes, back up your Windows Registry in a network folder or other remote location. **Failure to follow these instructions can result in irreparable damage to the operating system of the computer and all existing data.**

NOTE: Registry edits must be performed only by qualified and experienced personnel.

There are two registry entries that control the time-synchronization blackout behavior.

Create the following registry `REG_DWORD` values under the `HKEY_LOCAL_MACHINE\Software\Wow6432Node\Schneider Electric\Power Monitoring Expert\<version_number>` key.

TimesyncBlackoutInterval_mins

Default value: 5

This entry is specified in minutes. It must have a value greater than 1 in order for time-synchronization blackouts to occur. A value of 60 or greater configures blackouts to occur once an hour.

TimesyncBlackoutDuration_secs

Default value: 150 (2 minutes 30 seconds in seconds)

This entry is specified in seconds. A value of 0 (zero) disables the blackout feature. This entry cannot have a value greater than or equal to 3600 (one hour).

NOTE: If you want to disable the blackout feature but keep time synchronization enabled, set the TimesyncBlackoutDuration_secs register to 0.

Do not use the following settings. They disable both the blackout feature as well as time synchronization in general.

- TimesyncBlackoutInterval_mins < 1
- TimesyncBlackoutDuration_secs >= 3600 (1 hour)
- TimesyncBlackoutDuration_secs (the value converted to minutes) >= TimesyncBlackoutInterval_mins

To disable time synchronization for a particular device, use Management Console. Refer to Enabling and configuring time synchronization.

Time-synchronization blackout considerations

- Remember to specify TimesyncBlackoutInterval_mins in minutes and TimesyncBlackoutDuration_secs in seconds.
- If your blackout values conflict or are out of range, an error is sent to the system log database. If time synchronization signals are not occurring, check the system log to see if there's an error message about your blackout values.

Trends configuration

Use the Trends application to view trends for real-time and historical data. The information in the Trends application is accessed through trend graphs that are saved in the library. Power Monitoring Expert (PME) does not provide any pre-configured trends. Configure your own trends to meet your needs.

⚠ WARNING

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- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

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⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Do not use the software to control time-critical functions.
- Do not use the software to control remote equipment without proper access control and status feedback.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Open the Trends application from the **TRENDS** link in the Web Applications banner.

For information on how to configure the Trends application, see:

- Adding a new trend
- Editing a trend
- Sharing a trend
- Moving a trend
- Deleting a trend

For reference information see:

- The Trends user interface

For information on how to use Trends, see Trends.

Adding a new trend

Add new trends to monitor historical and real-time data in graphical format.

To add a completely new trend to the library:

1. In Trends, open the Trend Library and navigate to the folder where you want to create the trend.

   (Optional) Add a new folder by clicking **Add Folder** at the bottom of the library panel, or by clicking **Add Folder** in the **Options** menu at the top of the library.

2. In the Trend Library, at the bottom of the panel, click **Add Trend** . This creates a new trend and opens the Add Trend dialog.
3. In Add Trend, enter the configuration information on the **General**, **Axes**, **Chart**, and **Data** tabs. See Configuring a trend for details on the configuration options.

   NOTE: A public item is visible to all users in your user group. A private item is visible to you and any user in your user group with Edit permissions on this item type. See Default User Access Level Privileges and Customizing Access Level Privileges for details.

4. **Save** the trend.

To add a copy of an existing trend to the library:

1. In Trends, open the Trend Library and navigate to the trend you want to copy.

   (Optional) Add a new folder by clicking **Add Folder** at the bottom of the library panel, or by clicking **Add Folder** in the **Options** menu at the top of the library.

2. Right-click the trend name or click **Options** for this trend and select **Duplicate** to create a copy in the same folder. Select **Copy To** to create a copy in a different folder.
3. (Optional) In the Trend Library, select the new trend, right-click the trend name or click **Options** for this trend, and select **Edit** to open the trend settings. Change the trend name and other relevant settings.

   NOTE: A public item is visible to all users in your user group. A private item is visible to you and any user in your user group with Edit permissions on this item type. See Default User Access Level Privileges and Customizing Access Level Privileges for details.

4. **Save** the modified trend settings.

Related topics:

- Adding a new trend
- Editing a trend
- Sharing a trend
- Moving a trend
- Deleting a trend

For reference information see:

- The Trends user interface

For information on how to use Trends, see Trends.

Editing a trend

Edit a trend to change the trend name, add a data series, remove a data series or change the trend settings.

To edit a trend:

1. Open the Trend Setup dialog by:
   - Clicking **Edit** on the top right of the trend in the trend display pane.
   - Right-clicking a trend name in the Trend Library and selecting the **Edit** menu item.
   - Clicking **Options** for this trend in the Trend Library and selecting the **Edit** menu item.
2. Change the **General**, **Axes**, **Chart**, and **Data** settings for the trend in the Trend Setup dialog. See Configuring a trend for details on the configuration options.
3. **Save** the modified settings.

Related topics:

- Adding a new trend
- Editing a trend
- Sharing a trend
- Moving a trend
- Deleting a trend

For reference information see:

- The Trends user interface

For information on how to use Trends, see Trends.

Sharing a trend

Share trends with other user groups.

NOTE: For Sharing to be enabled, at least one user group, in addition to the Global group, must be configured. To share an item with another user group, you must be a member of that group. The item to be shared must be marked as Public, not Private.

To share a trend:

1. In Trends, open the Trend Library and navigate to the trend you want to share.
2. Right-click the trend name or click **Options** ⋮ for this trend and select **Share**. This opens the Share Trend window.
3. In Share Trend, select the user groups you want to share this trend with.

   (Optional) Specify a name for the shared trend. The groups you are sharing this trend with will see this name. The name of the original trend remains unchanged.
4. Click **OK** to share this trend.

NOTE: When you share an item with another user group, it appears in the **Shared** folder of this group. You cannot share a shared item.

Related topics:

- Adding a new trend
- Editing a trend
- Sharing a trend
- Moving a trend
- Deleting a trend

For reference information see:

- The Trends user interface

For information on how to use Trends, see Trends.

Moving a trend

Move trends to a different location in the Library to make them easier to find or easier to manage.

To move a trend:

1. In Trends, open the Trend Library and navigate to the trend you want to move.

   (Optional) Add a new folder by clicking **Add Folder** at the bottom of the library panel, or by clicking **Add Folder** in the **Options** menu at the top of the library.

2. Right-click the trend name or click **Options** for this trend and select **Move To**. This opens the Select Location window.
3. In Select Location, select the location you want to move this trend to.
4. Click **OK** to move the trend.

Related topics:

- Adding a new trend
- Editing a trend
- Sharing a trend
- Moving a trend
- Deleting a trend

For reference information see:

- The Trends user interface

For information on how to use Trends, see Trends.

Deleting a trend

Delete trends that are no longer needed.

To delete a trend:

1. In Trends, open the Trend Library and navigate to the trend you want to delete.
2. Right-click the trend name or click **Options** for this trend, and select **Delete**
3. In Delete Content, click **Yes**, to delete the trend from the Trend Library.

NOTE: Access to this application or function is controlled by user privileges. See Default User Access Level Privileges and Customizing Access Level Privileges for details.

Related topics:

- Adding a new trend
- Editing a trend
- Sharing a trend
- Moving a trend
- Deleting a trend

For reference information see:

- The Trends user interface

For information on how to use Trends, see Trends.

Software Modules

Software modules combine different software features and capabilities to create a specific set of deliverables. Software modules are designed around a particular application. Examples of software modules include the Power Quality Performance Module, the Energy Analysis Reports Module, and the Breaker Performance Module.

This section provides configuration information for the software modules in PME.

Use the links in the following table to find the module you are looking for:

Module	Application
Backup Power Module configuration	Generator and Uninterruptible Power Supply (UPS) performance monitoring and reporting, including battery health.
Breaker Performance Module configuration	Circuit breaker aging and breaker settings monitoring.
Capacity Management Module configuration	Generator and Uninterruptible Power Supply (UPS) capacity monitoring and reporting. Includes transformer and UPS loss monitoring.
Energy Analysis Dashboard Module configuration	Gadgets for identifying consumption patterns and anomalies and for comparing different consumers over time.
Energy Analysis Reports Module configuration	Reports for energy consumption monitoring and modeling, including energy usage by process area or by product output.
Energy Billing Module configuration	Energy-based billing and reporting, including consumption monitoring and reporting at the branch circuit level.
Event Notification Module configuration	Notifications of power system events via email or SMS.
Insulation Monitoring Module configuration	Monitoring for isolated power systems, such as the ones found in hospital operating rooms.
Power Quality Performance Module configuration	Analysis of power quality events and disturbances and their impact on the monitored system.

Backup Power Module configuration

NOTE: This module requires a separate license. See Licensing for more information.

The Backup Power Module provides generator and Uninterruptible Power Supply (UPS) monitoring and reporting. It reports on generator and UPS performance and battery health.

The Generator Test EPSS Report can be configured to conform to the requirements for an Emergency Power Supply System (EPSS) test, including automatic transfer switches (ATS). For example, the report shows the transfer time of the lead ATS and indicates whether the transfer time passes or does not pass the test requirements. See Emergency Power Supply Systems for more information on EPSS.

The following reports, diagrams, and tools are part of this module:

Type	Reports	Diagrams	Tools
Generator Performance	Generator Activity Generator Battery Health Generator Test EPSS Generator Load Summary	EPSS Diagrams	Generator Performance Configuration(*)
UPS Performance	UPS Auto Test	UPS Auto Test diagrams	UPS Configuration
	UPS Battery Health	n/a	n/a

(*) The Generator Performance Configuration tool includes the Run History, which is a record of the generator run activities.

To use the reports and diagrams in this module, the module must be configured, and the measurement data must be available as historical data logs in the database.

For configuration information on the component, see:

- Configure Generator Activity Report
- Configure Generator Battery Health Report/Export
- Configure Generator Test EPSS
- Configure Generator Load Summary Report
- Configure UPS Performance

Related topics:

Backup Power Module topics

- Backup Power Module design
- Backup Power Module configuration
- Backup Power Module operation

Other Software Modules

- Breaker Performance Module configuration
- Capacity Management Module configuration
- Energy Analysis Dashboard Module configuration

- Energy Analysis Reports Module configuration
- Energy Billing Module configuration
- Event Notification Module configuration
- Insulation Monitoring Module configuration
- Power Quality Performance Module configuration

Configure Generator Activity Report

⚠ WARNING

INACCURATE DATA RESULTS

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- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

To configure the Generator Activity Report:

1. Set up the monitoring device that records the generator electrical data in PME. See Supported measurements and devices for details on which measurements are required.
2. Create a Generator in the Generator Performance Configuration Tool with EPSS Test Module, and define, at a minimum, the following fields for this Generator:
   - **Name** - Enter a name for the generator.
   - **Electrical Data** - Select the Source of the electrical measurement data for the generator. Enter the generator Nameplate Rating and select the Unit.
   - **Status Measurements** - Select the Source of the generator Status Measurements, and the measurements used to indicate the Running and Stopped states.
3. Create a Transfer Switch in the Generator Performance Configuration Tool with EPSS Test Module, and define, at a minimum, the following fields for this transfer switch:
   - **Name** - Enter a name for the transfer switch.
   - **Status Measurements** - Select the Source of the transfer switch Status Measurements, and the measurements used to indicate the Normal, Test, and Emergency states.

   NOTE: The transfer switch states are required for the Run Reason information in the report.
4. (Optional) Repeat steps 2 and 3 to add additional generators and transfer switches.
5. Create a Group in the Generator Performance Configuration Tool with EPSS Test Module, and define, at a minimum, the following fields for this Group:
   - **Name** - Enter a name for the group.
   - **Generators** - Select the Generators you created in step 2.
   - **Transfer Switches** - Select the Transfer Switches you created in step 3.
6. Open the report template in the Reports Web Application, set the report input parameters, and generate the report.

NOTE: The groups you create with the Generator Performance Configuration Tool are available for selection as inputs to the Generator Activity Report. All Generators that are defined in a group are included in the report when that group is selected. You have the option to exclude generators in a group from a report by selecting this option in the report inputs section.

For information on how to use the report, see Generator Activity Report.

Configure Generator Battery Health Report/Export

NOTE: Generator Battery Health Export is based on the same data as the Generator Battery Health Report. The export version provides the raw data in CSV file format. The export file can be imported by other systems, such as Energy Operation.

⚠ CAUTION

INACCURATE DATA RESULTS

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- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.

Failure to follow these instructions can result in injury or equipment damage.

To configure the Generator Battery Health Report/Export:

1. Set up the monitoring device that records the generator battery voltage in PME. See Set up the Generator Battery Health monitoring device for details.
2. Create a Generator in the Generator Performance Configuration Tool with EPSS Test Module, and define, at a minimum, the following fields for this Generator:
   - **Name** - Enter a name for the generator.
   - **Electrical Data** - Select the Source of the electrical measurement data for the generator. Enter the generator Nameplate Rating and select the Unit.
   - **Status Measurements** - Select the Source of the generator Status Measurements, and the measurements used to indicate the Running and Stopped states.
   - **Battery Waveforms** - Select the **Battery Waveforms** check box . Select the source that is capturing the waveform. Select the measurement recording the waveform, for example `V4 Waveform`.
3. (Optional) Repeat step 2 to add additional generators.
4. Create a Group in the Generator Performance Configuration Tool with EPSS Test Module, and define, at a minimum, the following fields for this Group:
   - **Name** - Enter a name for the group.
   - **Generators** - Select the Generators you created in step 2.
5. Open the report template in the Reports Web Application, set the report input parameters, and generate the report.

NOTE: The groups you create with the Generator Performance Configuration Tool are available for selection as inputs to the Generator Battery Health Report. All Generators that are defined in a group are included in the report when that group is selected. You have the option to exclude generators in a group from a report by selecting this option in the report inputs section.

For information on how to use the report, see Generator Battery Health Report, and Generator Battery Health Export Report.

Set up the Generator Battery Health monitoring device

NOTE: The devices used for monitoring the generator electrical data for the Generator Battery Health Report must be able to run an ION framework and must have a V4 input for capturing the battery voltage waveform. Only the following devices meet those requirements:
- ION9000
- ION7650
- ION7550

Other devices cannot be used for this application.

Basic setup

Install and configure the monitoring device. Refer to the device Installation Guide for more information. Obtain the latest version of these documents from www.schneider-electric.com.

Connect the monitoring device to the generator as follows:

- Connect the digital signal from the generator crank relay to the digital input of the monitoring device. This is the signal that triggers the start of the waveform recording.
- V1 - V3 voltage inputs must have PTs to isolate the ground from the system being monitored and the battery.
- Connect V4 of the monitoring device to the positive side of the battery. Input impedance of V4 terminal, for the devices listed above, is 5 MOhm (phase - Vref).
- Connect Vref on the monitoring device to battery ground.
- Fusing must be installed according to the meter installation instructions.
- Perform a visual inspection of the connections to ensure there is physical separation between the system connected to V1, V2 and V3, and the battery connected to V4.
- For other wiring options with PTs, see the monitoring device Installation Guide.

⚠ ⚠ DANGER

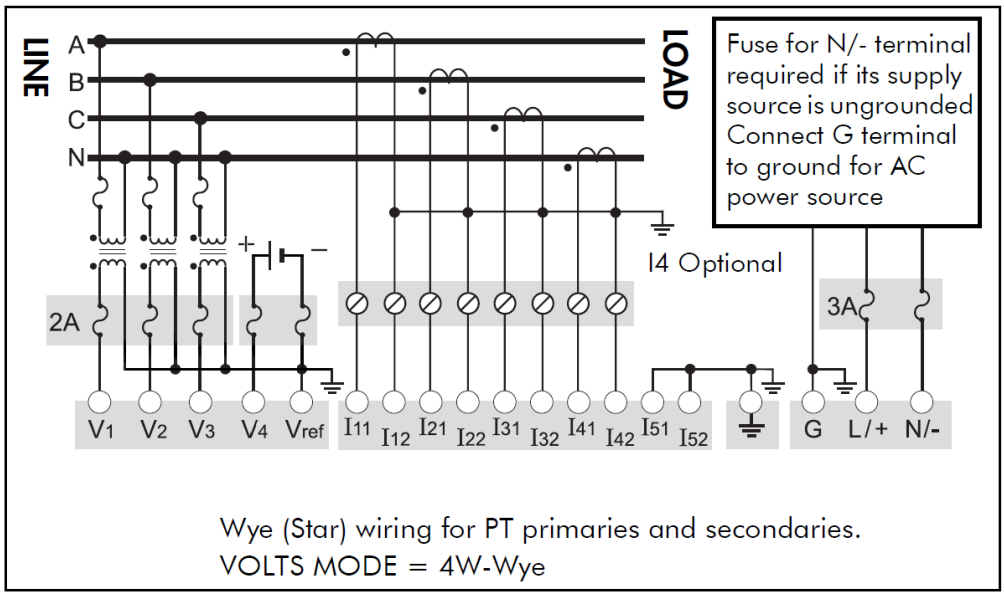
ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Treat the battery circuit as energized to the category of the installation.

Failure to follow these instructions will result in death or serious injury.

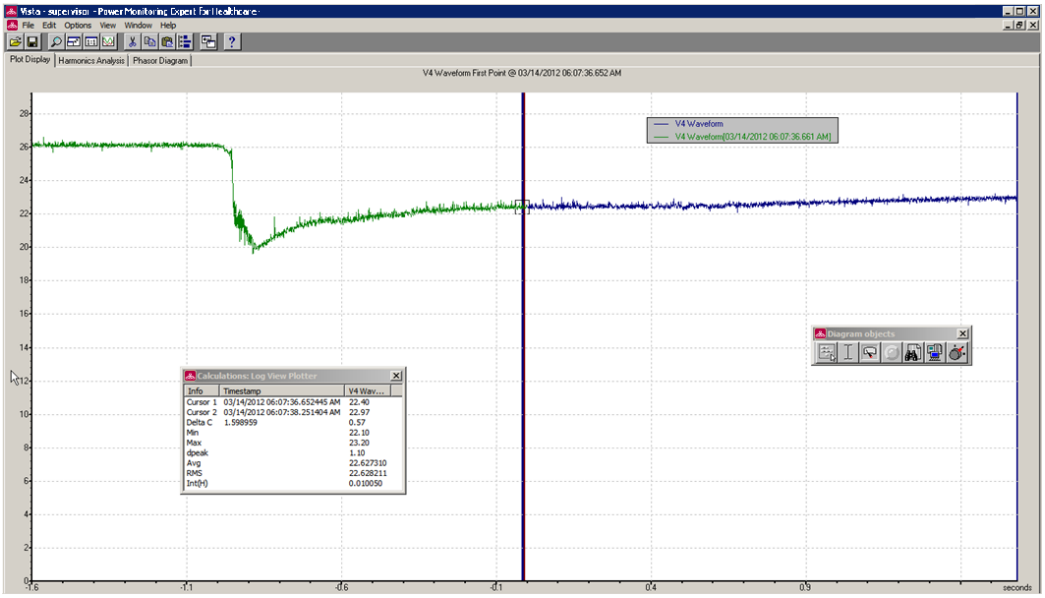
Refer to the following diagram as an example for connections to the meter.

4-Wire Wye, 3-Element, 3 PTs Connection Diagram



Setting up the Battery Health Framework

The Battery Health Framework is designed to capture and record a generator's battery voltage signature at start up. This voltage signature provides some indication of the health of the generator's battery bank. A typical waveform capture of the voltage drop when starting is shown next:



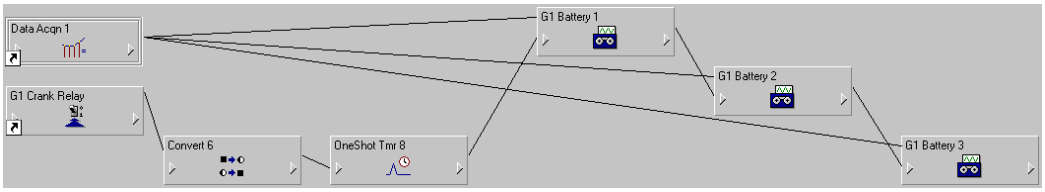
Note the following items about this example:

- This capture shows approximately 4 to 5 seconds' worth of data, accomplished via 3 waveform recorders in series configured at a resolution of 16x96.
- The voltage does not immediately recover to its original value (~26 v) but it begins to ramp up.
- There is about 0.5 seconds of data before the voltage drops to approximately 20 V.

Two options in the framework are possible to capture the waveform, based on how the crank relay signal is triggered - pulse or KYZ.

Example Framework

The following figure shows the typical modules for the framework.



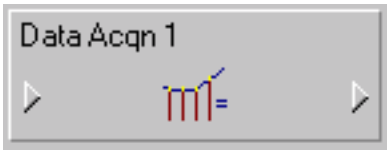
The types of module used are:

- Data Acquisition
- Digital Input
- Convert
- OneShot Timer
- Waveform Recorder

See the following descriptions for the way each module works in this framework.

Refer to *ION Reference* for details on how each module operates and for setting module parameters.

Data Acquisition – Data Acqn 1



The V4 signal from the meter goes to the Data Acquisition module.

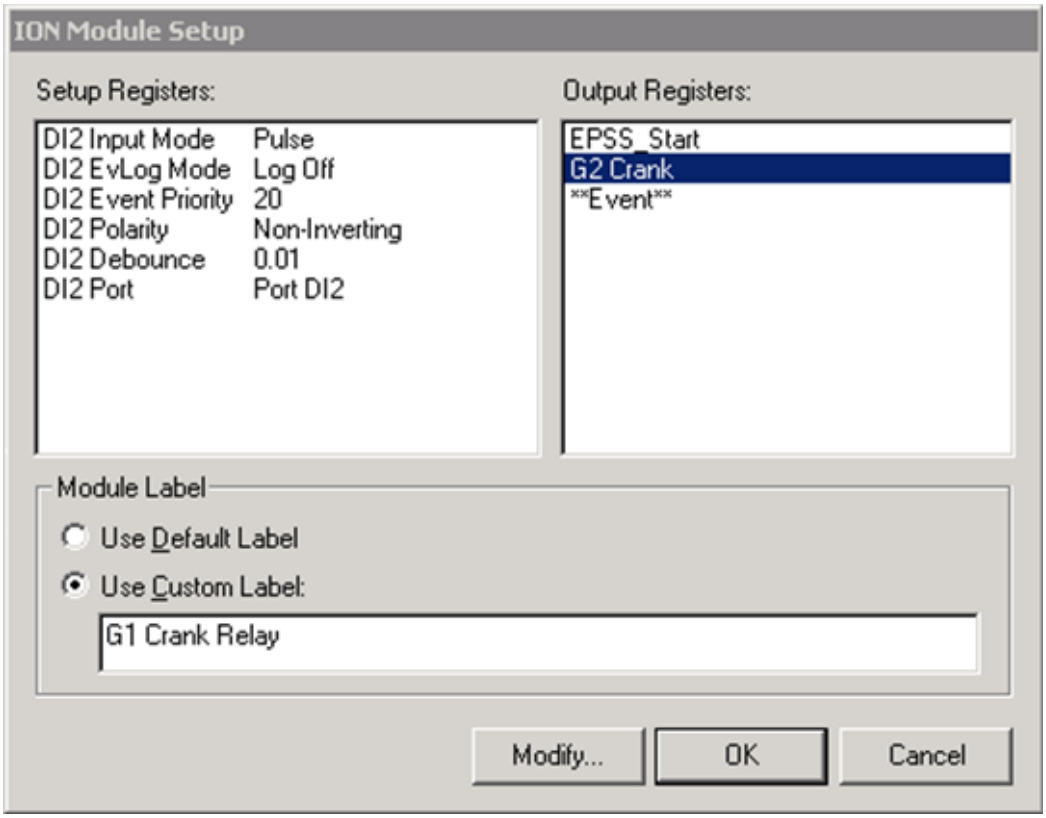
Digital Input – G1 Crank Relay

This module accepts the Cranking Relay signal from the field. When the signal goes high, the logic to record the battery voltage triggers.

The Input mode can be set to Pulse or KYZ, as explained next.

Pulse Input Mode

When the Crank Relay signal goes high, a pulse is generated on the Trigger output register, labeled "G1 Crank Relay." The setup registers for the Digital Input module are shown next.



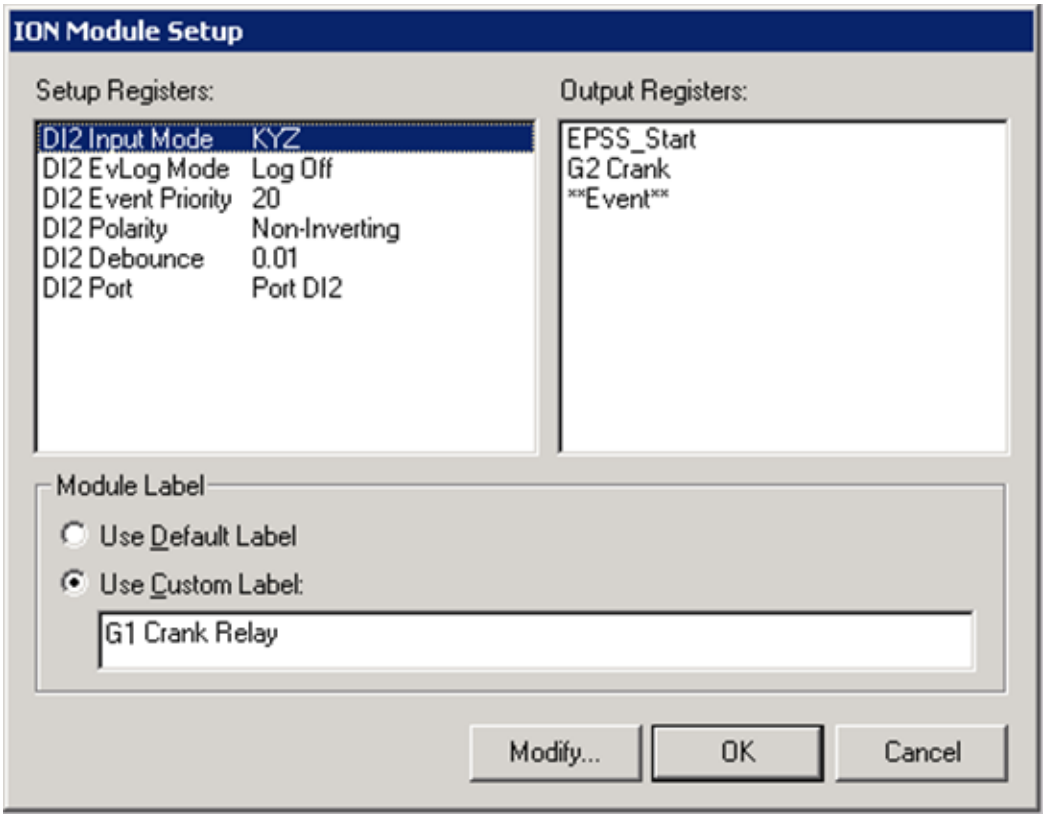
Note that the **Input Mode** value is Pulse. The Trigger output can now be fed into the first Waveform Recorder along with V4 from the Data Acquisition module.

KYZ Input Mode

If you are using the same Digital Input to handle the Generator Start signal (EPSS_Start) it is probably set to KYZ mode.

Input Mode KYZ means that a pulse is generated on the Trigger output register when the Crank Relay signal goes high AND when it goes low. The Convert module and One Shot Timer module (explained later) prevent triggering the downstream logic twice.

The Crank Relay Module is setup like this:



Note that the Input Mode value is KYZ.

Convert

The signal from the Digital Input module cannot be fed directly into the One Shot Timer. The Convert module converts the digital signal to analog for the One Shot Timer.

One-Shot Timer

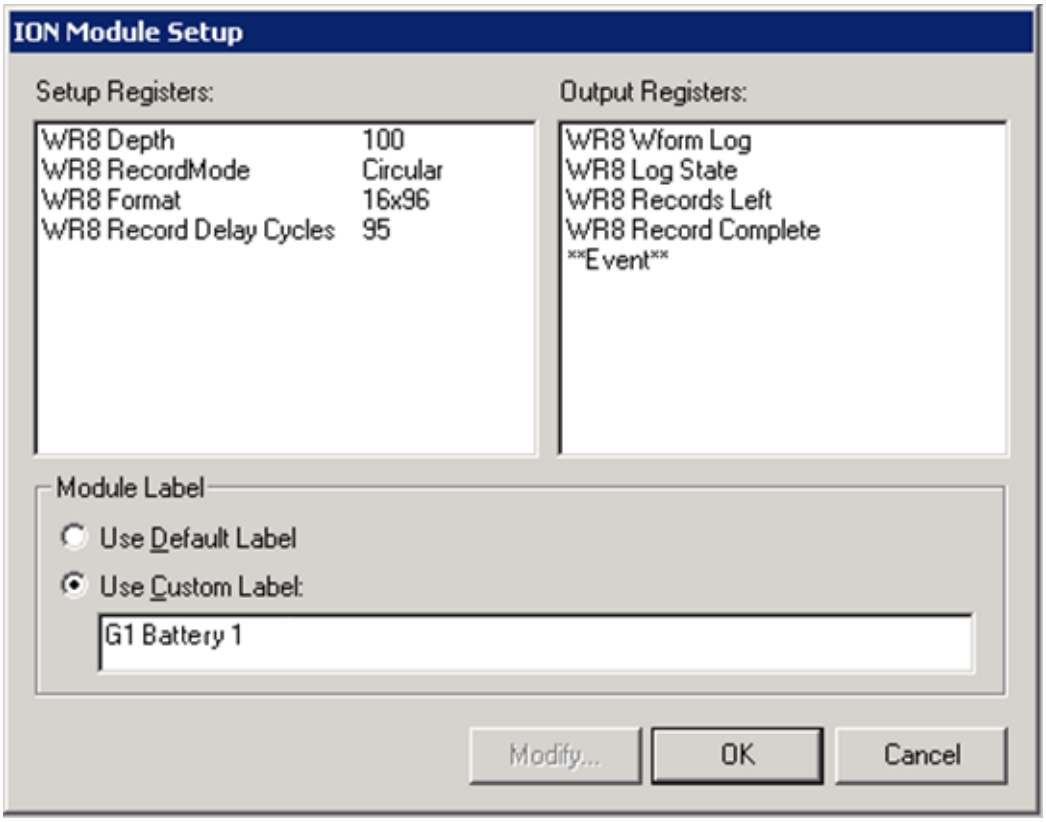
To prevent triggering the downstream logic twice, send the state (EPSS_Start) from the Convert module into the One Shot Timer:

Send the output register into the first Waveform Recorder G1 Battery 1.

First Waveform Recorder – G1 Battery 1

The Data Acquisition module and G2 Crank Relay module are the inputs to the first Waveform Recorder, labeled “G1 Battery 1.”

These are the setup registers for the module:

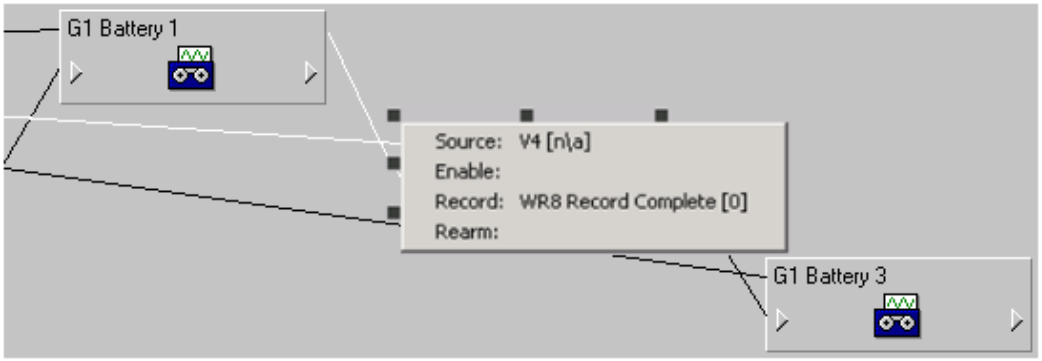


Note the following about the setup registers:

- Depth must be non-zero – 100 is a good number.
- Record Mode should be Circular.
- Format should 16x96. This means 16 samples per cycle and 96 cycles, so at 60 Hz this results in approximately 1.6 seconds' worth of data.
- Record Delay Cycles is set to 95 to allow the “window of observation” to move so that only post-event data is captured. Refer to *ION Reference* for more details.

Second and Third Waveform Recorders

The second Waveform Recorder - G1 Battery 2 - is cascaded with the first to capture another 1.6 seconds of the battery voltage signature. Do this by using the Record Complete output register on G1 Battery 1 as a flag to trigger G1 Battery 2 to start recording.

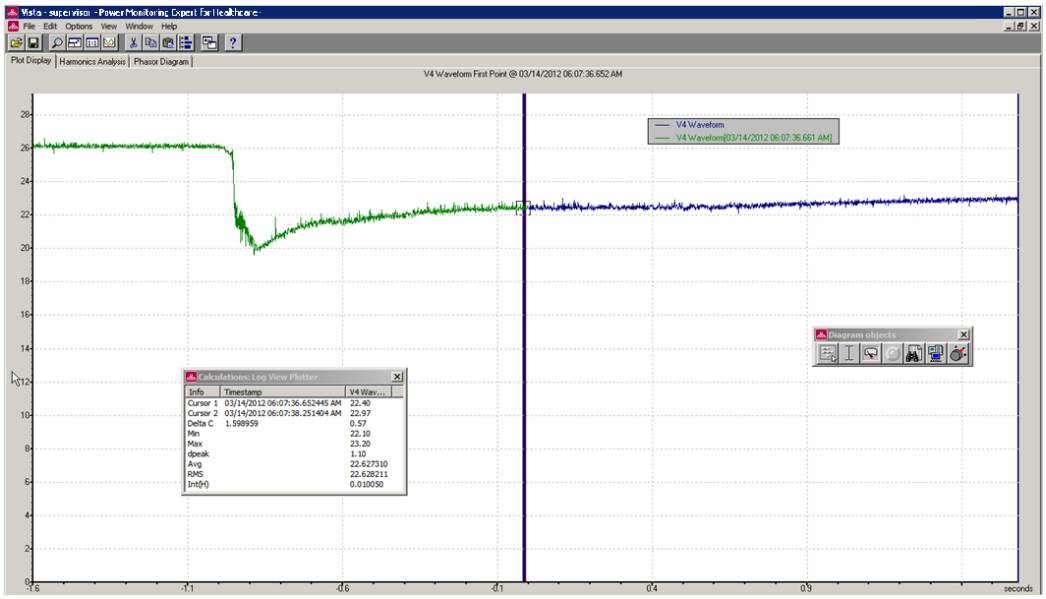


The third Waveform Recorder - G1 Battery 3 - is cascaded with the second recorder to capture the final 1.6 seconds of the battery voltage signature. As above, use the Record Complete output register on G1 Battery 2 as a flag to trigger G1 Battery 3 to start recording.

The Setup Registers should be the same as first waveform recorder with different labels.

Battery Health Waveform Capture results

After the framework is complete, in Vista you should see the voltage signature that looks like the following example image:



After you obtain this type of result, you can configure the generator in the Generator Performance Configuration Tool and define the Battery Health Report.

Configure Generator Test EPSS

Generator Test EPSS includes:

- Generator Test EPSS Report
- Generator Test EPSS Vista diagrams
- Generator Run History

⚠ WARNING

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NOTE: Before starting the configuration, the monitoring devices must be installed, communicating and connected to the relevant electric circuits. The generator and automatic transfer switch (ATS) digital and analog outputs must be connected to the equivalent inputs on the monitoring devices.

NOTE: All statuses for a specific ATS must be recorded by the same monitoring device. All statuses for a specific generator must be recorded by the same monitoring device.

You need to configure the system before you can use any of the EPSS features. The configuration includes these high-level steps:

Step 1: Setting up the monitoring devices in the PME software.

Step 2: Defining generators, ATSs, and groups in the Generator Performance Configuration tool.

Step 3: Generating Vista diagrams in the Generator Performance Configuration tool.

Step 4: Configuring and saving the EPSS Test report in Reports.

Step 1: Setting up the monitoring devices in the PME software:

1. Add the devices that are monitoring the generators, ATS, and load to PME, using Management Console or Device Manager.

   See EPSS devices for information on supported device types.

2. Configure the digital inputs on the devices for the generator and ATS status measurements, for each generator and ATS, with the following settings and labels:

NOTE: PME includes ION framework templates for the generator and ATS input measurements. These templates provide a starting point for configuring ION devices to monitor generator and ATS status data. If you use ION devices to monitor these inputs, see ION device frameworks for EPSS monitoring for more information.

ATS status signals:

Signal	Input Setup	Label(**)
ATS Normal	Mode: KYZ Event Log: On Event Priority: 64	ATS Normal
ATS Test	Mode: KYZ Event Log: On Event Priority: 64	ATS Test
ATS Emergency	Mode: KYZ Event Log: On Event Priority: 64	ATS Emergency
ATS Power Outage(*)	Mode: KYZ Event Log: On Event Priority: 64	Power Outage

Generator status signals:

Signal	Input Setup	Label(**)
Generator Stopped	Mode: KYZ Event Log: On Event Priority: 64	Gen Stop
Generator Running	Mode: KYZ Event Log: On Event Priority: 64	Gen Run
Generator Starting(*)	Mode: KYZ Event Log: On Event Priority: 64	Gen Start
Emergency Power Source Available (EPA)(*)	Mode: KYZ Event Log: On Event Priority: 64	EPA Available

(*)These signals are not required for the EPSS Test module. They can optionally be included in the EPSS report.
(**) The labels shown in the table are recommended labels; they are recognized by PME Alarms and categorized as Asset Monitoring alarms. PME creates measurement definitions based on the digital input labels. You can use different labels if necessary.

3. Configure the analog inputs on the devices for the generator engine measurements, for each generator, with the following labels:

NOTE: PME includes an ION framework template for the generator analog input measurements. This template provides a starting point for configuring ION devices to monitor generator engine data. If you use ION devices to monitor these inputs, see ION device frameworks for EPSS monitoring for more information.

Signal	Label(**)
Engine Temperature (or Coolant Temperature)	Engine Temp
Exhaust Gas Temperature (if single exhaust)	Ex Gas Temp
Exhaust Gas Temperature Left (if dual exhaust)	Ex Gas L Temp
Exhaust Gas Temperature Right (if dual exhaust)	Ex Gas R Temp
Engine Oil Pressure(*)	Engine Oil Prssr
Other Engine related measurements, for example battery voltage(*)	<your custom label>

(*)These signals are not required for the Generator EPSS Test module. They can optionally be included in the EPSS report.
(**) The labels shown in the table are recommended labels. PME creates measurement definitions based on the analog input labels. You can use different labels if necessary.

4. Configure logging on the devices for the following parameters:

   Do not use software logging for the ATS and generator status data. Software logging introduces unpredictable time delays which result in low timestamp accuracy for the logged data. Always use device on-board logging for this data.

Parameter	Type	Channels/Msrmnts	Logging Interval
ATS Status Signals	Digital Input Statuses	3-4	Log all ATS statuses every time one of the ATS statuses changes. **NOTE:** When one of the ATS statuses changes, all the ATS statuses must be logged with the same timestamp.

Parameter	Type	Channels/Msrmnts	Logging Interval
Generator Status Signals	Digital Input Statuses	2-4	Log all generator statuses every time one of the generator statuses changes. **NOTE:** When one of the generator statuses changes, all the generator statuses must be logged with the same timestamp.
Generator Engine Data	Analog Input Measurements	2 or more	Log engine data with a 1-minute logging interval. **NOTE:** Use the generator Run signal to start the logging and the Stop signal to end the data logging.
ATS Load Data	3-Phase Power System Measurements(*)	kW tot or kVA tot	Log ATS load data with a 1-minute logging interval. **NOTE:** Use the ATS Test and Emergency signals to start the logging and the Normal signal to end the data logging.
Generator Electrical Data	3-Phase Power System Measurements	Vln a,b,c,avg; Vll ab, bc,ca,avg I a,b,c,avg; kW tot; kVA tot; PF sign tot; Frequency	Log generator electrical data with a 1-minute logging interval. **NOTE:** Use the generator Run signal to start the logging and the Stop signal to end the data logging.

5. (Optional) Configure the device to generate a Transfer Time alarm in PME for an EPSS run. See EPSS Transfer Time alarm for details.
6. (Optional) Configure the device for remotely switching the ATS into Test mode. See Remote control of ATS Test mode for details.

Next, define the generators, ATSs, and groups in the Generator Performance Configuration tool.

Step 2: Defining generators, ATSs, and groups in the Generator Performance Configuration tool:

1. Open the Generator Performance Configuration tool.
2. On the **Generators** tab, add a generator, set its nameplate rating, and map the sources and measurements for the electrical, engine, and status measurements.
3. Repeat step 2 for all the generators that are part of your emergency power supply systems.
4. On the **Transfer Switches** tab, add an ATS, set its priority level, and map the sources and measurements for the load and status measurements.
5. Repeat step 4 for all the ATSs that are part of your emergency power supply systems.
6. (Optional) On the **Equipment** tab, add any additional equipment for which you want to include data in the EPSS report. Map the source and measurement for this equipment.
7. On the **Groups** tab, add a group representing an EPSS, and assign the generators, ATSs, and equipment that are part of the EPSS to this group.
8. Repeat step 7 for all your emergency power supply systems.

NOTE: The groups you create with the Generator Performance Configuration Tool are available for selection as inputs to the Generator Test EPSS Report. All generators and transfer switches that are defined in a group are included in the report when that group is selected. You have the option to exclude generators and transfer switches in a group from a report by selecting this option in the report inputs section.

See Generator Performance Configuration Tool with EPSS Test Module for information on how to use the tool.

Next, generate Vista diagrams in the Generator Performance Configuration tool.

Step 3: Generating Vista diagrams in the Generator Performance Configuration tool:

1. Open the Generator Performance Configuration tool.
2. Confirm that the Generators, ATSs, and Groups are defined.
3. On the **Groups** tab, click Generate Vista Diagrams.

See Generator Performance Configuration Tool with EPSS Test Module for information on how to use the tool.

Next, configure and save the EPSS Test report in Reports.

Step 4: Configuring and saving the EPSS Test report in Reports.

1. Open Reports in PME Web Applications.
2. Add a new Backup Power > Generator Test EPSS Report.
3. Set the report input parameters and save the report.

See Generator Test EPSS Report for information on report input parameters.

Configure Generator Load Summary Report

⚠ WARNING

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To configure the Generator Load Summary Report:

1. Set up the monitoring device that records the generator electrical data in PME. See Supported measurements and devices for details on which measurements are required.
2. Create a Generator in the Generator Performance Configuration Tool with EPSS Test Module, and define, at a minimum, the following fields for this Generator:
   - **Name** - Enter a name for the generator.
   - **Electrical Data** - Select the Source of the electrical measurement data for the generator. Enter the generator Nameplate Rating and select the Unit.
   - **Status Measurements** - Select the Source of the generator Status Measurements, and the measurements used to indicate the Running and Stopped states.
3. (Optional) Repeat step 2 to add additional generators.
4. Create a Group in the Generator Performance Configuration Tool with EPSS Test Module, and define, at a minimum, the following fields for this Group:
   - **Name** - Enter a name for the group.
   - **Generators** - Select the Generators you created in step 2.
5. Open the report template in the Reports Web Application, set the report input parameters, and generate the report.

NOTE: The groups you create with the Generator Performance Configuration Tool are available for selection as inputs to the Generator Load Summary Report. All Generators that are defined in a group are included in the report when that group is selected. You have the option to exclude generators in a group from a report by selecting this option in the report inputs section.

For information on how to use the report, see Generator Load Summary Report.

Configure UPS Performance

UPS Performance includes the UPS Auto Test Report and the UPS Battery Health Report.

⚠ WARNING

INACCURATE DATA RESULTS

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- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

Configure the UPS Auto Test Report

To configure the UPS Auto Test Report:

1. Set up the UPS devices in PME.

   NOTE: See Supported measurements and devices for information on supported UPS devices for this report.

2. Set up the UPS ION framework in the VIP. See Setting up the UPS Auto Test ION framework in the VIP for details.
3. Define the UPS devices in the UPS Configuration Tool.
4. Define a Group in the UPS Configuration Tool and add the UPS devices to the group.
5. Generate the Vista diagrams with the UPS Configuration Tool and configure the diagrams. See Setting up the Vista Diagram for UPS Auto Test for details.
6. Open the report template in the Reports Web Application, set the report input parameters, and generate the report.

For information on how to use the report, see UPS Auto Test Report.

Configure UPS Battery Health Report

To configure the UPS Battery Health Report:

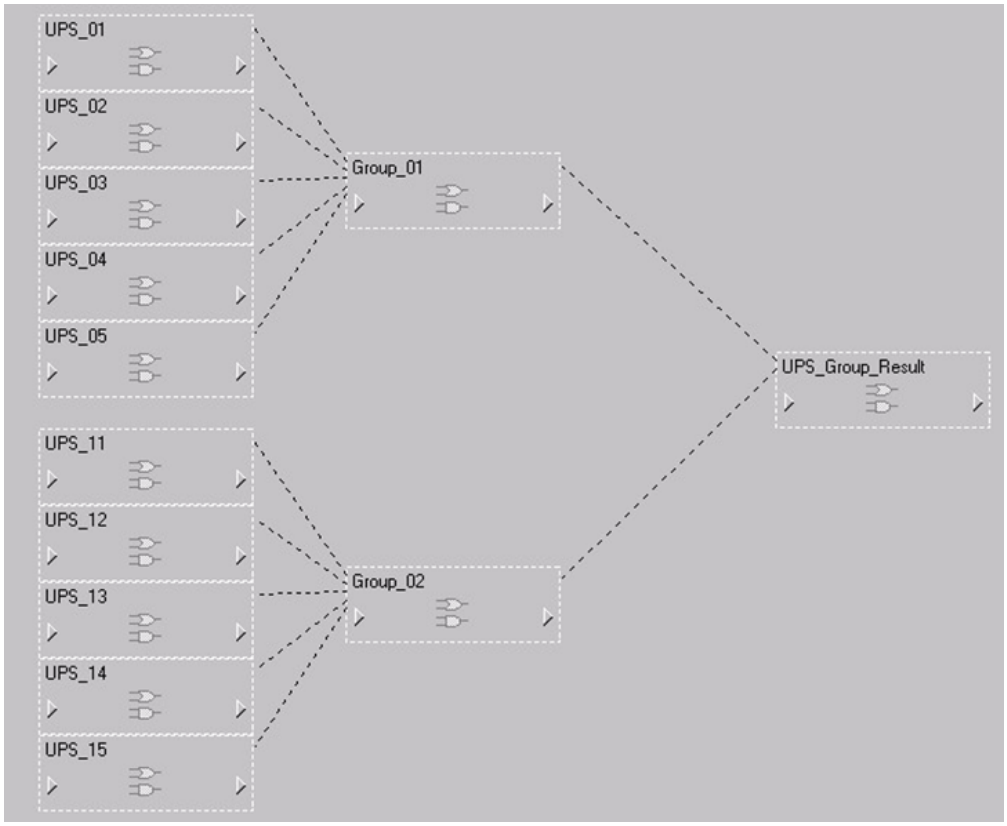
1. Set up the monitoring device that records the battery voltage. See Set up the UPS Battery Health monitoring device for information on how to configure the device. See Supported measurements and devices for details on which measurements are required
2. Open the report template in the Reports Web Application, set the report input parameters, and generate the report.

For information on how to use the report, see UPS Battery Health Report.

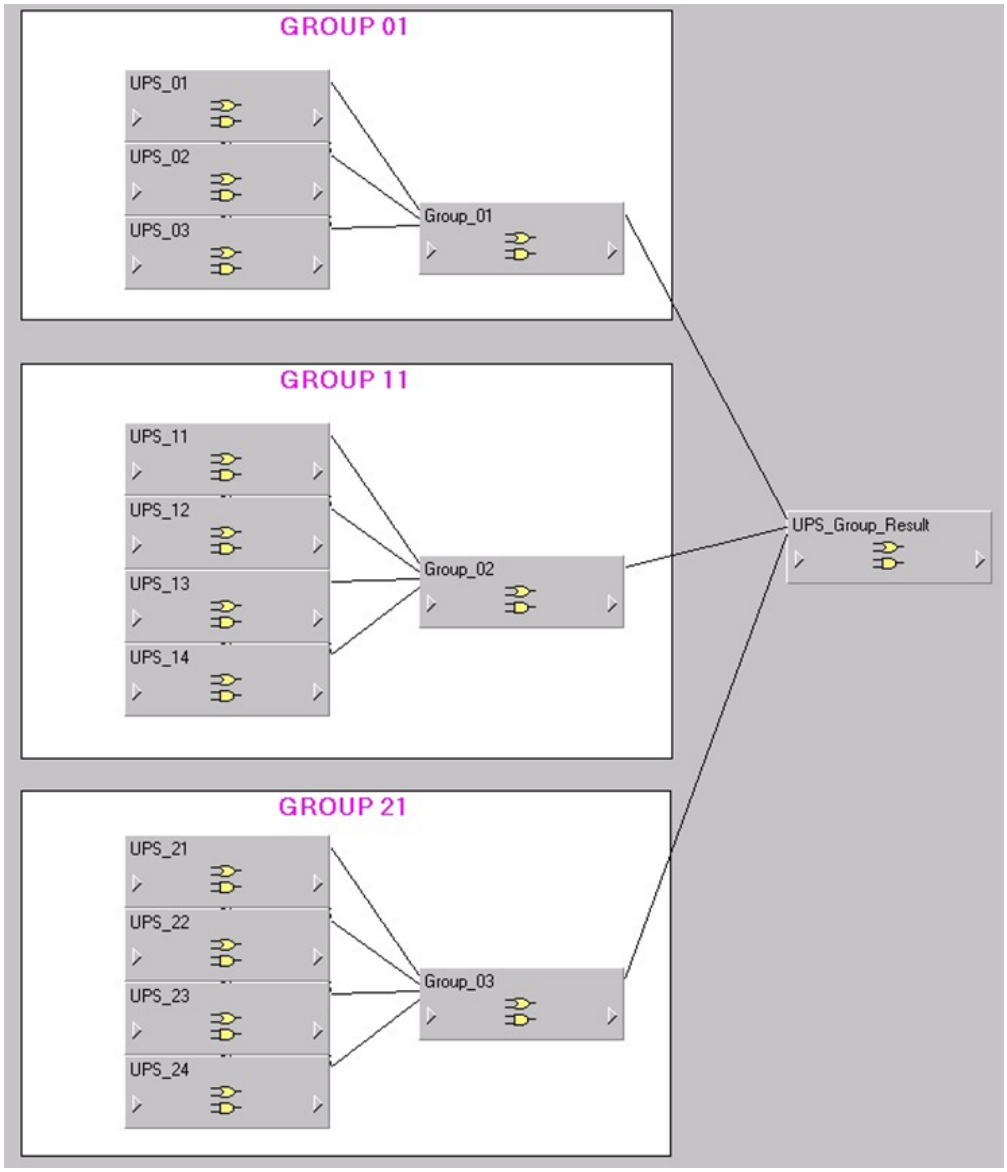
Setting up the UPS Auto Test ION framework in the VIP

To paste a UPS framework in VIP:

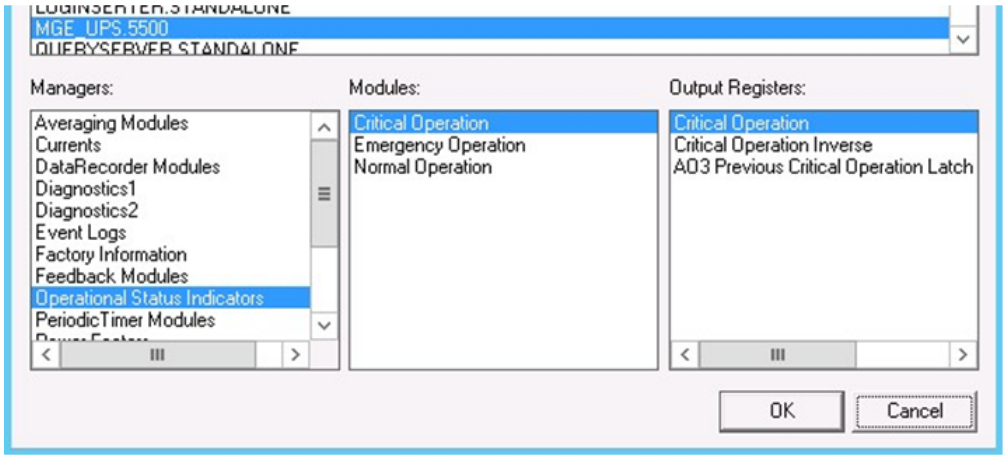
1. Open Designer and open the VIP.<*server_name*>.node.
2. Drag a Grouping Object and open it. Make sure that the toolbox is available (**Options > Show toolbox**).
3. Select **Edit > Paste from framework**, find `UPS Alarming Status.fwn` under `...\config\fmwk\EPSS\`, and free paste the framework into the Grouping object.
4. Set up the framework and customize it to match your system configuration. The default template assumes that you have two groups with five UPSs in each group.



The following example shows an instance where the user has three groups with a different UPS in each group:



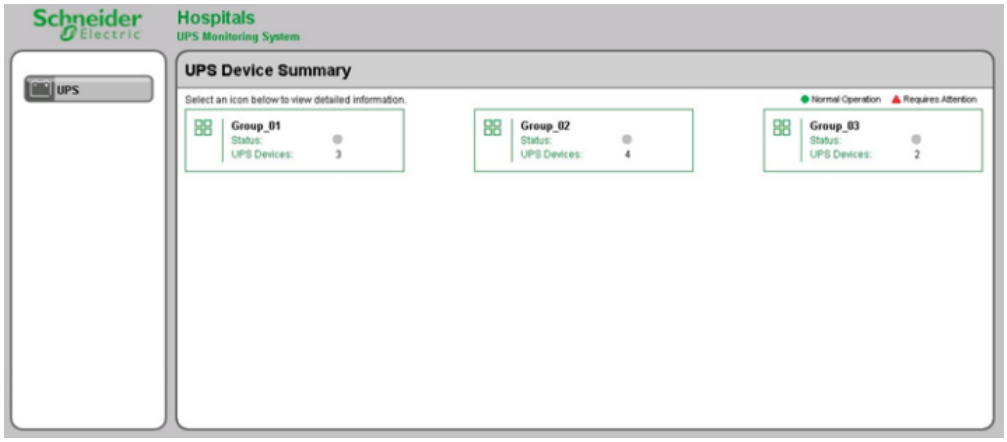
5. Connect the inputs of each AND/OR module (UPS) to the critical operation and battery usage status from the UPS devices.



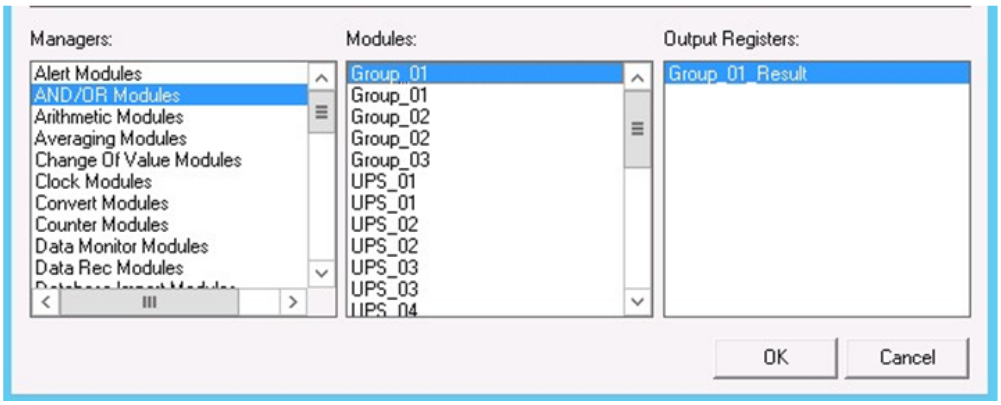
6. Repeat this step for each UPS in the group and for all UPSs in the other groups.
7. Save the framework.

Setting up the Vista Diagram for UPS Auto Test

1. Browse to `...\config\diagrams\ud\UPS\UpsGroups.dgm`.



2. Link the status object from the framework that you pasted in VIP in the previous steps.



3. Repeat step 2 for all other groups. Your UPS Monitoring system is now setup.

NOTE: Any UPS in the groups that require attention show a red indicator.

Set up the UPS Battery Health monitoring device

NOTE: The devices used for monitoring the UPS electrical data for the UPS Battery Health Report must be able to run an ION framework and must have a V4 input for capturing the battery voltage waveform. Only the following devices meet those requirements:
- ION9000
- ION7650
- ION7550

Other devices cannot be used for this application.

Basic setup

Install and configure the monitoring device. Refer to the device Installation Guide for more information. Obtain the latest version of these documents from www.schneider-electric.com.

Connect the monitoring device to the UPS as follows:

- Connect V1 - V3 to the UPS outputs. The voltage inputs must have PTs to isolate the ground from the system being monitored and the battery.
- Connect V4 of the monitoring device to the positive side of the battery. Input impedance of V4 terminal, for the devices listed above, is 5 MOhm (phase - Vref).
- Connect Vref on the monitoring device to battery ground.
- Fusing must be installed according to the meter installation instructions.
- Perform a visual inspection of the connections to ensure there is physical separation between the system connected to V1, V2 and V3, and the battery connected to V4.
- For other wiring options with PTs, see the monitoring device Installation Guide.

⚠ ⚠ DANGER

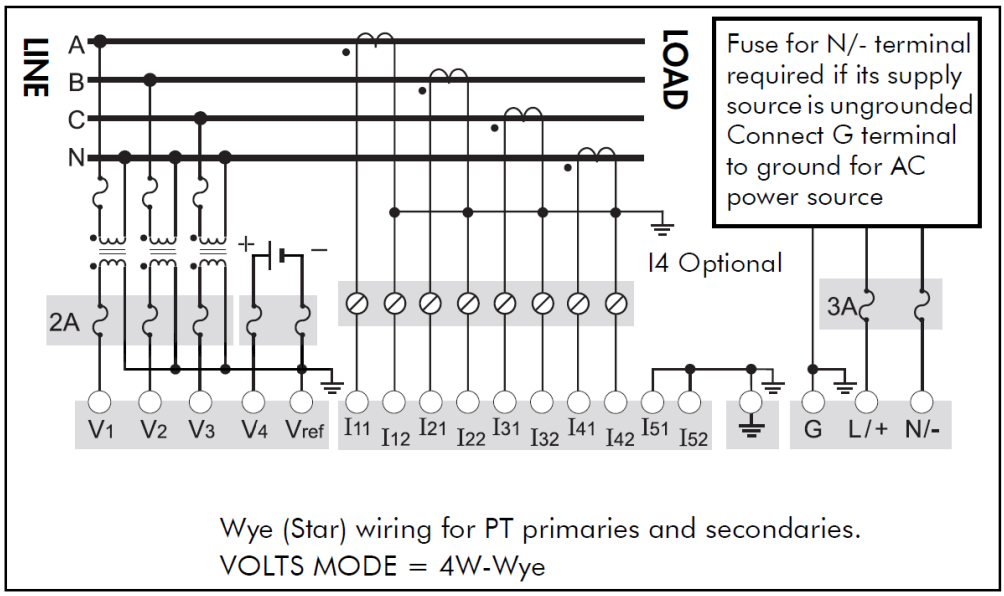
ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Treat the battery circuit as energized to the category of the installation.

Failure to follow these instructions will result in death or serious injury.

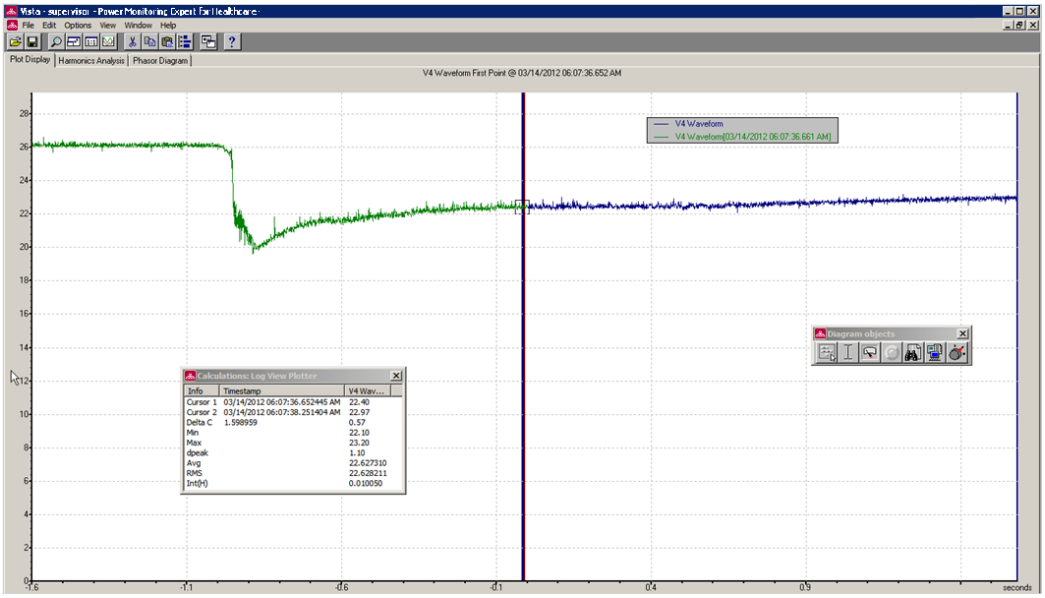
Refer to the following diagram as an example for connections to the meter.

4-Wire Wye, 3-Element, 3 PTs Connection Diagram



Setting up the UPS Battery Health framework

The UPS Battery Health framework is designed to capture and record a UPS's battery voltage signature at start up. This voltage signature provides some indication of the health of the UPS's battery bank. A typical waveform capture of the voltage drop when the UPS comes online is shown below:

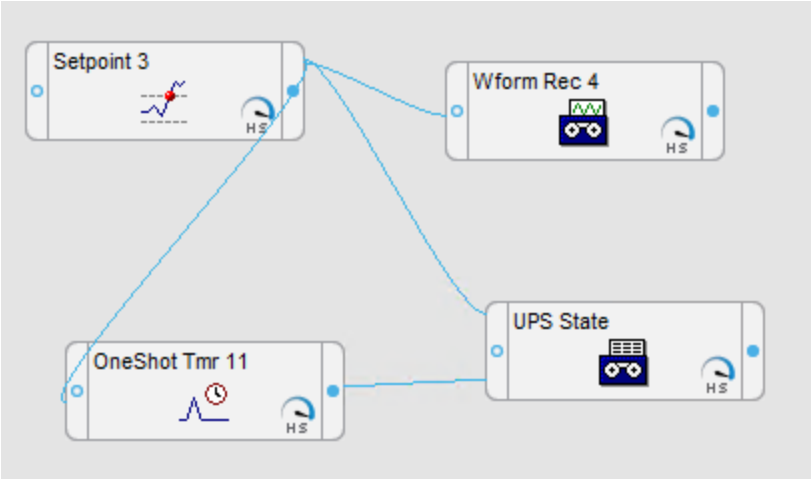


Note the following items about this example:

- This capture shows about 4 - 5 seconds' worth of data, accomplished via one (1) waveform recorder configured at a resolution of 512 x 4.
- The voltage does not immediately recover to its original value but it begins to ramp up.
- There is about 0.5 seconds of data before the voltage drop to approximately 20 V.

To paste the framework into the ION monitoring device:

1. Open Designer and open the device node of the monitoring device.
2. Drag a Grouping Object and open it. Make sure that the toolbox is available (**Options > Show toolbox**).
3. Select **Edit > Paste from framework**, find `UPS Battery Health.fwn` under `...\config\fmwk\EPSS\`, and free paste the framework into the Grouping object.
4. Link the Setpoint module Source input to the high speed Vln a input of the Power Meter module of the monitoring device. This input triggers the waveform capture during the UPS test when the UPS output turns on.



5. Check that the waveform recorder input is linked to the V4 output of the Data Acquisition module.
6. Save the framework.

Breaker Performance Module configuration

NOTE: This module requires a separate license. See Licensing for more information.

The Breaker Performance Module monitors aging and wear of circuit breakers and reports on breaker protection settings. It provides historical and real-time information for aging and wear related breaker parameters. You can also set up alarming on these parameters.

The following reports and diagrams are part of this module:

- Breaker Aging Report
- Breaker Settings Report
- Breaker Aging Vista diagrams

To use the reports and diagrams in this module, the module must be configured and the measurement data must be available as historical data logs in the database.

NOTE: Only certain Low Voltage, Schneider Electric breakers are supported by this module, see Supported devices for more information.

Configure the Breaker Aging Report

To configure the Breaker Aging Report and Vista diagrams:

1. Set up the breakers in the Management Console in PME
2. Set up the breaker aging calculations in PME. See Set Up the Breaker Aging Calculations for details.
3. Configure Breaker Devices, Switchboards, and Groups in the Breaker Configuration Tool .
4. Configure the breaker aging ION framework in the VIP. See Pasting the Circuit Breaker Framework in VIP for details.
5. (For the report) Open the report template in the Reports Web Application, set the report input parameters, and generate the report.
6. (For the Vista diagrams) Use the **Generate Vista Diagrams** function in the Breaker Configuration Tool to create the diagrams. Configure the diagrams after they have been generated. See Configuring Breaker Aging Vista diagrams for details. View the diagrams in Vista or in Web Applications Diagrams.

Configure the Breaker Settings Report

To configure the Breaker Settings Report:

NOTE: Step 2 in the workflow description below is optional. You can run the Breaker Settings Report without configuring the breakers in the Breaker Configuration Tool. The benefit of configuring breakers in the tool is that the breakers can be grouped and associated with switchboards for reporting. Also, if you want to run the Breaker Aging Report on the same breakers, you must configure them in the tool.

1. Set up the breakers in the Management Console in PME.
2. (Optional) Configure Breaker Devices, Switchboards, and Groups in the Breaker Configuration Tool.

NOTE: Clear the **Enable Breaker Aging** check box, in the Breaker Devices tab of the configuration tool, for breakers that are only used for the Breaker Settings Report. In that case only the **Name** and **Source** fields are required. To configure a breaker that is used for the Settings report and the Aging report, check the **Enable Breaker Aging** box and define all the required fields.

3. To run the report, open the report template in the Reports Web Application, set the report input parameters, and generate the report.

NOTE: PME checks the settings of a new breaker device as soon as the device has been added to the system. However, there can be a time delay until the settings data is available in the database for reporting. After the initial check, PME checks the breaker settings for updates every 24 hours.

NOTE: The groups you create with the Breaker Configuration Tool are available for selection as inputs to the Breaker Performance reports. All breakers that are defined in a group are included in the report when that group is selected.

For information on how to use the reports, see Circuit Breaker Aging Report and Circuit Breaker Settings Report.

Related topics:

Breaker Performance Module topics

- Breaker Performance Module Design
- Breaker Performance Module configuration
- Breaker Performance Module operation

Other Software Modules

- Backup Power Module configuration
- Capacity Management Module configuration
- Energy Analysis Dashboard Module configuration
- Energy Analysis Reports Module configuration
- Energy Billing Module configuration
- Event Notification Module configuration
- Insulation Monitoring Module configuration
- Power Quality Performance Module configuration

Set Up the Breaker Aging Calculations

The breaker aging and wear calculations and assessments are performed by a background service in PME. This service automatically detects compatible breaker devices that are configured in the Management Console. The service connects to these breakers, retrieves the relevant data and then performs the necessary calculations.

Setting up the breaker aging calculations includes the following steps:

- Starting the ION Software Modbus Gateway Service
- Adding a new calculation service provider
- Adding a new site for the calculation service
- Adding a Breaker Aging and Wear Provider device

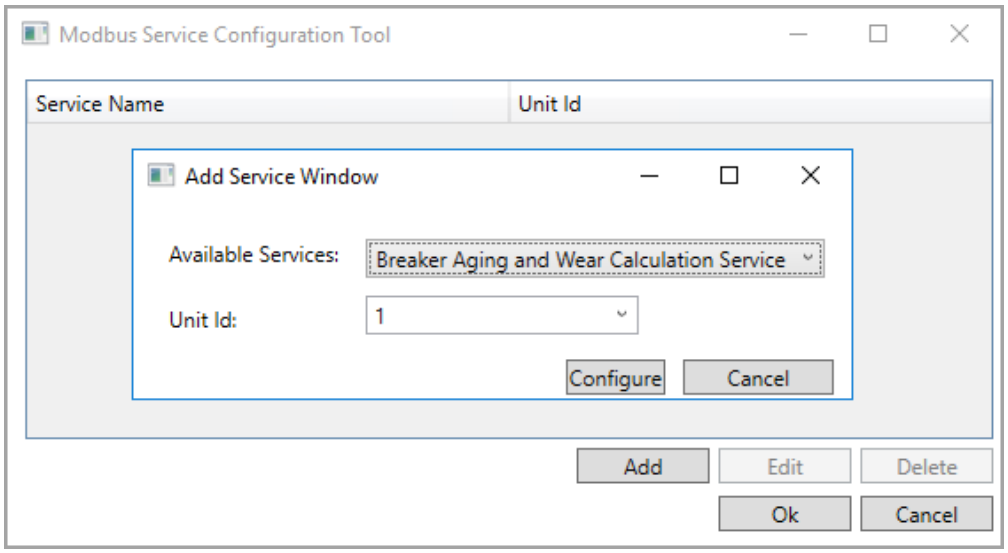
See the descriptions below for details on how to complete these tasks.

To start the ION Software Modbus Gateway Service,

1. Open the Windows Services panel, for example through **Administrative Tools** > **Services**.
2. Find and start the **ION Software Modbus Gateway Service** and set the **Startup type** to **Automatic**.

To add a new calculation service provider,

1. In File Explorer, navigate to `...\Power Monitoring Expert\system\bin` and run `ModbusServiceConfigurationTool.exe`.
2. In Modbus Services Configuration Tool, click **Add**.
3. From **Available Services** select **Breaker Aging and Wear Calculation Service**.



4. In **Unit ID** enter a value of `1` if this is the first service provider you are adding. Otherwise, enter the next incremental value for Unit ID.
5. Click **Configure**.
6. In Breaker Aging Service Configuration, review the settings and leave the values at their defaults. The defaults are a **Real Time Request Polling Interval** of 5 seconds and a **Real**

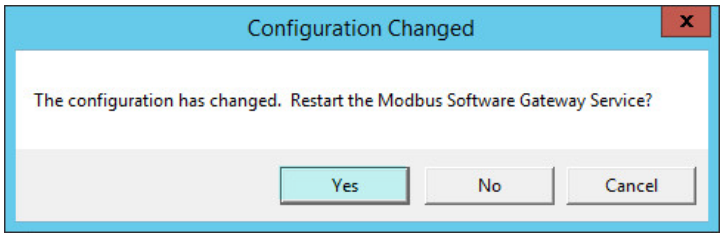
Time Request Priority Level of 0. Click **OK**.

NOTE: These settings control the real-time data requests for breaker aging and wear calculations. These settings do not affect other real-time data requests in the system, such as for Vista, Diagrams, or Gadgets. Only modify these settings if certain load conditions in the system require a change in the polling priority and frequency of meter real-time data.

Real Time Request Priority Levels:

Frequency (in seconds)	Priority
0	Low
250	Medium
500	High
1000	Intermediate
5000	Urgent
10000	Control

7. In Breaker Aging Service Configuration, click **OK**.
8. In Modbus Service Configuration Tool, click **OK**. A dialog appears informing you about the configuration change and the need to restart the ION Modbus Software Gateway Service.

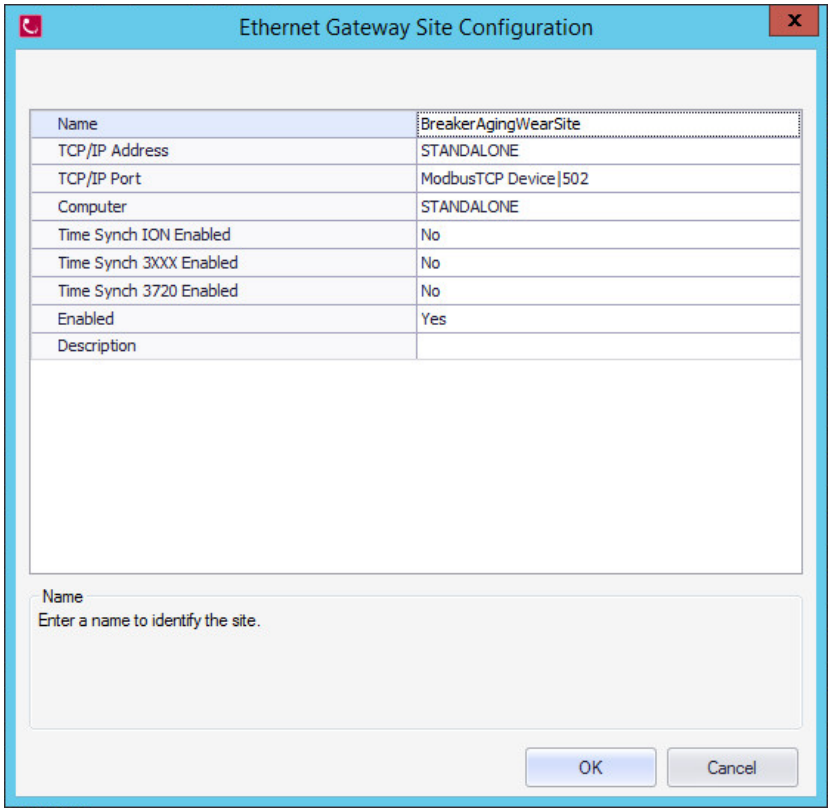


9. In Configuration Changed, click **Yes** to continue and to restart the ION Modbus Software Gateway Service.

To add a new site for the calculation service,

NOTE: You only need one site for the ION Modbus Software Gateway Service in your system. Skip these steps if you have already set up a site for other applications of the Modbus Software Gateway Service.

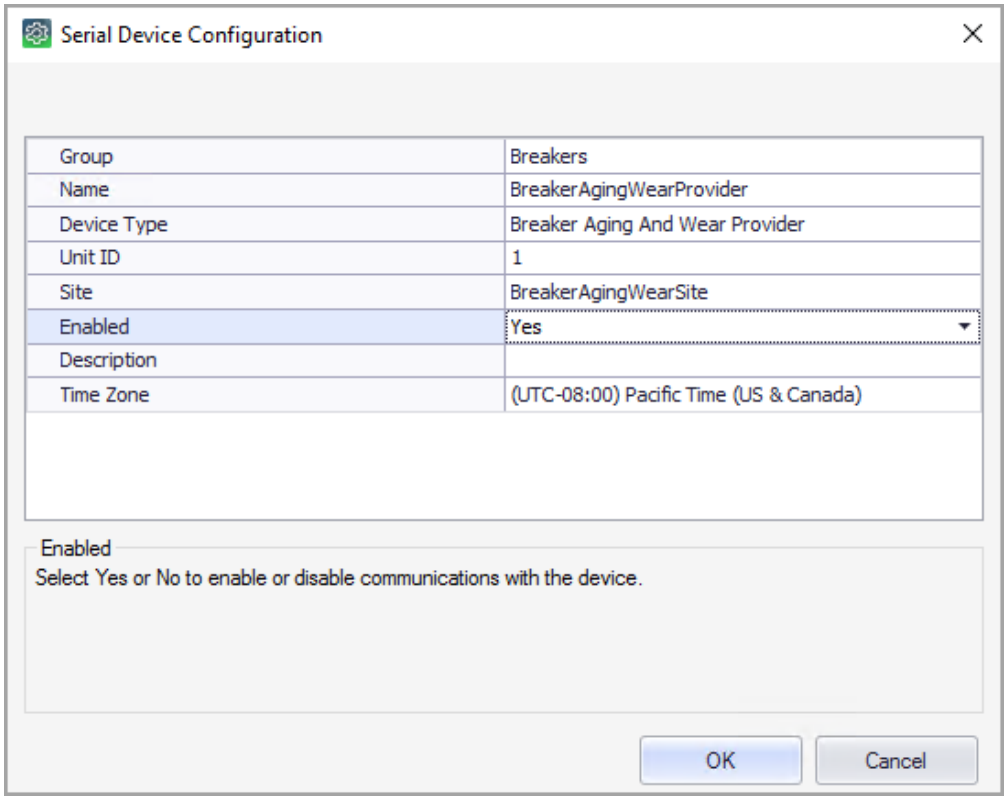
1. Open **Management Console** and log in with a supervisor-level account.
2. In the left pane, click **Sites**.
3. Add a new **Ethernet Gateway Site**. Enter the following information:
   - **Name**: Enter **BreakerAgingWearSite**.
   - **TCP/IP Address**: Enter <*Your local PME server name or IP address*>.
   - **TCP/IP Port**: Select **ModbusTCP Device|502**.



4. Click **OK**.

To add a Breaker Aging and Wear Provider device

1. Open **Management Console** and log in with a supervisor-level account.
2. In the left pane, click **Devices**.
3. Add a new **Serial Device on Ethernet Gateway Site**. Enter the following information:
   - **Group**: Enter **Breakers**.
   - **Name**: Enter **BreakerAgingWearProvider**.
   - **Device Type**: Enter **Breaker Aging And Wear Provider**.
   - **Unit ID**: Enter the same Unit ID you configured in the Modbus Service configuration tool.
   - **Site**: Select the **BreakerAgingWearSite**.
   - **Enabled**: Select **Yes**.



4. Click **OK**.

Pasting the Circuit Breaker Framework in VIP

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Do not use the software or devices for critical control or protection applications where human or equipment safety relies on the operation of the control action.
- Do not use an ION meter's digital output for any safety critical application.

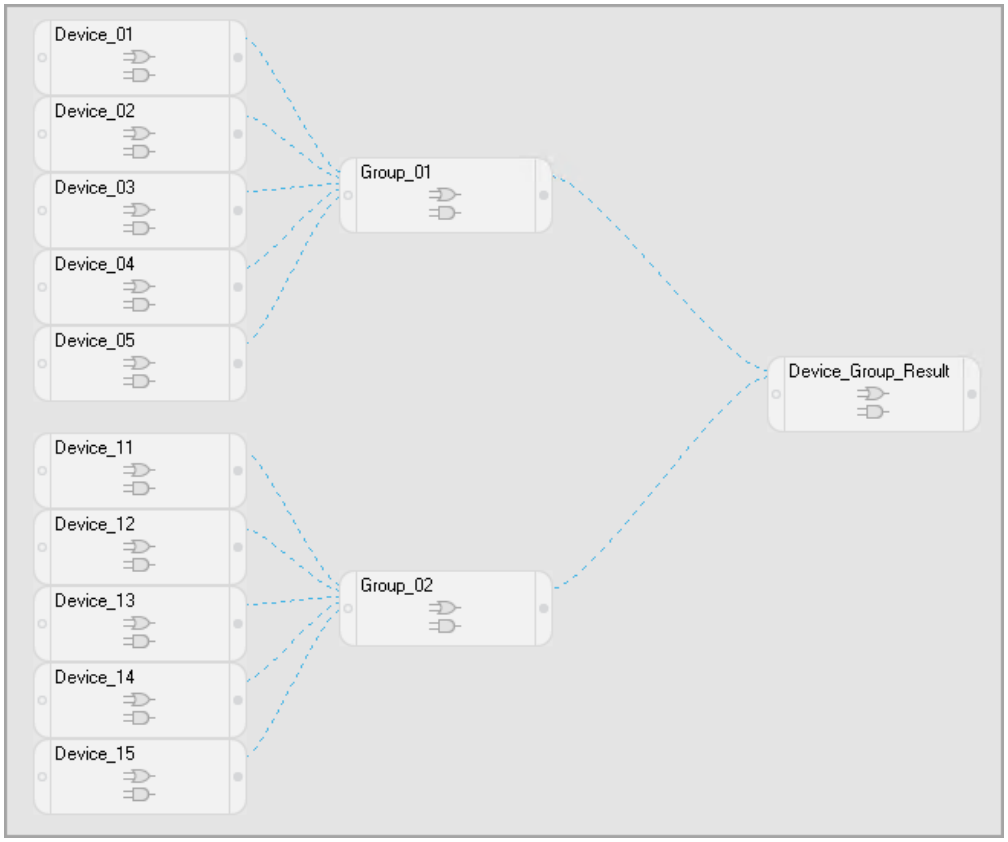
Failure to follow these instructions can result in death or serious injury.

NOTE: ION modules and registers must only be configured by personnel with a thorough understanding of ION architecture and the system in which the meters and software are installed.

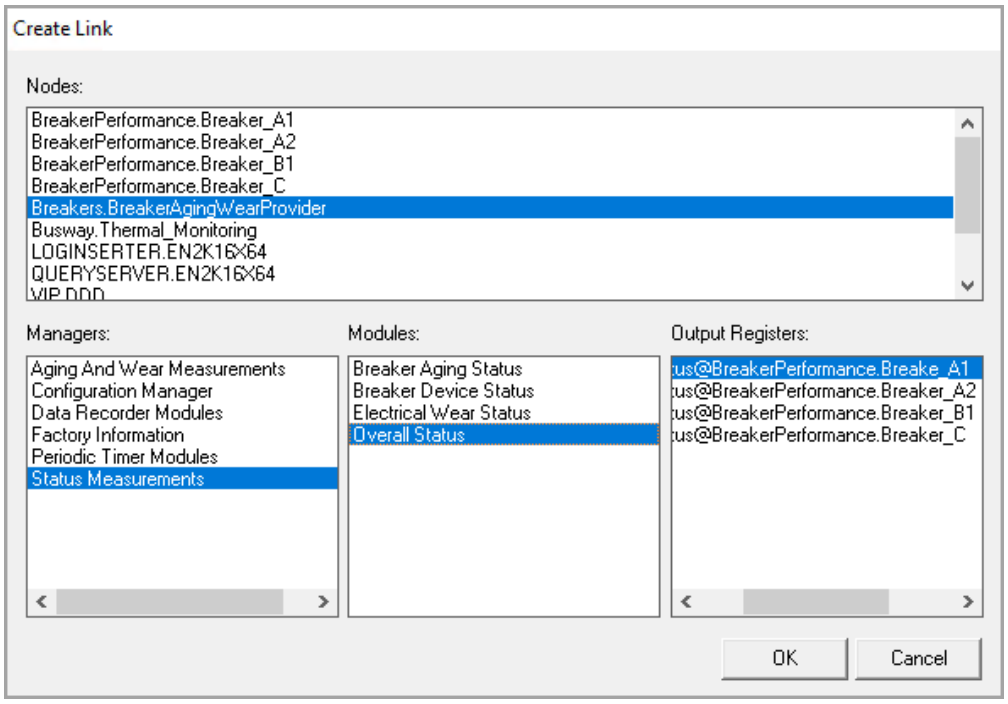
The VIP framework aggregates the overall aging and wear status of each breaker in a group to assess the group status. It also aggregates the status of each group in the system to assess the overall status for all breakers.

1. Open **Designer** and log in with a supervisor-level account.
2. Open the **VIP.DEFAULT** node.
3. Select **Edit > Paste from framework** and select the `...\config\fmwk\BreakerAging\CB Aging Grouping Status Framework.fwn` framework and paste it into the VIP.

   This framework is a template based on a breaker configuration with 2 groups and 5 breakers per group. Customize this template by adding modules for additional breakers or groups, or by removing not needed modules.



4. Connect the input of an AND/OR module labeled Device_<xx> to the Breaker Aging and Wear Provider overall status for the respective breaker device. Match the breaker/group pairing that you configured with the Breaker Configuration tool.



5. Repeat this step for each Circuit Breaker in each group as required.
6. Delete the Devices_<xx> and Groups_<xx> that do not exist, or add additional ones.
7. **Save & Save** the framework.

Configuring Breaker Aging Vista diagrams

The breaker aging diagrams are generated with the Breaker Configuration tool. This is part of configuring the Breaker Performance Module. The following steps assume that you have created these diagrams. See Breaker Performance Module configuration for details.

There are three different types of diagrams: Group summary diagram, group details diagram, and switchboard details diagram. Most of the measurements in these diagrams are automatically linked to the correct breaker information when the diagrams are created by the Breaker Configuration tool. You only need to manually link the group status indicators in the group summary diagram.

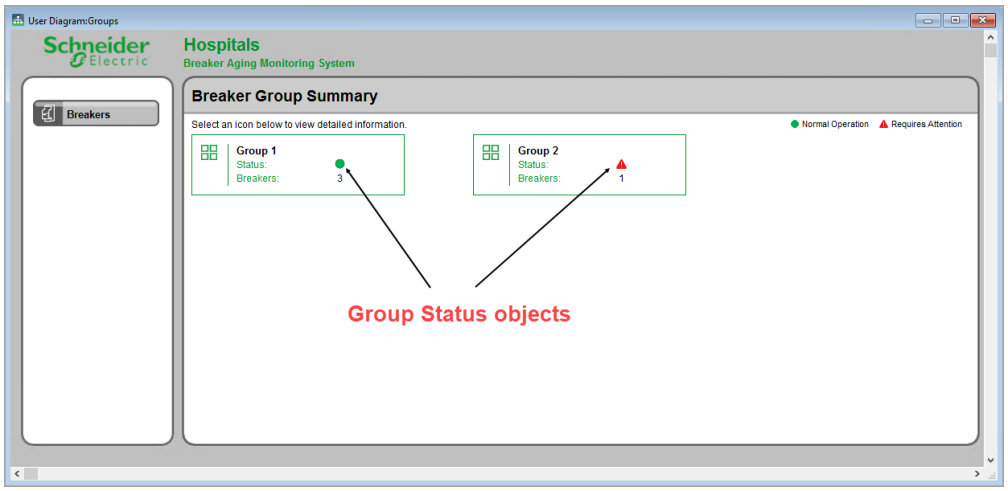
To link the group status indicators in the group summary diagram,

1. Open Vista and log in with a supervisor-level account.
2. Select **File** > **Open** and then choose `...\config\diagrams\ud\BreakerAging\Groups.dgm` to open the group summary diagram.

   NOTE: If you saved the diagrams in a location other than the default, then browse to that location to open the diagram.

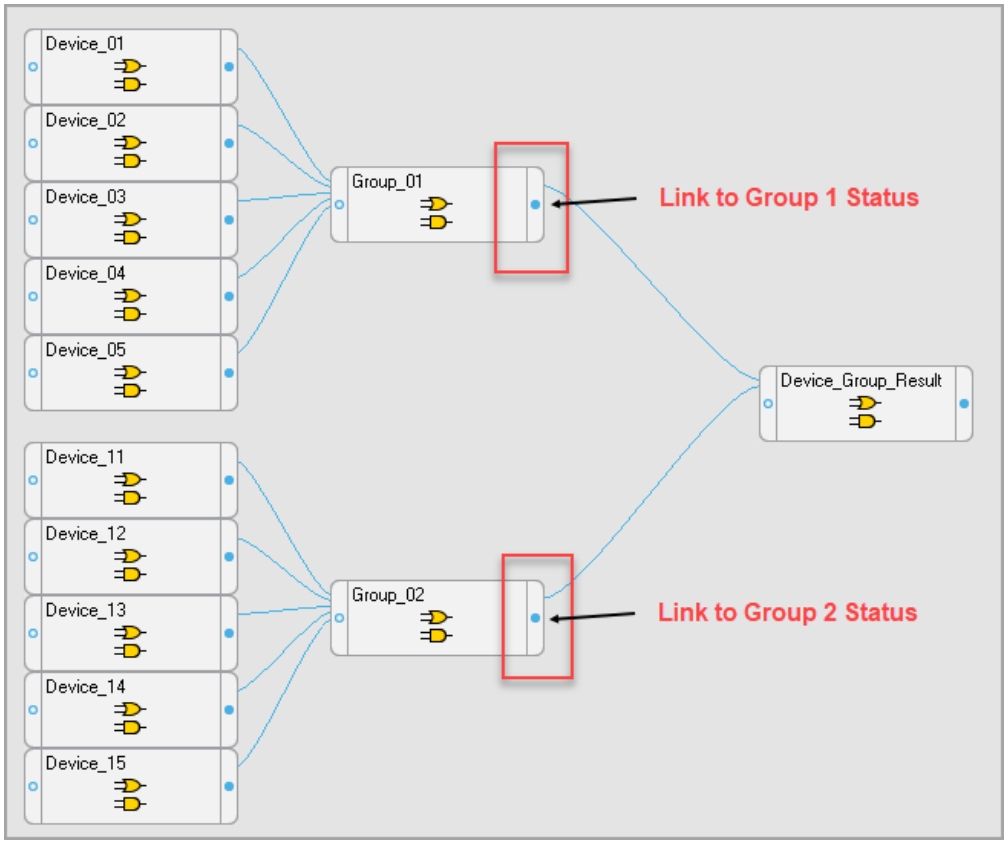
   The group summary diagram shows the group summary status and the number of breakers in the group for each of the groups setup with the Breaker Configuration tool.

   Example:



3. Manually link the group status object for each group to the output of the And/OR Module for the group in the Circuit Breaker Aging Status framework in the VIP.

   Example:



4. Save the diagram.

Capacity Management Module configuration

NOTE: This module requires a separate license. See Licensing for more information.

The Capacity Management Module provides generator, Uninterruptible Power Supply (UPS), and general equipment monitoring and reporting. It also includes transformer and UPS loss monitoring and reporting. The losses are reported in terms of energy and cost.

The following reports, diagrams, and tools are part of this module:

Reports	Diagrams	Tools
Branch Circuit Power Report	n/a	n/a
Equipment Capacity Report	Equipment Vista Diagrams	Generator Performance Configuration
Generator Capacity Report	n/a	Generator Performance Configuration
Generator Power Report	n/a	Generator Power Configuration Utility
Power Losses Report	n/a	Power Losses Configuration Utility
UPS Power Report	n/a	UPS Power Configuration Utility

To use the reports and diagrams in this module, the module must be configured and the measurement data must be available as historical data logs in the database.

For configuration information on the different reports, see:

- Configure the Branch Circuit Power Report
- Configure Generator and Equipment Capacity Reporting
- Configure Generator and UPS Power Reporting
- Configure the Power Losses Report

Related topics:

Capacity Management Module topics

- Capacity Management Module Design
- Capacity Management Module configuration
- Capacity Management Module operation

Other Software Modules

- Backup Power Module configuration
- Breaker Performance Module configuration
- Energy Analysis Dashboard Module configuration

- Energy Analysis Reports Module configuration
- Energy Billing Module configuration
- Event Notification Module configuration
- Insulation Monitoring Module configuration
- Power Quality Performance Module configuration

Configure the Branch Circuit Power Report

⚠ CAUTION

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.

Failure to follow these instructions can result in injury or equipment damage.

To configure the Branch Circuit Power Report:

1. Set up the monitoring device that records the branch circuit data. See Supported measurements and devices for details on which measurements are required.
2. Configure a hierarchy in PME using the `...\Power Monitoring Expert\applications\HierarchyManager\SampleTemplates\DataCenter\CustomerRackCircuitTemplate.xml` template.

   TIP: See Hierarchy Configuration Utility and Hierarchy Manager for information on how to install and maintain a hierarchy.

3. Open the report template in the Reports Web Application, set the report input parameters, and generate the report.

Configure Generator and Equipment Capacity Reporting

⚠ WARNING

INACCURATE DATA RESULTS

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- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

NOTE: Before starting the configuration, the monitoring devices must be installed, communicating and connected to the relevant electric circuits. Relevant generator digital outputs must be connected to the equivalent inputs on the monitoring devices.

To configure the Generator Capacity Report:

1. Add the devices that are monitoring the generators and loads to PME, using Management Console or Device Manager.

   See Supported Measurements and Devices for information on supported device types.

2. Configure the digital inputs on the devices for the generator status measurements, for each generator, with the following settings and labels:

Signal	Input Setup	Label(*)
Generator Stopped	Mode: KYZ Event Log: On Event Priority: 64	Gen Stop
Generator Running	Mode: KYZ Event Log: On Event Priority: 64	Gen Run

   (*) The labels shown in the table are recommended labels. PME creates measurement definitions based on the digital input labels. You can use different labels if necessary.

3. Configure logging on the devices for the following parameters:

Parameter	Type	Measurements	Logging Interval
Generator Electrical Data	3-Phase Power System Measurements	kW tot or kVA tot	Log generator electrical data with a 1, 5, or 15 minute logging interval, depending on the desired resolution. **NOTE:** Use the generator Run signal to start the logging and the Stop signal to end the data logging.
Load Data	3-Phase Power System Measurements	kW tot or kVA tot	Log load data with the same logging interval as the generator electrical data logging. **NOTE:** Use the generator Run signal to start the logging and the Stop signal to end the data logging.
Generator Status Signals	Digital Input Statuses	Generator Stopped Generator Running	Log all generator statuses every time one of the generator statuses changes. **NOTE:** When one of the generator statuses changes, all the generator statuses must be logged with the same timestamp.

4. Create a Generator in the Generator Performance Configuration Tool with EPSS Test Module, and define, at a minimum, the following fields for this Generator:
   - **Name** - Enter a name for the generator.
   - **Electrical Data** - Select the Source of the electrical measurement data for the generator. Enter the generator Nameplate Rating and select the Unit.
   - **Status Measurements** - Select the Source of the generator Status Measurements, and the measurements used to indicate the Running and Stopped states.
   - **Evaluation Method** - Select the Evaluation Method that is used for the generator test and the pass/fail criteria for the selected method.
5. (Optional) Repeat steps 1 and 2 to add additional generators.
6. Create a Group in the Generator Performance Configuration Tool with EPSS Test Module, and define, at a minimum, the following fields for this Group:
   - **Name** - Enter a name for the group.

- **Generators** - Select the Generators you created in step 2.
- **Load Sources** - Add the loads that are supplied by the generator.

7. To run the report, open the report template in the Reports Web Application, set the report input parameters, and generate the report.

For information on how to use the report, see Generator Capacity Report.

To configure the Equipment Capacity Reports:

1. Add the device that is monitoring the equipment load to PME, using Management Console or Device Manager.

   See Supported Measurements and Devices for information on supported device types.

2. Configure logging on the device for the following parameters:

Parameter	Type	Measurements	Logging Interval
Equipment Load Data	3-Phase Power System Measurements	kW tot, kVA tot, or I avg	Log load data with a 1, 5, or 15 minute logging interval, depending on the desired resolution.

3. Create an Equipment item in the Generator Performance Configuration Tool with EPSS Test Module, and define, at a minimum, the following fields for this Equipment:
   - **Name** - Enter a name for the equipment.
   - **Load Data** - Select the Source and Measurement for the load data. Enter the equipment Rating and select the Unit.
4. (Optional) Repeat steps 1 and 2 to add additional generators and transfer switches.
5. Create a Group in the Generator Performance Configuration Tool with EPSS Test Module, and define, at a minimum, the following fields for this Group:
   - **Name** - Enter a name for the group.
   - **Equipment** - Select the Equipment you created in step 2.
   - **Load Sources** - Add the loads that are connected to the equipment.
6. To run the report, open the report template in the Reports Web Application, set the report input parameters, and generate the report.

For information on how to use the report, see Equipment Capacity Report.

Configure Generator and UPS Power Reporting

⚠ WARNING

INACCURATE DATA RESULTS

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- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

To configure the Generator Power Report,

1. Set up the monitoring devices that record the load data. See Supported Measurements and Devices for details on which measurements are required.
2. Define the generator power system using the Generator Power Configuration Utility.
3. Open the report template in the Reports Web Application, set the report input parameters, and generate the report.

For information on how to use the report, see Generator Power Report.

To configure the UPS Power Report,

1. Set up the monitoring devices that record the UPS output data. See Supported Measurements and Devices for details on which measurements are required.
2. Define the UPS power system using the UPS Power Configuration Utility.
3. Open the report template in the Reports Web Application, set the report input parameters, and generate the report.

For information on how to use the report, see UPS Power Report.

Configure the Power Losses Report

⚠ WARNING

INACCURATE DATA RESULTS

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- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

To configure the Power Losses Report,

1. Set up the monitoring devices that record the input and output data for the transformers and UPS. See Supported Measurements and Devices for details on which measurements are required.
2. Define the power losses system using the Power Losses Configuration Utility.
3. Open the report template in the Reports Web Application, set the report input parameters, and generate the report.

For information on how to use the report, see Power Losses Report.

Energy Analysis Dashboard Module configuration

NOTE: This module requires a separate license. See Licensing for more information.

The Energy Analysis Dashboard Module includes dashboard gadgets that help you break down consumption by load type, visualize consumption cost, and do an 80/20 analysis to identify the largest consumers. You can identify consumption patterns and anomalies and compare different consumers over time.

The following gadgets are part of this module:

- Sankey gadget
- Pareto Chart gadget
- Aggregated Pareto Chart gadget
- Heat Map gadget
- Consumption Ranking gadget
- Aggregated Consumption Ranking gadget

⚠ WARNING

INACCURATE DATA RESULTS

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- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

No special configuration is required for this module. See Dashboards configuration for information on how to create a dashboard with gadgets.

Related topics:

Energy Analysis Dashboard Module topics

- Energy Analysis Dashboard Module design
- Energy Analysis Dashboard Module configuration
- Energy Analysis Dashboard Module operation

Other Software Modules

- Backup Power Module configuration
- Breaker Performance Module configuration
- Capacity Management Module configuration

- Energy Analysis Reports Module configuration
- Energy Billing Module configuration
- Event Notification Module configuration
- Insulation Monitoring Module configuration
- Power Quality Performance Module configuration

Energy Analysis Reports Module configuration

NOTE: This module requires a separate license. See Licensing for more information.

The Energy Analysis Reports Module includes reports that help you understand energy usage patterns to find energy waste, analyze transformer and circuit capacity and assess energy usage by process area or by product output. Use the energy modeling capabilities in this module, to forecast consumption, identify unexpected changes in your consumption, or identify actual savings as a result of energy management measures.

The following reports are part of this module:

- Create Model Report
- Duration Curve Report
- Energy Modeling Reports
- Energy Regression Analysis Report
- Energy Usage Per State Report
- KPI Report
- Multi Equipment Operation Report
- Power Usage Per State Report
- PUE Summary Report
- Single Equipment Operation Report
- Use Model Report

⚠ WARNING

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

To configure the Energy Modeling report, see Configuring the Energy Modeling report for special configuration information on this report.

To configure the PUE Summary report:

1. Set up the monitoring devices that record the report data. See Supported measurements and devices for details on which measurements are required.

   NOTE: To use the reports in this module, the measurement data must be available as historical data logs in the database.

2. Install the PUE VIP framework. See Loading the PUE framework into VIP.
3. Configure the framework. See Configure the PUE framework.
4. Create logical devices. See Creating Logical Devices.
5. Open the report template in the Reports Web Application, set the report input parameters, and generate the report.

TIP: For more information on the PUE Summary Report, see Terms and Definitions and PUE Summary Report Calculations .

To configure the Energy Analysis Reports Module (except the Energy Modeling report and the PUE report):

1. Set up the monitoring devices that record the report data. See Supported measurements and devices for details on which measurements are required.

   NOTE: To use the reports in this module, the measurement data must be available as historical data logs in the database.

2. Open the report template in the Reports Web Application, set the report input parameters, and generate the report.

For information on how to use the reports in this Module, see Energy Analysis Reports

Related topics:

Energy Analysis Reports Module topics

- Energy Analysis Reports Module design
- Energy Analysis Reports Module configuration
- Energy Analysis Reports Module operation

Other Software Modules

- Backup Power Module configuration
- Breaker Performance Module configuration
- Capacity Management Module configuration
- Energy Analysis Dashboard Module configuration
- Energy Billing Module configuration
- Event Notification Module configuration

- Insulation Monitoring Module configuration
- Power Quality Performance Module configuration

Configuring the Energy Modeling report

Before you can use the modeling report, you must first create a model for your facility or process with the Create Model Report. This model is then used in the Use Model Report. You only use the Create Model report during configuration. After the model has been created, you do not need to run this report again, unless you want to create a new model.

To create a model and use the Energy Modeling report:

1. Run the Create Model report with an initial set of parameters and analyze the results. Select **No** for the **Save Model Configuration** input parameter.

   TIP: Consider choosing a reporting period with normal consumption behavior to create your model. For example, a good period could be "Last Year".

2. Based on the results, define sub-models and exception periods, if applicable.
3. Re-run the Create Model report using sub-models, exception periods, and modified input parameters and analyze the results.
4. Repeat steps 2 and 3 until you are satisfied with the accuracy of the model.
5. Run the Create Model report one more time, select **Yes** for the **Save Model Configuration** and enter a meaningful model name. This saves your model to the database.
6. Run the Use Model report with the model you created. Ensure that the sub-models and exception periods are correctly defined for the reporting period.
7. (Optional) Setup a subscription to run the Use Model report on a regular basis. Select **Yes** for the **Insert Date** input parameter. This saves the model output data to the database. You can use this data in the Trends and Dashboards applications.

Defining a sub-model

Sub-models are used to improve the accuracy of the overall model by recognizing time intervals or operating conditions with different consumption characteristics. For example, using a sub-model that differentiates between weekdays and weekend days can be more accurate for processes that are influenced by a workweek pattern, than using a single model for all days. Which sub-model works best depends on the nature of the facility or process.

Sub-models are defined with the **Modeling Configuration** tool in the **Settings > System > Modeling** area of the Web Applications. Use one of the pre-defined sub-models or create your own.

To define a sub-model:

1. In Modeling Configuration, select the **Sub-Models** tab.
2. Click Insert + in the top right corner of the window to switch to insert mode.
3. Enter a **Sub-Model Name**, select a **Minimum Aggregation Interval**, and enter a **Desired Label**, and **Condition** in the input boxes at the top of the main display grid.

   The Condition must be a valid SQL query statement.

4. Click Insert + to the right of the input boxes to insert the new sub-model definition. The definition is moved to the bottom of the main display grid, below any pre-existing sub-model definitions.

5. Click Search in the top right corner of the window to switch back to search mode.
6. (Optional) To edit an existing definition, click Edit to the right of the definition in the display grid, or click any of the fields of the definition in the grid. To update the definition, after editing it, click Update, to cancel click Cancel. To delete a sub-model definition, click Delete.

Defining exception periods

Exception periods are special time intervals, such as holidays, with unpredictable consumption behavior that is different from the rest of the time period. Exception periods can be defined down to a specific time interval for a specific source and measurement.

You can either choose to model these exception periods separately, which means they will become a sub-model, or you can choose to exclude them from the model completely.

Exception periods override sub-model definitions if they cover the same time period. For example, you could define a holiday, a day your facility was in shutdown, or a day when you performed system tests, as an exception period. If that day was a weekend day and you are using a sub-model to differentiate between weekdays and weekend days, then the exception period overrides the sub-model, which means that special day will be modeled differently than a regular weekend day.

Exception periods are defined with the **Modeling Configuration** tool in the **Settings > System > Modeling** area of the Web Applications.

To define exception periods:

1. In Modeling Configuration, select the **Exception Periods** tab.
2. Click Insert in the top right corner of the window to switch to insert mode.
3. Enter an **Exception Period Name**, select a **Source** and **Measurement**, enter a **Desired Label**, and **Condition** in the input boxes at the top of the main display grid.

   The Condition must be a valid SQL query statement.

   NOTE: The **Desired Label** is used to control if the exception period is excluded from the model, or if it is treated as a sub-model. Enter the text **Delete** as Desired Label if you want to exclude that period from the model. Enter any other text, for example a descriptive text such as Holiday, if you want to sub-model the exception period. An excluded exception period will be blank in the final model output graphic.

4. Click Insert to the right of the input boxes to insert the new exception period definition. The definition is moved to the bottom of the main display grid, below any pre-existing exception period definitions.
5. Click Search in the top right corner of the window to switch back to search mode.
6. (Optional) To edit an existing definition, click Edit to the right of the definition in the display grid, or click any of the fields of the definition in the grid. To update the definition, after editing it, click Update, to cancel click Cancel. To delete an exception definition, click Delete.

See a Model creation example.

Loading the PUE framework into VIP

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Do not use the software or devices for critical control or protection applications where human or equipment safety relies on the operation of the control action.
- Do not use the software to control time-critical functions.
- Do not use the software to control remote equipment without proper access control and status feedback.

Failure to follow these instructions can result in death or serious injury.

NOTE: ION modules and registers must only be configured by personnel with a thorough understanding of ION architecture and the system in which the meters and software are installed.

We recommend that you create a new VIP, VIP.Data_Center, to run the PUE framework. If your PME system already has a VIP.Data_Center, or if you want to use a different preexisting VIP, then you must be careful not to accidentally overwrite existing VIP modules when pasting the new framework.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Before pasting an ION framework verify that the system is not performing critical control actions that may affect human or equipment safety.
- Do not overwrite an existing ION framework in the VIP using lock paste.
- Verify correct system operation after pasting an ION framework.

Failure to follow these instructions can result in death or serious injury.

NOTE: If you choose to create a custom VIP, you need to update the PUE scripts, that create the logical devices, with the custom VIP name. See Creating Logical Devices for details on where to find the scripts.

To create a new VIP:

1. Open a Command Prompt window.
2. Change the current folder to `...\Power Monitoring Expert\system\bin`.
3. Type `vip -Service -NVIP.Data_Center` on the command line.

   This creates a VIP service with the name **VIP.Data_Center**.
4. Open the Windows Services panel.
5. Start the newly created VIP service.

To load the PUE framework into the VIP:

1. Open Designer, and select **File** > **Open**. Select the VIP.Data_Center from the **Select Node** box. Click **OK**.
2. (Optional) Create a grouping object in the VIP for the PUE framework. Open the grouping object to paste the framework into it.
3. Select **Edit** > **Paste from framework**. The **Paste from Framework** screen appears.
4. Browse to `...\Schneider Electric\Power Monitoring Expert\config\fmwk\DataCenter` and select the `PS4DC - Data Center VIP For Logical Devices.fwn` framework file from the DataCenter folder. Click **Open**.
5. In the Paste Summary, select the framework modules for lock paste, then click **OK**.

   NOTE: See Using the Paste Summary dialog for information on lock paste.

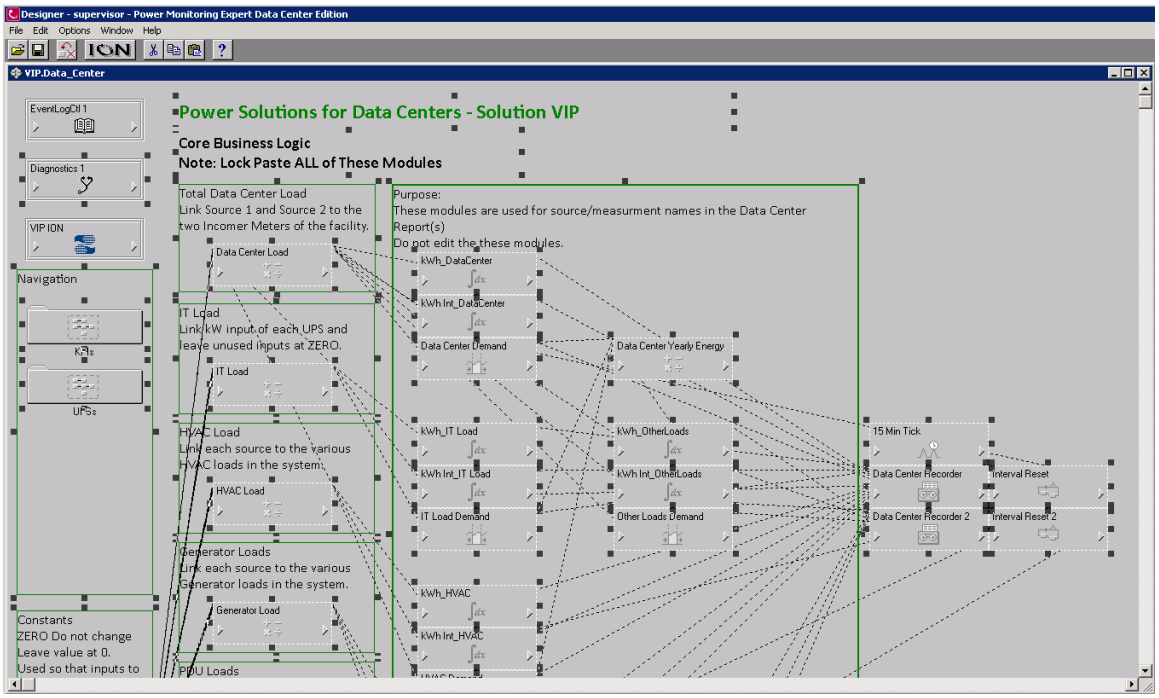
6. Click **Save** to safe the newly pasted framework in Designer.

Configure the PUE framework

Connect the VIP Registers

After the PUE framework is created in the VIP, you must link (connect to) the various types of data sources as shown below to bring in real-time data. Data sources include:

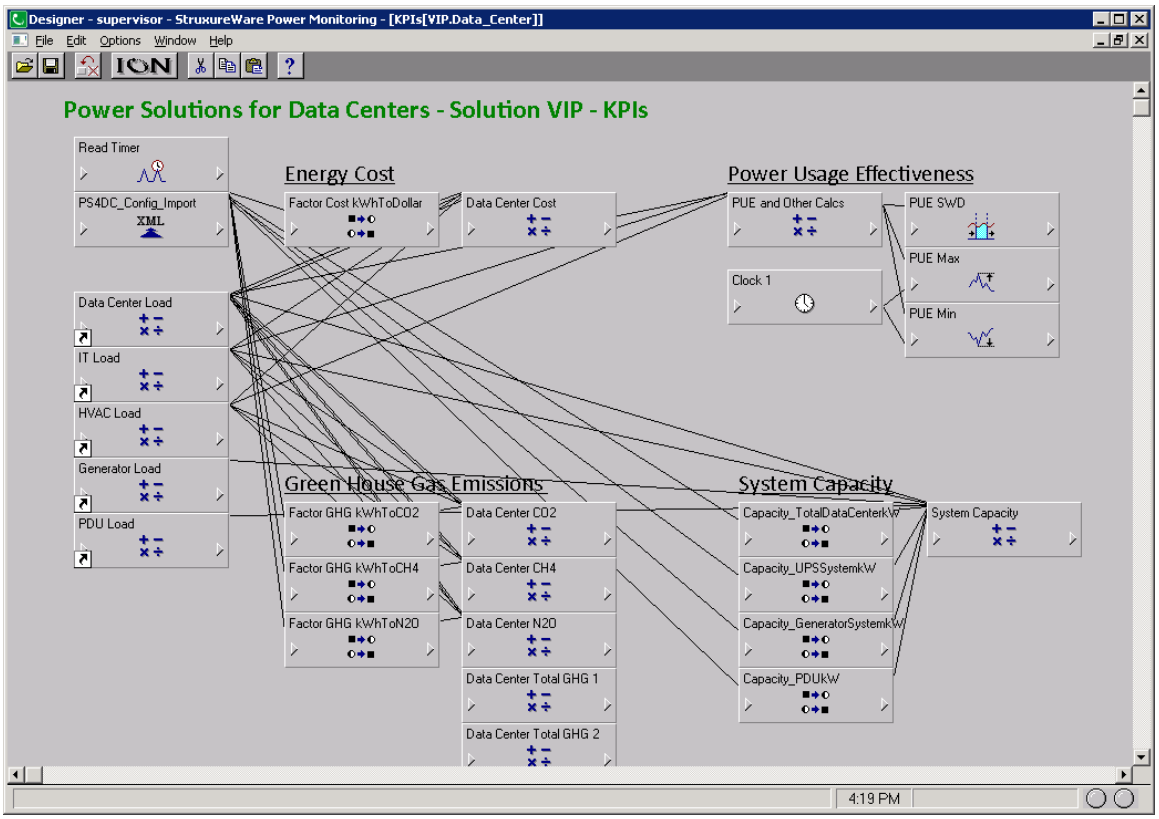
- Data Center incomers
- IT Load
- HVAC loads
- Generators
- PDUs



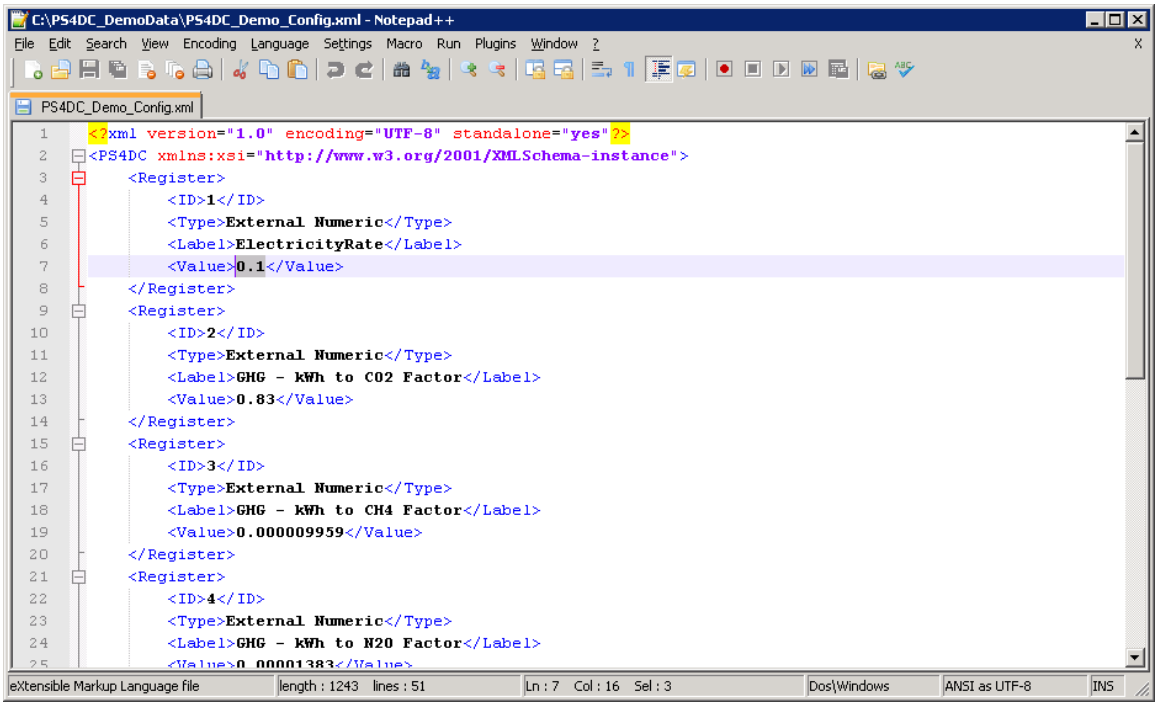
Link the data sources to the appropriate Arithmetic Module that aggregates (sums) the data. Be sure that all unused inputs are linked to the “zero” value, as unlinked inputs will cause a “N/A” output.

Update the XML Configuration file

The PUE framework refers to an XML file named `PS4DC_Config.xml` in order to import data, such as the electricity rate and system capacity limits. In order for the KPI screens to make sense for each customer, these values must be changed to match their facility. The file’s registers are linked to the VIP through an XML Import Module in the KPIs section of the VIP, as illustrated in the figure below.



The `PS4DC_Config.xml` XML configuration file is located in the `…\config\diagrams\ud\DataCenter\KPIs` folder. To edit the file, open it in a text editor and edit the `<Value>` tag, as shown below:



NOTE: To implement real-time energy costs or emissions factor, you can develop a script using a Visual Basic script or other technique that writes to the XML file in the specified format.

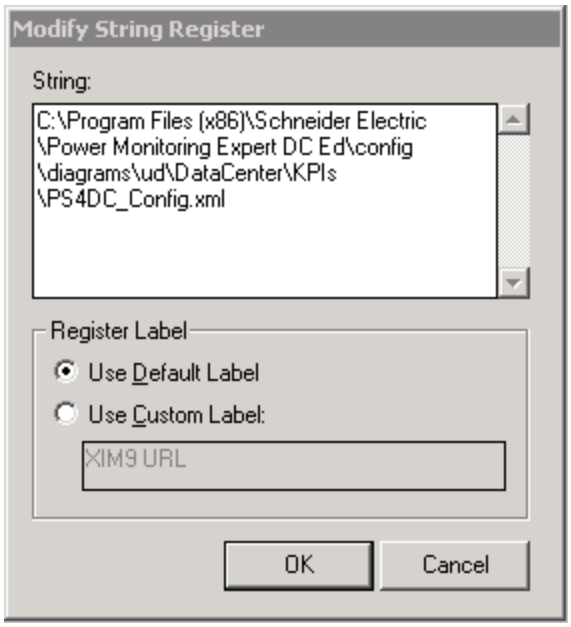
Updating the XML Import Module path information

The XML import module requires the correct path information to properly link to the XML file.

To update the path information for the module:

1. Open Designer and click **File** > **Open**, then select the VIP that contains the PUE frameworks.
2. In the Navigation box on the left side of the framework, double-click the **KPIs** grouping folder to open the KPI sub-framework.
3. In the KPI sub-framework, right-click the **PS4DC_Config_import** module to open the ION Module Setup dialog.
4. In ION Module Setup, select XIM9 URL from the Setup Register list and click **Modify…**.
5. In the Modify String Register dialog, enter the path information to the `PS4DC_Config.xml`

file.



The default location for a new installation is `C:\Program Files (x86)\Schneider Electric\Power Monitoring\config\diagrams\ud\DataCenter\KPIs\PS4DC_Config.xml`.

Creating Logical Devices

To present the information from the PUE VIP framework, a number of logical devices can be created using the included SQL scripts. Logical devices are used to present the data in a more intuitive manner than linking directly to the values in the VIP.

NOTE: Logical devices are not included as devices in the device licensing count.

To create logical devices:

1. In Windows Explorer navigate to the `...\Schneider Electric\Power Monitoring Expert\Diagnostic\DataCenter\LogicalDevices\SQL` folder.

   The following SQL scripts, are available in this location:

   - `1_Create_Custom_Measurements.sql`
   - `2_Create_Logical_Device_Types.sql`
   - `3_MakeElectricalLogicalDevices.sql`
   - `4_MakeGHGLogicalDevices.sql`
   - `5_MakeCapacityLogicalDevices.sql`
   - `6_MakeCostLogicalDevices.sql`

   These scripts will create a number of logical devices related to data center applications. Not all of these devices are needed for PUE.

NOTE: The scripts are designed for a system with VIP.Data_Center. If you use a custom VIP (not VIP.Data_Center) for the PUE framework, then you need to update these scripts. You need to change all `VIP.Data_Center` references in the scripts to the name of your custom VIP. The following scripts need to be updated: `3_MakeElectricalLogicalDevices.sql`, `4_MakeGHGLogicalDevices.sql`, `5_MakeCapacityLogicalDevices.sql`, `6_MakeCostLogicalDevices.sql`

2. In numeric sequence, for each script right-click the script and select **Open with > SSMS - SQL Server Management Studio** from the drop down list. Run the script.

   NOTE: These scripts must be run in the order indicated by their file name.

3. Restart `ION Network Router Service` to restart all ION services.

The scripts create five logical device types and the appropriate custom measurements. The device types are:

- DC_Elec
- DC_GHG
- DC_PUE
- DC_Capacity
- DC_Costs

The scripts create 16 logical devices, as shown below.

Enabled	Group	Name	Type	Address	Site	Status	Protocol	Description
✓	Data_Center	IT_Load	DC_Elec	n/a	n/a	n/a	n/a	n/a
✓	Data_Center	Total_Load	DC_Elec	n/a	n/a	n/a	n/a	n/a
✓	Data_Center	PDU_Load	DC_Elec	n/a	n/a	n/a	n/a	n/a
✓	Data_Center	Gen_Loads	DC_Elec	n/a	n/a	n/a	n/a	n/a
✓	Data_Center	OtherLoads	DC_Elec	n/a	n/a	n/a	n/a	n/a
✓	Data_Center	Total_GHG	DC_GHG	n/a	n/a	n/a	n/a	n/a
✓	Data_Center	IT_GHG	DC_GHG	n/a	n/a	n/a	n/a	n/a
✓	Data_Center	HVAC_GHG	DC_GHG	n/a	n/a	n/a	n/a	n/a
✓	Data_Center	PUE	DC_PUE	n/a	n/a	n/a	n/a	n/a
✓	Data_Center	PDU_Capacity	DC_Capacity	n/a	n/a	n/a	n/a	n/a
✓	Data_Center	IT_Capacity	DC_Capacity	n/a	n/a	n/a	n/a	n/a
✓	Data_Center	Total_Capacity	DC_Capacity	n/a	n/a	n/a	n/a	n/a
✓	Data_Center	Gen_Capacity	DC_Capacity	n/a	n/a	n/a	n/a	n/a
✓	Data_Center	Total_Costs	DC_Costs	n/a	n/a	n/a	n/a	n/a
✓	Data_Center	IT_Costs	DC_Costs	n/a	n/a	n/a	n/a	n/a
✓	Data_Center	HVAC_Costs	DC_Costs	n/a	n/a	n/a	n/a	n/a

The included Vista Data Center KPI files are linked to these devices. If it is necessary to change the device names, the Vista diagrams must be edited as well.

Energy Billing Module configuration

NOTE: This module requires a separate license. See Licensing for more information.

The Energy Billing Module is a fully functional energy-based billing reporting system. It also provides load and consumption monitoring and reporting at the branch circuit level, which is typically used in data center applications.

The following reports are part of this module:

- Billing Report
- Billing Summary Report
- Billing Verification Report
- Energy by IT Customer Report
- Multiple Billing Report
- Multiple Billing Export Report

To use the reports in this module, the module must be configured and the measurement data must be available as historical data logs in the database.

For information on how to configure this module, download the Billing Module Toolkit from the Exchange Community. See Resources for link information. The Billing Module Toolkit is a collection of tutorials and examples that show you how to configure and use this module.

Energy by IT Customer Report configuration

The report requires branch circuit level energy and current measurement data. The report supports different types of energy and current measurements, see Supported measurements and devices for more information.

To use this report, the measurement data must be available as historical data logs in the database, and a hierarchy must be configured using the `CustomerRackCircuitTemplate.xml` template.

NOTE: Remember to update the Managed Circuits in the Management Console after each device configuration change.

Hierarchy template

You can find the `CustomerCircuitTemplate.xml` hierarchy template at:
`...\Power Monitoring Expert\applications\HierarchyManager\SampleTemplates\DataCenter\`.

For information on how to install a hierarchy template and make bulk configuration changes, see Hierarchy Configuration Utility.

For information on how to maintain a hierarchy configuration and make individual configuration changes, see Hierarchy Manager.

Related topics:

Energy Billing Module topics

- Energy Billing Module design
- Energy Billing Module configuration
- Energy Billing Module operation

Other Software Modules

- Backup Power Module configuration
- Breaker Performance Module configuration
- Capacity Management Module configuration
- Energy Analysis Dashboard Module configuration
- Energy Analysis Reports Module configuration
- Event Notification Module configuration
- Insulation Monitoring Module configuration
- Power Quality Performance Module configuration

Event Notification Module configuration

NOTE: This module requires a separate license. See Licensing for more information.

Use the Event Notification Module (ENM) to notify recipients about critical power system events. ENM can send notifications of power system events through email or SMS. ENM uses the Alarms application to detect system events. You can set up notifications for activity in any of the event, alarm, or incident views. The notification details are defined in a notification rule. A notification rule can be enabled or disabled, and you can use a schedule to determine when the rule is applied. You can define more than one notification rule.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Do not rely solely on Event Notification Module use for alarm notification where human or equipment safety relies on the operation of the control action.
- Do not use Event Notification Module to control time-critical functions.
- Do not use the software to control remote equipment without proper access control and status feedback.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

NOTE: Other parts of the overall communication system, such as email servers and cellular phone systems, could fail and result in notifications not being delivered. If notifications are not delivered to recipients, conditions that cause alarming may persist and result in safety critical issues.

ENM is a built-in feature of PME. It is available for configuration as soon as the Event Notification Module license has been activated. Before configuring notifications, review the prerequisites and considerations in Event Notification Module Design.

TIP: You can open Notifications from **SETTINGS > Alarms > Notifications** in web applications.

To configure notifications, see:

Settings

- Editing notification settings

Rules

- Adding a notification rule
- Enabling or disabling a notification rule
- Editing a notification rule
- Deleting a notification rule

Recipients

- Adding a recipient
- Editing a recipient
- Deleting a recipient

Templates

- Adding a template
- Editing a template
- Deleting a template

Schedules

- Adding a Schedule
- Editing a schedule
- Deleting a schedule

For reference information see:

- Notification Manager user interface
- Add Rule UI
- Add Recipient UI
- Add Template UI
- Schedules Configuration UI
- Notification delay example

Related topics:

Event Notification Module topics

- Event Notification Module Design
- Event Notification Module configuration
- Event Notification Module operation

Other Software Modules

- Backup Power Module configuration
- Breaker Performance Module configuration
- Capacity Management Module configuration
- Energy Analysis Dashboard Module configuration
- Energy Analysis Reports Module configuration
- Energy Billing Module configuration
- Insulation Monitoring Module configuration
- Power Quality Performance Module configuration

Editing notification settings

Edit notification settings to configure the parameters that control the behavior of the application and define the delivery options.

To edit notification settings:

1. In Notification Manager, select the **Settings** tab.
2. In the Settings tab, configure the following options and click **Save** for each:
   a. General Settings:
      - **Remote Access Host**: (Optional) The URL or IP address for the PME server. This URL is used to provide a hyperlink in the notification messages that links back to the alarm view details in the Alarms web application.

        Example:

      - **Maintenance Mode**: Maintenance mode disables all notification rules. Use this to temporarily disable notifications and avoid unwanted messages during a planned power system event, for example a planned shutdown.

   b. Email Settings:
      i. Email Settings
         - **From Address**: The recipients of email notifications will see the messages being sent from this address. It must be formatted as an email address, but it does not have to be from a valid, existing email account.
         - **From Display Name**: The recipients of email notifications will see the messages coming from this sender.
         - **Include Email Header**: Set to use a header in the notification email or not.

      ii. SMTP Settings
         - **SMTP Server Host**: Set the SMTP server URL or IP address.
         - **SMTP Server Port**: Set the server port number.
         - **SMTP Server Uses SSL**: Check this box if you want to use an SSL connection to the SMTP server.
         - **SMTP Server Credentials**: Set the username and password if you use an SSL connection to the SMTP server.

TIP: Test the email server setup by sending a test message to a valid email address in the Test Email Recipient Address box.

c. SMS Settings

NOTE: The SMS capabilities of the Event Notification Module are built on technology from Twilio, a third-party vendor. To use SMS with notifications, you need to open an account with Twilio and sign up for SMS service. See the Twilio web site for more information.

Set the Twilio SMS Account SID, Authentication Token, and Outbound Phone Number. This information is provided by Twilio when you open an account and sign up for SMS service.

TIP: Test the SMS setup by sending a test message to a valid phone number in the Test SMS Recipient Address box.

d. Alarms Settings

Use the Alarms settings to control how soon a notification is sent out after alarm activity is detected. A shorter delay provides more immediate notification but can result in more messages being sent. A longer delay can help aggregate additional activity into a single message, reducing the number of notifications sent during an incident. See Notification delay example for more details.

Choose between two pre-configured setting options and a custom option. The following settings can be customized:

- **Initial Delay (seconds)**: The time the system waits, after an alarm activity is detected, before sending a message.
- **Incremental Delay (seconds)**: The time the system waits if a new alarm activity is detected during a delay period, before sending a message.
- **Maximum Delay (seconds)**: The time after which the system sends a notification regardless of any incremental delays.

Related Topics:

Event Notification Module configuration

Settings

- Editing notification settings

Rules

- Adding a notification rule
- Enabling or disabling a notification rule
- Editing a notification rule
- Deleting a notification rule

Recipients

- Adding a recipient
- Editing a recipient
- Deleting a recipient

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- Adding a template
- Editing a template
- Deleting a template

Schedules

- Adding a Schedule
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- Deleting a schedule

For reference information see:

- Notification Manager user interface
- Add Rule UI
- Add Recipient UI
- Add Template UI
- Schedules Configuration UI
- Notification delay example

Adding a notification rule

Add a notification rule to receive messages when alarms or incidents happen in your power system.

To add a new notification rule:

1. In Notification Manager, select the **Rules** tab, and then click **Add Notification Rule** to open the Add Notification Rule window.

   TIP: Click **Duplicate** or use the **Duplicate** command, in the right-click context menu, to duplicate an existing notification rule.

2. In Add Notification Rule, select the alarm view for which you want to monitor the activity and receive notifications. Click **Next**.
3. Select one or more recipients to receive a notification. Click **Next**.

   TIP: You can add a new recipient to the system by clicking **Add Recipient**. See Adding a recipient for more information.

4. (Optional) Select a notification schedule and the schedule timezone for this notification rule. Click **Next**.

   TIP: You can add a new schedule to the system by clicking **Add Schedule**. See Adding a Schedule for more information.

5. Specify a notification Rule Name.
6. Enable or disable the rule.
7. Select a message template.
8. Set the Delivery Options:
   a. Enable or disable email notification.
   b. Enable or disable SMS notification.
   c. Set which activities in the alarm view trigger a notification.

      NOTE: You can choose to only receive notifications when an alarm goes active or a new incident happens.
      Or you can choose to receive notifications on all activity.

9. Click **Finish**.

Related Topics:

Event Notification Module configuration

Settings

- Editing notification settings

Rules

- Adding a notification rule
- Enabling or disabling a notification rule

- Editing a notification rule
- Deleting a notification rule

Recipients

- Adding a recipient
- Editing a recipient
- Deleting a recipient

Templates

- Adding a template
- Editing a template
- Deleting a template

Schedules

- Adding a Schedule
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- Deleting a schedule

For reference information see:

- Notification Manager user interface
- Add Rule UI
- Add Recipient UI
- Add Template UI
- Schedules Configuration UI
- Notification delay example

Enabling or disabling a notification rule

Enable a notification rule to start receiving messages when alarms or incidents happen in your power system. Disable a notification rule to stop receiving messages for alarms defined in the rule.

To enable or disable a notification rule:

1. In Notification Manager, select the **Rules** tab.
2. In the notification rules table, find the row of the rule which you want to enable or disable, and then turn Enabled on or off in this row.
3. Right-click the row and select **Edit Rule** to open Edit Notification Rule. You can also open Edit Notification Rule by double-clicking the row.
4. In Edit Notification Rule, select the Settings tab and then turn Rule Enabled on or off.
5. Click **Save**.

Related Topics:

Event Notification Module configuration

Settings

- Editing notification settings

Rules

- Adding a notification rule
- Enabling or disabling a notification rule
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- Deleting a notification rule

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- Editing a recipient
- Deleting a recipient

Templates

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- Deleting a template

Schedules

- Adding a Schedule
- Editing a schedule
- Deleting a schedule

For reference information see:

- Notification Manager user interface
- Add Rule UI
- Add Recipient UI
- Add Template UI
- Schedules Configuration UI
- Notification delay example

Editing a notification rule

Edit an existing notification rule to add or remove recipients, or to modify the notification rule parameters such as alarm view, schedule, or delivery options.

To edit a notification rule:

1. In Notification Manager, select the **Rules** tab.
2. In the notification rules table, find the row of the rule which you want to edit, and then click **Edit** in this row to open the Edit Notification Rule window

   TIP: You can also open Edit Notification Rule through the **Edit Rule** command in the right-click context menu or by double-clicking the row.

3. In Edit Notification Rule, select the tab that contains the settings you want to change.
4. Update the settings.
5. Click **Save**.

Related Topics:

Event Notification Module configuration

Settings

- Editing notification settings

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- Editing a schedule
- Deleting a schedule

For reference information see:

- Notification Manager user interface
- Add Rule UI
- Add Recipient UI
- Add Template UI
- Schedules Configuration UI
- Notification delay example

Deleting a notification rule

Delete a notification rule that is no longer needed.

To delete a notification rule:

1. In Notification Manager, select the **Rules** tab.
2. In the notification rules table, find the row of the rule which you want to delete, and then click **Delete** in this row. This opens the Delete Notification Rule confirmation box.

   TIP: You can also delete a notification rule through the **Delete Rule** command in the right-click context menu.

3. Click **Yes** to confirm.

Related Topics:

Event Notification Module configuration

Settings

- Editing notification settings

Rules

- Adding a notification rule
- Enabling or disabling a notification rule
- Editing a notification rule
- Deleting a notification rule

Recipients

- Adding a recipient
- Editing a recipient
- Deleting a recipient

Templates

- Adding a template
- Editing a template
- Deleting a template

Schedules

- Adding a Schedule
- Editing a schedule
- Deleting a schedule

For reference information see:

- Notification Manager user interface
- Add Rule UI

- Add Recipient UI
- Add Template UI
- Schedules Configuration UI
- Notification delay example

Adding a recipient

Add a recipient to define the contact information for sending alarm notification messages. The new recipient will be available in the notification rule wizard when adding or editing a rule.

To add a recipient:

1. In Notification Manager, select the **Recipients** tab, and then click **Add Recipient** to open the Add Recipient window.

   TIP: Click **Duplicate** or use the **Duplicate Recipient** command, in the right-click context menu, to duplicate an existing recipient.

2. Enter the following information:
   - **Recipient Name**: The name that is displayed in the recipients table and the Available Recipients list.
   - **Email Address**: The email address used to send email notifications to this recipient.
   - **SMS Phone Number**: The phone number used to send text notifications to this recipient.

   TIP: Click **Test** to send a test email or test SMS message to confirm that your entries are correct and valid.

   NOTE: The notification settings for email and SMS must be configured correctly before you can send test messages. See Editing notification settings for details.

3. Click **OK**.

NOTE: You can also add recipients though the notification rule wizard when adding or editing a rule. Use the same process as described in steps 2-3 above.

Related Topics:

Event Notification Module configuration

Settings

- Editing notification settings

Rules

- Adding a notification rule
- Enabling or disabling a notification rule
- Editing a notification rule
- Deleting a notification rule

Recipients

- Adding a recipient
- Editing a recipient
- Deleting a recipient

Templates

- Adding a template
- Editing a template
- Deleting a template

Schedules

- Adding a Schedule
- Editing a schedule
- Deleting a schedule

For reference information see:

- Notification Manager user interface
- Add Rule UI
- Add Recipient UI
- Add Template UI
- Schedules Configuration UI
- Notification delay example

Editing a recipient

Edit an existing recipient to update the recipient information such as name, email, or phone number.

To edit a recipient:

1. In Notification Manager, select the **Recipients** tab.
2. In the recipients table, find the row of the recipient which you want to edit, and then click **Edit** in this row to open the Edit Recipients window

   TIP: You can also open Edit Recipients through the **Edit Recipient** command in the right-click context menu or by double-clicking the row.

3. In Edit Recipient, update the information you want to change.
4. Click **OK**.

Related Topics:

Event Notification Module configuration

Settings

- Editing notification settings

Rules

- Adding a notification rule
- Enabling or disabling a notification rule
- Editing a notification rule
- Deleting a notification rule

Recipients

- Adding a recipient
- Editing a recipient
- Deleting a recipient

Templates

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- Deleting a template

Schedules

- Adding a Schedule
- Editing a schedule
- Deleting a schedule

For reference information see:

- Notification Manager user interface
- Add Rule UI
- Add Recipient UI
- Add Template UI
- Schedules Configuration UI
- Notification delay example

Deleting a recipient

Delete a recipient that is no longer needed.

NOTE: If you delete a recipient that is used in a notification rule, then this recipient is automatically removed from the rule.

To delete a recipient:

1. In Notification Manager, select the **Recipients** tab.
2. In the recipients table, find the row of the recipient which you want to delete, and then click **Delete** in this row. This opens the Delete Recipient confirmation box.

   TIP: You can also delete a recipient through the **Delete Recipient** command in the right-click context menu.

3. Click **Yes** to confirm.

Related Topics:

Event Notification Module configuration

Settings

- Editing notification settings

Rules

- Adding a notification rule
- Enabling or disabling a notification rule
- Editing a notification rule
- Deleting a notification rule

Recipients

- Adding a recipient
- Editing a recipient
- Deleting a recipient

Templates

- Adding a template
- Editing a template
- Deleting a template

Schedules

- Adding a Schedule
- Editing a schedule
- Deleting a schedule

For reference information see:

- Notification Manager user interface
- Add Rule UI
- Add Recipient UI
- Add Template UI
- Schedules Configuration UI
- Notification delay example

Adding a template

Add a template to customize the information that is included in the alarm notification messages. The new template will be available in the notification rule wizard when adding or editing a rule.

NOTE: You can customize the notes text and hyperlink text that is included in a message. You cannot customize the alarm details information in the message.

To add a template:

1. In Notification Manager, select the **Templates** tab, and then click **Add Template** to open the Add Template window.

   TIP: Click **Duplicate** or use the **Duplicate Template** command, in the right-click context menu, to duplicate an existing template.

2. Enter the following information:
   - **Template Name**: The name that is displayed in the templates table and the Message Template drop-down box.
   - **Note**: The text that is included in the email or SMS message, after the alarm details information.
   - **Link**: (Optional) A hyperlink that is included in the email or SMS message, after the alarm details information and after the Note text.
3. Click **OK**.

NOTE: You can also add templates though the notification rule wizard when adding or editing a rule. Use the same process as described in steps 2-3 above.

Related Topics:

Event Notification Module configuration

Settings

- Editing notification settings

Rules

- Adding a notification rule
- Enabling or disabling a notification rule
- Editing a notification rule
- Deleting a notification rule

Recipients

- Adding a recipient
- Editing a recipient
- Deleting a recipient

Templates

- Adding a template
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- Deleting a template

Schedules

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- Editing a schedule
- Deleting a schedule

For reference information see:

- Notification Manager user interface
- Add Rule UI
- Add Recipient UI
- Add Template UI
- Schedules Configuration UI
- Notification delay example

Editing a template

Edit an existing template to update the information that is included in the alarm notification messages.

To edit a template:

1. In Notification Manager, select the **Templates** tab.
2. In the templates table, find the row of the template which you want to edit, and then click **Edit** in this row to open the Edit Template window

   TIP: You can also open Edit Template through the **Edit Template** command in the right-click context menu or by double-clicking the row.

3. In Edit Template, update the information you want to change.
4. Click **OK**.

Related Topics:

Event Notification Module configuration

Settings

- Editing notification settings

Rules

- Adding a notification rule
- Enabling or disabling a notification rule
- Editing a notification rule
- Deleting a notification rule

Recipients

- Adding a recipient
- Editing a recipient
- Deleting a recipient

Templates

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- Editing a template
- Deleting a template

Schedules

- Adding a Schedule
- Editing a schedule
- Deleting a schedule

For reference information see:

- Notification Manager user interface
- Add Rule UI
- Add Recipient UI
- Add Template UI
- Schedules Configuration UI
- Notification delay example

Deleting a template

Delete a template that is no longer needed.

NOTE: If you delete a template that is used in a notification rule, the rule changes automatically to using the default template.

NOTE: You cannot delete the default template.

To delete a template:

1. In Notification Manager, select the **Templates** tab.
2. In the templates table, find the row of the template which you want to delete, and then click **Delete** in this row. This opens the Delete Template confirmation box.

   TIP: You can also delete a template through the **Delete Template** command in the right-click context menu.

3. Click **Yes** to confirm.

Related Topics:

Event Notification Module configuration

Settings

- Editing notification settings

Rules

- Adding a notification rule
- Enabling or disabling a notification rule
- Editing a notification rule
- Deleting a notification rule

Recipients

- Adding a recipient
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Templates

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- Deleting a template

Schedules

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- Deleting a schedule

For reference information see:

- Notification Manager user interface
- Add Rule UI
- Add Recipient UI
- Add Template UI
- Schedules Configuration UI
- Notification delay example

Adding a Schedule

Add a schedule to define the days and times when a notification rule is applied. The new schedule will be available in the notification rule wizard when adding or editing a rule.

NOTE: A schedule only has an effect if the associated notification rule is enabled. If the rule is disabled, the schedule is ignored.

NOTE: Schedules are shared across applications. For example, the same schedule can be used for an alarm rule and a notification rule.

To add a schedule:

1. In Notification Manager, select the **Schedules** tab, and then click **Add Schedule** to open the Add Schedule window.

   TIP: Click **Duplicate** or use the **Duplicate Schedule** command, in the right-click context menu, to duplicate an existing schedule.

2. Enter a schedule name.
3. Define the active and inactive days and times of the schedule.
4. Click **Save**.

NOTE: You can also add schedules though the notification rule wizard when adding or editing a rule. Use the same process as described in steps 2-4 above.

Related Topics:

Event Notification Module configuration

Settings

- Editing notification settings

Rules

- Adding a notification rule
- Enabling or disabling a notification rule
- Editing a notification rule
- Deleting a notification rule

Recipients

- Adding a recipient
- Editing a recipient
- Deleting a recipient

Templates

- Adding a template
- Editing a template

- Deleting a template

Schedules

- Adding a Schedule
- Editing a schedule
- Deleting a schedule

For reference information see:

- Notification Manager user interface
- Add Rule UI
- Add Recipient UI
- Add Template UI
- Schedules Configuration UI
- Notification delay example

Editing a schedule

Edit an existing schedule to change the days and times when a notification rule is applied.

NOTE: Schedules are shared across applications. For example, the same schedule can be used for an alarm rule and a notification rule.

To edit a schedule:

1. In Notification Manager, select the **Schedules** tab.
2. In the schedules table, find the row of the schedule which you want to edit, and then click **Edit** in this row to open the Edit Schedule window

   TIP: You can also open Edit Schedule through the **Edit Schedule** command in the right-click context menu or by double-clicking the row.

3. In Edit Schedule, update the information you want to change.
4. Click **OK**.

Related Topics:

Event Notification Module configuration

Settings

- Editing notification settings

Rules

- Adding a notification rule
- Enabling or disabling a notification rule
- Editing a notification rule
- Deleting a notification rule

Recipients

- Adding a recipient
- Editing a recipient
- Deleting a recipient

Templates

- Adding a template
- Editing a template
- Deleting a template

Schedules

- Adding a Schedule
- Editing a schedule
- Deleting a schedule

For reference information see:

- Notification Manager user interface
- Add Rule UI
- Add Recipient UI
- Add Template UI
- Schedules Configuration UI
- Notification delay example

Deleting a schedule

Delete a schedule that is no longer needed.

NOTE: Schedules are shared across applications. Confirm that a schedule is not in use before deleting it.

NOTE: If you delete a schedule that is used in a notification rule, then this schedule is automatically removed from the rule.

To delete a schedule:

1. In Notification Manager, select the **Schedules** tab.
2. In the schedules table, find the row of the schedule which you want to delete, and then click **Delete** in this row. This opens the Delete Schedule confirmation box.

   TIP: You can also delete a schedule through the **Delete Schedule** command in the right-click context menu.

3. Click **Yes** to confirm.

Related Topics:

Event Notification Module configuration

Settings

- Editing notification settings

Rules

- Adding a notification rule
- Enabling or disabling a notification rule
- Editing a notification rule
- Deleting a notification rule

Recipients

- Adding a recipient
- Editing a recipient
- Deleting a recipient

Templates

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Schedules

- Adding a Schedule
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- Deleting a schedule

For reference information see:

- Notification Manager user interface
- Add Rule UI
- Add Recipient UI
- Add Template UI
- Schedules Configuration UI
- Notification delay example

Insulation Monitoring Module configuration

⚠ WARNING

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

NOTE: This module requires a separate license. See Licensing for more information.

The Insulation Monitoring Module provides monitoring for isolated (IT) power systems, such as the ones found in hospital operating rooms. It also helps in locating isolation faults. The module can be configured for applications based on the IEC standard, and for applications based on the ANSI standard.

The following report and diagrams are part of this module:

- Insulation Monitoring Report
- Facility Summary Vista diagram
- Areas Summary Vista diagram
- Area Details Vista diagrams

To use the report and diagrams in this module, the module must be configured, and the measurement data must be available as historical data logs in the database.

For information on how to configure this module for the ANSI and IEC markets, see:

- ANSI: Insulation Monitoring configuration (ANSI)
- IEC: Insulation Monitoring configuration (IEC)

Related topics:

Insulation Monitoring Module topics

- Insulation Monitoring Module Design
- Insulation Monitoring configuration
- Insulation Monitoring Module operation

Other Software Modules

- Backup Power Module configuration
- Breaker Performance Module configuration
- Capacity Management Module configuration
- Energy Analysis Dashboard Module configuration
- Energy Analysis Reports Module configuration
- Energy Billing Module configuration
- Event Notification Module configuration
- Power Quality Performance Module configuration

Insulation Monitoring configuration (ANSI)

To configure the Insulation Monitoring Module for facilities in the ANSI market:

1. Install and configure the devices and hardware components. See Insulation Monitoring Hardware Configuration for ANSI for details.
2. Use the Insulation Monitoring Configuration Tool for ANSI to:
   a. Configure the panels, areas, and groups
   b. Generate Vista diagrams
3. Set up the VIP framework and configure the Vista diagrams. See Configuring the VIP Framework and Vista Diagrams for ANSI for details.
4. Open the Insulation Monitoring report template in the Reports Web Application, set the report input parameters, and generate the report.
5. View the diagrams in Vista or in Web Applications Diagrams.

Insulation Monitoring Hardware Configuration for ANSI

This section contains information about the hardware devices used in an insulation monitoring solution. Refer to the installation manuals for each device for instructions, safety messages, and parameter details.

⚠ WARNING

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

Configuring hardware components for ANSI

The Insulation Monitoring application includes several hardware components. Some of these components communicate on an internal bus and must be configured with unique IP addresses and unit IDs.

Set up the parameters for the installed hardware as described in this section.

Isolated Power Panel

The isolated power panel includes the circuit monitoring devices such as the IG6.

See the Bender Resources Web site for circuit monitoring device installation instructions.

NOTE: Make sure the clocks on all devices are correctly configured during commissioning so that the reports you run show the correct timestamp.

IGC COM460/COM461/COM465IP Gateway

In the Insulation Monitoring application, the IGC COM460/COM461/COM465IP Gateway converts the serial Bender BMS protocol to Modbus TCP. For this solution, note the following:

- The IP address must be unique. Set up the IP address so that the software can communicate with it.

  NOTE: Make sure to always set the unit ID to **1**. Doing this sets the gateway to Master mode on the Bender bus.

- Set the gateway to operate on its internal bus.

See the Bender Resources Web site for instructions on how to configure the gateway.

Line Isolation Monitor

The Iso-Gard™ IG6 line isolation monitor (LIM-IG6) is installed in the isolated power panel. This device continuously calculates the total hazard current (THC) by measuring the leakage impedance between isolated line and ground. Up to two LIM-IG6 monitors can be installed in one panel.

NOTE: Set the Unit ID of the LIM IG6 to immediately succeed the Unit ID of the COM460.

For example, if you have a branch of COM460s with the devices connected to it, such as three IG6s, two EDS 461s, and one CMS 460, then set the Unit IDs as follows:

Device Type	Unit ID
COM460	1
LIM-IG6	2
LIM-IG6	3
LIM-IG6	4
EDS 461	5
EDS 461	6
CMS 460	7

- Set the Unit ID of the Serial devices that are connected to the IGC COM46x gateway.
- Set the total hazard current level to the appropriate value for your location.

NOTE: Make sure the clocks on all devices are correctly configured during commissioning so that the reports you run show the correct timestamp.

See the LIM-IG6 documentation for instructions on how to install and operate the device.

Circuit Fault Locator (Optional)

The EDS 151 and EDS 461 circuit fault locator identifies the specific circuits where insulation faults could result in current leakage that exceeds the defined total hazard current level. For this solution, note the following:

NOTE: Make sure the clocks on all devices are correctly configured during commissioning so that the reports you run show the correct timestamp.

- Set up the unit ID on the device. This ID must be unique from the unit ID and serial ID of other devices.

See the EDS 151 and EDS 461 documentation for instructions on how to configure the device.

Circuit Load Transformer (Optional)

The solution can include an optional SWT3 or SWT4 circuit transformer for load monitoring.

See the LIM-IG6 documentation for instructions to connect wiring to the circuit transformer and configure the device.

Temperature Sensor (Optional)

The temperature sensor monitors the temperature of the isolation transformer, if installed. Temperature data appears in the Vista diagrams if the device is installed and set up in the configuration tool.

See the LIM-IG6 documentation for instructions to connect wiring to the temperature sensor and configure the device.

Load Current Evaluator (Optional)

The CMS460 Load Current Evaluator is used to detect, monitor and evaluate loads and installation for load currents in power supplies.

NOTE: Make sure the clocks on all devices are correctly configured during commissioning so that the reports you run show the correct timestamp.

- Set up the unit ID on the device. This ID must be unique from the unit ID and serial ID of other devices.

See the CMS460 Load Current Evaluator documentation for instructions on how to configure the device.

After the parameters for the hardware components are configured, set up the communications for the devices as described next.

Configuring devices for ANSI

The following devices must be set up:

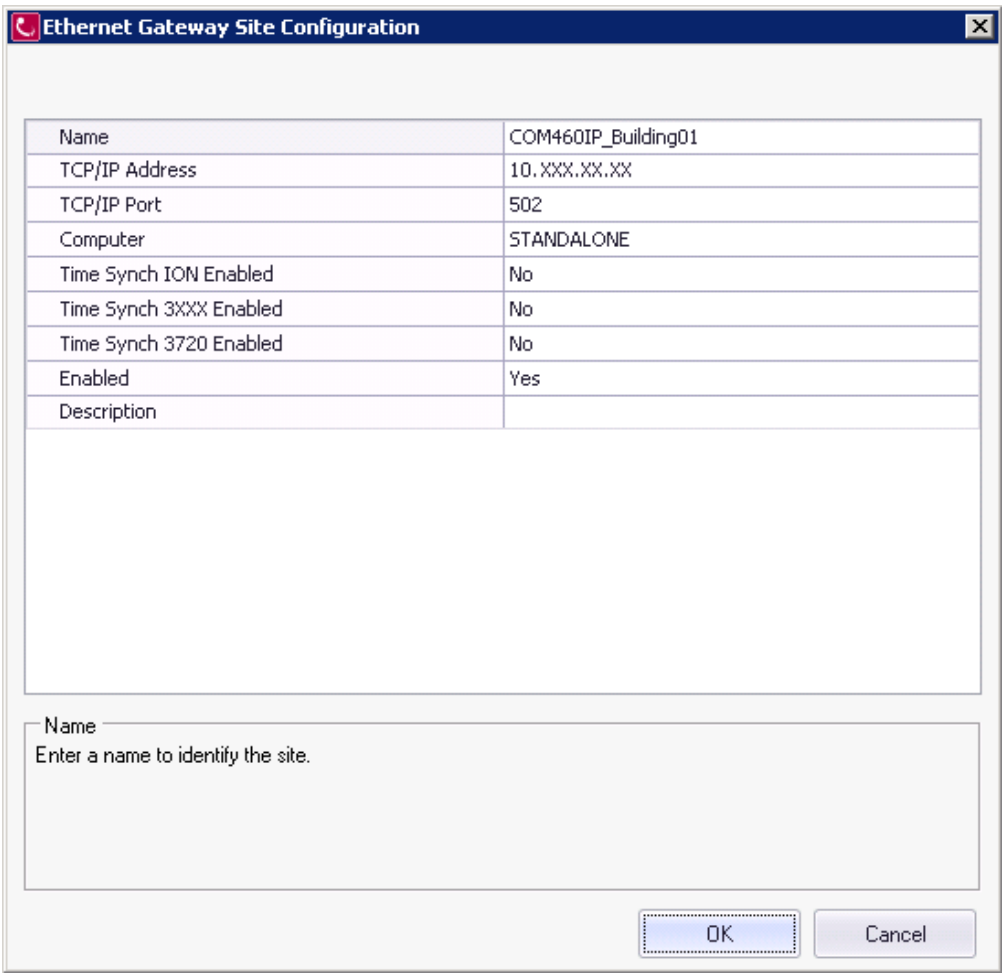
- IGC Gateway
- LIM-IG6 devices
- EDS 151 and EDS 461 circuit fault locators, if installed
- CMS460, if installed.

To configure devices:

1. Open Management Console on the server.
2. Add the IGC Gateway as follows:
3. Click **Sites**.
4. In the sites area, right-click and select **New** > **Add Ethernet Gateway Site**. The Ethernet Gateway Site Configuration screen appears.
5. Enter details for the gateway:
   - **Name** - Enter a name that will be recognizable in the Insulation Monitoring Configuration Tool.
   - **TCP/IP Address** - This address must be unique from all other gateways and devices in the system.
   - **TCP/IP Port** - Select **Modbus TCP Device 502**.

- **Enabled** - Select **Yes**.
- Complete other fields as needed.

Example:



6. Click **OK**.
7. Click **Devices** to add the LIM-IG6 and EDS 151 / EDS 461 circuit fault locators that are connected to the gateway.
8. In the devices area, right-click and select **New** > **Serial Device on Ethernet Gateway Site**. The Serial Device Configuration screen appears.
9. Enter details for the LIM-IG6 or EDS 151 / EDS 461 device.
   - **Name** - Enter a name that will be recognizable in the Insulation Monitoring Configuration Tool.
   - **Device Type** - Select the appropriate type.
   - **Unit ID** - This value must be unique from all other devices in the system.
   - **Site** - Select the gateway you just added.
   - **Enabled** - Select **Yes**.
   - Complete other fields as necessary.
10. Click **OK**.

11. Repeat steps 8 - 10 for all other devices connected to the gateway.

After all devices associated with the gateway are added, repeat the above steps for other gateways and their devices in the system.

After all hardware is configured, configure the areas and devices in the Insulation Monitoring Configuration Tool.

NOTE: Configure the gateway and all devices connected to the gateway as a group. Then set up another gateway and its associated devices.

Configuring the VIP Framework and Vista Diagrams for ANSI

After the diagrams have been generated with the Insulation Monitoring Configuration Tool, configure the VIP framework and link it to the diagrams to display the alarm status from the LIM-IG6 in the diagrams.

NOTE: If there is only one LIM-IG6 in your system, you do not need to create a VIP and configure the VIP framework. Instead, link the Vista status objects directly to the LIM-IG6. See Finalizing the Vista Diagrams.

Creating a new VIP for the framework

You need to create a new VIP to set up the insulation monitoring VIP framework.

To create a new VIP:

1. Open a Command Prompt window.
2. Change the current folder to `...\Power Monitoring Expert\system\bin`.
3. Type `vip -Service -NVIP.InsulationMonitoring_Alarming` on the command line.

   This creates a VIP service with the name **VIP.InsulationMonitoring_Alarming**.
4. Open the Windows Services panel.
5. Start the newly created VIP service.

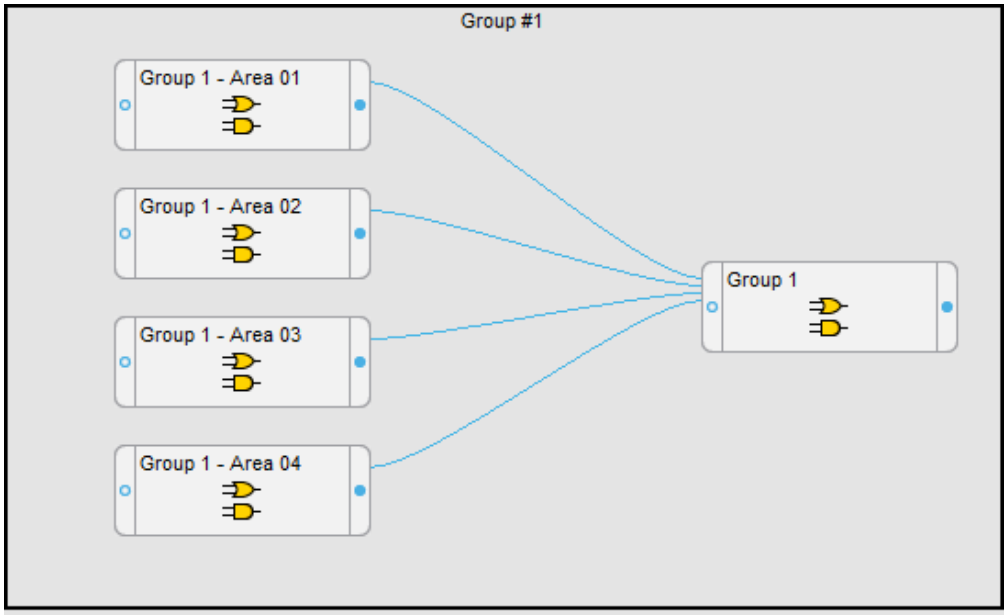
Configuring the VIP framework

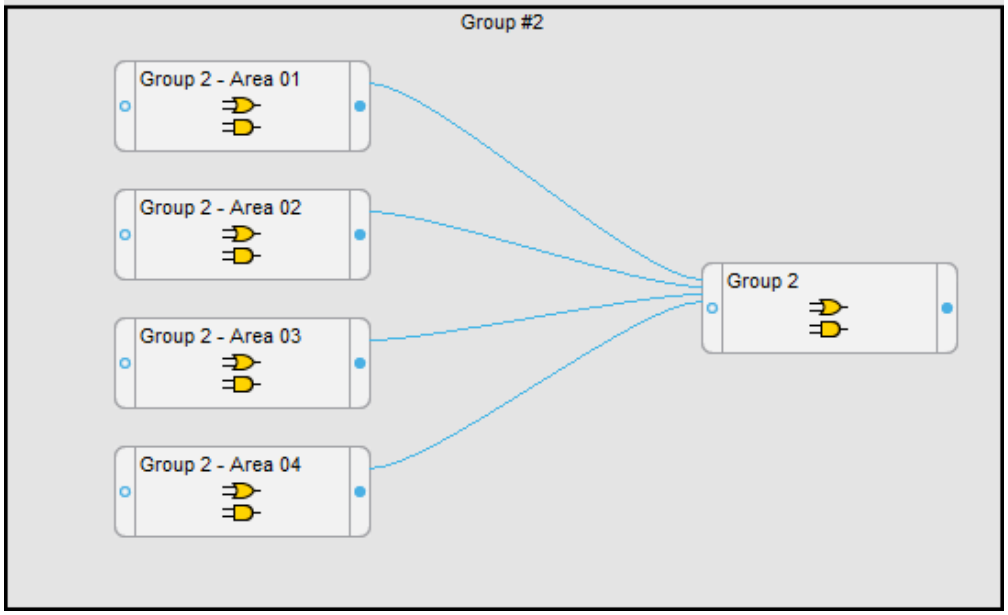
The VIP framework aggregates the alarm status for the different areas and group levels. The framework logic combines the different statuses using an OR condition, which means the summary status shows an alarm if one or more of the inputs are in an alarm state. The alarm summaries are then displayed in the Vista diagrams

To configure the VIP framework:

1. Open Designer.
2. Open the **VIP.InsulationMonitoring_Alarming**.
3. Paste the framework `Insulation Monitoring Alarming Status for ANSI.fwn` in `...\config\fmwk\InsulationMonitoring` into the VIP.

   The framework contains two groups with four areas each. This is meant to be a starting point. Add or remove areas, or entire groups to meet your needs. Here is an example of the default framework:





4. Link the **Common Registers > Common Alarm** register from the LIM-IG6 isolation monitors to the Area AND/OR modules. Each LIM-IG6 in an area must be linked to the AND/OR module for this area. For example, if area 1 has three LIM-IG6, then all three must be linked to the Area 01 AND/OR module.
5. Save the framework changes.

Finalizing the Vista Diagrams

After the VIP framework is configured, open the diagrams in Vista and link the alarm status objects to the correct modules in the VIP framework, as shown below. The colors shown on the status objects are:

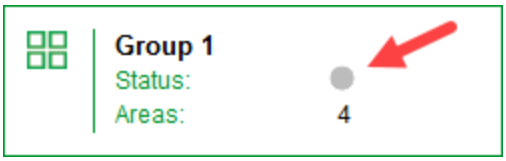
- **Green** - Normal. The Total Hazard Current (THC) measurement is below the limit.
- **Red** - Alarm. The THC measurement exceeds the limit or the LIM-IG6 is in test mode.
- **Gray** - Unlinked. The object has not been connected to an alarm status register.

See Using the diagrams for alarm status display examples.

Group Level Diagrams

In the top-level Facility Summary diagram, link the alarm status object to the AND/OR module output for the Group Level Status in the VIP framework.

NOTE: If there is only one LIM-IG6 in your system, link the Vista status object directly to the **Common Registers > Common Alarm** register on the LIM-IG6.

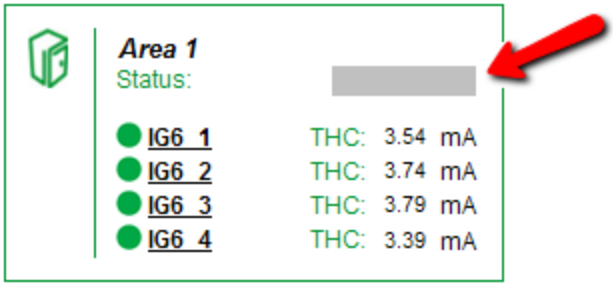


In the example above, you would link the status object to the output of the Group 1 AND/OR module in the VIP.

Area Diagrams

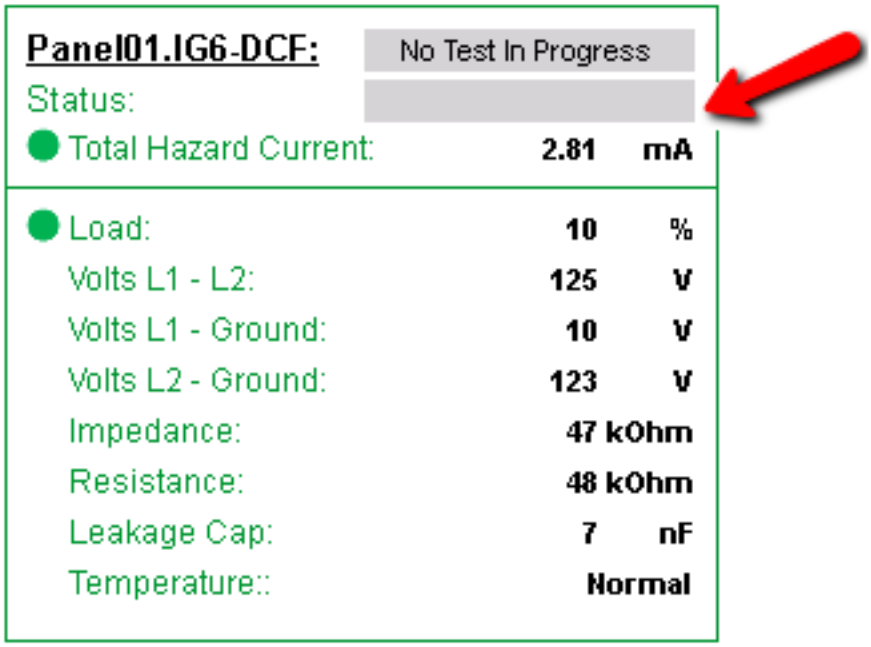
Link the area status objects in the diagram to the corresponding Area AND/OR module outputs in the VIP framework.

NOTE: If there is only one LIM-IG6 in your system, link the Vista status object directly to the **Common Registers > Common Alarm** register on the LIM-IG6.



Area Details Diagrams

Link the area details status objects in the diagram to the corresponding **Common Registers > Common Alarm** register on the LIM-IG6.



Opening diagrams in Power Monitoring Expert

After you have configured the diagrams, open them in Diagrams or Vista. Confirm that all monitoring devices are communicating as expected. Verify that all status objects in the diagrams are displayed correctly. Fix any unlinked or incorrectly linked objects.

Insulation Monitoring configuration (IEC)

To configure the Insulation Monitoring Module for facilities in the IEC market:

1. Install and configure the devices and hardware components. See Insulation Monitoring Hardware Configuration for IEC for details
2. Use the Insulation Monitoring Configuration Tool for IEC to:
   a. Configure the panels, areas, and groups.
   b. Generate Vista diagrams
3. Set up the VIP framework and configure the Vista diagrams. See Configuring the VIP Framework and Vista Diagrams for IEC for details.
4. Open the Insulation Monitoring report template in the Reports Web Application, set the report input parameters, and generate the report.
5. View the diagrams in Vista or in Web Applications Diagrams.

Insulation Monitoring Hardware Configuration for IEC

This section contains information about the hardware devices used in an insulation monitoring solution. Refer to the installation manuals for each device for instructions, safety messages, and parameter details.

⚠ WARNING

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

NOTE:

- Isolated power panels, optional monitoring devices, and communications for hardware must be installed in the designated areas.
- The insulation monitoring device must be configured correctly, and time synced to the EGX gateway.

Configuring devices for IEC

The following devices must be set up:

- EGX100 Gateway
- Insulation Monitoring (IM) devices
- (Optional) Insulation Fault Locator (IFL) devices

To configure devices:

1. Open Management Console on the server.
2. Add the EGX100 Gateway as follows.
3. Click **Sites**.
4. In the sites area, right-click and select **New** > **Add Ethernet Gateway Site**. The Ethernet Gateway Site Configuration screen appears.
5. Enter details for the gateway:
   - **Name** - Enter a name that will be recognizable in the Insulation Monitoring Configuration Tool.

- **TCP/IP Address** - This address must be unique from all other gateways and devices in the system.
- **TCP/IP Port** - Select **Modbus TCP Device 502**.
- **Enabled** - Select **Yes**.
- Complete other fields as needed.

6. Click **OK**.
7. Click **Devices** to add the IM and IFL devices that are connected to the gateway.
8. In the devices area, right-click and select **New** > **Serial Device on Ethernet Gateway Site**. The Serial Device Configuration screen appears.
9. Enter the following details:
   - **Group** - Select the device group.
   - **Name** - Enter a name that will be recognizable in the Insulation Monitoring Configuration Tool.
   - **Device Type** - Select the appropriate type.
   - **Unit ID** - This value must be unique from all other devices in the system.
   - **Site** - Select the gateway you just added.
   - **Enabled** - Select **Yes**.
   - Complete other fields as necessary.
10. Click **OK**.
11. Repeat steps 8 - 10 for all other devices connected to the gateway.

After all devices associated with the gateway are added, repeat the above steps for other gateways and their devices in the system.

After all hardware is configured, configure the areas and devices in the Insulation Monitoring Configuration Tool.

NOTE: Configure the gateway and all devices connected to the gateway as a group. Then set up another gateway and its associated devices.

Configuring the VIP Framework and Vista Diagrams for IEC

After the diagrams have been generated with the Insulation Monitoring Configuration Tool, configure the VIP framework and link it to the diagrams to display the alarm status from the Insulation Monitoring (IM) devices in the diagrams.

Creating a new VIP for the framework

You need to create a new VIP to set up the insulation monitoring VIP framework.

To create a new VIP:

1. Open a Command Prompt window.
2. Change the current folder to `...\Power Monitoring Expert\system\bin`.
3. Type `vip -Service -NVIP.InsulationMonitoring_Alarming` on the command line.

   This creates a VIP service with the name **VIP.InsulationMonitoring_Alarming**.
4. Open the Windows Services panel.
5. Start the newly created VIP service.

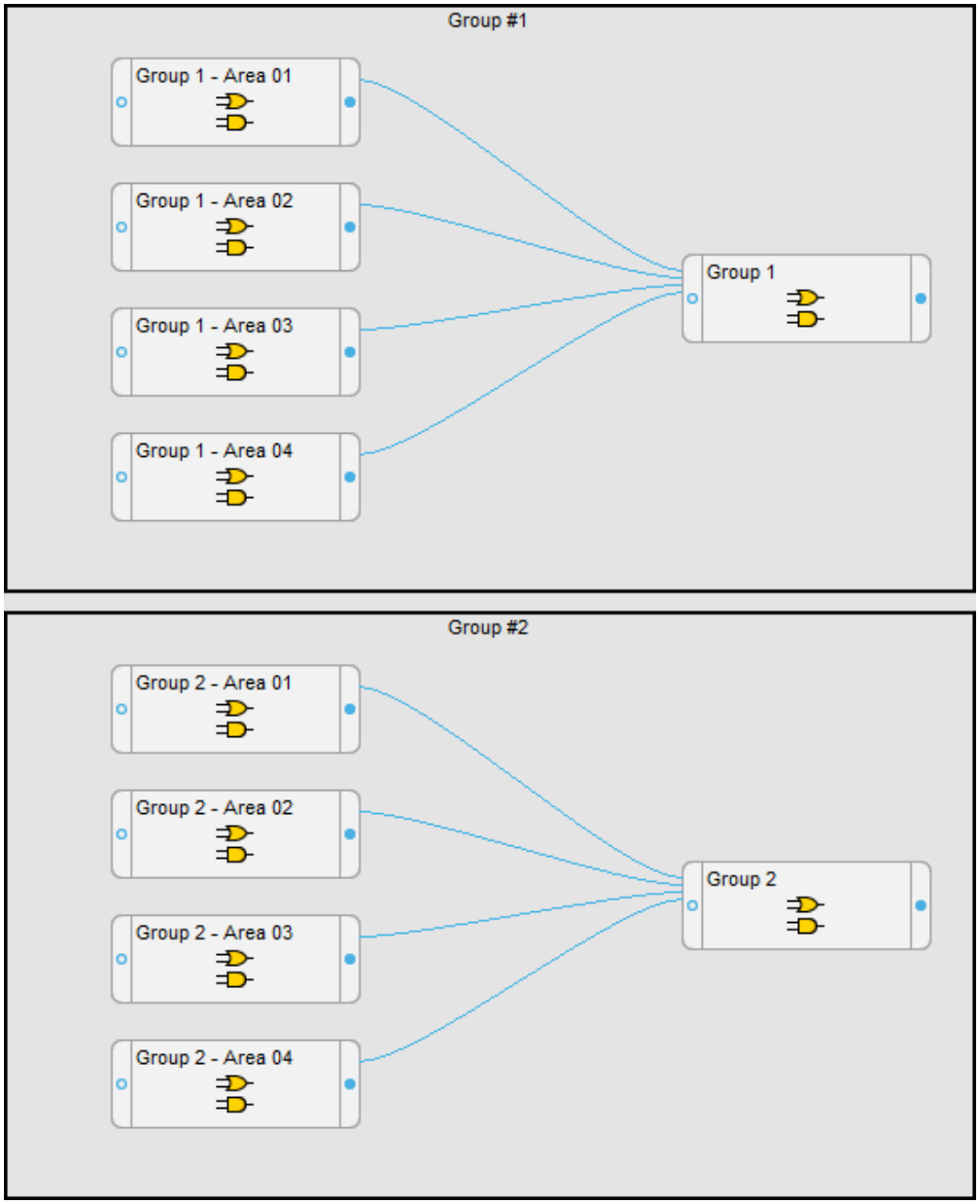
Configuring the VIP framework

The VIP framework aggregates the alarm status for the different areas and group levels. The framework logic combines the different statuses using an OR condition, which means the summary status shows an alarm if one or more of the inputs are in an alarm state. The alarm summaries are then displayed in the Vista diagrams

To configure the VIP framework:

1. Open Designer.
2. Open the **VIP.InsulationMonitoring_Alarming**.
3. Paste the framework `Insulation Monitoring Alarming Status for IEC.fwn` in `...\config\fmwk\InsulationMonitoring` into the VIP.

   The framework contains two groups with four areas each. This is meant to be a starting point. Add or remove areas, or entire groups to meet your needs. Here is an example of the default framework:



4. Link the **Alarm Status** > **Insulation Status Alarm**, **Electrical Status Alarm**, and **Wiring Connection Lost** registers from the IMs to the Area AND/OR modules.
5. Save the framework changes.

Finalizing the Vista Diagrams

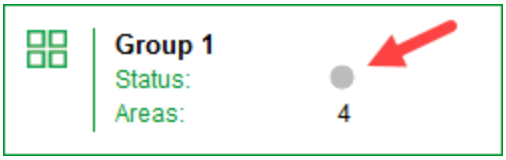
After the VIP framework is configured, open the diagrams in Vista and link the alarm status objects to the correct modules in the VIP framework, as shown below. The colors shown on the status objects are:

- **Green** - Normal. The Impedance measurement is below the limit.
- **Red** - Alarm. The Impedance measurement exceeds the limit.
- **Gray** - Unlinked. The object has not been connected to an alarm status register.

See Using the diagrams for alarm status display examples.

Group Level Diagrams

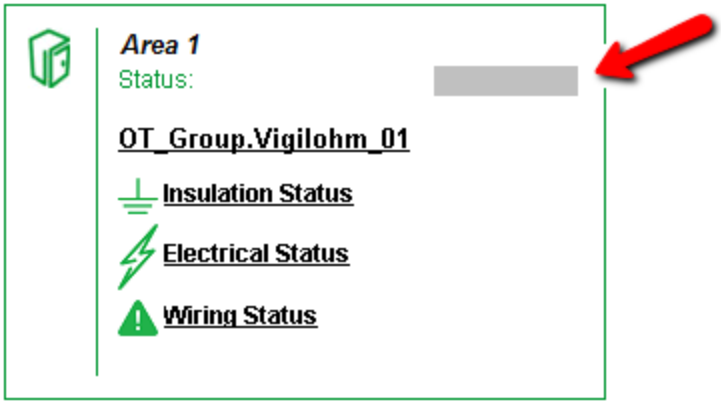
In the top-level Facility Summary diagram, link the alarm status object to the AND/OR module output for the Group level Status in the VIP framework.



In the example above, you would link the status object to the output of the Group 1 AND/OR module in the VIP.

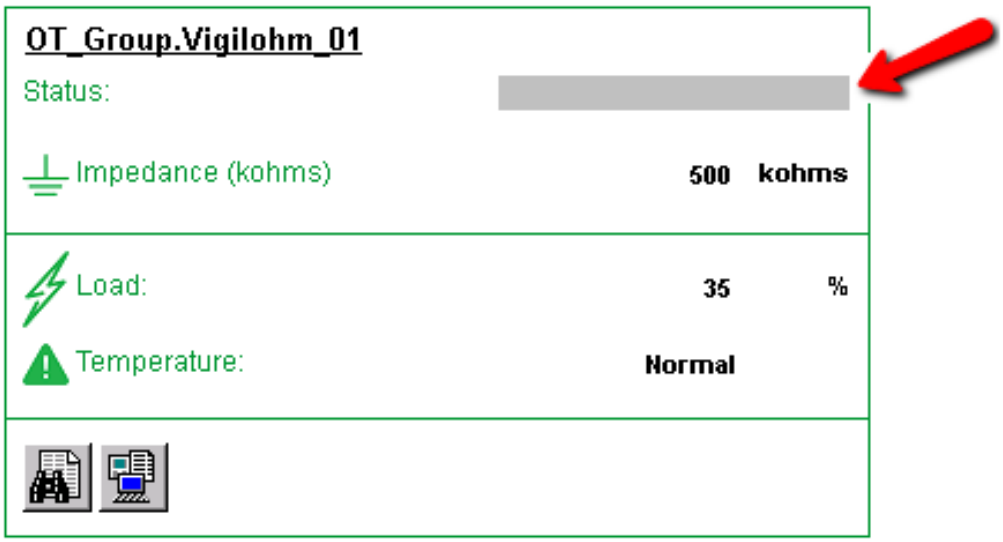
Area Diagrams

Link the area status objects in the diagram to the corresponding Area AND/OR module outputs in the VIP framework.



Area Details Diagrams

Link the area details status objects in the diagram to the corresponding Area AND/OR module outputs in the VIP framework.



Opening diagrams in Power Monitoring Expert

After you have configured the diagrams, open them in Diagrams or Vista. Confirm that all monitoring devices are communicating as expected. Verify that all status objects in the diagrams are displayed correctly. Fix any unlinked or incorrectly linked objects.

Power Quality Performance Module configuration

NOTE: This module requires a separate license. See Licensing for more information.

The Power Quality (PQ) Performance Module analyzes power quality event and disturbance data as well as power factor measurements. It determines the potential impacts of power quality on the monitored power system and displays the results in graphical formats, with color coding to highlight problem areas. The module combines standard software features with specialized components to produce its outputs.

The following reports, diagrams, and Dashboard Gadgets are part of this module:

- Power Quality Impact report
- Power Quality Analysis report
- Power Quality Indicator diagrams
- Standardized Equipment diagrams
- Power Quality Rating gadget
- Power Quality Rating Trend gadget
- Power Quality Incident Breakdown gadget
- Power Quality Incident Impact gadget
- Power Quality Incident Location gadget
- Power Quality Impact gadget
- Power Quality Impact Trend gadget
- Power Factor Impact gadget
- Power Factor Impact Trend gadget

To use the reports, diagrams, and Dashboard Gadgets in this module, the module must be configured. The measurement data must be available as historical data logs in the database.

For information on how to configure this module, see Configure Power Quality Performance.

Related topics:

Power Quality Performance Module topics

- Power Quality Performance Module Design
- Power Quality Performance Module configuration
- Power Quality Performance Module operation

Other Software Modules

- Backup Power Module configuration
- Breaker Performance Module configuration
- Capacity Management Module configuration
- Energy Analysis Dashboard Module configuration

- Energy Analysis Reports Module configuration
- Energy Billing Module configuration
- Event Notification Module configuration
- Insulation Monitoring Module configuration

Configure Power Quality Performance

To configure Power Quality Performance,

1. Configure the Monitoring Devices.
2. Configure Global Parameters.
3. Configure Power Quality Performance diagrams.
4. Configure Power Quality Impact Gadgets and Report .
5. Configure Power Factor Impact Gadgets.
6. Configure Power Quality Analysis Report.
7. Set up Power Quality Performance Dashboards and Reports.
8. Fine-tune Power Quality Performance.

NOTE:
No configuration is required for the following Gadgets:

Type	Gadgets
Power Quality Rating Gadgets	Power Quality Rating Gadget Power Quality Rating Trend Gadget
Power Quality Events Detail Gadgets	Power Quality Events Breakdown Gadget Power Quality Events Impact Gadget Power Quality Events Location Gadget

Configure the Monitoring Devices

The Power Quality Performance module relies on power quality measurements taken by the monitoring devices in a system. It processes these measurements using back-end analytics functions and VIP framework logic, and produces outputs that are displayed in Gadgets, diagrams, and reports.

The module depends exclusively on historical data in the database. It does not use real-time data from the devices directly. The back-end analytics does not modify the historical source data in the database. The data is read from the database, processed, and then displayed.

The Power Quality Performance can do its analysis only if the monitoring devices (power meters, circuit breakers) have been properly configured to capture power quality events and disturbances. This section describes the following:

- Enable power quality event detection.
- Enable power quality disturbance logging.
- Enabling time synchronization.

Enable power quality event detection

See Supported Devices for Power Quality Performance monitoring for supported devices.

Enabling power quality event detection on the supported meters involves:

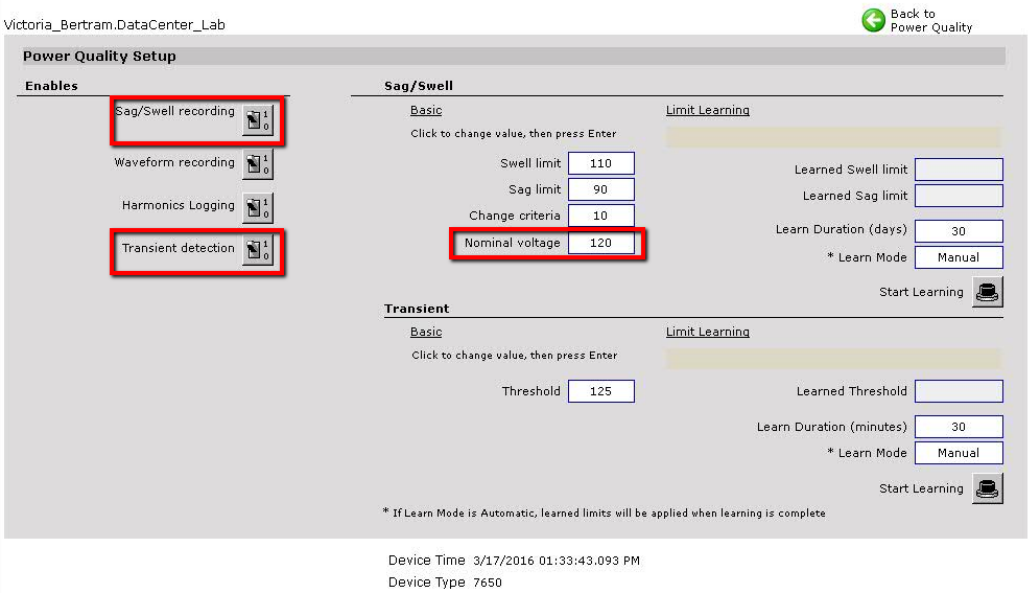
- Enabling Sag/Swell detection
- Enabling Transient detection

Disturbance direction detection (DDD) is enabled by default if supported.

NOTE: DDD, available on select meters, is used to determine if the events are undetermined, internal, or external to the system. Without DDD, all events will show as undetermined in the Power Quality Performance features.

You can do this by using meter configuration tools (such as ION Setup), or by configuring the meter directly. Refer to the meter documentation for more information.

In addition, you can configure ION meters (such as, ION9000, ION7650, PM8000, etc.), in PME Vista.



After the power quality events are detected by the meter, they are classified by Power Monitoring Expert Power Quality Event Classification method and stored in Power Monitoring Expert database as:

- Interruptions
- Voltage Sag
- Voltage Swell
- Transient Voltage
- Over voltage
- Under voltage

See Power Quality Performance events and disturbances for information on PME Power Quality Event Classification.

Enable power quality disturbance logging

Power Quality Performance consumes the periodical data logs for:

- Voltage Unbalance
- Current Unbalance
- Voltage Harmonics
- Current Harmonics
- Frequency Variation
- Flicker

The supported meters are listed in Supported Devices for Power Quality Performance monitoring. They are categorized as:

- **Logged by Default** – The supported measurements are logged by the default. For these meters, no additional configuration is required. However, for brownfield installations, care must

be taken to see if the configuration has been modified.

- **Not Logged by Default** – The meter measures the value but does not log it. You need to enable logging on these meters.

Choose the measurement to log

The supported measurements and their corresponding register labels are listed in Required measurements for Power Quality Performance monitoring.

For example, for Voltage Unbalance, you may find both of the supported registers Voltage Unbalance L-L Worst and Voltage Unbalance L-N Worst available in a non-ION device. Choose the one which is required by your local standards.

Or, for Voltage Harmonics, you may find all the 8 supported registers available in a non-ION device. If per-phase analysis is important to the customer on this device, choose the 3 per-phase measurements based on your system and standards. If per-phase analysis is not important (because of the load, design, or other reasons), choose only one measurement; either THD Voltage L-L or THD Voltage L-N, which are the averages of the per-phase values.

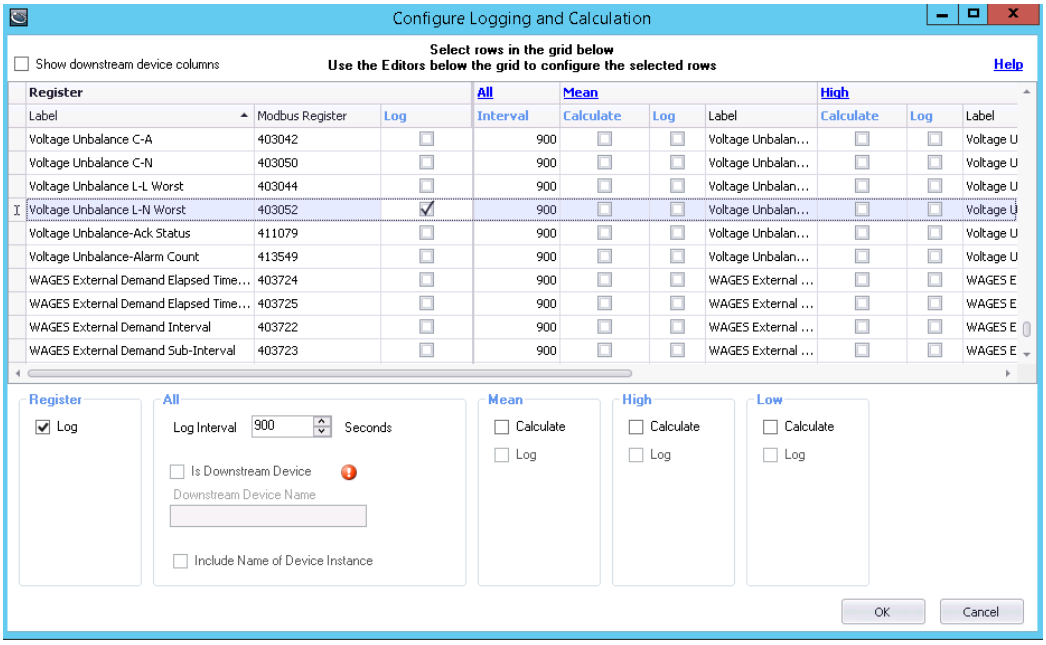
NOTE: For each disturbance category, choose only the needed measurements from the supported list to log. Do NOT log all of them; doing so can cause unwanted database growth and performance issues.

Enable the logging

To enable the logging for devices categorized as “Not Logged by Default”:

- Supported measurements are logged by default for most ION meters, so configuration is not required. For some models, where the supported measurements are not logged by default, you can configure logging by using PME Designer.
- For non-ION meters, you can use PME Device Type Editor to configure logging:

NOTE: For non-ION devices, PQ Performance only supports the logged instantaneous values. Do NOT log the calculated values (Mean, High, or Low). For Harmonics and Unbalance measurements, the recommended logging Interval is 3600 seconds.



- For the non-ION meters, especially PM800 (except PM810 without PME810LOG), CM3000, and CM4000, configure the on-board logging using meter configuration tools.

NOTE: The PM800 Series devices are supported, except the PM810 without PM810LOG.

Flicker

Flicker is only available when the supported meter has a PQ framework with EN50160 evaluation enabled. Refer to the meter documentation for more information.

Once enabled, the flicker measurements are logged in 10-minute intervals by default. There is no need to change the logging interval.

Enabling time synchronization

Time synchronization is crucial for:

- Event clustering (the same event seen by different devices is only counted once).
- Correctly associating the process impact alarms with power quality events.

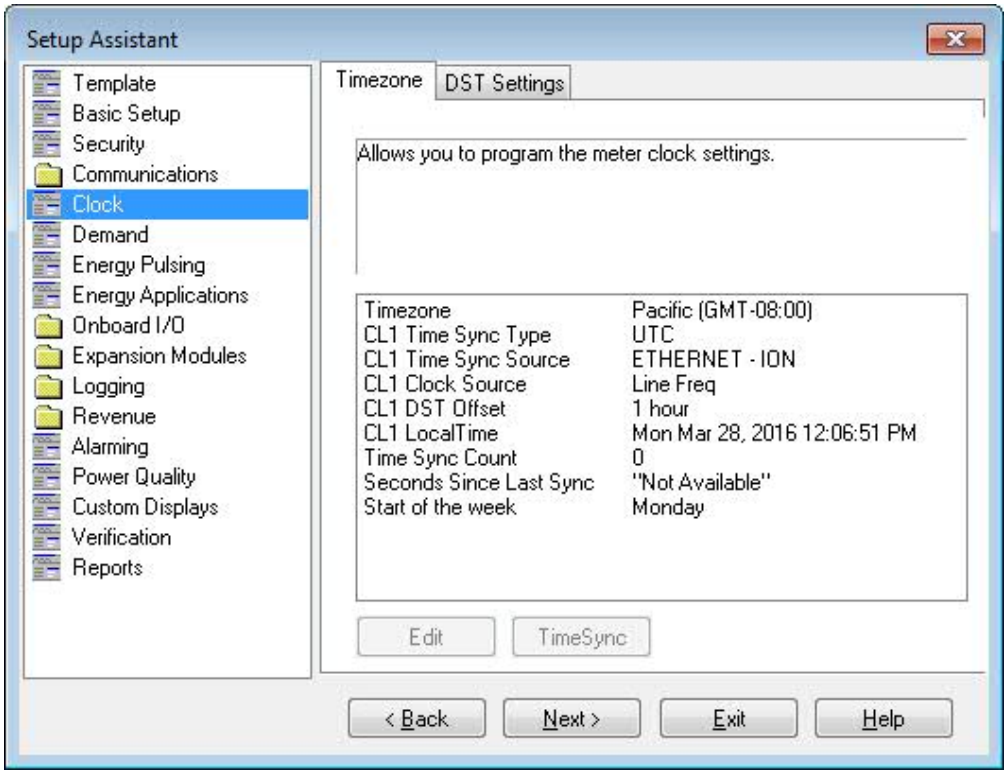
The standard synchronization between the Power Monitoring Expert server and devices is adequate for enabling Power Quality Performance features.

- For Modbus devices, time synchronization through Modbus is activated by default.
- For all ION protocol devices (e.g. ION7650, PM8000, etc.), the application engineer needs to enable this feature.

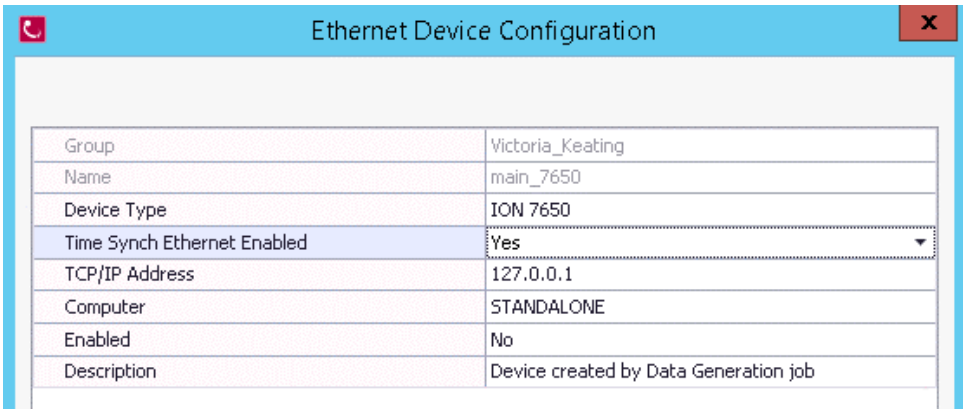
NOTE: High accuracy of time synchronization (such as IRIG-B, etc.), can be used to address user requirements, but it is not required for Power Quality Performance.

To enable Power Monitoring Expert time synchronization on an ION device:

1. Connect to the device using ION Setup. On the **Timezone** tab for **Clock**, change entry for the **CL1 Time Sync Source** to **ETHERNET - ION**. You can also do this on the meter front panel.

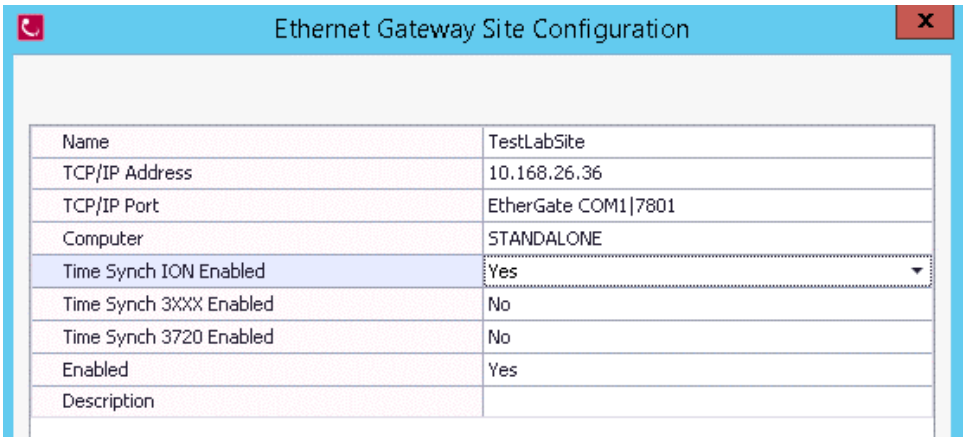


2. In Management Console:
   a. For an Ethernet device, set the **Time Synch Ethernet Enabled** to **Yes** in the **Ethernet Device Configuration**.



   b. For a serial device, set the **Time Synch ION Enabled** to **Yes** in the **Ethernet Gateway**

Site Configuration.



Configure Global Parameters

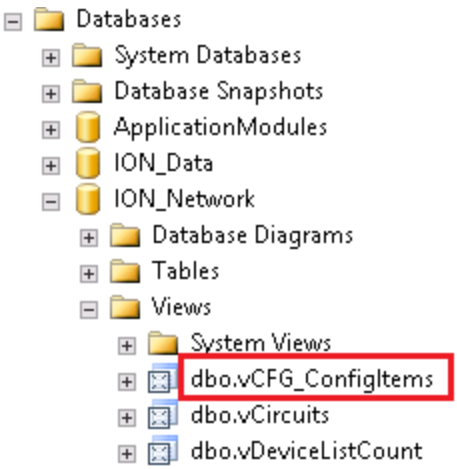
You may need to change the global parameters, depending on the requirement of the customer's facility.

Configure the Nominal Frequency

The default nominal frequency is 60Hz.

To edit the default nominal frequency:

1. In SQL Server Management Studio, locate the dbo.vCFG_ConfigItems view in the ION_ Network database, and right-click to select "Edit Top 200 Rows".



2. Find the **Frequency Nominal** row.
3. Set the Value to the appropriate local nominal frequency.

Module	Category	Item	Value
PQAnalytics	General Settings	Frequency Nominal	60

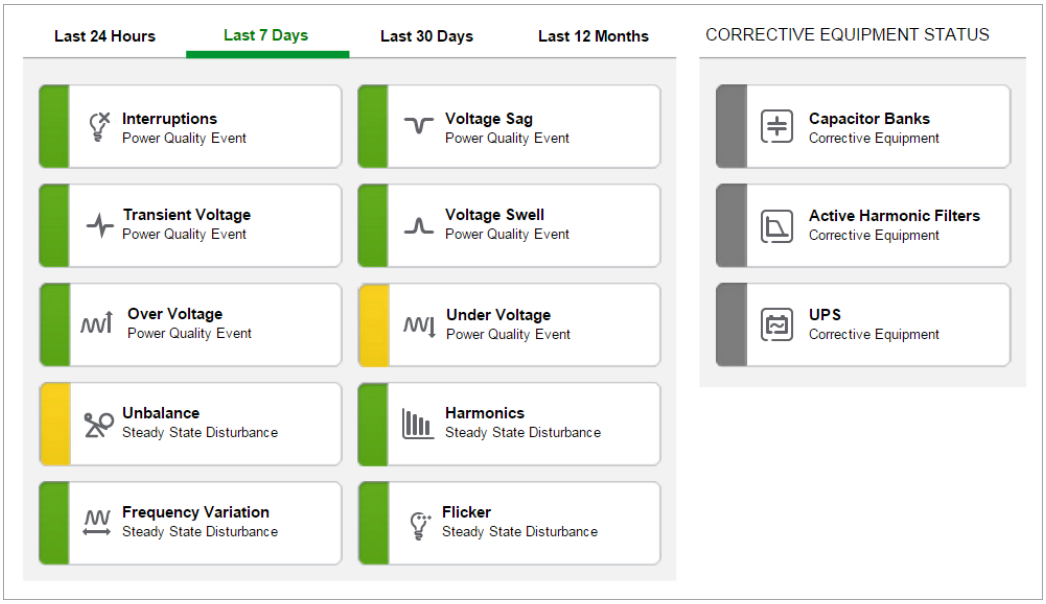
Configure Power Quality Performance diagrams

The following sections describe how to configure the Power Quality Performance diagrams:

- Configure Power Quality Indicator Diagrams
- Configure the Standardized Equipment Diagrams
- (Optional) Create a Power Quality Performance link in the Web Applications

Configure Power Quality Indicator Diagrams

The Power Quality (PQ) Indicator Diagrams introduce simple green-yellow-red indicators for the most common power quality problems.



The PQ Indicator Diagrams are pre-configured with default settings. Complete the following steps to enable the functionality:

- Paste the Power Quality Performance Framework
- Open the Power Quality Indicator Diagrams

Paste the Power Quality Performance Framework

The VIP Frameworks included with the Power Quality Performance installation get data from the Power Quality Performance Web Service to display values and drive the status objects in the Power Quality Performance Indicator Vista diagrams.

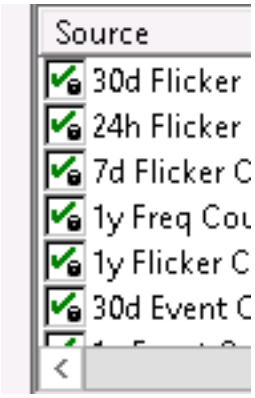
NOTE:

- The VIP.PQADVISOR ION Service must be running to proceed with the steps below. (The service is configured to start automatically.)
- Installing the Power Quality Performance framework onto an ION VIP Service other than VIP.PQADVISOR is not recommended.
- Installing the Power Quality Performance framework onto an ION VIP Service that has existing modules that have been put in by a user is not recommended.

1. Open Power Monitoring Expert Designer.
2. Click **File > Open**.
3. Click the 'VIP.PQADVISOR' node and click **OK**.
4. Select the **Edit > Paste from framework** menu item.
   a. Navigate to the folder containing the Power Quality Performance framework file: `{root install folder}\config\fmwk\PQPerformance`
5. Click the file `PQPerformance.fwn` and click **Open**.

   NOTE: Use the most current version of the fwn file available.

6. In the Paste Summary dialog:
   a. Ignore items with a red check mark, as these are core modules that cannot have two instances in the same VIP. The existing modules will work with the new framework being pasted.
   b. In the **Source** column, select the first list entry with a green check mark, press and hold the **Shift** key, and then click the green check mark icon in the check box on the final entry. This action applies the lock paste selection to all entries.



NOTICE
UNINTENDED DEVICE OPERATION Do not use the lock paste option to overwrite existing destination modules. **Failure to follow these instructions can result in operational differences in required modules.**

Only use the lock paste option if you are an advanced user familiar with ION architecture.

   c. In a new Power Monitoring Expert installation, no modules should be overwritten. In an existing Power Monitoring Expert installation, there may be conflicts and the framework paste may try to overwrite existing module; if this occurs double click the check box again so that it returns to just a check mark, and note the module that created a conflict.

7. Press **OK** when pasting is complete.

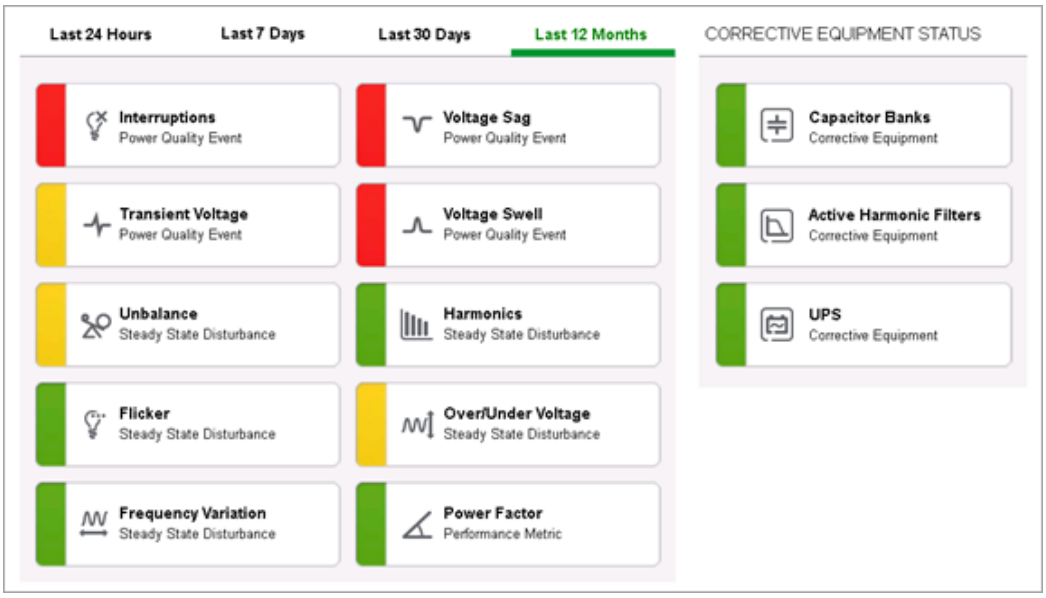
   The Power Quality Performance framework is visible in Designer.

8. Click **Save** to complete the process.

Open the Power Quality Indicator Diagrams

The PQ Indicator Diagrams are located in:
`{root install folder}\config\diagrams\ud\PQPerformance`

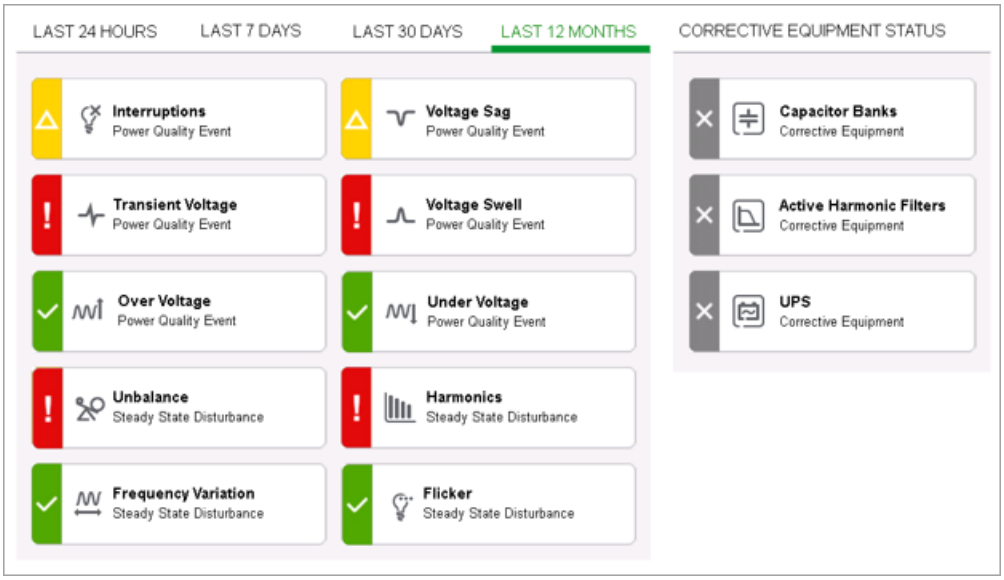
The diagrams start to function once the framework is pasted in the Power Quality Performance VIP. You can link them to the existing Vista diagrams or use them separately.



NOTE: When a Power Quality Indicator has no supported device to feed it the required data, it should be disabled by following the procedures in the section Disable unused Power Quality Indicators.

Alternative symbols can be used to provide a colorblind friendly view. They are located in the folder:

`{root install folder}\config\diagrams\images\PQPerformance\Indicators\Alternate\`



Set the Query Server – Distributed system only

When using distributed PME systems, set the query server node for the following landing page diagrams:

- `LandingPage_24h.dgm`
- `LandingPage_7d.dgm`
- `LandingPage_30d.dgm`
- `LandingPage_12m.dgm`

Configure the Standardized Equipment Diagrams

The following sections describe how to set up and configure the Standardized Equipment Pages. Skip this section if corrective equipment does not exist in the system.

- Configure the Framework for the Equipment Diagrams
- Configure the Equipment Diagram Detail Pages
- Configure the Equipment Diagram Group Pages
- Configure the Equipment Diagram Landing Pages

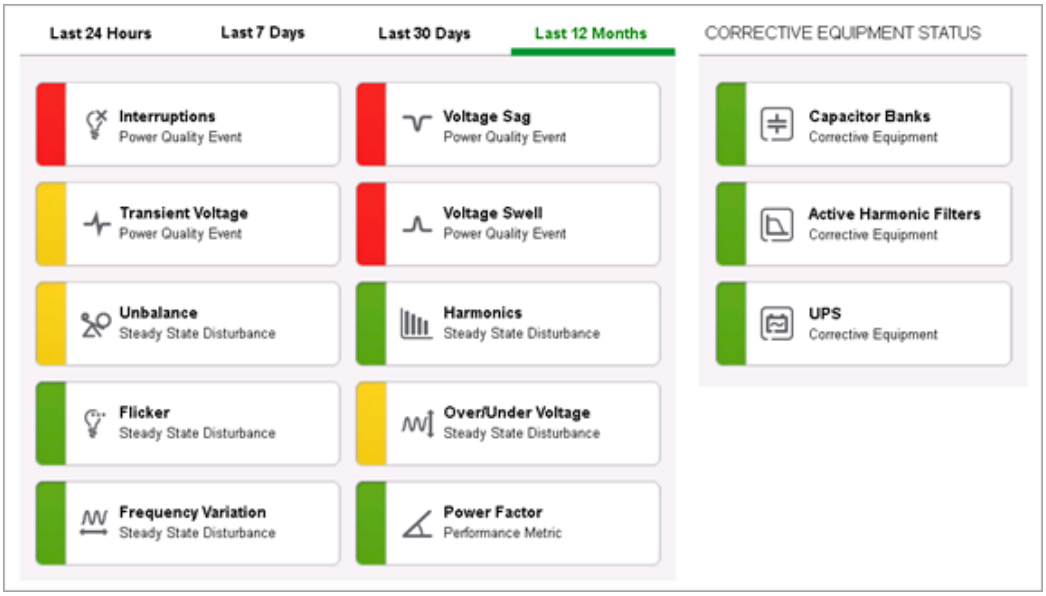
Unlike the Power Quality Performance Indicator diagrams, the Equipment diagrams are not auto-functional pages, but rather templates that you use during commissioning to provide the user with equipment status displays with the same user experience and focus on simplification as the Power Quality Performance Indicator pages.

The equipment diagram elements are:

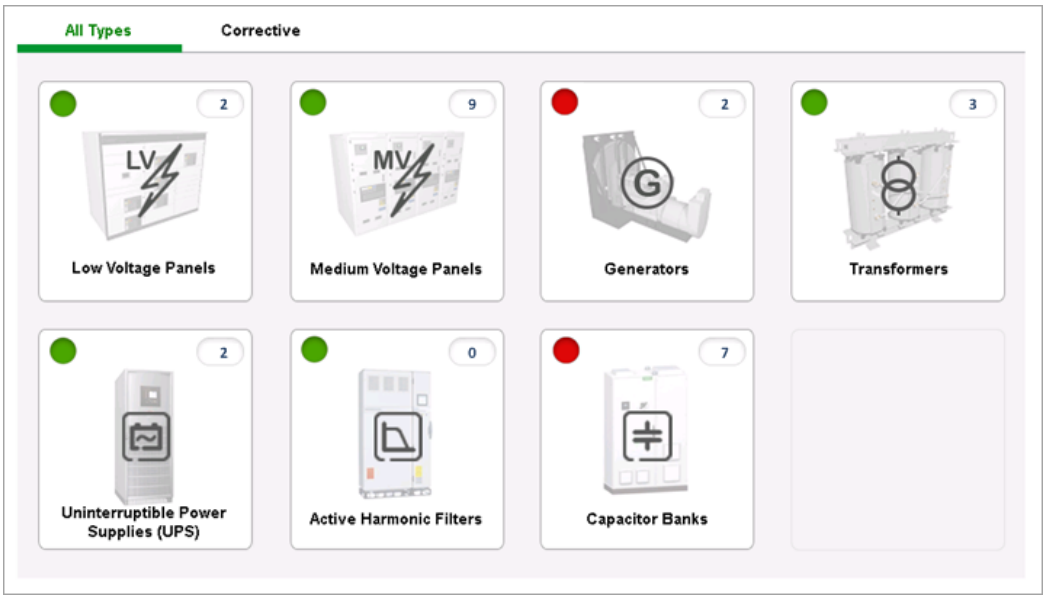
- Equipment Diagram Landing Pages
- Equipment Diagram Grouping Pages
- Equipment Diagram Detail Pages

Equipment Diagram Landing Pages

The Corrective Equipment Status portion of the Power Quality Performance page is a landing page.

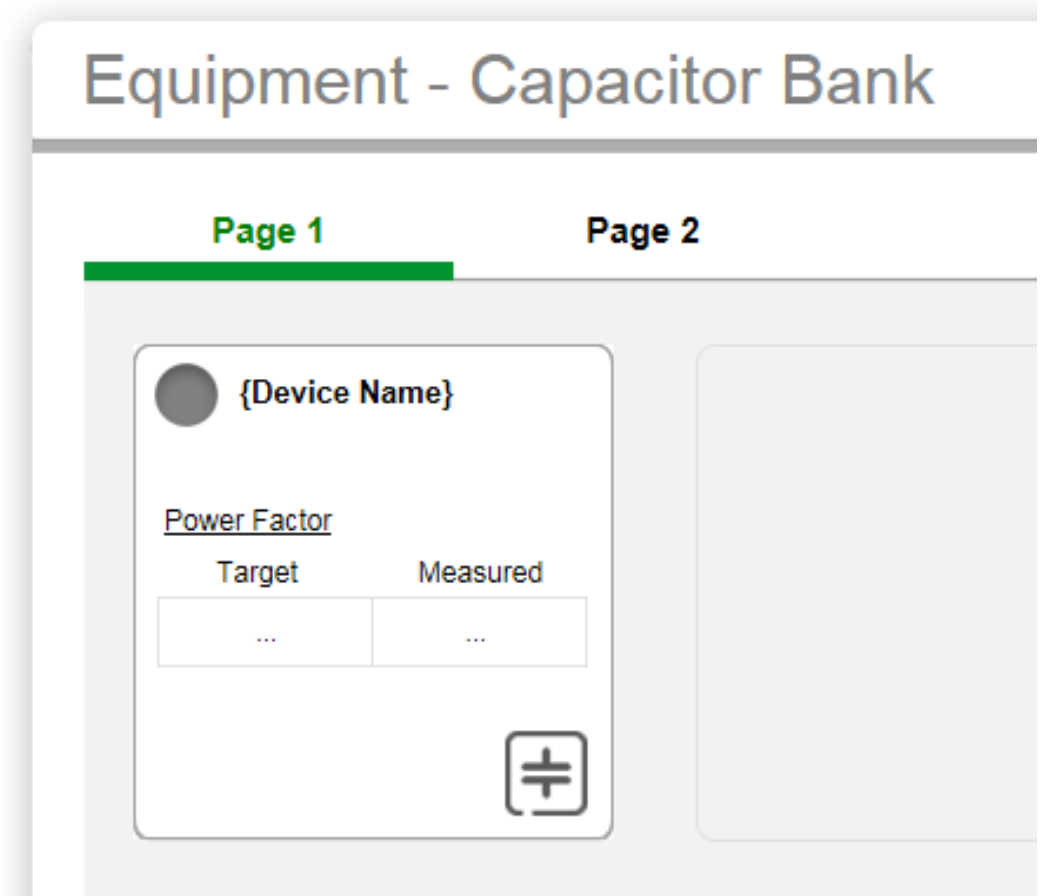


The Equipment page is also a landing page.



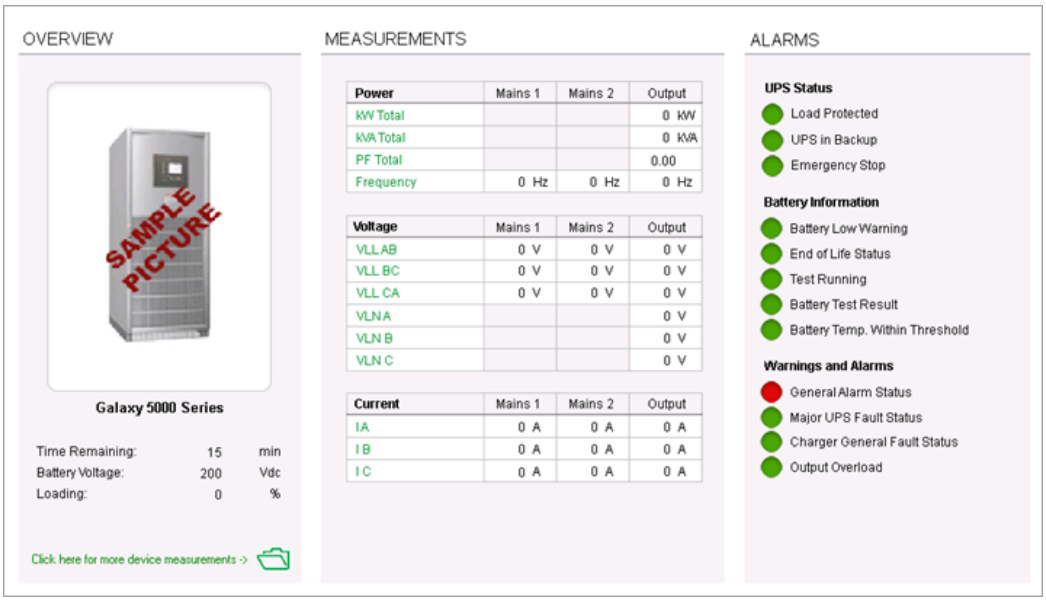
Equipment Diagram Grouping Pages

When you select an element of the Equipment landing page (e.g. Capacitor Banks), the grouping page opens. A summary entry for each device (e.g. Capacitor Bank) in the system could be configured here.



Equipment Diagram Detail Pages

When you select an element on the Equipment Grouping Page, the equipment diagram detail page for that device opens.



The following supported devices currently have template pages available:

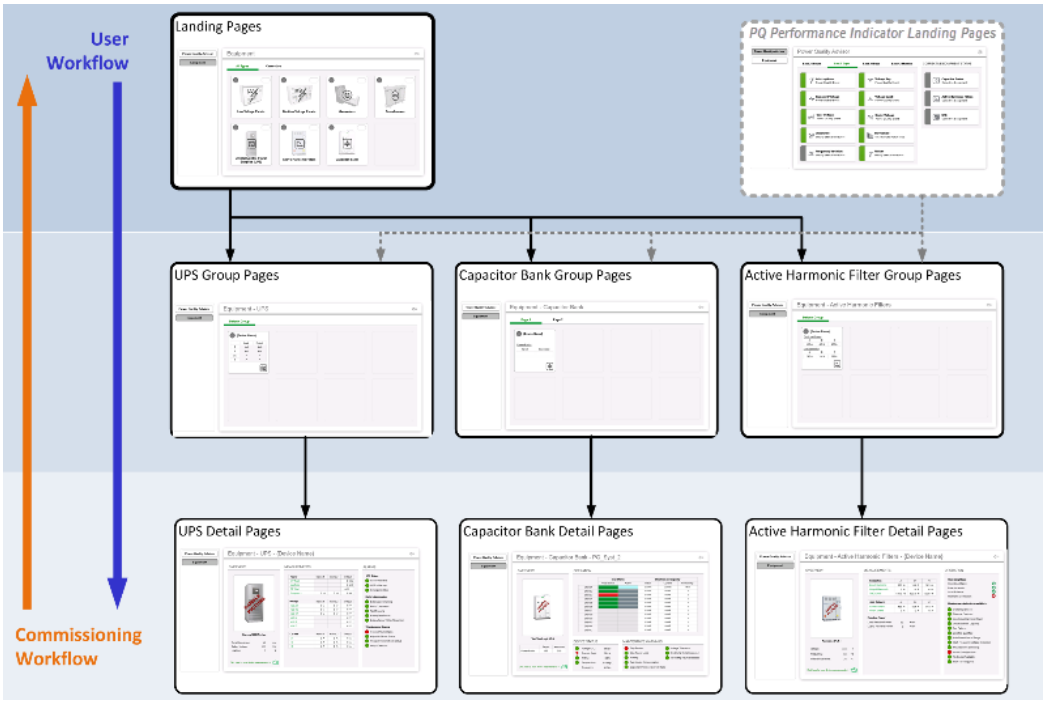
- Capacitor Banks: VarPlus Logic VL6 and VL12
- Active Harmonic Filters (AHF): Accusine PCS+/PFV+

- Uninterruptible Power Supplies (UPS): Galaxy 5000 and 5500

All Equipment Diagrams are installed in the following location:
`{root install folder}\config\diagrams\ud\Equipment`

Configuration Workflow

The order of commissioning is the opposite of user workflow. Set up the Detail Pages first, and then create the buttons for each Detail Page on the Group Pages. The Landing Pages (both Equipment and PQ Performance Indicator), require no commissioning other than optional customization if required.



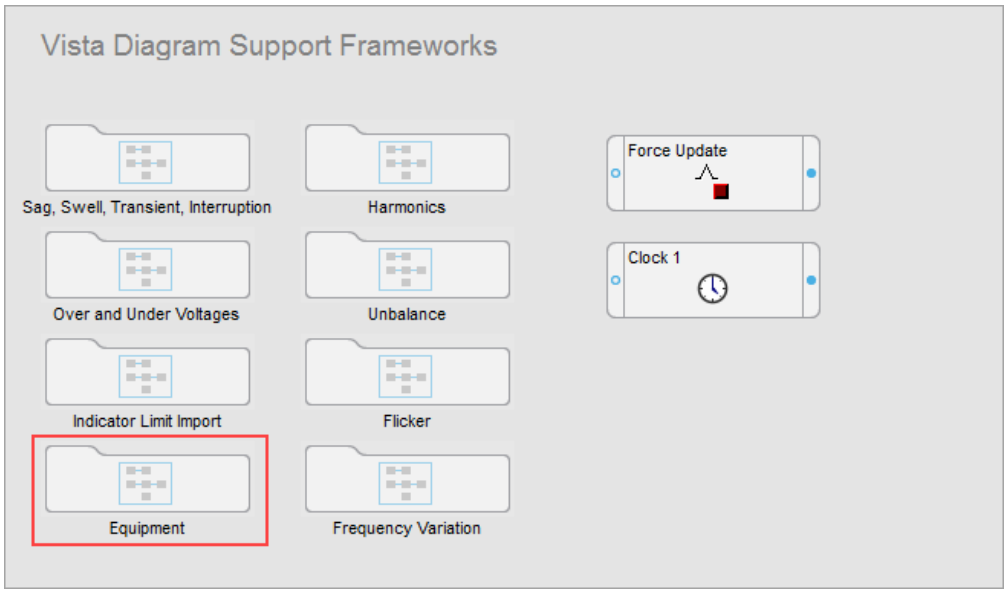
Configure the Framework for the Equipment Diagrams

Configure the Equipment Pages of the VIP framework to display aggregated warning/alarm indicators found on the Power Quality Performance Indicator Landing Pages and on the Equipment Landing and Group Pages.

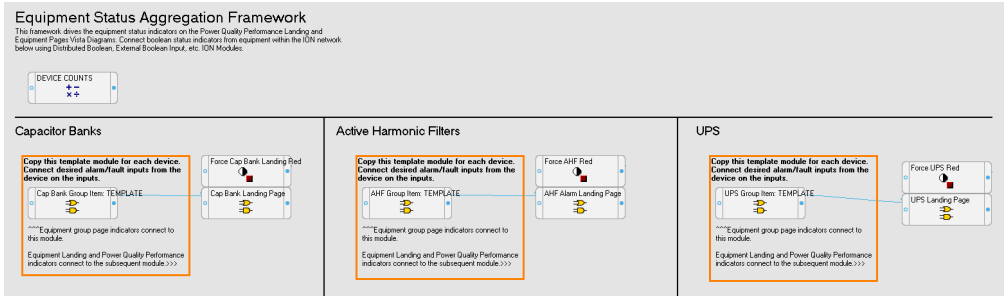
NOTE: The VIP.PQADVISOR service must be set up and running with the Power Quality Performance Framework configured to commission the Equipment Diagrams.

The Power Quality Performance framework contains some template OR Logic modules and simple instructions on configuring the VIP to work with the Equipment Pages:

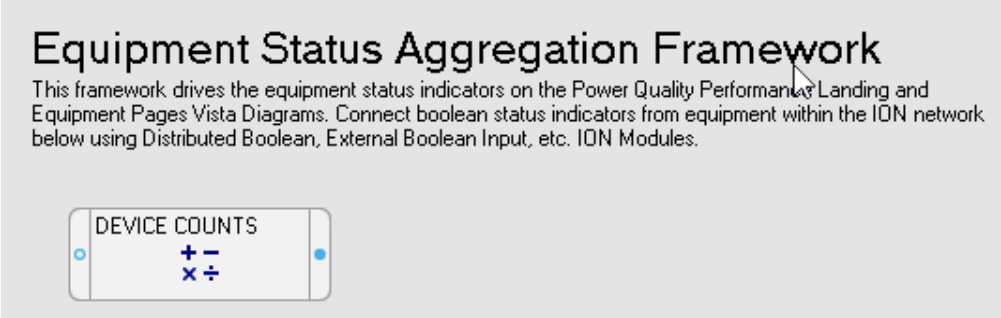
1. Open VIP.PQADVISOR in Designer.
2. Open the **Equipment** grouping folder.



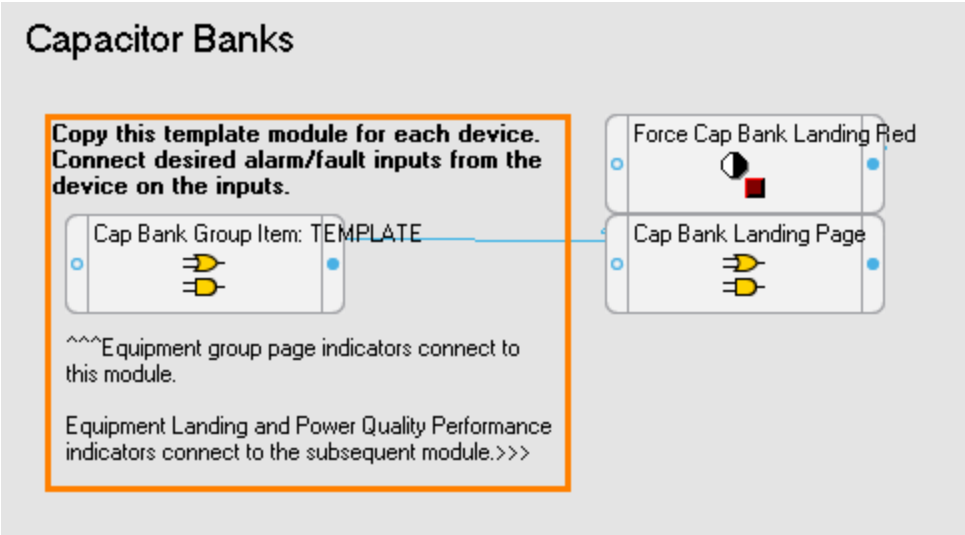
The Equipment folder contains the following:



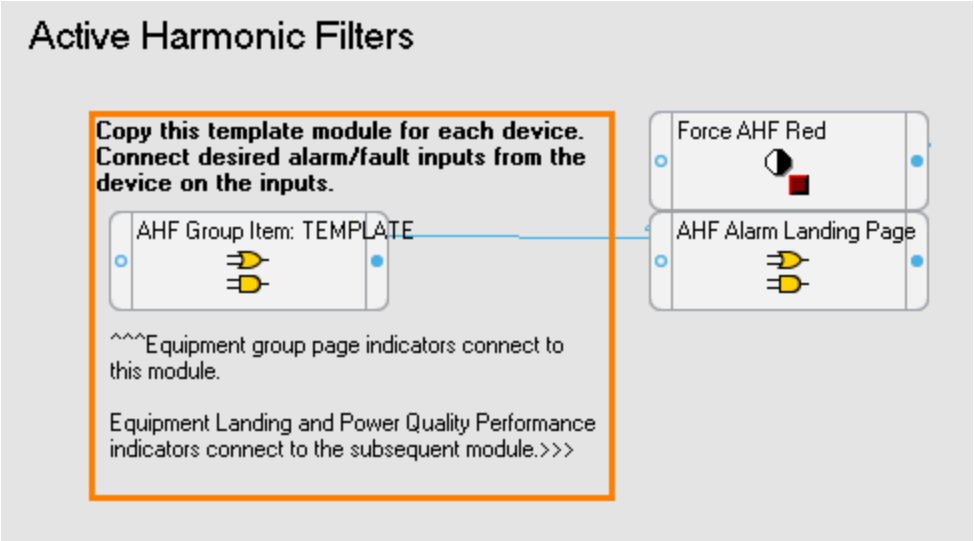
Summary Section:



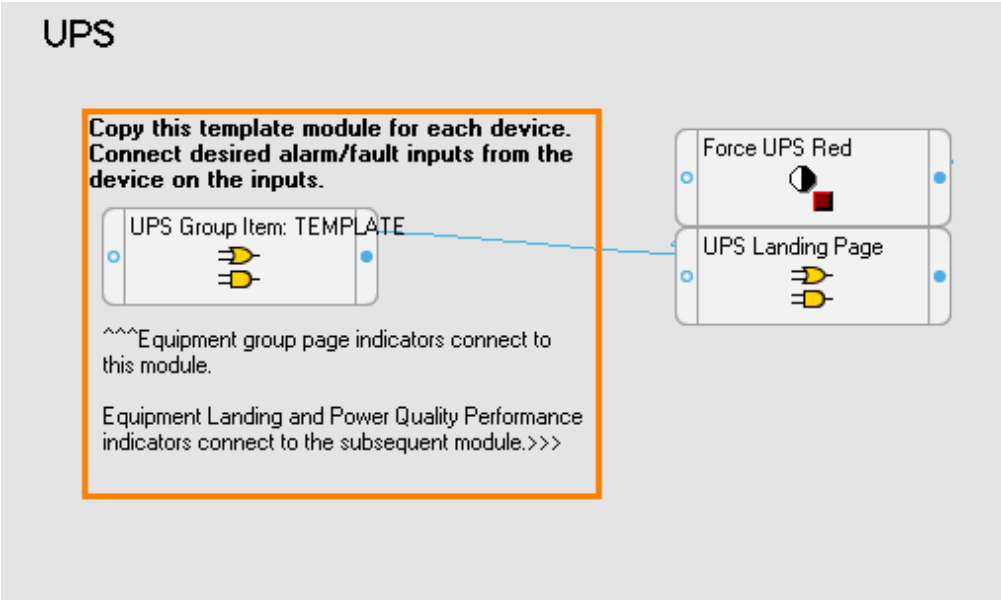
Capacitor Bank section:



Active Harmonic Filters section:

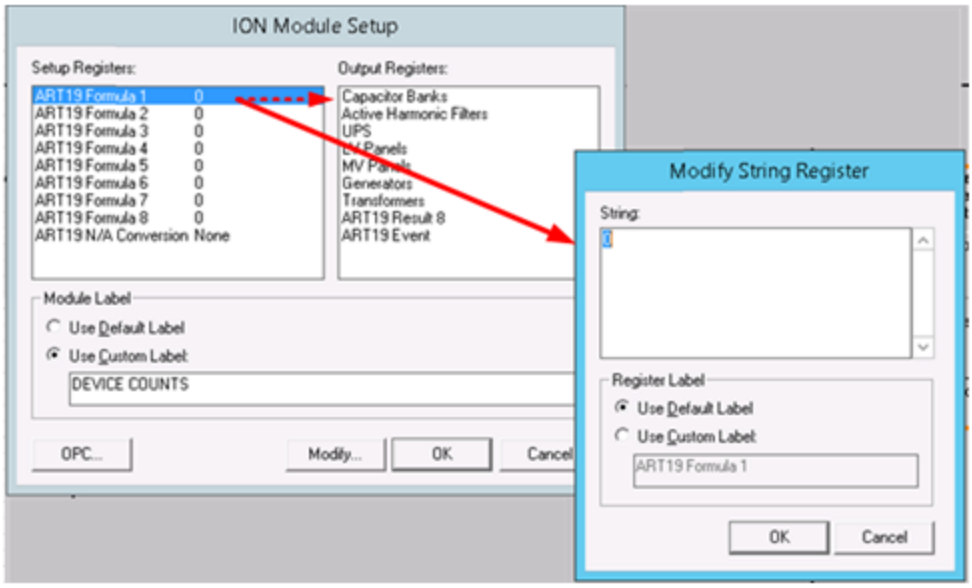


The UPS section:



Configure device count

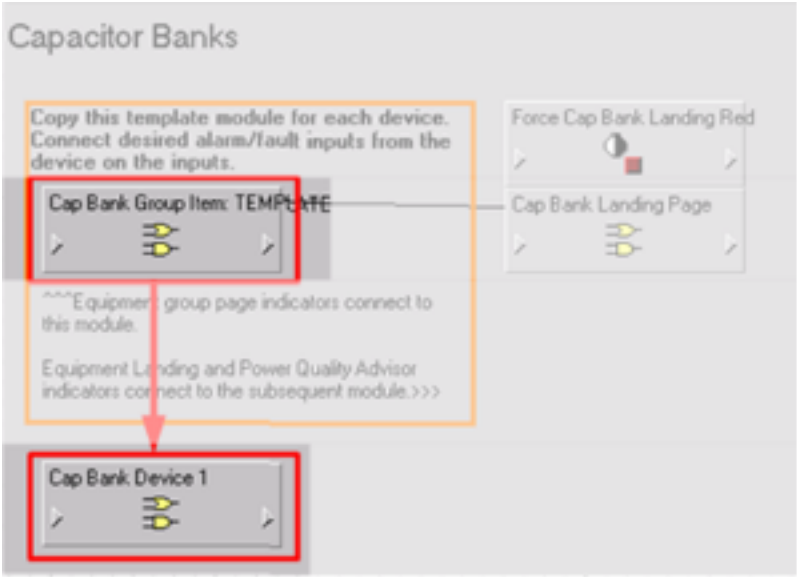
1. Right-click the module labeled **DEVICE COUNTS** to open the ION Module Setup dialog.
2. Double-click any of the 'Formula' Setup Registers to modify their value. The value entered represents the number of devices of corresponding type listed directly to the right in the Output Registers list.



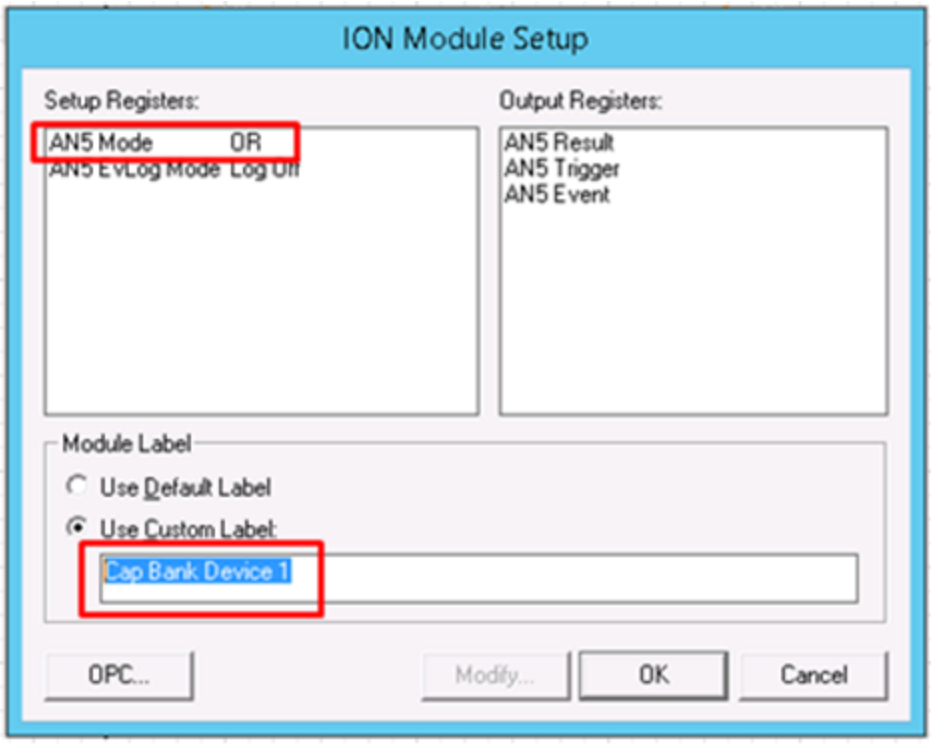
3. Repeat Step 2 until there is a device count number for each of the listed devices.

Configure equipment status

1. Set up the capacitor bank by duplicating the template module labeled **Cap Bank Group Item: TEMPLATE** (or by creating a new AND/OR module).

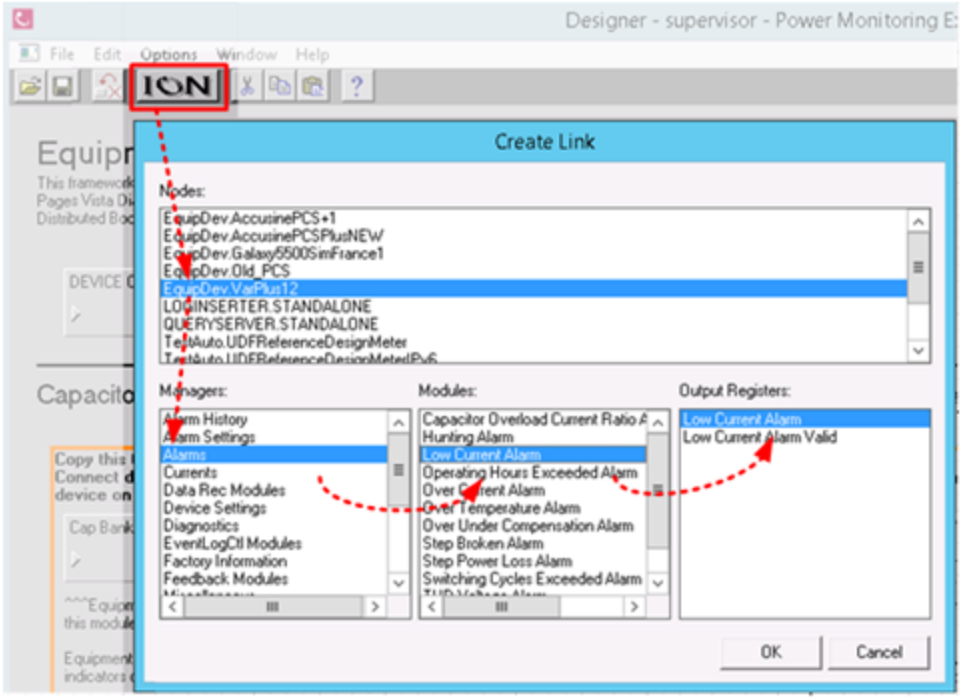


2. Right-click the new module and make the following modifications:
   a. Set the mode of operation to OR.
   b. Enter the name of the capacitor bank device in the **Custom Label** field.

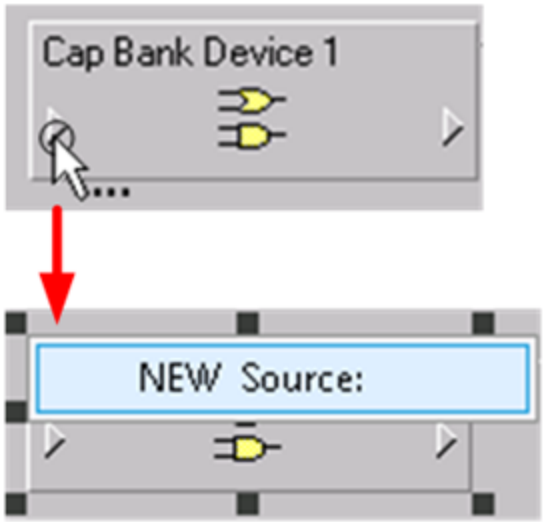


3. Link the input of the new module to a device alarm status output by performing the following steps:
   a. Click the **ION** button on the toolbar to open the Create Link dialog.
   b. Click the desired device, **Alarms** under **Managers**, **Low Current Alarm** under **Modules**, and **Low Current Alarm** under **Output Registers**.

c. Click **OK**.



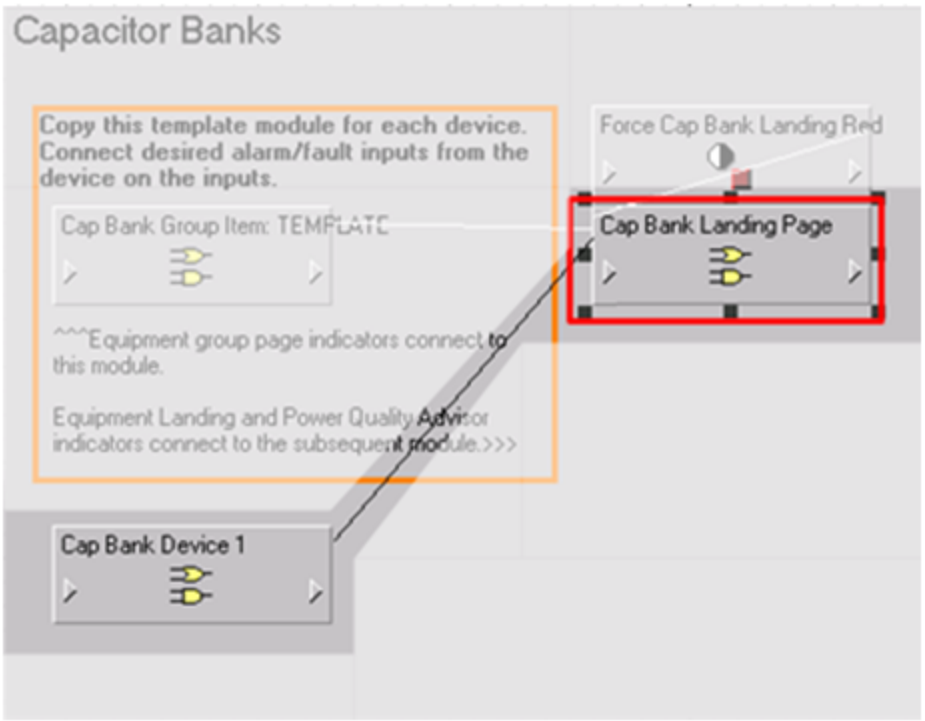
d. The cursor appears with a circle; click the input of the module and select **NEW Source**.



4. Repeat Step 3 until each of the capacitor bank's desired alarm status is connected to the module.

   By doing this, the output of the module outputs a '1' (High) state if any of the connected alarm states are activated.

5. Link the output of the new module to the input of the module labeled **Cap Bank Landing Page**.

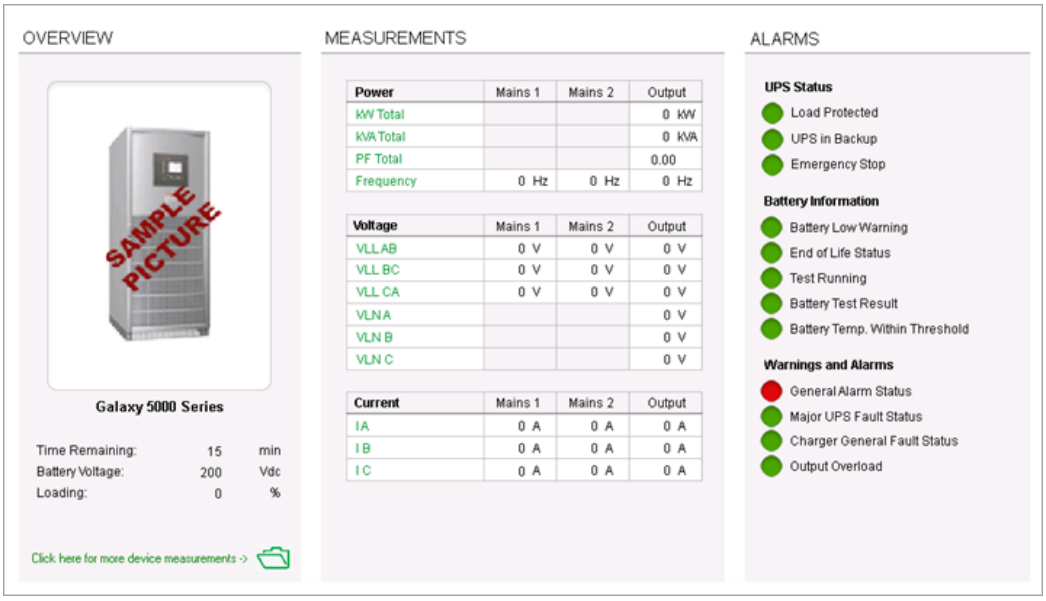


6. Repeat Steps 1-5 for each capacitor bank in the system.
7. Remove the link between the output of the template module and the input of the Landing Page module:
   a. Right-click the input of the Landing Page module.
   b. In the resulting window select the appropriate input.
   c. Click **Unlink**.
8. Repeat Steps 1-7 for the Active Harmonic Filter and UPS device frameworks until each desired corrective equipment device in the system is connected.
9. **Save** the modified framework.

NOTE: The outputs of the modules configured for the individual devices drive the Equipment Group Page indicators, and the outputs of the Landing Page modules drive the Landing Page Indicators on both the Equipment Pages and Power Quality Performance Indicator pages.

Configure the Equipment Diagram Detail Pages

Each individual piece of equipment in the system can have its own detail page. These diagrams connect directly to the devices and do not have any interaction with the Power Quality Performance VIP service.

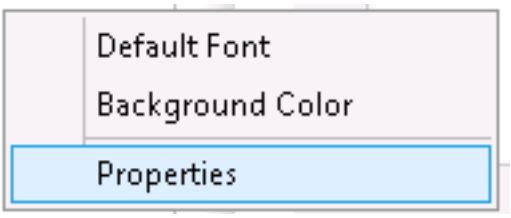


To set up any of the detail pages using the provided template diagrams:

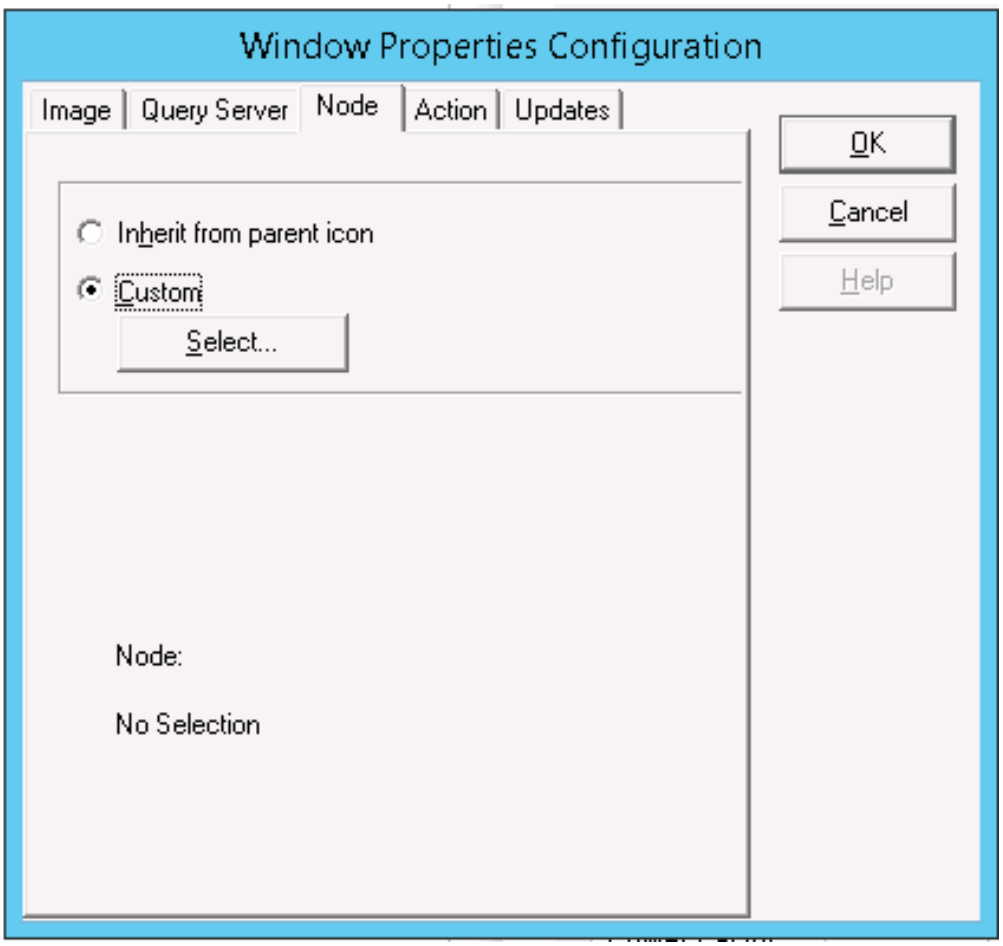
1. In Windows Explorer, open the folder `...\Power Monitoring Expert\config\diagrams\ud\Equipment` that contains the DetailPage template for one of the Equipment (UPS, Capacitor bank or Harmonic filter).
2. Highlight the template that will be used and copy it by pressing **Ctrl+C** and paste it using **Ctrl+V**.
3. When the file is pasted, it is enabled for editing. Choose a new name for the diagram file; preferably one that is easily associated with the device of interest.

   NOTE: Take care not to overwrite the original template file by ensuring that the new file has a new and distinct file name.

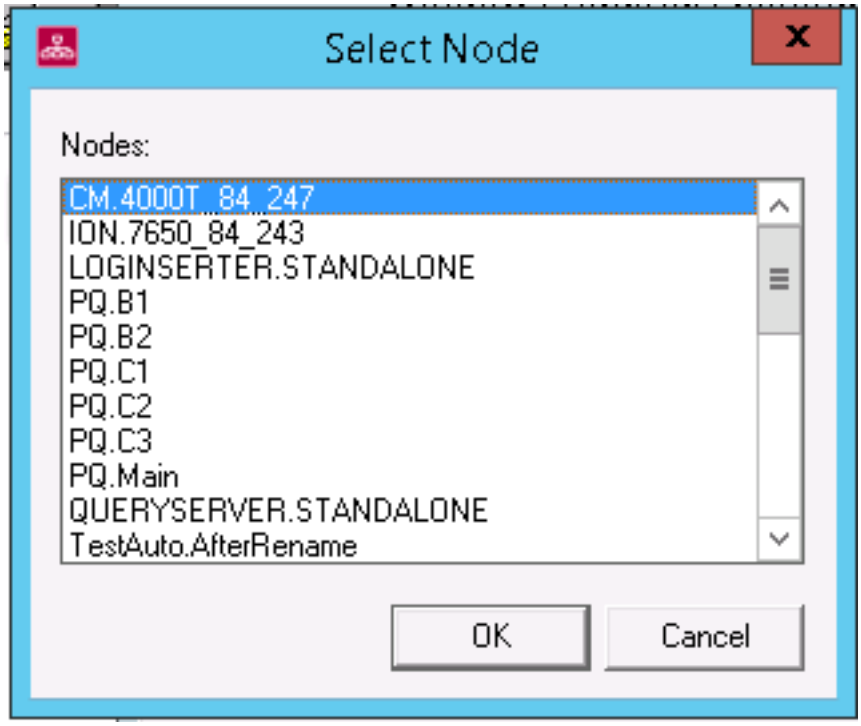
4. Open the PME Vista application and ensure that the toolbox is enabled.
5. Open the new file that was created in step 3 by selecting **File > Open** and navigating to the containing folder in the dialog.
6. When the diagram opens, right-click anywhere on the background, and select **Properties** on the menu.



7. In the subsequent dialog, select the **Node** tab.



8. On the **Node** tab, select **Custom** and then click **Select** to open the Select Node dialog.
9. Select the node name of the equipment for which the diagram was created, and click **OK**.

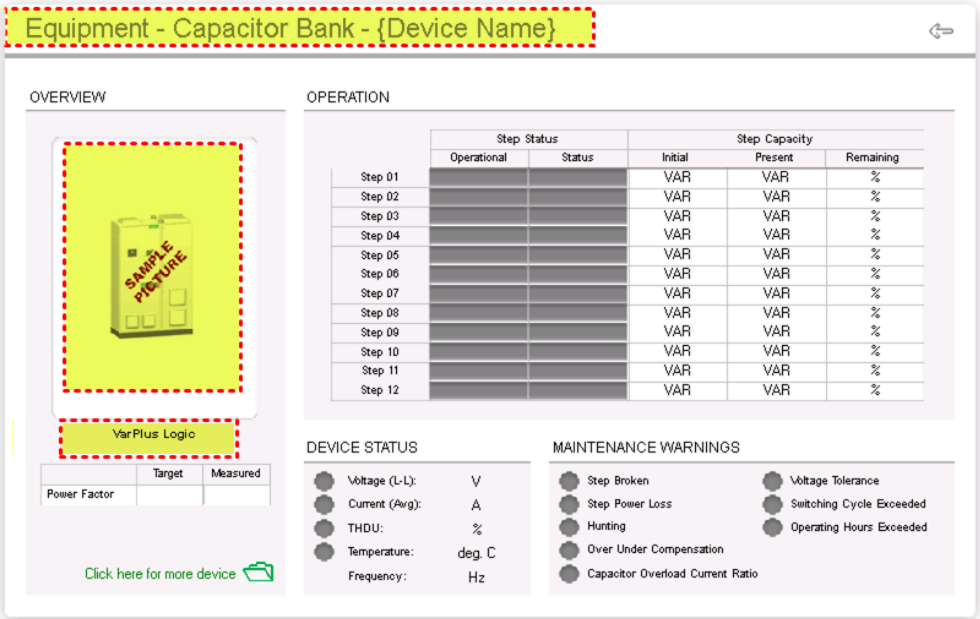


10. Click **OK** on the properties dialog, and click **Save** in Vista.

    Provided the correct device was selected as the parent node of the page (that is, that the device mapping is correct), all the fields and indicators on the page should populate and be ready for use.

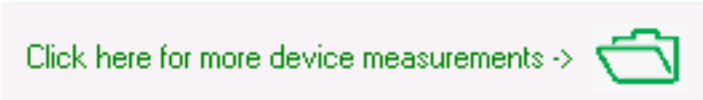
    Verify that the device selected is the correct type for the template being used, and that the device is configured correctly.

    Once the page has been linked to the node, there are a few manual steps that should be completed to customize the page:



11. Customize the page as per the graphic above:
    a. Update the page header to include the unique name of the device.
    b. Change the picture of the device from the sample image to a custom image, such as a standard image or an actual picture of the device.
    c. Update the device model name to be more specific.

12. As a final step, click the folder icon in the Overview section to view the default diagram of the device. Verify that the correct default diagram appears, and that the values and status shown match what appears on the detail page.

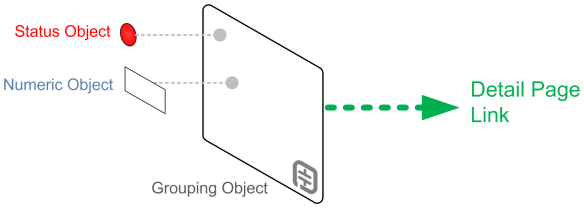


13. Repeat all steps for other equipment.

Configure the Equipment Diagram Group Pages

Group Pages display multiple devices of a particular type from a single location.

This is made possible by creating and customizing "Buttons" that consist of grouping, numeric, text, and status objects arranged to represent a clickable overview of a single device.



Group Pages set up and scaling

Before the Group Page for a particular device type can be populated, the logical organization of the device grouping must be reviewed, and multiple Group Pages need to be created if necessary.

If there are less than eight devices of the Group Page type, then proceed to the Group Page Buttons set up and Detail Page association. If there are more than eight, create more Group Page diagrams. These new pages will be linked as tabs from the main device type Group Page.

Device scaling

The first step is to determine how many diagrams will be required by counting the number of devices of the type in question. A single Group Page diagram has eight Button positions, so there will need to be a Group Page diagram for each eight devices and portion thereof. For example, if the system contains ten capacitor banks (each with its own Detail Page diagram), then there will need to be two Group Page diagrams; one page with eight buttons, one page with two.

Alternately, a different organizational scheme can be incorporated by creating a Group Page for each logical grouping of devices. For example, a separate Group Page can be created for each production line in a facility, thus allowing the user to conveniently check the active harmonic filters that are present for a production line that is experiencing problems.

Another option is to create Group Pages for different buildings or areas within a facility.

Ultimately, it is up to the deploying Application Engineer to determine the solution which makes the most sense for the user's application.

Group scaling

Each Group Page has space for six tabs, therefore, if there are more than six Group Pages required for a single device type, they need to be arranged into sub-types on the Landing page level. For example, if there were twelve Group Pages for active harmonic filters, they need to be split into two logical categories and treated separately on the Landing Page level.

For this set up guide, assume that there are only six or less Group Pages required in the steps outlined below.

Group Page logical set up

With the number of Group Pages required in mind, complete the following preliminary setup steps:

Set up the Group Page files

1. In Windows Explorer, open the folder `...\Power Monitoring Expert\config\diagrams\ud\Equipment` that contains the Group Pages.
2. Highlight the template that will be used. Copy it by pressing **Ctrl+C** and paste it using **Ctrl+V**.
3. When the file is pasted, the file name opens for editing.

   Choose a new name for the diagram file; preferably one that reflects how the Group Pages will be organized.

   Note that the original file (the one that contains the word "All" or "Pg1" in the filename) will be the main Group Page that is linked to/from the Equipment landing page. For example, if one were creating an active harmonic filter Group Page for each floor of a facility the filenames would be as follows:

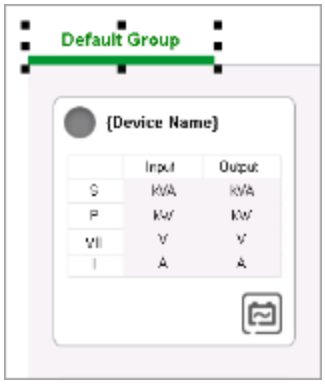
   a. Equipment_GroupPage__AHFAll.dgm (default filename for the first floor)
   b. Equipment_GroupPage_ AHF_Floor2.dgm
   c. Equipment_GroupPage__AHF_Floor3.dgm

   And so on.

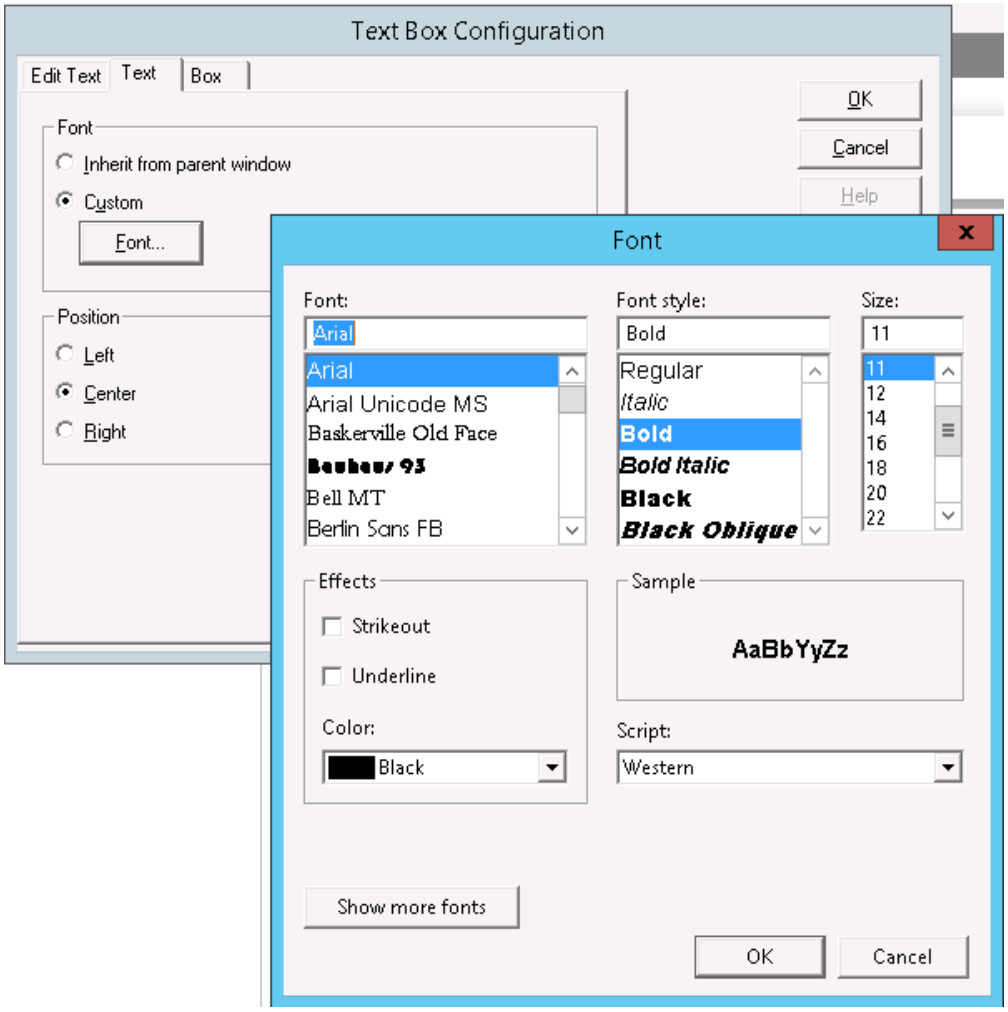
   NOTE: Use the most current version of the dgm file available.
4. Press **Enter** to save the file name.
5. Repeat steps 2-3 until you create all required files.

Set up tabs in the First Group Page

1. Open PME Vista and ensure that the Toolbox is enabled.
2. Open the first logical Group Page file that is to be set up by selecting **File > Open** from the menu bar and navigating to the containing folder in the dialog.
3. Select the tab text (the green text **Default Group** in new installations) and press **Ctrl+C** to copy it.



4. Press **Ctrl+V** to paste up to six text boxes - one for each Group Page.
5. Arrange the text boxes evenly along the tab line in up to five additional "tab" positions.
6. Change the text color for each of the pasted text boxes (but not the original) to black:
   a. Right-click the text box to open the Text Box Configuration dialog.
   b. Click the **Text** tab.
   c. Select **Custom** and click the **Font** button to open the Font dialog.
   d. Select **Black** from the Color drop down menu and click **OK**.
   e. Click **OK** on the configuration dialog to complete the change.



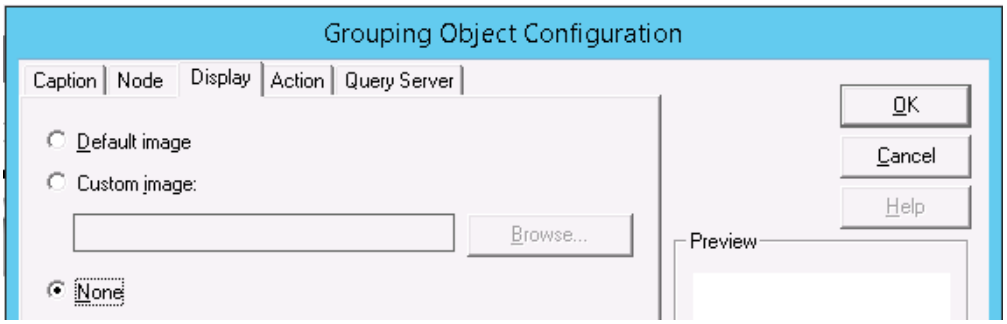
7. Place a new Grouping Object over top of each new text box.

8. Change the shape of each new grouping object by left-clicking the object and dragging the black tabs that appear.

   The objects will be what the user will click to navigate to other tabs; they should therefore cover the text underneath, and should not overlap.

9. Make each new grouping object link to the Group Page diagram referenced by the text underneath it.
   a. Right-click the grouping to open the Grouping Object Configuration dialog.
   b. Select the **Action** tab.
   c. Select **Open User Diagram** and click the **Browse** button to open the Choose sub-diagram dialog.

10. Make each new grouping object appear transparent to show the text underneath it.
    a. Right-click the grouping to open the configuration dialog.
    b. Select the **Display** tab.
    c. Select **None**.
    d. Click **OK** in the configuration dialog to complete the change.



11. Hold down the left mouse button and draw a marquee around the entire tab (text box and grouping) objects.
12. Press **Ctrl+C** to copy the objects.
13. Save and close the diagram.

Set up tabs in subsequent Group Pages

1. Open the next Group Page diagram by selecting **File > Open** from the menu bar and navigating to the containing folder in the dialog.
2. Delete any existing text box objects in the tab area by selecting them and pressing **Delete**.

3. Press **Ctrl+V** to paste the tab objects from the previous Group Page diagram.
4. Change the color of the text in the text box that represents the first Group Page to black (see "Setting up Tabs in the First Group Page', Step 6).
5. Add a new grouping object over top of the text that represents the first Group Page, modify it to be transparent, and link it to the first Group Page diagram file (see "Setting up Tabs in the First Group Page', steps 8-10).
6. Delete the grouping object in the tab area that links to the current Group Page by selecting it and pressing **Delete**.
7. Change the color of the text in the text box that represents the current Group Page to green.
8. Change the background image of the diagram to one that has highlighting on the correct portion of the tab area:
   a. Right-click any unpopulated space on the diagram area and select **Properties** on the menu.
   b. Select the **Image** tab in the Configuration dialog.
   c. Select **Custom Image** and click **Browse**.
   d. In the resulting, navigate to the following location:
   `…\config\diagrams\images\Equipment_Diagrams\Backgrounds`
   e. Select the correct background image.

      Each Equipment diagram background image included in this installation is the same, except for the position of a green highlight in the tab area. The filename of the background image indicates where the green highlight is located. For example, "PQEquip_Lvl1BG_Pos2.bmp" has a highlight in the second position from the left, indicated by the "Pos2" text in the filename. Double-click the file to complete the selection.

      NOTE: Use the most current version of the bmp file available.

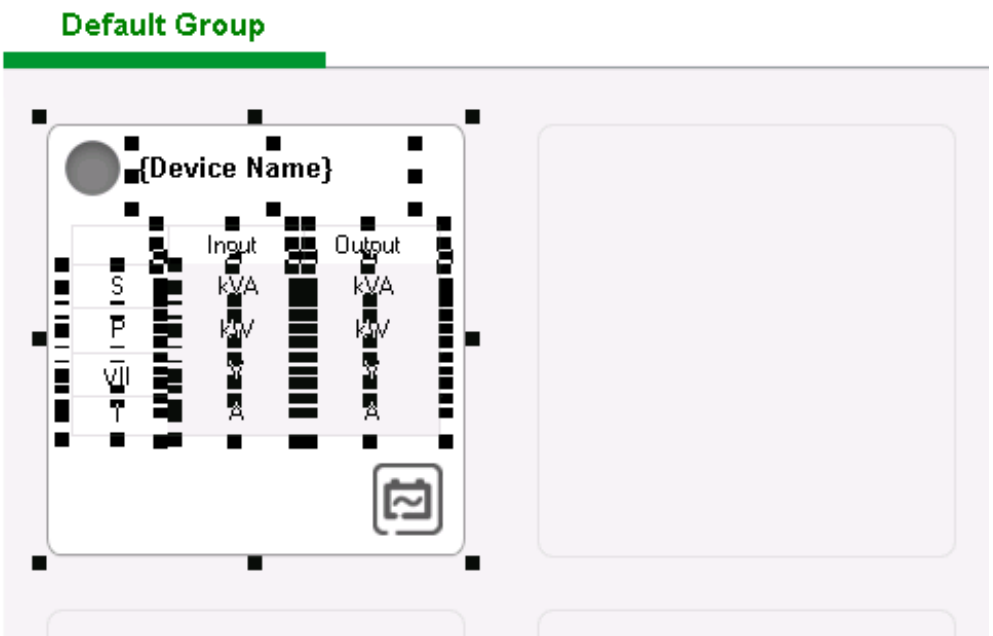
   f. Click **OK** to complete the change and to close the configuration dialog.
9. Repeat steps 1-8 until all Group Pages have the required tabs.

Group Page Buttons set up and Detail Page association

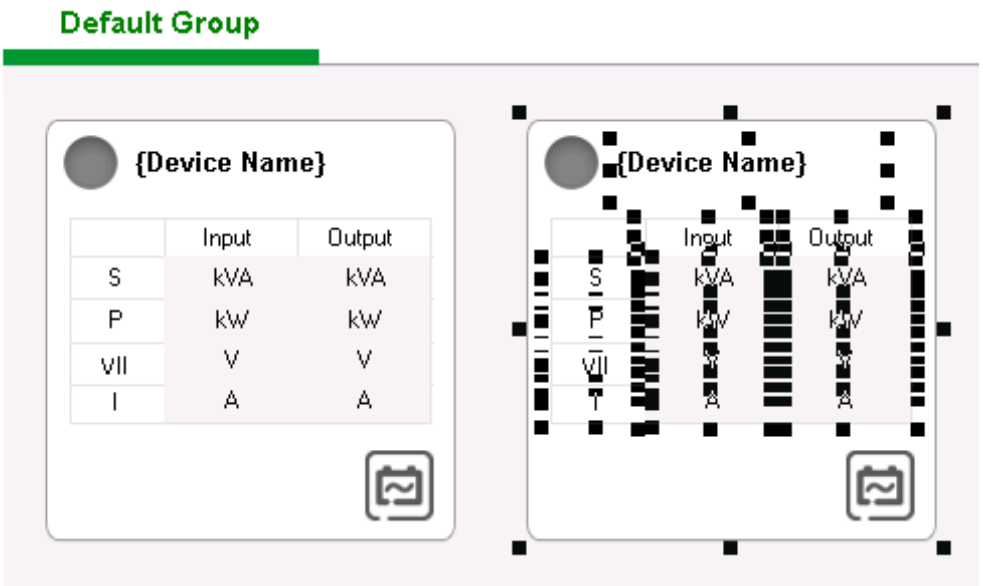
The following steps outline how to set up a Group page with custom buttons for each device that has an associated Detail Page:

1. Open Vista and ensure the Toolbox is enabled.
2. Open the Group Page file that is to be set up by selecting **File > Open** from the menu bar and navigating to the containing folder in the dialog.
3. Hold down the left mouse button and draw a marquee around the template button in the top left position of the page space, selecting all objects contained within.

4. Press **Ctrl+C** to copy the button items.



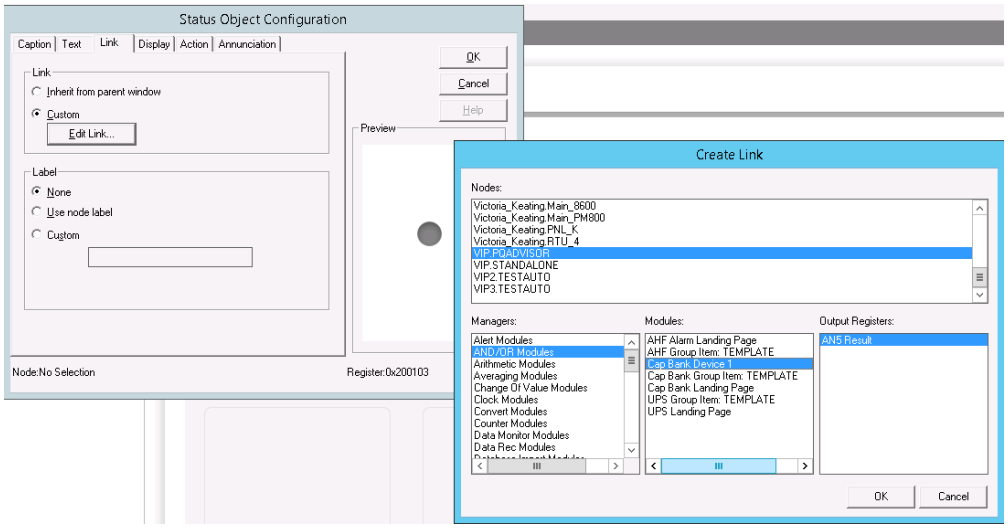
5. Press **Ctrl+V** to paste up to seven additional buttons (for a total of eight on the page); one for each device with a Detail Page.



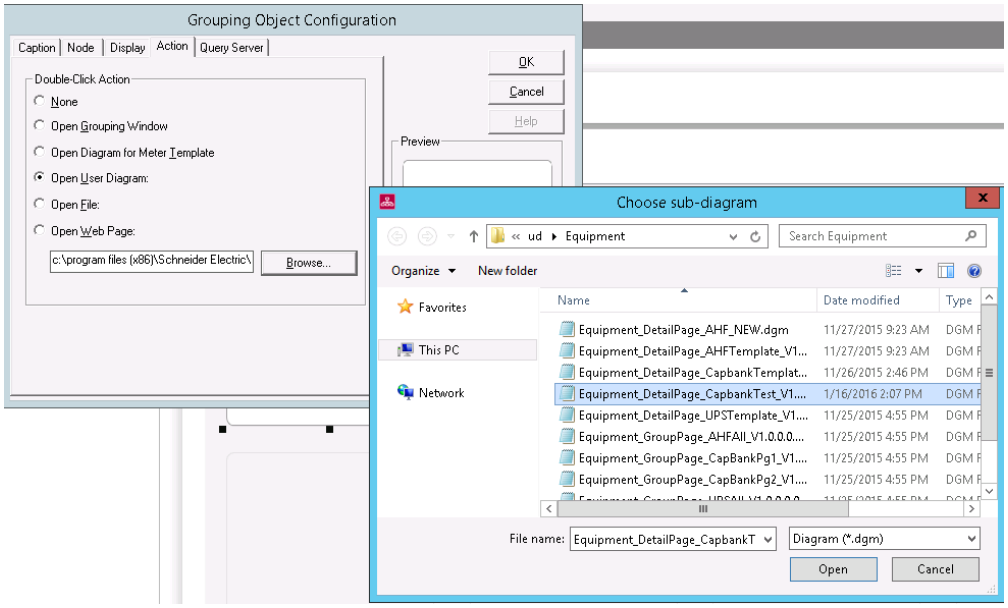
6. Link an indicator (status) object to its corresponding ION module in the Power Quality Performance Equipment VIP Framework:
   a. Right-click the indicator (status) object.
   b. Navigate to the correct module output by selecting the following in the Create Link dialog:
      i. Node: VIP.PQADVISOR.
      ii. Managers: And/OR Modules.
      iii. Modules: the AND/OR module that was set up for the corresponding device in the

Equipment Status Indicator Framework step.

iv. Output registers: (module designator) Result.



7. Repeat step 6 for each indicator object on the page.
8. Link the numeric objects within the button to the corresponding outputs on the device.
   a. Right-click the numeric object.
   b. Navigate to the correct module output by selecting the following in the 'Create Link' dialog; start by selecting the device in the 'Node' section and navigating to the desired numeric output.
9. Repeat step 8 for each numeric object on the page.
10. Link the button background to the appropriate Detail Page:
    a. Right-click the button (grouping object) area where there is no other object (such as numeric or indicator).
    b. Select the **Action** tab on the configuration dialog.
    c. Select **Open User Diagram** and click **Browse**.
    d. In the resulting window, navigate to the Detail diagram file.
    e. Click **OK** on the configuration dialog to complete the change.



11. Repeat step 10 for each button (Grouping Object) on the page.
12. Repeat this process for each (corrective) device type in the system.

    The Group Page should now be configured.
13. Repeat this process for any other Group Page diagrams in the system.

Group Button measurement linking

The measurements displayed on the Group Page buttons are linked to the device measurements by navigating to the appropriate measurement in the numeric object configuration window. To help the deploying Application Engineer, these links are listed in more detail below along with the ION Handle:

See the section called “How to Modify Indicators” in the Appendix called “How to Modify Power Quality Performance Vista Diagrams” for instructions on how to link to ION Handles.

VarPlus Logic Capacitor Bank Button Measurement Display

Button Label	Measurement Label in Device	ION Handle
Power Factor - Target	Target Cos Phi 01	0x8502E01
Power Factor - Measured	Power Factor Total	0x8803701

Accusine PCS+ Active Harmonic Filter Button Measurement Display

Button Label	Measurement Label in Device	ION Handle
Total Load Current - A	Load Current A Total	0x8100001
Total Load Current - B	Load Current B Total	0x8100002
Total Load Current - C	Load Current C Total	0x8100003

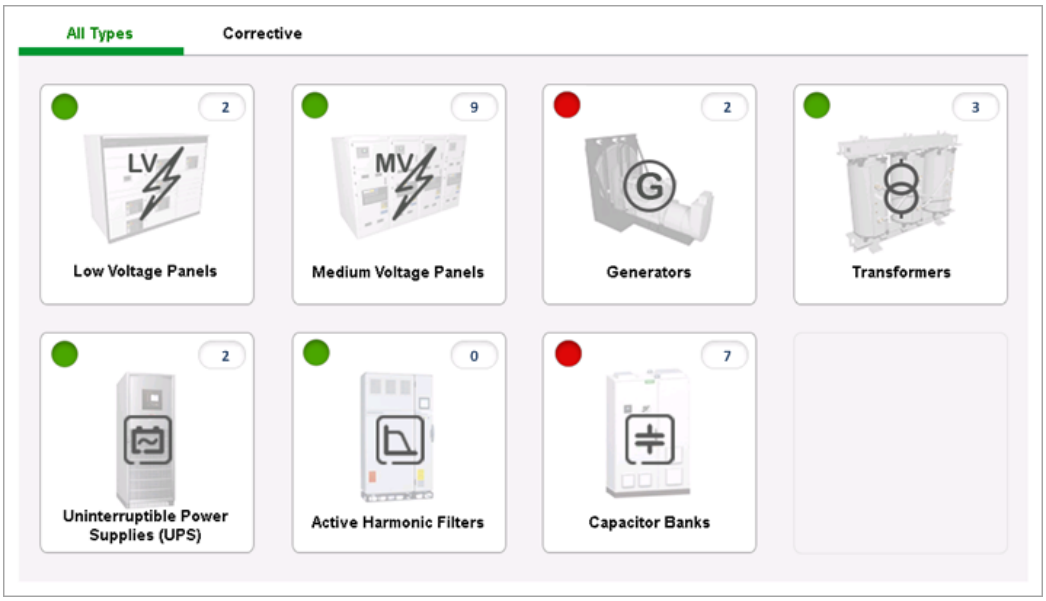
Button Label	Measurement Label in Device	ION Handle
Load Harmonic - A	Load Harmonics Current A	0x810001B
Load Harmonic - B	Load Harmonics Current B	0x810001C
Load Harmonic - C	Load Harmonics Current C	0x810001D

Galaxy 5500 UPS Button Measurement Display

Button Label	Manager	Module	Output Register	ION Handle
Time Remaining	Diagnostics2	Backup Time	Battery Time Remaining	0xb300002
Battery Voltage	Voltages	Voltage	Battery DC Voltage	0xc000018
Loading	Power Factors	Power Factor	Total Output Percent Load	0xb200001

Configure the Equipment Diagram Landing Pages

Configuring Landing Pages is the last step in setting up the Equipment Page.



The indicators (Status Objects) on the Landing Pages are linked to the output of the respective Equipment Landing Page ION Module in the Power Quality Performance Framework of the VIP.PQADVISOR service.

The Equipment Counts (Numeric Objects) are linked to the 'DEVICE COUNTS' ION Arithmetic Module in the Equipment Status Indicator Framework. The number of devices of each category within the system needs to be entered into the Setup Registers of the module.

Link the button background to the appropriate Group Page:

1. Right-click the button (grouping object) area anywhere that there is no other object (such as numeric or indicator).
2. Select the **Action** tab on the Configuration dialog.
3. Select **Open User Diagram** and click **Browse**.
4. In the resulting window, navigate to the Group diagram file.
5. Click **OK** on the Configuration dialog to complete the change.
6. Save the diagram.

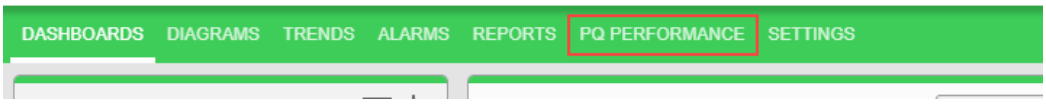
Customization might be needed under the following circumstances:

- There are more than six Group Pages (i.e. more than 48 devices) for a particular device.
- The customer's application demands multiple Landing Pages with custom groups of device types. An example of this is pre-configured on default Landing Page; there is a tab for all devices and a tab for corrective devices only.

When customization is required, follow the steps in this section for adding additional pages/tabs and additional buttons. Note that the background images used for the Group Pages are the same as those used in the Landing Pages.

(Optional) Create a Power Quality Performance link in the Web Applications

An optional step is to create a link in Web Applications to view the Power Quality Performance Vista diagrams:



See Customizing the Web Applications links for details on how to create this link. See Adding idle detection to custom Web Application links for information on how to add idle detection to prevent session timeouts.

Configure Power Quality Impact Gadgets and Report

The Power Quality Impact Gadgets and Reports associate PQ events with process impact alarms within a given process / production line, and applies a flat rate cost estimate to the duration of the process impact alarm.

The following sections describe the configuration steps to make the Power Quality Impact Gadgets work:

- Acquire process impact signals
- Set up process impact alarms
- Set up Power Quality Groups

Acquire process impact signals

A process impact alarm is designed to be created on:

- An electrical value (e.g. current, voltage, power, etc.) from a power device. In this way PME detects the process impact independently (for example, based on a current drop).
- A process impact signal from another system or equipment. The process impact signals can be:
  - Hard wired signals from the process. The signal can be from the process PLC, motor VSD, etc. It can be hard wired to a digital input or an analog input of the meter which monitors the corresponding load (requires AI/DI capability on the meter). The signal can also be hard wired to a dedicated PLC, which can then be connected into PME as a Modbus device.
  - OPC tags from the process. Power Monitoring Expert (working as OPC client) acquires the process impact signals from process SCADA system (working as OPC server) via OPC.

NOTE: If signals from multiple processes are connected to a single device (for example, process A and process B signals on a PLC, power meter or OPC connection), then logical devices must be defined to represent each process to be used in the power quality group definition.

To acquire the process impact signals (if Power Monitoring Expert is not detecting the process impact independently), the following tasks may be required to accomplish the work:

- Using meter I/Os
- Using third-party Modbus device in Power Monitoring Expert
- Using Power Monitoring Expert as an OPC client
- Using Power Monitoring Expert Logical Device

See Power Monitoring Expert documentation for more information.

Set up process impact alarms

After the process impact signals are connected into the Power Monitoring Expert system, or Power Monitoring Expert is set up to detect the process impact independently, process impact alarms need to be set up.

To set up process impact alarms:

1. Launch **Software Alarms** from **Management Console > Tools > Web Tools**, or from Web Apps **Settings** > **Alarms**.
2. Select **Add Alarm Rule**.
3. Select the **Realtime Setpoint** template if the alarm is based on an analog value. Select **Realtime Digital Setpoint** template if the alarm is based on a digital value.
4. Select the **Measurement** that will be used to determine a process impact event (e.g. **Current Avg** if using the current drops to signify the process impact, or **Equipment State** if the process impact signal is mapped to this measurement for the Logical Device created for the process)
5. In the **Alarm Name** field, enter **Process Impact Alarm**.

   NOTE: The string “Process Impact Alarm” is the only flag that the Power Quality Impact report and gadgets looks for.

6. Configure the thresholds for the Active and Inactive Conditions.
7. Configure the **Pickup Delay** and **Dropout Delay**:

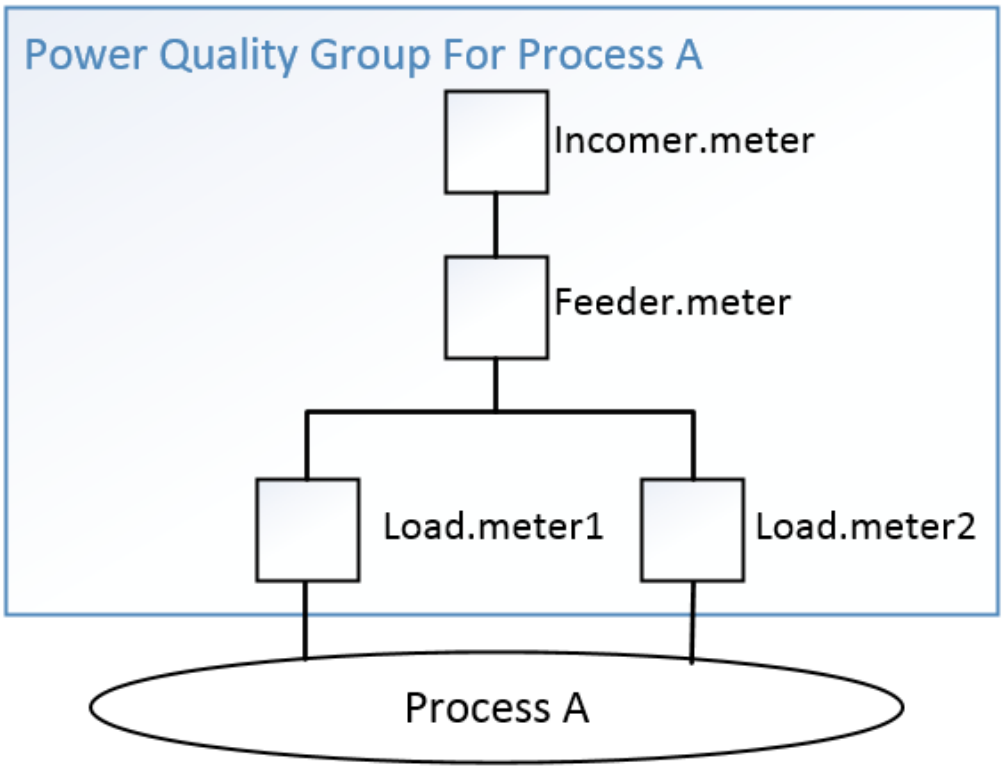
   The alarm will go ON if the threshold has been exceeded for longer, in seconds, than the “Pickup Delay” value.
   The alarm will go OFF if the value is below the threshold for longer, in seconds, than the “Dropout Delay” value.

8. Configure the **Priority**. Use a number less than 64 to prevent the alarm from appearing in the PME Alarm Viewer.
9. Set the **Realtime Interval**. The recommendation is **5** seconds.
10. Select the **Source** for the alarm rule. If a Logical Device is created to represent a process, select the logical device.
11. (Optional) Define and select a schedule if you want to control when the Alarm is enabled or disabled.
12. Give the Alarm rule a name.
13. Click **Finish**.

For more details on how to setup software based alarming see Software Alarms configuration.

Set up Power Quality Groups

The Power Quality Groups are defined per process (for example, a production line), so that only the power quality events captured by the meter which relate to the particular process are considered in the impact analysis.



Power Quality Groups must be defined or the Power Quality Impact gadgets and Report will not function.

The incomer meters defined in the Power Quality Groups are also used for the Power Factor section of the Power Quality Analysis Report.

Power Quality Group definition

Power Quality Group are defined in the `PowerQualityGroups.csv` file which is located under the folder:
`{root install folder}\Applications\PowerQuality\`

The format of the comma delimited file is as follows:
`<Power Quality Group Name>,<Incomer Meter>,<Feeder Meter>,<Load Meter>,<Rate>`

Where:

- **Power Quality Group Name** – The name for the group (target process). It is used for selecting the group in Power Quality Impact gadgets and report.
- **Incomer meter** – The meter monitors the incomer. It typically has the PQ event detection capability. The event it captures will be used in the analysis.
- **Feeder Meter** – The meter between the incomer meter and the load meter (could be multiple). The PQ events it captures can potentially impact the process at its downstream. If a feeder meter does not support PQ event detection, then there is no need to include it in the definition. See the examples in next section.
- **Load Meter** – Contains the Process Impact Alarms. The Power Quality Impact Gadgets and Report will not work if the load meters are not defined for the Power Quality Groups. It can be a

logical device if the Process Impact Alarm is defined on a logical device. See Set up process impact alarms for more information. The load meter typically doesn't have PQ event detection capability.

- **Rate** – The flat hourly rate for the cost impact calculation

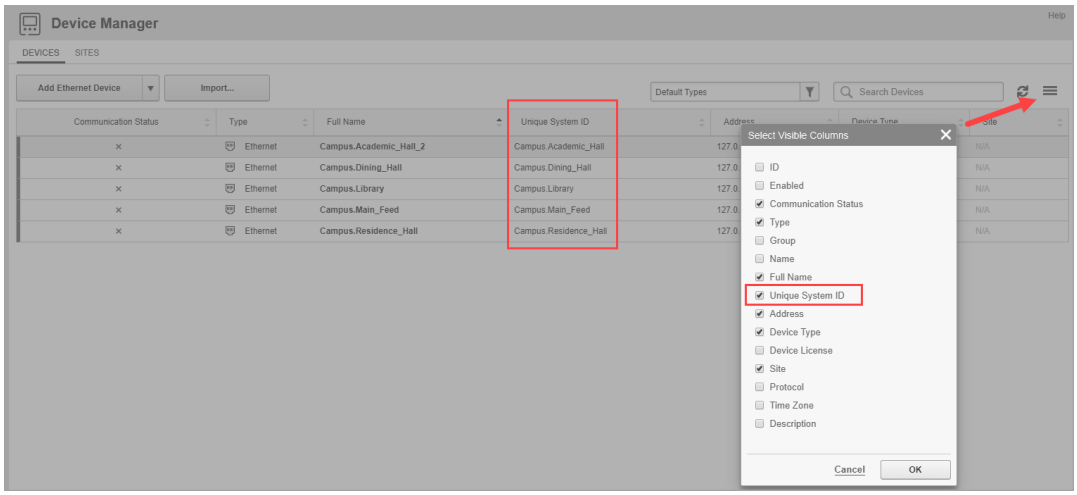
NOTE:
- The file structure only allows one incomer meter, one feeder meter, and one load meter per row. If, for a category, more than one meter needs to be included, define them in multiple lines with the same group name.
- The file structure allows one rate per group; define it only in the first row of the group.
- The PQ events captured by the meters in a Power Quality Group will be clustered before associating with the Process Impact Alarms, so that the same event seen by different meters are counted only once.
- Only the PQ events captured by the incomer meter and feeder meter are considered in the analysis. If the load meter supports PQ event detection, and you want to include the events it detects into the analysis, you need to define it as a feeder meter as well. See the examples in next section.
- The incomer meters defined are also used by the Power Factor section of the Power Quality Analysis Report to determine the incomer meters in the system. See the examples in next section.

Edit PowerQualityGroup.csv

NOTE: Before editing the `PowerQualityGroups.csv` file, make sure you understand the relationship between the power metering system and the process of the customer's facility.

To edit the `PowerQualityGroups.csv` file:

1. Identify the system name of a device, go to Device Manager, select **Unique System ID** in the Column Selector to add the system name to the display:



NOTE: Only the device system names are acceptable.

2. Edit the file in Excel, Notepad or other text editor. For each Power Quality Group:
   a. In column B, list all related incomer meters that can detect PQ events for the group. Use multiple rows if there is more than one incomer meter.
   b. In column C, list all related feeder meters that can detect PQ events for the group. Use multiple rows if there is more than one feeder meter.
   c. In column D, list all related load meters on which the Process Impact Alarms are configured for the group. Use multiple rows if there is more than one load meter.
   d. Repeat the group name in column A for each row.
   e. Specify the rate in column E for only the first row for the group.
3. Repeat step 2 for each Power Quality Group.
4. Save the file and keep the format as .csv.

NOTE:
- The list separators for the .csv are “,” for most regions, and “;” for several European countries. The list separators will be detected from the culture settings and used by the import/export exe.
- The rate under culture settings, other than English (en-XX), needs to be enclosed in double quotes. For example, for Spain (es-ES), if the rate 123.456.789,0 is represented, it is input as "123.456.789,0".

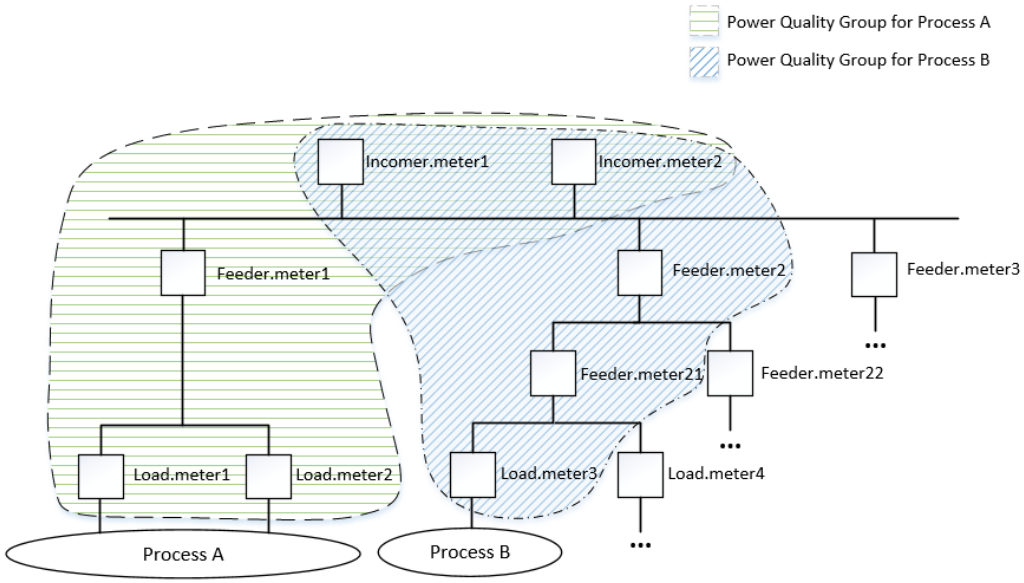
Example 1:

Take the metering layout in the following image as an example, the definition contains the following:

	A	B	C	D	E
1	Process A	Incomer.meter	Feeder.meter	Load.meter1	10000
2	Process A			Load.meter2	

Example 2:

In a more complicated example:



The file contains the following:

	A	B	C	D	E
1	Process A	Incomer.meter1	Feeder.meter1	Load.meter1	10000
2	Process A	Incomer.meter2		Load.meter2	
3	Process B	Incomer.meter1	Feeder.meter2	Load.meter3	20000
4	Process B	Incomer.meter2	Feeder.meter21		

Example 3:

As explained in the previous section, in addition to Example 2, if the feeder meters do not have PQ event detection capability, there is no need to define them. (There is no effect if they are defined.)

	A	B	C	D	E
1	Process A	Incomer.meter1		Load.meter1	10000
2	Process A	Incomer.meter2		Load.meter2	
3	Process B	Incomer.meter1		Load.meter3	20000
4	Process B	Incomer.meter2			

Example 4:

As explained in the previous section, in addition to Example 3, if the Process Impact Alarm for the “Process A” is defined only under “Load.meter2”, then “Load.meter2” is the only meter that needs to be defined for the “Process A”. (There is no effect if other load meters are included.)

	A	B	C	D	E
1	Process A	Incomer.meter1		Load.meter2	10000
2	Process A	Incomer.meter2			
3	Process B	Incomer.meter1		Load.meter3	20000
4	Process B	Incomer.meter2			

Example 5:

As explained in the previous section, in addition to Example 4, if the “Load.meter3” can detect sag/swell, and you want the event it captures to be included in the analysis, you need to duplicate it as a feeder meter:

	A	B	C	D	E
1	Process A	Incomer.meter1		Load.meter2	10000
2	Process A	Incomer.meter2			
3	Process B	Incomer.meter1	Load.meter3	Load.meter3	20000
4	Process B	Incomer.meter2			

Example 6:

The incomer meters defined in the Power Quality Groups are also used for the Power Factor section of the Power Quality Analysis Report.

If the customer does not require the Power Quality Impact feature, and only wants to enable the Power Factor section of the Power Quality Analysis Report, the file can be created as:

	A	B	C	D	E
1		Incomer.meter1			
2		Incomer.meter2			

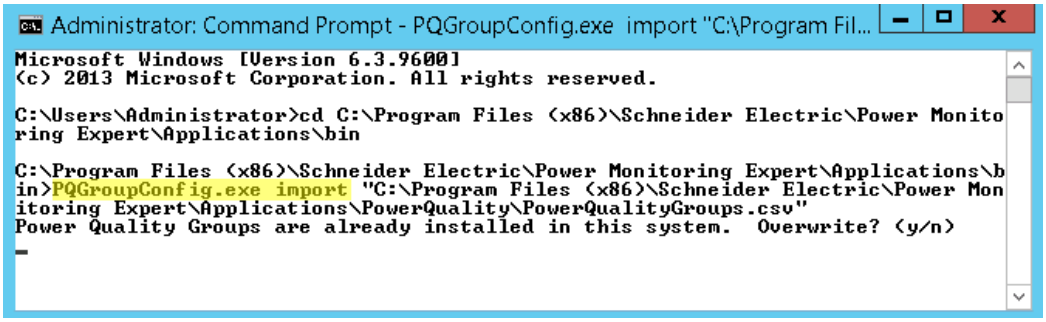
Import / Export Power Quality Group Definition

The tool PQGroupConfig.exe is used to import / export the Power Quality Group definition in the `PowerQualityGroups.csv` file. It is located in `{root install folder}\Applications\bin`

Import Power Group Quality definition

To import the definition, run the command line:

```
PQGroupConfig.exe import "<filepath>\<filename>"
```



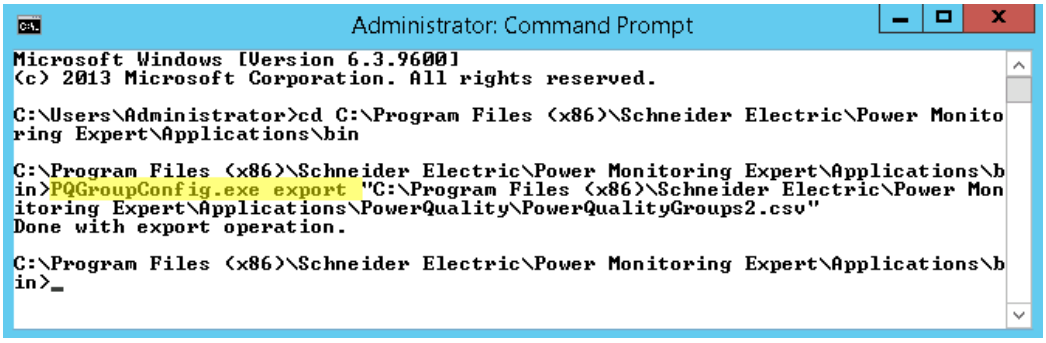
If you are using the default file name and path, copy the following command line:

```
PQGroupConfig.exe import "C:\Program Files (x86)\Schneider Electric\Power Monitoring Expert\Applications\PowerQuality\PowerQualityGroups.csv"
```

Export Power Group Quality definition

To export the definition, run the command line:

```
PQGroupConfig.exe export "<filepath>\<filename>"
```



If you are using the default file name and path, copy the following command line:

```
PQGroupConfig.exe export "C:\Program Files (x86)\Schneider Electric\Power Monitoring Expert\Applications\PowerQuality\PowerQualityGroups.csv"
```

Configure Power Factor Impact Gadgets

The Power Factor Impact Gadgets provide a clear visual indication of the impact of poor power factor on your energy bill.

NOTE:

- The Power Factor Impact Gadgets only work for billing periods that start on the first day of the month. Billing periods that do not start on the 1st (for example, the 20th) are not supported.
- The Viewing Period for the Power Factor Impact Gadget should be set to **This Month or Last Month**. The gadget does not show meaningful information if you set the Viewing Period to another value.
- The Aggregation Period for the Power Factor Impact Trend Gadget should be set to **By Month**. The gadget does not show meaningful information if you set the Aggregation Period to another value.

The calculated surcharge is based on the rate file defined for the PME Rate Engine. Creating or modifying the rate files requires knowledge of the PME Rate Engine. To learn about the PME Rate Engine, refer to PME Billing Module Toolkit.

The following sections describe the Power Factor Impact Gadgets configuration steps:

- Set up the Power Factor Impact rate file
- Set up the incomer meters in the hierarchy

Set up the Power Factor Impact rate file

There are four sample rate files in `{root install folder}\config\reports\billing report\ratelibrary` based on different calculation methods that are generally used by utilities for power factor rate penalties:

- `Power Factor Impact - Active Energy Billing with PF Adjustment Option 1.xml`
- `Power Factor Impact - Active Energy Billing with PF Adjustment Option 2.xml`
- `Power Factor Impact - Apparent Energy Billing.xml`
- `Power Factor Impact - Reactive Energy Billing.xml`

The rate file `Power Factor Impact Rate.xml` is active by default. It includes the same calculation as the first sample file. See Power Factor Rate File Calculation for the calculations of the sample rate files.

To set up the Power Factor Impact rate file:

1. Consult with the customer to see how the power factor penalties are calculated by the utility provider, including the power factor target under which penalty will be charged.
2. Choose the sample file in which the power factor penalty calculation is the closest to customer's utility contract.
3. Copy the selected rate file to the file name "`Power Factor Impact Rate.xml`"

4. Modify the file to have the same power factor penalty calculation with customer's utility contract. To learn how to modify the rate files, please refer to the *PME Billing Module Toolkit* as mentioned above.
5. Set the target to be shown in the gadgets.
   a. Find PF target value by searching for "`<Name>PF_target</Name>`"
   b. Modify the value for the **Formula** accordingly.

```
<VariableFromFormula>
    <Formula>92</Formula>
    <Name>PF_target</Name>
```

6. Save the file.

Set up the incomer meters in the hierarchy

The PME Rate Engine only works with a hierarchy node. Therefore, you need to add the meters which are subjected to the penalty to a hierarchy. You can do this with the default hierarchy, a custom hierarchy, or virtual meters.

The gadgets only work on a single node. If more than one physical meter needs to be defined (e.g. dual incomer from same utility), add the meters to a single node in the hierarchy, or add meters to a single virtual meter.

For example, to add the dual incomer meters as a virtual meter:

1. Launch **Hierarchy Manager** from **Management Console** or navigate to `http://<ServerName>/hierarchymanager` in a web browser.
2. Click the **Virtual Meter** tab and click **Add**.
3. Choose a name for the virtual meter, for example Main_Incomers.
4. Click **Add** and select a meter to add to the Virtual Meter. Repeat until you have added all the meters that incur PF penalties.

After the hierarchy node is defined, it can be selected in the Power Factor Impact Gadgets.

Configure Power Quality Analysis Report

The Power Quality Analysis Report does not need configuration to work, unless you want to include output for the Power Factor section in the report.

The Power Factor section reports the power factor information for the incomer meters in the system. The report retrieves the incomer meter definition from the Power Quality Group definition. See for more information on how to define the incomer meters.

Alternatively, the Power Factor section can be toggled off when generating the report.

Set up Power Quality Performance Dashboards and Reports

This section describes best practices when using Power Quality Performance Dashboards and Reports.

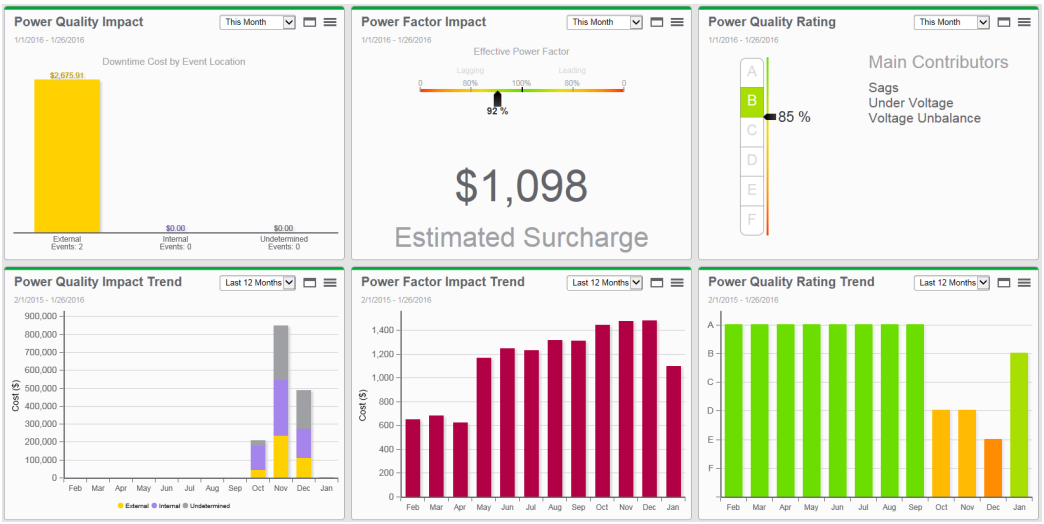
Set up Power Quality Performance Dashboards

Power Quality Performance gadgets are grouped into two groups in Power Monitoring Expert Dashboards:

- Power Quality Overview
  - Power Quality Impact
  - Power Quality Impact Trend
  - Power Factor Impact
  - Power Factor Impact Trend
  - Power Quality Rating
  - Power Quality Rating Trend
- Power Quality Details
  - Power Quality Events Breakdown
  - Power Quality Events Impact
  - Power Quality Events Location

Set up Power Quality Overview Dashboards

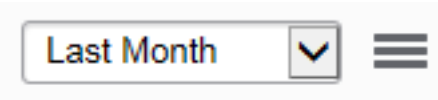
The following image is an example of a Power Quality Overview dashboard.

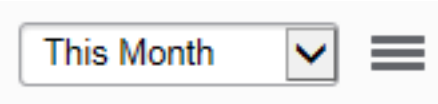


Gadget viewing period

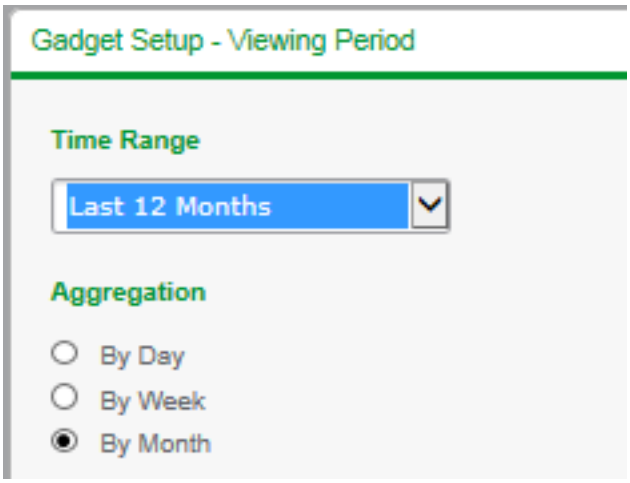
When displaying each gadget with its trending gadget, the aggregation period of each bar in the trending gadget should match the viewing period of the non-trending gadget. Otherwise, they are not comparable.

For example, if the non-trending gadget is set to be monthly,





the corresponding trending gadget should be set to a time range of **Last 12 Months**, and an aggregation of **By Month**.

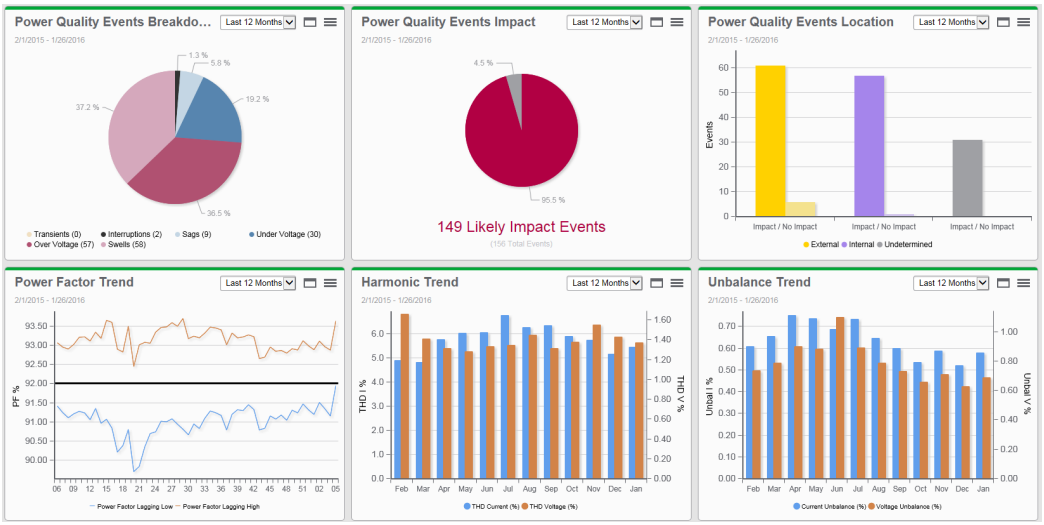


NOTE: Specifically for the Power Factor Impact Gadgets:

- The Viewing Period for the Power Factor Impact Gadget should be set to **This Month or Last Month**. The gadget does not show meaningful information if you set the Viewing Period to another value.
- The Aggregation Period for the Power Factor Impact Trend Gadget should be set to **By Month**. The gadget does not show meaningful information if you set the Aggregation Period to another value.

Set up Power Quality Detail Dashboards

The following image is an example of the Power Quality Detail dashboard. (Three regular Trend charts for Power Factor, Harmonics, and Unbalance are combined in this dashboard.)



Generate Power Quality Performance Reports

The following Power Quality Performance reports are available:

- Power Quality Analysis Report
- Power Quality Impact Report

NOTE: When you generate the Power Quality Performance reports, a reporting period longer than 12 months is not supported. Use multiple yearly reports instead.

Fine-tune Power Quality Performance

Fine-tuning Power Quality Performance is very important during commissioning to obtain useful power quality views. It depends heavily on customer requirements, power system design, power meters used in the system, and the power quality condition of the customer's facility.

This section describes the following fine-tuning procedures:

- Change device inclusion and exclusion for the analysis
- Change Power Quality Indicator thresholds
- Disable unused Power Quality Indicators

Change device inclusion and exclusion for the analysis

You can include or exclude certain meters for power quality assessment by Power Quality Performance. For example, this capability is useful when you want to include only meters which are critical, or to exclude spare meters, etc. Also, for performance reasons, it is important to exclude unnecessary meters.

You can include or exclude the following Power Quality Event types:

- Interruptions
- Voltage Sags
- Voltage Swells
- Transient Voltage
- Over Voltage
- Under Voltage

And you include or exclude the following Power Quality Disturbance types:

- Voltage Unbalance
- Current Unbalance
- Voltage Harmonics
- Current Harmonics
- Frequency Variation
- Flicker

Each PQ event or disturbance has an inclusion list and an exclusion list, and the following logic applies to both lists:

1. The inclusion list is processed first:
   a. If the inclusion list is empty, assume that ALL sources in the system are included. This means all sources in the sources table.
   b. If the inclusion list is not empty, use only sources that exist in the inclusion list. If a source in the inclusion list does not exist in the sources table, do not add it to the list.

2. The exclusion list is processed last:
   a. From the source list obtained in step 1, remove any source that appears in the exclusion list.

The following features in the Power Quality Performance module which are affected by the inclusion and exclusion lists:

- PQ Indicator Diagrams
- PQ Rating Gadget
- PQ Rating Trend Gadget
- Power Quality Events Breakdown Gadget
- Power Quality Events Impact Gadget
- Power Quality Events Location Gadget
- Power Quality Analysis Report – for all sections except the Power Factor section

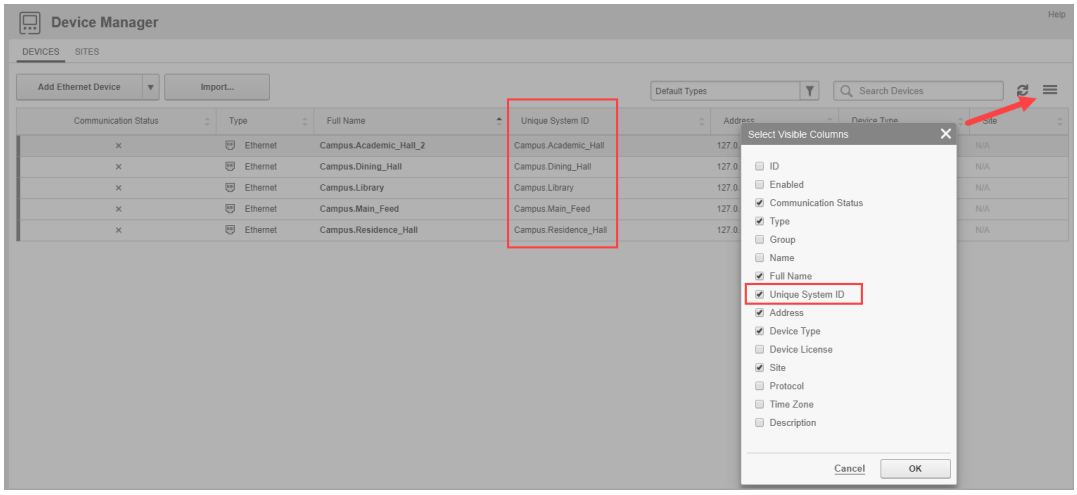
NOTE: These lists do not define:

- Devices considered by the Power Quality Impact Gadgets and Report.
- Devices considered by the Power Factor Impact Gadgets.
- Devices considered for the Power Factor section of the Power Quality Analysis Report.

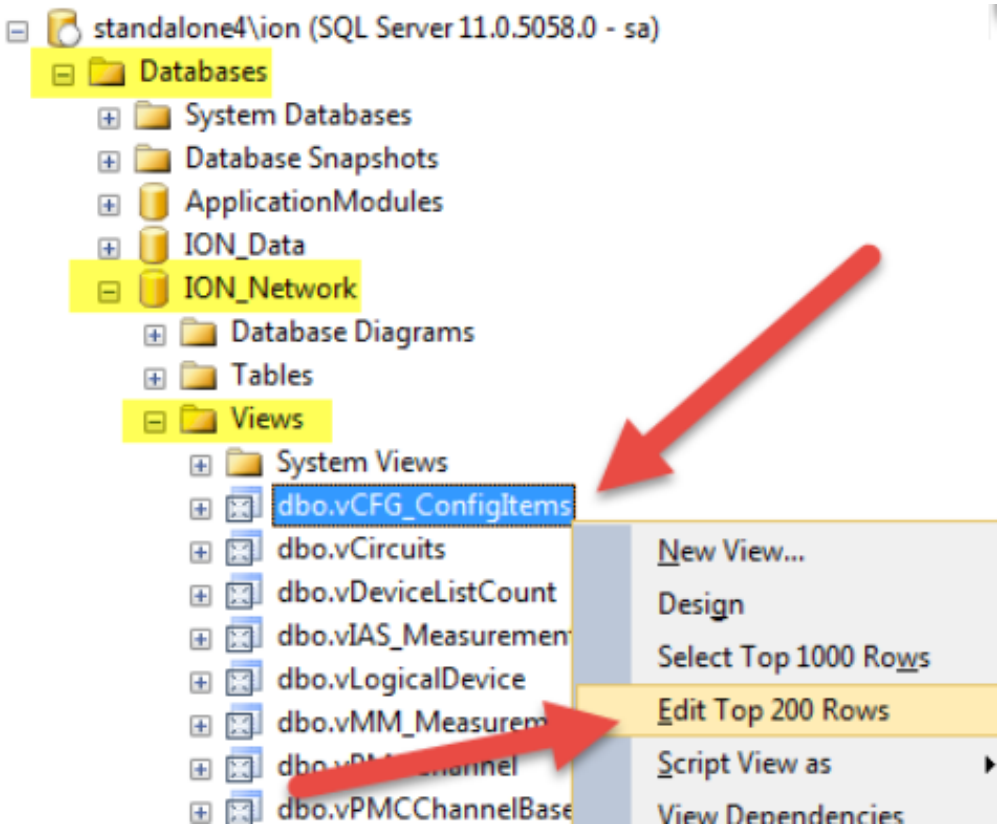
See the configuration sections of the above features for details.

To edit the inclusion and exclusion lists:

1. Identify the system name of the target device. Go to Device Manager, show **Unique System ID** column using the Column Selector:



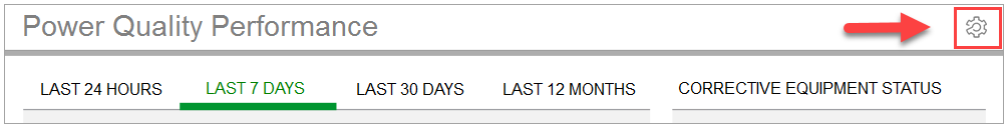
2. Go to SQL Server Management Studio, locate the dbo.vCFG_ConfigItems view in the ION_ Network database, and right-click and select "Edit Top 200 Rows".



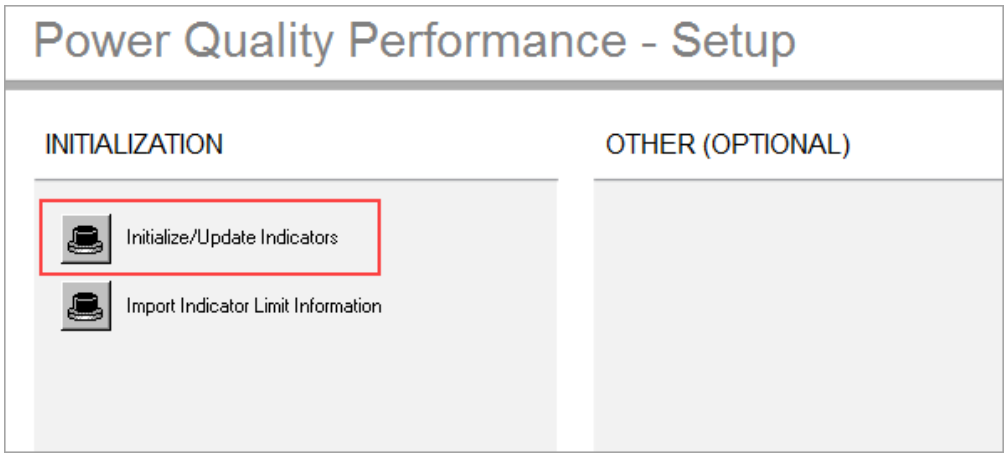
The following variables are the inclusion and exclusion lists:

Module	Category	Item	Value	DefaultValue
PQAnalytics	Source Lists	SwellInclusionList		
PQAnalytics	Source Lists	SwellExclusionList		
PQAnalytics	Source Lists	InterruptionInclusionList		
PQAnalytics	Source Lists	InterruptionExclusionList		
PQAnalytics	Source Lists	TransientInclusionList		
PQAnalytics	Source Lists	TransientExclusionList		
PQAnalytics	Source Lists	OvervoltageInclusionList		
PQAnalytics	Source Lists	OvervoltageExclusionList		
PQAnalytics	Source Lists	UndervoltageInclusionList		
PQAnalytics	Source Lists	UndervoltageExclusionList		
PQAnalytics	Source Lists	FrequencyInclusionList		
PQAnalytics	Source Lists	FrequencyExclusionList		
PQAnalytics	Source Lists	HarmonicsVoltageInclusionList		
PQAnalytics	Source Lists	HarmonicsVoltageExclusionList		
PQAnalytics	Source Lists	HarmonicsCurrentInclusionList		
PQAnalytics	Source Lists	HarmonicsCurrentExclusionList		
PQAnalytics	Source Lists	FlickerInclusionList		
PQAnalytics	Source Lists	FlickerExclusionList		
PQAnalytics	Source Lists	UnbalanceVoltageInclusionList		
PQAnalytics	Source Lists	UnbalanceVoltageExclusionList		
PQAnalytics	Source Lists	UnbalanceCurrentInclusionList		
PQAnalytics	Source Lists	UnbalanceCurrentExclusionList		

3. In the **Value** fields, enter the comma delimited list of the devices, for example:
   `PQ.B1,PQ.B2,Main.BackupGenerator`
4. To apply the changes immediately in the PQ Indicator Diagrams, go to the Power Quality Performance Setup page in Vista:



   Click **Initialize/Update Indicators**.



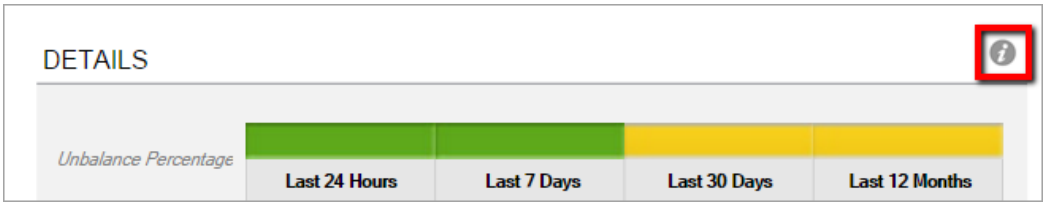
5. To apply the changes immediately in the Power Quality Rating Gadgets, force the gadgets to clear their cache by “editing” the gadget, and clicking **Save** (no changes are required).

To exclude all sources for a given category, put a string in the inclusion and exclusion list. For example: “disabled”.

Module	Category	Item	Value
PQAnalytics	Source Lists	FlickerInclusionList	disabled
PQAnalytics	Source Lists	FlickerExclusionList	disabled

Change Power Quality Indicator thresholds

The Power Quality Indicator threshold for each indicator is displayed on the information page. (Click the “i” icon.)



INDICATOR INFORMATION

	Green	Yellow	Red
Voltage and Current Unbalance for all time periods	V Unbal < : 1 % OR I Unbal < : 10 % for >= 95% of the time period	V Unbal >= : 1 % V Unbal <= : 5 % OR I Unbal >= : 10 % I Unbal <= : 40 % for > 5% of the time period	V Unbal > : 5 % OR I Unbal > : 40 % for > 5% of the time period

The thresholds are used to determine the Power Quality Rating by using a color (green, orange, red) for each Power Quality indicator. Also, only the samples which exceed the threshold are shown in the Detail Report of the PQ Indicator diagrams.

The count thresholds specified here are used to determine the colors for a year. They get divided by 365 for **Last 24 Hours**, by 52 for **Last 7 Days**, and so on. The calculation is as follows:

Round Up ((Yearly Service Limit) x (Number of Days / 365))

For example, for 30 days, where the yearly limit for orange is 5 and the yearly limit for red is 15:

Orange limit: (5 * (30/365)) = 0.41 which rounds up to 1.

Red limit: (15 * (30/365)) = 1.23 which rounds up to 2.

NOTE: The orange limits are >=, but the red limits are

To change the thresholds:

1. In SQL Server Management Studio, in the ION_Network database locate the dbo.vCFG_ ConfigItems view.
2. Right-click the dbo.vCFG_ConfigItems view and select **Edit Top 200 Rows**.

   The following items are the indicator thresholds:

Module	Category	Item	Value	DefaultValue
PQAnalytics	General Settings	Transients/Year - Orange	5	5
PQAnalytics	General Settings	Transients/Year - Red	15	15
PQAnalytics	General Settings	Sags/Year - Orange	5	5
PQAnalytics	General Settings	Sags/Year - Red	15	15
PQAnalytics	General Settings	Swells/Year - Orange	5	5
PQAnalytics	General Settings	Swells/Year - Red	15	15
PQAnalytics	General Settings	Interruptions/Year - Orange	2	2
PQAnalytics	General Settings	Interruptions/Year - Red	5	5
PQAnalytics	General Settings	Overvoltages/Year - Orange	5	5
PQAnalytics	General Settings	Overvoltages/Year - Red	15	15
PQAnalytics	General Settings	Undervoltages/Year - Orange	5	5
PQAnalytics	General Settings	Undervoltages/Year - Red	15	15
PQAnalytics	General Settings	THDU - Orange	5	5
PQAnalytics	General Settings	THDU - Red	8	8
PQAnalytics	General Settings	Voltage Unbalance - Orange	1	1
PQAnalytics	General Settings	Voltage Unbalance - Red	5	5
PQAnalytics	General Settings	Current Unbalance - Orange	10	10
PQAnalytics	General Settings	Current Unbalance - Red	40	40
PQAnalytics	General Settings	Frequency Nominal	60	60
PQAnalytics	General Settings	Frequency Deviation - Orange	1	1
PQAnalytics	General Settings	Frequency Deviation - Red	2	2
PQAnalytics	General Settings	Flicker Pst - Orange	0.9	0.9
PQAnalytics	General Settings	Flicker Pst - Red	1	1
PQAnalytics	General Settings	Flicker Plt - Orange	0.7	0.7
PQAnalytics	General Settings	Flicker Plt - Red	0.8	0.8

The count thresholds specified here are used to determine the colors for a year. They get divided by 365 for **Last 24 Hours**, by 52 for **Last 7 Days**, and so on. The calculation is as follows:

Round Up ((Yearly Service Limit) x (Number of Days / 365))

For example, for 30 days, where the yearly limit for orange is 5 and the yearly limit for red is 15:

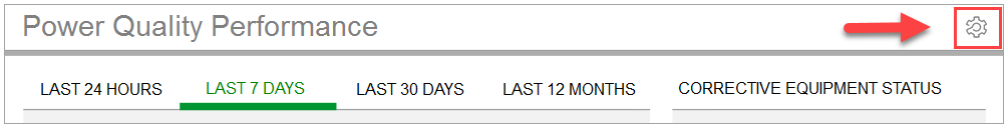
Orange limit: (5 * (30/365)) = 0.41 which rounds up to 1.

Red limit: (15 * (30/365)) = 1.23 which rounds up to 2.

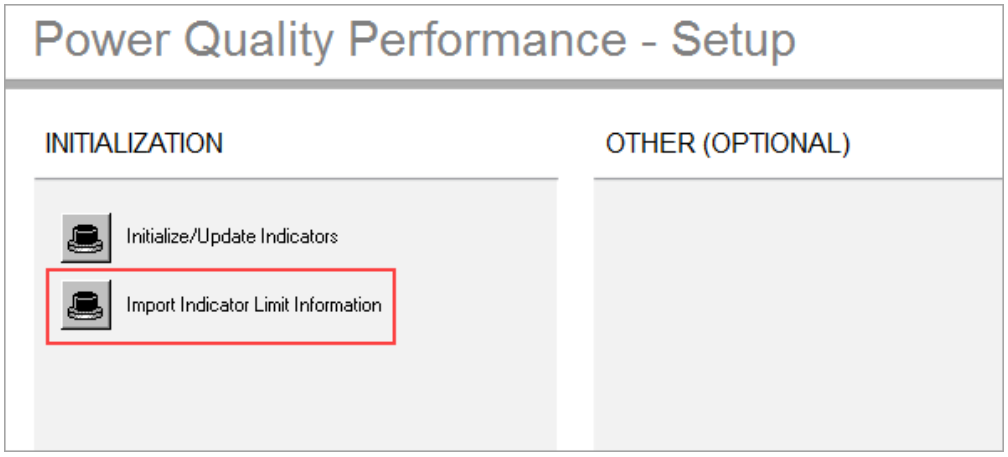
NOTE: The orange limits are >=, but the red limits are >.

3. Change the threshold item `value` as needed.

4. For the PQ Indicator Diagrams to display the updated limit information, go to the Power Quality Performance Setting page in Vista:



Click **Import Indicator Limit Information**.



Change Power Quality Indicator weight factors

When setting up a baseline for the Power Quality Rating of the system, adjust the Weight Factor to meet customer requirements, or to reflect the actual condition of the system. For example, increase the weight for the indicator that is important to the customer, or decrease the weight for the indicator that is not important.

NOTE: If a certain indicator is not available in the system, for example, no meter in the system can monitor transient, set its weight to 0.

The formula used to calculate the Power Quality Rating is:

$$PQ.Rating = \frac{\sum PQ.Indicators.Value \times Weight\ Factor}{\sum PQ.Indicators.MaxValue \times Weight\ Factor} \times 100\%$$

Where:

- **PQ.Indicators.Value** is a number indicating each Power Quality Indicator status, Green = 2 ; Yellow= 1 ; Red = 0
- **PQ.Indicators.MaxValue** = 2 for each individual indicator.
- **Weight Factor** is an adjustable value (default=1) for assigning a different weight to each individual indicator depending on customer requirements.

To change a weight factor:

1. In SQL Server Management Studio, in the ION_Network database locate the dbo.vCFG_ ConfigItems view.
2. Right-click the dbo.vCFG_ConfigItems view and select **Edit Top 200 Rows**.

   The following items are the weight factors:

Module	Category	Item	Value	DefaultValue
PQAnalytics	General Settings	Interruptions Weight	1	1
PQAnalytics	General Settings	Sags Weight	1	1
PQAnalytics	General Settings	Swell Weight	1	1
PQAnalytics	General Settings	Transient Weight	1	1
PQAnalytics	General Settings	Harmonics Weight	1	1
PQAnalytics	General Settings	Unbalance Weight	1	1
PQAnalytics	General Settings	Flicker Weight	1	1
PQAnalytics	General Settings	FreqVar Weight	1	1
PQAnalytics	General Settings	OverUnder Weight	1	1

3. Change the weight item `value` as needed.
4. To apply the changes immediately in the Power Quality Rating Gadgets, force the gadgets to clear their cache by “editing” the gadget, and then click Save (no changes are required).

Disable unused Power Quality Indicators

When a Power Quality Indicator has no supported device to feed it the required data, disable it by using the procedures in the following sections. See Supported Devices for Power Quality Performance monitoring for meter support information.

Disable Flicker, Frequency, Harmonics or Unbalance Indicators

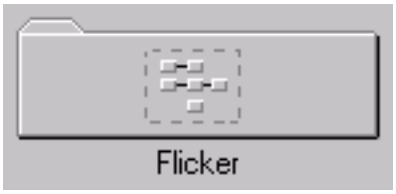
Use the following procedure to disable the Flicker, Frequency, Harmonics, and Unbalance indicators. Flicker is used specifically in this example, but the procedure is the same for the other items.

You can also use the following procedure to disable Overvoltage and Undervoltage. However, note that it will disable both simultaneously. If only one needs to be disabled, use the procedure in the next section.

1. To prevent Power Quality Performance from requesting Flicker values, add a string “disabled” to the FlickerInclusionList & FlickerExclusionList (no double quotes needed). See Change device inclusion and exclusion for the analysis for detail steps.

Module	Category	Item	Value
PQAnalytics	Source Lists	FlickerInclusionList	disabled
PQAnalytics	Source Lists	FlickerExclusionList	disabled

2. To prevent the Power Quality Performance indicator diagrams from displaying status:
   a. Edit the VIP.PQADVISOR in Designer.
   b. Open the Flicker folder.

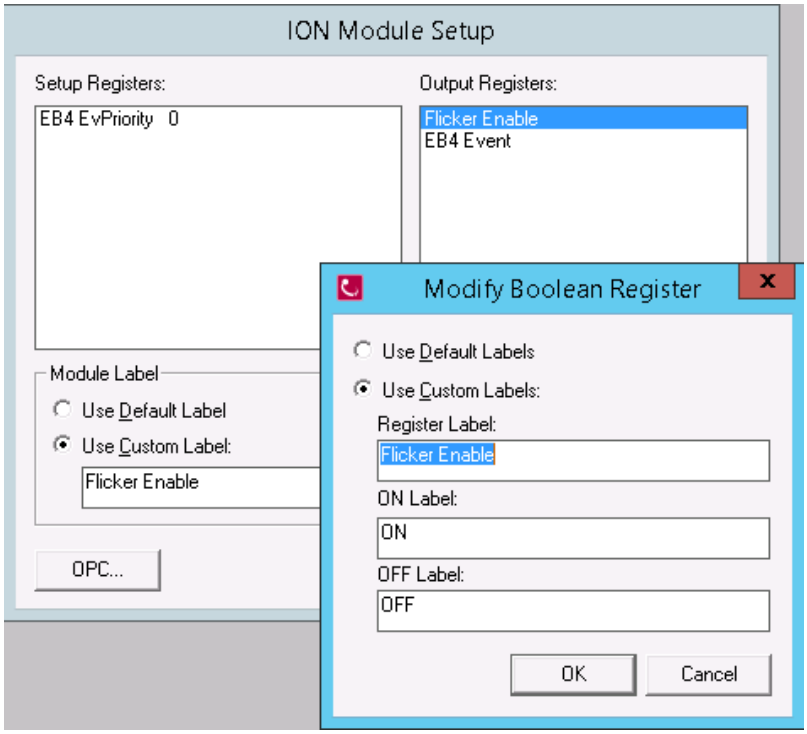


c. Add a new Ext Bool Module.

d. Link the switch output register of the new module to the Enable input register on the 4 XML import modules used for Flicker.

   i. Right click on the newly created Ext Bool Module

   ii. Change the Module Label and the switch Output Register Label to “Flicker Enable”



   iii. Select the outputs for the Flicker Enable module and select “Flicker Enable”

   iv. Select the input of the 24hr Flicker Count Import XML module and select “Flicker Enable”

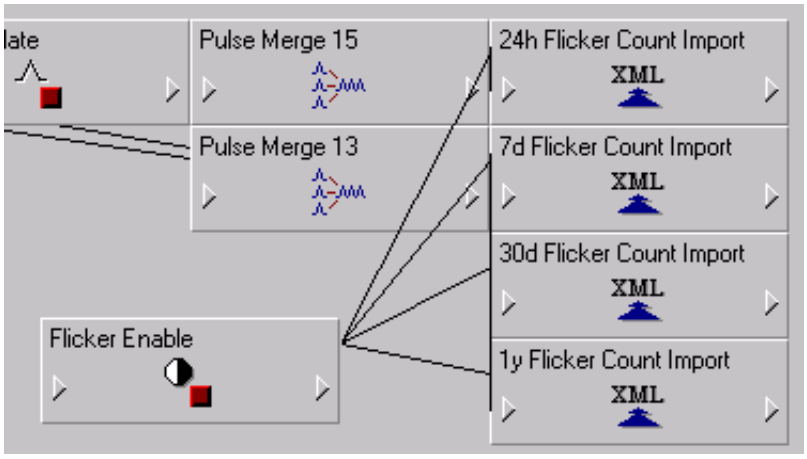
   v. Repeat the previous step for the following:

   7d Flicker Count Import XML module

   30d Flicker Count Import XML module

1y Flicker Count Import XML module

vi. The result will look like this:



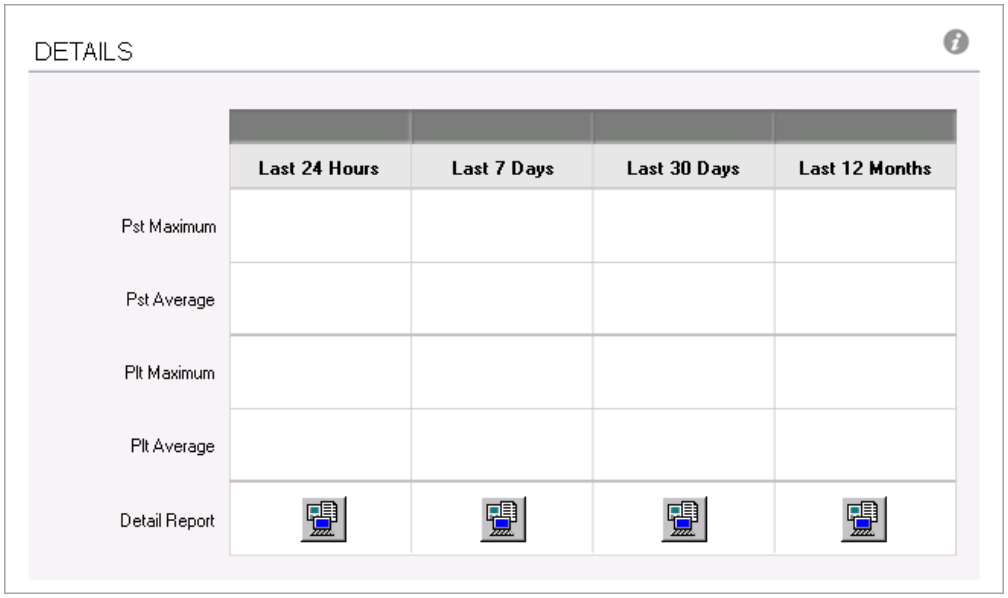
3. Save the VIP and close Designer.

   Since the Ext Boolean has a default value of “false”, the Flicker Count Import modules are disabled upon saving the VIP.

4. Check the Power Quality Performance Indicator Diagram.

   The Flicker icon should be grey.

The details should be blank:



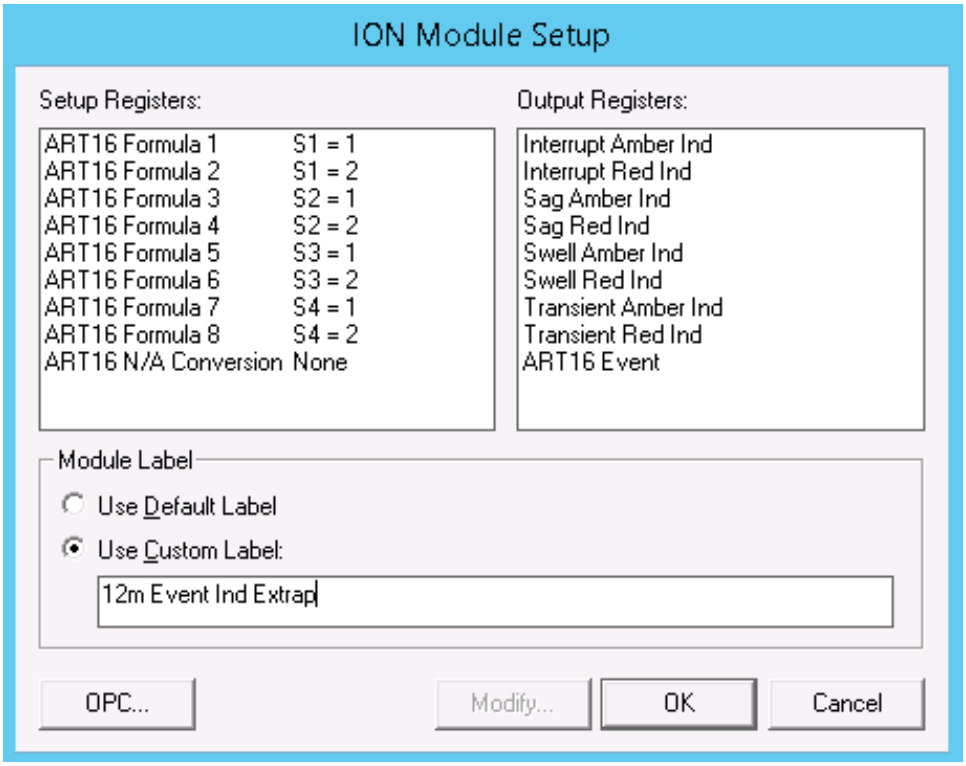
Disable Sag, Swell, Interruptions, Transient, or Unbalance Indicators

Use the following procedure to disable the Sag, Swell, Interruptions, and Transient indicators, if the devices being used in the installation do not support them. Transients are used specifically in this example, but the procedure is the same for the other items.

You can also use the following procedure to disable either Overvoltage or Undervoltage, if only one needs to be disabled. If both need to be disabled simultaneously, then use the procedure in the previous section.

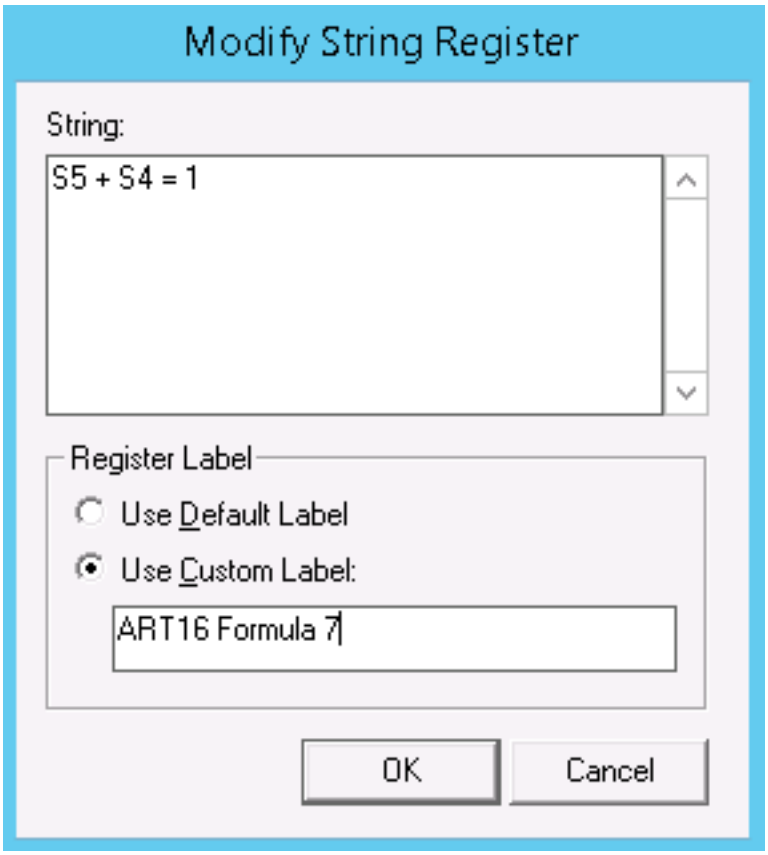
1. To Power Quality Performance from requesting Transient values, add the string “disabled” (without the quotes) to the TransientInclusionList and TransientExclusionList. See Change device inclusion and exclusion for the analysis for detailed steps.
2. To prevent the Power Quality Performance indicator diagrams from displaying Transient status:
   a. Edit the VIP.PQADVISOR in Designer.
   b. Open the Sag, Swell Transient, Interruption folder.

   c. Right click on the 12m Event Ind Extrap module.



   d. Double click on Formula 7 and add “S5 + “ to the beginning of the string. This will cause the output of the equation to be NA because S5 is unassigned and therefore equivalent to NA. If transients need to be added back to the system (e.g. a new meter which supports

transients is purchased for the site), then it is easy to remove the string “S5 +” from the setup register string



e. Repeat step d for Formula 8

f. Repeat steps c, d, and e for:

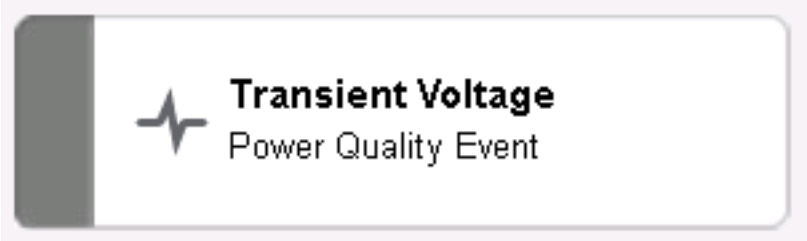
   24h Event Ind Extrap module

   7d Event Ind Extrap module

   30d Event Ind Extrap module

3. Save the VIP and close Designer.

4. Check the Power Quality Performance Indicator Diagram. The Transient Voltage icon should be grey.



The DETAILS page should display zeros:

DETAILS

Number of Events	Last 24 Hours	Last 7 Days	Last 30 Days	Last 12 Months
No Impact	0	0	0	0
Likely Impact	0	0	0	0
Internal	0	0	0	0
External	0	0	0	0
Undetermined	0	0	0	0
Detail Report				

Breaker Configuration Tool

TIP: You can open the Breaker Configuration Tool from the **Power Monitoring Expert > Configuration Tools** folder on your desktop.

Use the Breaker Configuration Tool to configure the Breaker Performance Module. With this tool you define Breaker Devices, Switchboards, and Groups for the Breaker Aging Report and the Breaker Settings Report.

The reports have different configuration requirements. Not all of the components and properties available in the configuration tool have to be configured for both of the report templates. See Breaker Performance Module configuration for details.

Prerequisites

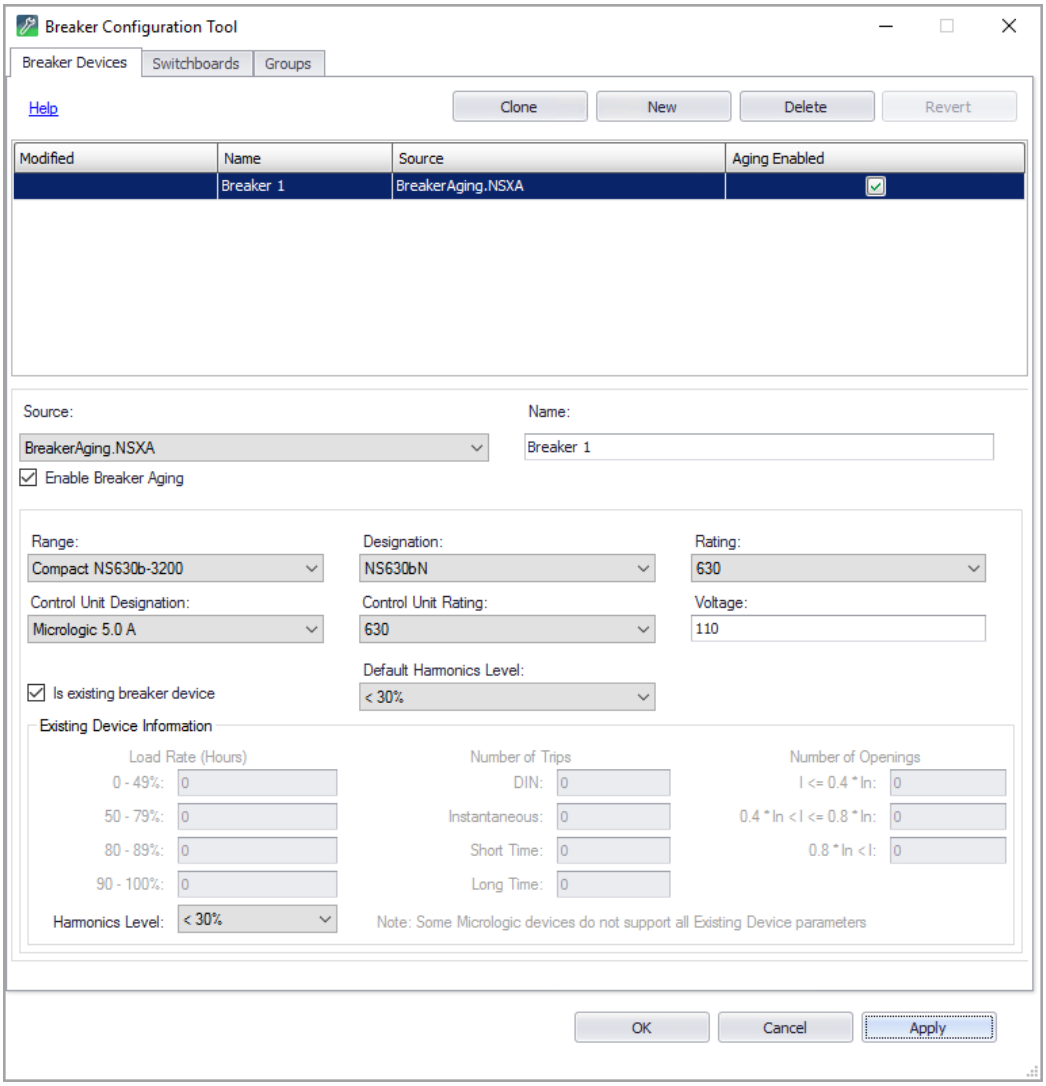
- The breaker monitoring devices that are recording the breaker data must be configured in the PME Management Console before you can configure the components and properties in the configuration tool.

⚠ WARNING

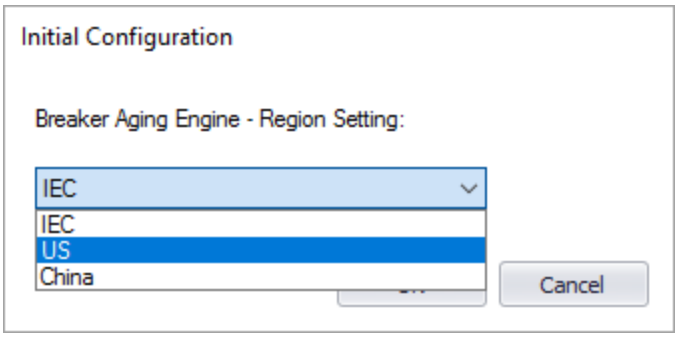
INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not install incorrect drivers for the circuit breaker devices in the software.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.



NOTE: The first time you open the Breaker Configuration Tool, you must set the regional settings for the breaker aging engine. The Initial Configuration settings dialog is only displayed the first time open the tool. After the initial selection, the tool remains in the selected setting for future start ups. To show this dialog again, hold down `Ctrl + Shift` when opening the tool.



Configuring breaker devices

To configure breaker devices:

1. In the Breaker Configuration Tool, select the **Breaker Device** tab, and then click **New** to add a new breaker.

   You can also clone an existing breaker. To clone a breaker, select it in the list and then click **Clone**. In the **Select Breakers to Clone** dialog box that opens, select the monitoring devices that you want to configure as breakers and click **OK**.

   NOTE: Cloned breakers have the same configuration settings as the original. After cloning, you can edit the settings of the new breakers if necessary. You can only create clones for monitoring devices of the same device type as the original.

2. Enter the following information:
   - **Name**: Enter a unique name for the breaker.
   - **Source**: Select the monitoring device that is providing the data for this breaker. You can only associate a monitoring device with one breaker in the tool.

     NOTE: Select **Enable Breaker Aging** if this breaker is used for both the Breaker Settings and the Breaker Aging features. Clear the check box for **Enable Breaker Aging** if this breaker is only used for the Breaker Settings report.

3. (Only for Breaker Aging) Enter the following information:
   - Use the dropdown lists to select values for **Range**, **Designation**, **Rating**, and **Control Unit Rating**.
   - **Voltage**: Enter a value.

4. (Only for Breaker Aging) Select **Is existing breaker device** if the breaker device is a pre-existing breaker in your electrical system. Clear the check box for **Is existing breaker device** if this is a new breaker in your electrical system. For pre-existing breakers, complete the available fields.

   NOTE: If you select **Is existing breaker device**, then you must ensure the breaker is mapped to a switchboard, on the Switchboards tab, and **Apply Historical Data** is selected for this Switchboard. Otherwise, the breaker aging calculations cannot be performed and the diagrams will not display any values.

5. Click **Apply** to save the changes and keep the configuration tool open. Click **OK** to save the changes and close the configuration tool.
6. (Optional) Repeat steps 1-5 to add additional breaker devices.

Configuring switchboards

To configure switchboards:

1. In the Breaker Configuration Tool, click the **Switchboards** tab, and then click **New** to add a new Switchboard.

2. Enter the following information:
   - **Name**: Enter a unique name for the switchboard.
   - **Breakers**: Select one or more breakers from the list. Each breaker can only be associated with one switchboard in the system.
3. Enter the following information:
   - **Critical Threshold %** and **Moderate Threshold %**: Enter default values (0-100%) to be used for each breaker associated with this switchboard when performing analysis of their electrical aging and electrical wear levels.
   - **Environmental Conditions**: Select values for **Switchboard IP**, **Salty Atmosphere**, **Corrosive Gas**, and **Dust Level**.
   - **Current Environmental Data**: Select values for **Vibration Level**, **Humidity**, and **Temperature**.
4. (Only for Breaker Aging) Select **Apply Historical Data** if the switchboard is pre-existing in your electrical system. Clear the check box for **Apply Historical Data** if this is a new switchboard in your electrical system. For pre-existing switchboards, select values for **Vibration Level**, **Temperature**, and **Humidity**.
5. Click **Apply** to save the changes and keep the configuration tool open. Click **OK** to save the changes and close the configuration tool.
6. (Optional) Repeat steps 1-5 to add additional switchboard devices.

Configuring groups

To configure groups:

1. In the Breaker Configuration Tool, click the **Groups** tab, and then click **New** to add a new group.
2. Enter the following information:
   - **Name**: Enter a unique name for the group.
   - **Switchboards** Select one or more switchboards from the list. The same switchboard can be used in multiple groups.
3. Click **Apply** to save the changes and keep the configuration tool open. Click **OK** to save the changes and close the configuration tool.
4. (Optional) Repeat steps 1-3 to add additional groups.

Generating Vista diagrams

To generate Vista diagrams:

1. In the Breaker Configuration Tool, click the **Groups** tab, and then click **Generate Vista Diagrams** to open the Vista Diagram Generation dialog.

   NOTE: At least one group must be configured for the Generate Vista Diagrams command to be available.

2. In Vista Diagram Generation, select the output path for the diagram files and select the groups for which you want to generate diagrams.
3. (Optional) Select **Include Custom Logo** and then select the logo image file for the diagrams. By default, a Schneider Electric logo appears.
4. Under **Options**, drag the indicator to define the width of Vista diagrams you generate.
5. Click **Generate Vista Diagrams** to generate the diagram files, then click **Close**.

Designer

Use Designer to configure nodes on your network that are based on ION Architecture. The node can be a software component or a hardware device.

NOTE: Only nodes based on ION Architecture can be configured using Designer.

Designer's graphical user interface helps visualize a node's configuration. You can link ION modules together to customize a node for your particular application. You can also cut, copy and paste functionality within a single node or between different nodes.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not use a controlled output for any safety critical application due to possible unexpected changes of state during power cycles, power outages, configuration changes, or firmware upgrades.

Failure to follow these instructions can result in death or serious injury.

Only personnel with a thorough understanding of ION architecture and the system in which the meters and software are installed can configure ION modules and registers.

For more information on ION Architecture, ION modules or ION registers, see the *ION Reference*.

Getting started with Designer

Designer is a programming tool intended **for advanced users only**. Familiarity with ION architecture is essential, as Designer is based on ION architecture.

The functions used in traditional power monitoring are treated as discrete modular objects that can be interconnected and customized. These objects, known as ION modules, are the basic building blocks that comprise a node.

Designer is used to make any changes to the operation of an ION-compliant node. ION devices, the Virtual Processor and Log Inserter are all configured using Designer.

For those already familiar with Designer, see Designer shortcuts for a list of the most commonly used commands.

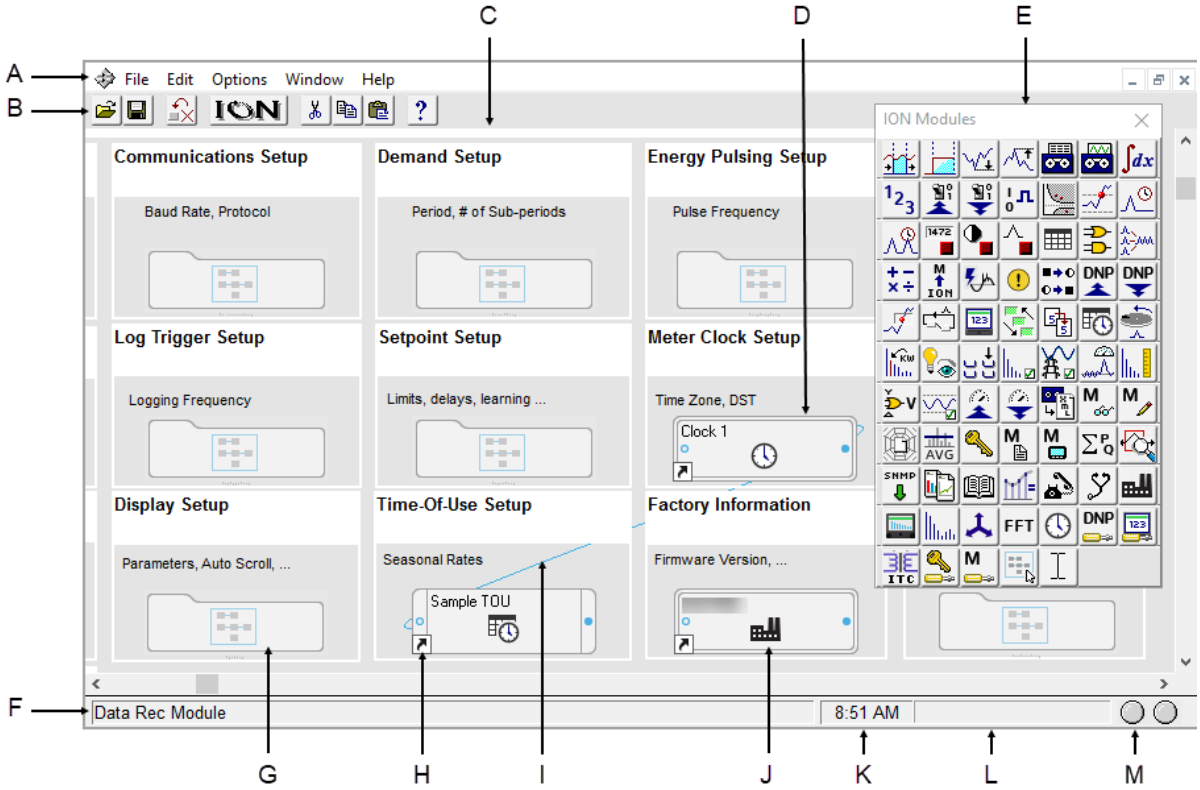
Starting, logging into and exiting Designer

To start Designer, use one of the methods outlined in Starting a component of Power Monitoring Expert or open Management Console and select **Tools > System > Designer**.

For instructions on logging in to or exiting Designer, see Logging into a component and Ending a session, respectively.

Node diagrams and the Designer interface

This section describes the components of the Designer interface and of node diagrams.



A	Menu bar	B	Toolbar	C	Workspace with open node diagram	D	Core module (indicated by double border)
E	Toolbox	F	Status line	G	Grouping object	H	Shortcut icon
I	Module link	J	Module icon	K	Time display	L	Progress indicator
M	Communication status lights						

The Designer interface

The Designer interface consists of a main screen with a title bar, a menu bar, a toolbar, a workspace, and a status bar. When in Edit mode, the ION Modules toolbox is also displayed.

Title bar

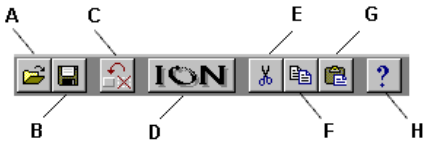
The title bar displays the name of the program, the user name, and the name of the active node diagram.

Menu bar

Below the title bar is the menu bar. Click on a menu name to display a list of available commands.

Toolbar

The Toolbar offers quick access to the commands used most frequently. Each command offered on the toolbar is also available from the menu bar.

A	Open		E	Cut
B	Save		F	Copy
C	Reset		G	Paste
D	Create a link		H	Help

When you point at a toolbar button, a description of it appears in the status bar at the bottom of the screen and on a small ToolTip beside the button.

Workspace

The main area in the center of the screen is the workspace, where you view and edit node diagrams.

Status bar

The status bar displays status information. The components, from left to right, are:

- **Status line**: Describes any active processes and provides brief descriptions of the currently selected command or toolbar button. For example, when you move the pointer over a toolbar button or click on a menu name, a brief description of the item appears in the status line.
- **Time display**: Displays the current time on the workstation.
- **Progress indicator**: Depicts the progress on an action being performed.
- **Communication status lights**: Indicate if Designer is currently receiving and transmitting data on the Power Monitoring Expert network.

The node diagram

A node diagram is a graphical representation of an ION-compliant node. The node diagram displays the actual configuration of the node. Module icons represent the ION modules in the node, while lines drawn between these module icons show links between the ION modules.

In some cases, groups of modules are organized inside grouping windows. When closed, a grouping window appears as a grouping object (an icon that looks like a folder). Click a group object to open the grouping window that contains the module icons.

Using a node diagram

The node is graphically displayed as a node diagram in Designer. The node diagram contains a number of ION modules, which represent the node's current configuration. You can change the configuration of the node simply by editing its node diagram. For example, when you delete a module from a node diagram, the module is removed from both the diagram and the node. You can add, configure, link and delete modules on the node by making the corresponding changes to the module icons in the node diagram. A module’s setup registers can be accessed and changed through the module icon.

Use Designer to configure hardware nodes (for example, ION meters) or software nodes (for example, Virtual Processor or Log Inserter).

NOTICE

LOSS OF DATA

Do not leave hardware or software nodes open in Designer, as this stops log downloads from the device.

Failure to follow these instructions can result in permanent loss of data.

Default node diagrams in Designer

When a meter is opened in Designer, the default diagrams for the appropriate meter and default template are loaded automatically.

Opening a node diagram

1. Select **File > Open** to open the **Select Node** dialog.
2. Select the node you want to open then click **OK**.

   When you select a node from the list, Designer communicates with the specified node and opens the applicable node diagram.

NOTICE

UNINTENDED DEVICE OPERATION

Do not open a node diagram if the node is currently being configured from its front panel.

Failure to follow these instructions can result in unplanned configuration changes.

When Designer loads a node diagram, it compares the diagram with the configuration of the node. If there are any discrepancies between the diagram and the node, Designer updates the diagram to match the node:

- If a diagram depicts a module that does not exist on the node, Designer deletes the module icon from the diagram.
- If a node contains a module that is not depicted in the diagram, Designer adds the module icon to the diagram.
- If the links between modules differ from node to diagram, Designer adjusts the diagram to match the node.

A node diagram typically does not differ from the node's true configuration unless the node's configuration was changed through other means (for example, with a remote display unit.)

Saving a node diagram

Saving a node diagram serves two purposes: it saves your changes to the diagram, and applies your changes to the node.

- To save the active node diagram, select **File > Send & Save**.
- To save all open node diagrams, select **File > Send & Save All**.

Closing a node diagram

To close the node diagram(s):

- Select **File > Close** to close the active diagram, or
- Select **File > Close All** to close all open diagrams and windows.

If you attempt to close a diagram without saving your changes, Designer displays a message with a list of the modules affected.

You can then do one of the following:

- Click **OK** to return to the diagram and save your work before closing the diagram.
- Click **Close Anyway** to discard any unsaved changes and close the diagram.

NOTE: If you reopen a diagram containing unsaved changes, Designer may list the unsaved changes as offline modules.

Display mode versus Edit mode

There are two display modes in Designer, which affect how you navigate a node diagram. Whether or not the toolbox is shown indicates the mode you are in: if the toolbox is open, you are in edit mode; if it is closed, you are in display mode.

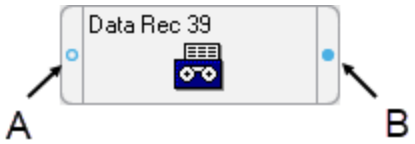
Display mode allows you to view the node diagram without making changes. To prevent accidentally moving or deleting modules or links, use Display mode when navigating node diagrams. In Display mode, **single-click** grouping objects to open associated grouping windows.

Edit mode allows you to configure the node and the appearance of the node diagram. In Edit mode, **double-click** grouping objects to open associated grouping windows. **Right-click** objects or icons to view configuration options.

For more information on the Toolbox, see Using the ION modules toolbox.

Designer shortcuts

Designer provides several shortcuts to assist in programming the nodes.



A	Input
B	Output

The following table lists the different mouse and keyboard combinations you can perform on a module's input or output symbols, and their corresponding functions:

Action	Result
Left-click input	The list of inputs appears - you can select an input and link it to another module's output register
SHIFT + left-click input	The list of inputs appears with the current input values displayed in square brackets
Right-click input	The Delete Links dialog appears - you can break links from this dialog.
SHIFT + right-click input	The Delete Links dialog appears, showing inputs and current input values in square brackets
Left-click output	The list of output registers appears
SHIFT + left-click output	The list of output registers appears with the current register value displayed in square brackets
CTRL + left-click output	The list of setup registers appears - these setup registers can be linked to inputs on other modules
SHIFT + CTRL + left-click output	The list of setup registers appears with the current register settings displayed in square brackets
Right-click output	The list of output register owners appears - you can break links from this dialog
CTRL + right-click output	The list of setup register owners appears - you can break links from this dialog

NOTE: To create a shortcut to an ION module, see Creating a shortcut to an ION module.

Designer icons

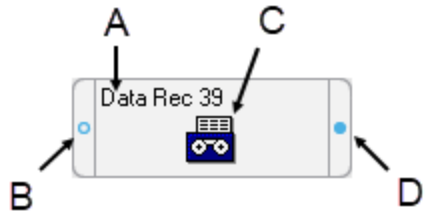
In each node diagram, Designer uses icons to represent the configuration of the node. There are two basic types of icons: module icons and grouping icons.

Module icons represent ION modules located on the node. Grouping icons represent a group of module icons.

NOTE: A module icon with a symbol  in the lower corner is a shortcut.

Module icons

All module icons share four common elements: a label, a graphic, an input symbol and an output symbol.



A	Label	C	Graphic
B	Input Symbol	D	Output Symbol

- The **label** displays the name of the module.
- The **graphic** shows a picture to distinguish one type of module from another.
- The **input** and **output** symbols provide access to the module's input and output registers. Click the left symbol to display a list of inputs; click the right symbol to display a list of output registers. See Linking ION modules for more information.

Module icons with a double border represent core modules; module icons with a single border represent standard modules. For more information on core and standard modules, see Core modules and standard modules.

Grouping icons and grouping windows

Grouping icons represent grouping windows. Click a grouping icon (left) to open its associated grouping window (right).

A grouping window acts as a folder or sub-window where you can store icons that you want to keep together. For example, you can use grouping windows to group module icons by application—a single grouping window may contain all module icons required for demand or advanced setup routines.

You can use a grouping window much like a standard window. You can create, rename or delete a grouping window; you can move a grouping window within a diagram, and you can move a module into or out of a grouping window.

When you finish editing the grouping window, close it to minimize the window to its corresponding grouping icon in the node diagram.

Opening a grouping window

Click on the grouping icon.

Closing a grouping window

Click the **Close** button .

Moving icons into a grouping window

To move an icon (or group of icons) to or from an open grouping window, select it and drag it to the new location.

1. Click on a grouping icon to open the grouping window.

   Drag the grouping window by the title bar and position it so that you can see the icon(s) that you want to move.

2. Select the icon(s) you want to move and drag the selection into the grouping window.

When you move a linked module icon into a grouping window, the module remains linked but any lines that represent links to modules outside the window disappear.

Creating a new grouping window

To create a new grouping window, drag the grouping object from the toolbox onto the node diagram.

The ION modules toolbox is a collection of ION modules and generic tools that you can add to a node diagram. If the ION modules toolbox is not displayed, select **Options > Show Toolbox**. See Using the ION modules toolbox for more information.

When you point to an object in the toolbox, the name of the object is displayed on a ToolTip. You can use ToolTips to identify the grouping object in the toolbox.

Renaming a grouping window

When you create a new grouping window, the default name is that of the node diagram. To change the name of a grouping window, rename the grouping icon:

1. Right-click the grouping icon to open the **Grouping Object Configuration** dialog.
2. Select **Use Custom** from the Caption section and type the new name into the text box.
3. Click **OK**.

Changing the font of a grouping window

To change the font, font style and size of a caption:

1. Right-click the grouping icon to open the **Grouping Object Configuration** dialog.
2. In the Font section, do one of the following:
   - To use the font of the parent window, select **Inherit from parent window**.
   - To use a different font, select **Custom**, then click **Font** to open the **Font** dialog. Select the font options you want then click **OK** to continue.
3. Click **OK**.

Changing the position of the caption

To change the location of the caption:

1. Right-click the grouping icon to open the **Grouping Object Configuration** dialog.
2. Select either **Top** or **Bottom** in the Position section to specify a caption position above or below the grouping icon.
3. Click **OK**.

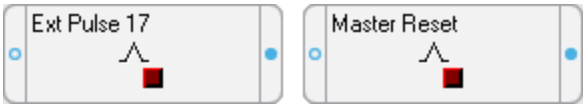
Deleting a grouping window

NOTE: When you delete a grouping window, any modules inside are deleted as well. Designer displays a message before deleting modules. See Deleting or cutting an ION module for more information on deleting modules.

1. Select the grouping icon of the window you want to delete.
2. Press the **Delete** key. If the grouping window contains modules, Designer displays a list of modules that will be deleted.

Displaying default or custom icon labels

Module icons can display two types of labels: Default (left) and Custom (right).



- **Default labels**: All modules have a default label. The default label identifies the module by type and, if applicable, by number. It appears in node diagrams, user diagrams and event logs unless a custom label is available.
- **Custom labels**: Custom labels are available only if they have been preconfigured by a user. A custom label usually identifies a module by its function or purpose. Custom labels are useful for describing modules, setup registers, output registers, and Boolean ON/OFF conditions. For information on adding custom labels, see Customizing a module label.

Displaying default labels or custom labels

Select **Options > Show Default Labels** to toggle the option on or off.

- When Show Default Labels is selected, default labels are displayed.
- When Show Default Labels is not selected, custom labels are displayed.

This is a global setting that applies to all node diagrams.

Moving icons in a node diagram

You can move module and grouping icons anywhere in a node diagram. This is useful for organizing your diagram (for example, by function or type) so that you can easily find a particular module or visualize the workings of your node's configuration. You can move a single icon or group of icons within a single node diagram, or into an open grouping window.

NOTE: Moving the icons in a node diagram does not affect the function of the modules or the node in any way.

Moving icons

1. Select the icon(s) you want to move.

   When a grouping icon is selected, all icons within its grouping window are automatically selected as well.
2. Drag the selected icon(s) to the new location.

NOTE: When selecting a group of icons, you can only choose icons from within the active window.

Arranging icons in a node diagram

You can use the Align and Grid options in the Layout dialog to adjust the spacing and layout of the module and grouping icons in your node diagram. Use the Align option to specify the horizontal and vertical arrangement of the selected icons and the Grid option to activate and configure invisible guidelines.

NOTE: Arranging the icons in a node diagram does not affect the function of the modules or the node in any way.

Changing the order of layered or stacked icons

If an icon appears on top of another icon that you want to bring to the front, select the icon that is sitting on top, then click CTRL+K (or click **Edit > Send to Back**).

Aligning icons

The **Align** tab in the Layout dialog allows you to specify the horizontal and vertical alignment of selected objects.

To align objects:

1. Select the icons that you want to align.
2. Select **Edit > Layout** to open the **Layout** dialog.
3. Select the **Align** tab and set the horizontal and vertical alignment of the icons.

   The options in each area determine the criteria by which you can align icons. For example, if you select **Left sides** under Horizontal and **Space evenly** under Vertical, Designer aligns all objects in the selection by their left sides (using the leftmost object for reference) and distributes them evenly along a vertical axis.
4. Click **OK**.

Using the grid

The **Grid** tab in the Layout dialog activates and configures an invisible grid. Icons placed onto the grid snap to the nearest gridline to help align and space them evenly.

To activate or deactivate the grid:

1. Select **Edit > Layout** to open the **Layout** dialog.
2. Select the **Grid** tab.
3. Select one of the following options:
   - **No Grid** turns the grid off.
   - **Grid size in pixels** activates the grid. Type a number in the Grid size in pixels box to specify the size of the grid (distance between grid lines).
4. Click **OK** to save your changes.

Designer windows

To create links between several node diagrams or grouping windows, you need to position the open windows so you can see all the modules involved. Use the Window menu to organize open windows in the workspace.

Arranging windows in your workspace

To arrange windows, do one of the following:

- To locate an open window and move it to the foreground, select the Window menu and select the window name from the list of open windows.
- To arrange all open windows in the workspace, select **Window > Arrange All**.

Changing a window's background color

By default, the background color of all windows in a node diagram is light gray. To select a new background color for a window:

1. Right-click the background of the window and select **Background Color** to open the **Color** dialog.
2. Select the color you want or click **Define Custom Colors** for more options.
3. Click **OK**.

When choosing a background color, consider how the color affects the visibility of icons and links. Links, highlights and shadow effects used to depict the various states of an ION module may not appear against certain background colors. For this reason, you should avoid using certain colors for your background, particularly white, dark gray and black.

Changing a window's default font

You can specify a default font to be used for all module icons, grouping icons and text boxes in a window.

1. Right-click the background of the window and select **Default Font** to open the **Font** dialog.
2. Specify a new default font, size and style.
3. Click **OK**.

Fonts can also be specified individually for grouping windows and text boxes. See Changing the font of a grouping window and Changing the font of a Text Box for more information.

ION module overview

After you have opened a node diagram, you can view the node's configuration or edit it by working with its ION modules. As described earlier, each module performs a specific function. Using Designer, you can add, remove or link modules together to customize the function of the node.

This section explains how to add and remove ION modules from your node diagram. It describes the basic types of modules, and explains how you can organize your node diagram by grouping modules together, arranging them, and labeling them.

For more information on ION modules and architecture, refer to the ION Reference.

Working with ION modules

The following sections outline some considerations to remember when working with ION modules.

Output and setup registers

A register is a type of memory bank that stores a module's linking and configuration information. Each module uses two types of registers: output registers and setup registers.

Module status: online and offline

The terms "online" and "offline" describe whether a module is currently active or not. A module is described as online when it is functioning normally (monitoring its input and updating its output registers). An offline module is inactive.

Anytime you send and save changes to a node, Designer temporarily takes the affected modules offline and programs them with your changes. After they have been programmed, the modules are then placed back online.

Normally, this is a routine procedure. However, certain circumstances may cause a module to remain offline. For example, if the node lacks sufficient processing power to operate the module, the module remains offline.

You can easily identify any offline modules: all offline modules are highlighted with a red outline. In addition, whenever you open a node diagram, Designer displays a list of all offline modules in the node.

NOTE: If you have offline modules in your node, you may be able to put them back online by selecting **File > Send & Save**.

Module status: programmed vs. pending

The terms “programmed” (left) and “pending” (right) refer to whether or not a module's representation in the node diagram matches the node itself.

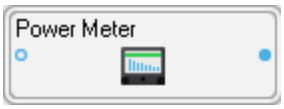
Programmed: A programmed module is one that is the same both in the node diagram and in the node. The links, labels and setup register values in the node diagram exactly match those on the node. When you first open a node diagram, all the modules appear programmed since they are read directly from the node itself and then displayed in the node diagram.

Pending: A pending module is one where changes have been made to the module in the node diagram and not yet sent to the node, so the node diagram does not match the node. The borders of pending module icons appear as a dashed line.

If you change a module in the node diagram (for example, re-link it or edit its setup registers), it does not match the node until you select **File > Send & Save**. Until it is saved, the edited module is depicted as pending to indicate that it does not match the configuration on the node. When you send and save your changes to the node, the module becomes programmed.

Core modules and standard modules

There are two basic types of ION modules: core (left) and standard (right).



Core modules are required ION modules that are fundamental to the operation of the node. You cannot add or delete core modules and, in some cases, you cannot configure them. Core module icons are identified by a double border around the edge. The Power Meter module is an example of a core module.

Standard modules are reusable ION modules. Generally, most modules in a node are standard modules. You can add or delete standard modules as required. Standard modules icons are identified by a single border. The Setpoint module is an example of a standard module.

Persistent modules

Similar to core modules in that they cannot be added or deleted, persistent modules are standard modules that have been converted to core modules. These modules are created at the factory, and can never be removed from the meter frameworks. Persistent modules are represented by icons with single borders.

An example of a persistent module is External Pulse module #1 on the ION8600 meter. This module pulses when the Demand Reset switch is pressed on the meter.

Using ION modules

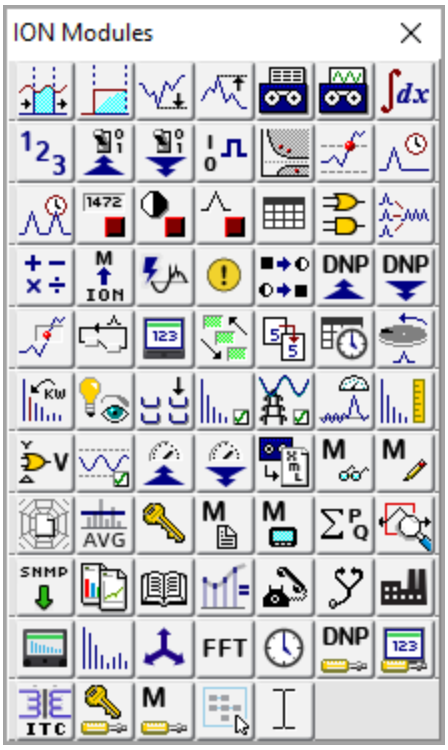
You can change the function of a node by editing the appropriate module(s) in the node diagram and linking modules together.

This section describes how to locate an existing module, how to add a new module, and how to delete a module. It also explains how to create a shortcut to a module and how to view the contents of a module in text format.

After you have located or added the module you want, you can configure it using the procedure described in Linking ION modules.

Using the ION modules toolbox

The ION Modules toolbox is a collection of ION modules and generic tools that you can add to a node diagram. To display the ION Modules toolbox, select **Options > Show Toolbox**.



The type and quantity of modules offered on the toolbox varies depending on the type of node you are configuring; however, the generic tools (the grouping and text objects) are available for all nodes.

NOTE: To identify a module in the toolbox, point to it with the mouse—the module type is displayed as a ToolTip and on the status line at the bottom of the screen.

To add a module to your node diagram (and to the node itself), drag its icon from the toolbox into the diagram window.

Opening the ION modules toolbox

To open the toolbox, select **Options > Show Toolbox**.

Closing the ION Modules Toolbox

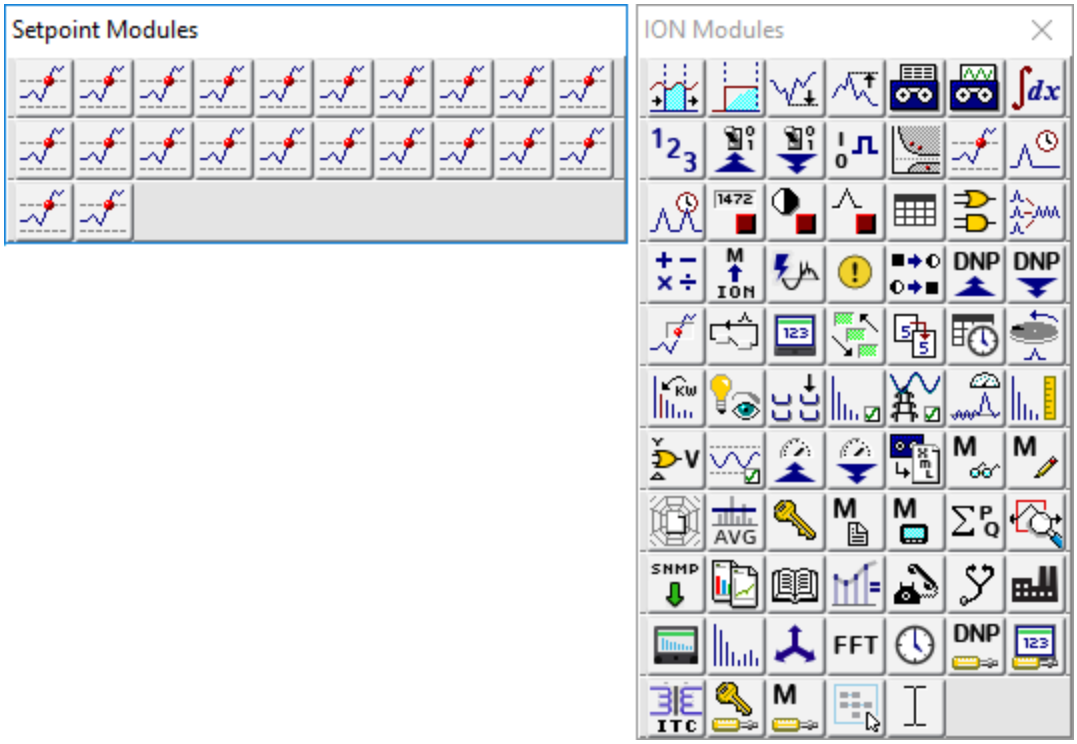
Click the **Close** button ✕ or clear **Options > Show Toolbox**.

Locating an existing ION module

Before you can edit a module, you must first locate it in the node diagram. To find a module in a node diagram, you can use the module tray feature of the toolbox.

Locating an existing module from the Module Tray

1. To display the module tray, right-click the toolbox icon for the type of module you want to locate. The module tray appears beside the toolbox.



   The module tray displays links to all modules of that type that are currently in use on the node—for example, in the image above, there are 22 Setpoint modules in use by the node. To identify a link in the tray, point to it—the module's label is displayed on the status line at the bottom of the screen.

2. To locate a particular module, click its link in the module tray. Designer locates the module and displays it in the center of the workspace. If the module is located inside a grouping window, Designer opens the window to display the module.

TIP: To close the module tray, click on any module icon in the toolbox.

Adding a new ION module

Most nodes are pre-programmed at the factory to provide the most commonly required functions. However, if the factory default configuration is not appropriate for your application, you can add a new module.

Adding a module on a node

Drag the icon of the module you want to add from the toolbox onto the node diagram.

As you drag the icon, the cursor changes shape to indicate you are placing an object.

Designer adds the module and places a pending module icon into the diagram. You can then link and configure the module.

See Linking ION modules for more information on programming modules.

Deleting or cutting an ION module

To remove a standard module from a node, delete its icon from the node diagram. By removing unnecessary modules from the node, you can free up resources for use elsewhere.

NOTICE
UNINTENDED DEVICE OPERATION Do not delete any ION modules without knowing which modules are dependent on it. **Failure to follow these instructions can result in the unintended operation of the remaining modules.**

NOTE: Each time a module is deleted, all of its output registers, setup registers and input links are deleted as well. Removing this information from the node affects the operation of any modules that depend on it. For this reason, you should be aware of all dependent modules (also known as owners) before you delete anything.

Checking for dependent modules

When two linked modules are located in the same window, Designer depicts the link as a line that runs from the output register of one module to the input of another. You can easily identify the dependent module (or owner) by the line running to its input. However, if one of the linked modules is located in a different window, the connection is not visible. A more effective way to locate a module's owners is to view the owners of its registers.

Viewing the owners of a module's setup and output registers

You can view a register's owners to quickly identify all dependent modules on the node. You can determine what purpose the modules serve, and then decide whether to delete them or not.

1. Do one of the following to open the **Owners** dialog:
   - To view the owners of a module’s output registers, right-click the output symbol.
   - To view the owners of a module’s setup registers, hold the CTRL key and then right-click the output symbol.

   The dialog lists all of the module's registers and any dependent modules on the node (dependent modules on other nodes are not displayed).

2. Click a register in the Registers list to display the owners of that register in the Owners list on the right. Owner information includes the module name or label and its relevant input.
3. If necessary, delete the link between a register and one of its owners. Select the owner from the Owners list and click **Unlink**. (See Deleting links for more information on deleting module links.)
4. When you have finished viewing the register owners, click **OK**.

Viewing owners on other nodes

Displaying a module's register owners is an effective way to locate dependent modules on the selected node but it does not show any dependent modules located on another node.

If you remove a module with a dependent module on another node, the dependent module's inputs are not reset. It continues to look for the deleted output register.

If you are not sure whether a module has dependents on other nodes, check with the person who programmed them to ensure you do not disrupt the operation of any modules on that node. If you still want to remove the module, you may want to directly delete the link on the other node first. In this way the module is not inadvertently linked to the next module to occupy the location of the deleted module.

Deleting or cutting an ION module

After you have determined that you can remove an ION module without disrupting other functions, there are two ways to remove it: delete and discard the module or cut the module to paste it in another location.

In either case, Designer immediately removes the icon from the node diagram and deletes the module from the node. The difference is, when you delete a module, it is discarded; when you cut a module, it can be restored (by selecting **Edit > Paste**).

NOTE: You do not have to select **Send & Save Changes** to delete a module. Designer immediately removes the module from both the diagram and the node.

Removing an ION module from the node

1. Select the icon(s) of the module(s) you want to remove.
2. Do one of the following:
   - To cut the module(s) to paste it in another location, select **Edit > Cut**.
   - To discard the module(s), press the **Delete** key.

NOTICE
UNINTENDED DEVICE OPERATION Do not delete any ION modules without knowing which modules are dependent on it. **Failure to follow these instructions can result in the unintended operation of the remaining modules.**

NOTE: If a module has a dependent module on another node, Designer does NOT alert you of the dependency when you delete it. Before you delete a module, ensure that you are aware of all links to modules on other nodes.

Designer displays a summary of the proposed changes.

The summary lists all selected modules, and identifies those in the selection that will be deleted (including those with dependents on that node) and those that will not. Select a module in this list to display any additional information available in the field at the bottom of the dialog.

3. Click **OK** to remove the selected modules (or **Cancel** to abort the procedure).

   Designer removes the module icon from the node diagram and deletes the module from the node itself.

NOTE: If you delete a shortcut icon, the original module is not affected. However, when you delete the original module, all shortcuts to that module are also deleted.

Viewing a node or module as text

You can use the View Diagram Text command to display as text the complete contents of one or more modules or of an entire node. Use this option to view the specified information on your screen so you can sort it, perform analysis, create a detailed record of your node's configuration, or print a copy for your records.

1. Select the module(s) that you want to display.

   TIP: To select all modules in the node, left-click on the background of the main node window, being careful not to click on a module icon, then select **Edit > Select All**.

2. Select **Options > View Diagram Text** to open the **Text View** screen. The text of any modules that are offline appears in red.

- The Text View screen offers several ways to view, sort and find information:
- In the View dropdown list, select one of two view modes:
  - Use **Archive** to display information useful for archiving the node's configuration.
  - Use **Diagnostic** to display diagnostic information on the selected module(s).

- In the **Sort by** dropdown list, select the criteria by which you want to sort the data:

Archive View	Diagnostic View	Sorts by
Default	Default	Module label
Module Class	Module Class	Type of module
Module Name	Module Name	Default label
	Module State	Displays offline modules first followed by online modules. Sorts alphabetically within each group.
	Module Update Period	Displays event driven modules first, then inactive (not updating) modules, followed by high-speed (one cycle updates) modules, and finally high-accuracy (one second updates) modules. Sorts alphabetically within each group.

- In the **Find** text field, type a text string and click **Find** to find that text string in the data.

To reset the text view after you have made a configuration change, click Refresh. If you want to print a copy of the text view information, click Print. When you are finished viewing the text view information, click Close.

Creating a shortcut to an ION module

To save time switching between modules in different windows, create a shortcut icon in one window that represents the original module in the other window.

A shortcut icon is identified by a symbol in the lower left corner of a module icon.

Creating a Shortcut Icon

Hold down SHIFT+CTRL then drag the module icon(s) to the window where you want to place the shortcut(s).

After you have created a shortcut icon, you can use it in the same way you use the original module icon. Both icons support the same features. However, if you delete the shortcut icon, the original module icon is not deleted; whereas if you delete the module icon, it deletes all shortcuts to that module.

NOTE: You cannot create more than one shortcut icon per window for a single module.

Adding a text box to a node diagram

You can place a text box anywhere in a node diagram, and move it or resize it as necessary. You can use a text box to describe any process or function in your system; for example, you can label individual components of your system or display a block of descriptive text or instructions.

Adding a Text Box

1. Drag a **Text Box** object ( ) from the toolbox onto the node diagram.

   A text box opens in the diagram with the default message: “Your text goes here.”

2. Right-click the text box to replace the default text with your own text. The **Text Box Configuration** dialog opens.

- Select the **Edit Text** tab, then do one of the following:
- To display the name of the node in the text box, select **Use Default**.

3. To display your own message, select **Use Custom** and type your text into the field provided.
4. Click **OK**. The text box displays your specified text.

Resizing a Text Box

To resize a text box:

1. Select the text box.
2. Do one of the following:
   - To make the object larger or smaller, drag a corner handle.
   - To stretch the object horizontally or vertically, drag a middle handle.

Changing the font of a Text Box

The font, size and style of the text used in the text box is based on the default setting specified for the active window. If you want to use a different font, you can specify a new font for the text box:

1. Right-click the text box to open the **Text Box Configuration** dialog.
2. Select the **Text** tab.
3. In the Font section, do one of the following.
   - To use the font specified for the parent window, select **Inherit from parent window**.
   - To use a different font, select **Custom**, then click **Font** to open the **Font** dialog. Specify a font, style, and size. Click **OK** to continue.
4. Click **OK**.

Changing the position of the Text

To change the position of the text in the text box:

1. Right-click the text box to open the **Text Box Configuration** dialog.
2. Select the **Text** tab.
3. In the Position section, select **Left**, **Center**, or **Right**.
4. Click **OK**.

Adding a border or background color to a Text Box

To add a border to a text box or change its background color:

1. Right-click the text box to open the **Text Box Configuration** dialog.
2. Select the **Box** tab.
3. Do one or more of the following:
   - To add a border, select **Show** in the Border section and click **Color** to select a border color.

- To set the width of the border, type a border width in the “Width in pixels” field in the Border section.
- To add a background color, select **Custom** in the Background Color section and click **Color** to select a background color.

4. Click **OK**.

Linking ION modules

Linking ION modules together is the foundation of programming ION-compliant nodes in Power Monitoring Expert. Although an ION module can perform a function in isolation, the strength and flexibility of the ION architecture comes from the ability to interconnect modules to build more sophisticated functions.

Choosing which ION modules to link

The first step in linking modules is to decide which modules you want to use. When choosing a module to link, you have two choices: you can add and link a new module or you can re-link an existing module.

In some cases, you may not want to add a new module. For example, if all the modules of a particular type are already used, you need to re-link one of them to perform the new function. Most devices are preconfigured at the factory to provide common measurements and calculations. If any of these factory defaults are unnecessary in your application, you can unlink the modules involved and reuse them.

Plan ahead before you add new modules. Unlinked modules are wasted resources.

You may find a linked module that you can use to add a new link, in order to augment the function it is performing. For example, if you have a Setpoint module that triggers a waveform recording, then later decide to use this trigger to reset a counter, you can link that Counter module to the same Setpoint that controls the Waveform Recorder module.

Linking ION modules graphically

Linking modules graphically means pointing and clicking a module’s input, then clicking another module’s output register to link it (note that both input and output register classes must be compatible). You can use this method to link to modules on the same node or to create links across nodes.

You can use the autolinking feature to speed up the process of linking ION modules. Typically, linking ION modules involves connecting the output register of one module to the input of another. In many cases, only one of the module's inputs have the same register class as the selected output register.

If autolinking is enabled, Designer automatically selects the appropriate input and establishes the link. If necessary, it overwrites an existing link. This relieves you from having to manually select the input; however, you cannot see what input you are linking to.

By default, autolinking is disabled. You should only use autolinking if you are thoroughly familiar with all the inputs and output registers of the modules you are working with so that you do not inadvertently create undesirable links.

Enabling autolinking

To enable autolinking, select **Options > Enable Autolinking**. A check mark beside the option indicates it is selected.

Disabling autolinking

To disable autolinking, clear **Options > Enable Autolinking**.

Linking ION modules on the same node

If the selected node is a meter such as the ION7650, the process of configuring the node primarily involves creating links between modules on that node.

NOTE: To cancel a link-in-progress, click anywhere in the background of the window or press the ESC key.

Linking modules using the point and click method

1. To list a module's output registers, click the output symbol on the right side of the module icon. To list the module's setup registers, hold the CTRL key while clicking the output symbol.

   Either a menu opens or, if the module has many registers, a dialog opens listing the available registers.

2. Select the register you want to link:
   - In the menu, click the register you want to select.
   - In the dialog, double-click the register (or click it then click **Select**).

3. Move the cursor towards the module you want to link to. The cursor changes and a dotted line follows it across the node diagram. This indicates you are in the process of creating a link and it shows where the connecting line will appear in the node diagram.

   If you link to a module that is in a different window than the original module (either in a different node diagram or grouping window) the dotted line disappears but the cursor still indicates that a link is in progress.

   If the module you want is obscured by another window, click on the title bar of the window containing the module. This brings the window to the foreground without canceling the link. (If you click on the background of the window, the link is cancelled.)

4. Click the input symbol of the module that you want to link to display the module's inputs. Either a menu opens or, if the module has many registers, a dialog opens listing the module's inputs.

   If the input is already linked, the label of the register it is linked to is displayed beside the input. If you select the input, the existing link is overwritten.

   The inputs that are of a different class than the selected output register are grayed out to indicate you cannot select them.

5. Select the input you want to link to:
   - In the menu, click the register you want to select.
   - In the dialog, double-click the register (or click it then click Select).
6. Select **File > Send & Save** to save your changes to the node.

The procedure described above can also be performed in reverse order. You can select a module's input first and then link it to another module's output register.

Linking modules with variable number of inputs

Some modules, such as AND/OR modules, Data Recorder modules, and Log Acquisition modules have a variable number of inputs. In these cases, when you click on the input symbol, the menu offers one instance of the variable input as well as any fixed inputs the module may have. When linking to one of these modules, you can select the **NEW Source** item to add a new link or you can select an existing link and overwrite it.

If the two modules are in the same window, the line remains on the screen to show the link between the modules—when you save this change to the node, the line changes from a dotted line to a thin black line to indicate that the link is now programmed on the node.

Linking ION modules across different nodes

If the selected node is a software node, such as the Virtual Processor or Log Inserter, many of the links you create are to modules on other nodes. When you create links across different nodes, it is important to keep track of these links and note what modules are dependent on others. This helps you determine what will happen if you ever want to delete a module that is linked to a module on another node.

NOTE: You cannot link modules on one device to another. For example, you cannot create a link between a module on an ION7330 to a module on a different ION7330 or to a module on another meter.

1. Open the node diagrams that contain the modules you want to link.
2. Position the diagrams within the workspace so you can see the two modules you want to link.
3. In the first node diagram, click on the output symbol of the module icon. A menu or dialog opens listing the module's output registers.
4. In the list of output registers, click the register you want. (In the case of the dialog, click a register and then click **Select**.)
5. Drag the cursor from the first node diagram to the module you want to link to in the second node diagram. The dotted line ceases to follow the cursor if it crosses the window boundary but the cursor changes to indicate a link is in progress.
6. Click on the input symbol of the module icon in the second node diagram. A menu or dialog opens listing the module's inputs. Those that are of a different class than the selected output register are grayed out to indicate you cannot select them.
7. Click the input you want, or in the case of the dialog, click the input then click **Select**. Designer does not graphically represent links between modules on different nodes so you will

not see a line connecting the modules.

8. Select **File > Send & Save** to save your changes to the node.

This procedure can also be performed in reverse order. You can select a module's input first and then link it to another module's output register.

NOTE: If the input is already linked, the label of the register it is linked to is displayed beside the input. If you select this input, the existing link is overwritten.

A note about performance

While creating links, you may notice that the circle at the end of the arrow cursor is sometimes black ( ).

This indicates that Designer is in the process of retrieving information about a module. You can still click on the inputs or outputs of other modules, but Designer aborts the original request. To minimize the amount of communications between Designer and the connected nodes, avoid unnecessary clicking on the input and output symbols.

If you click on several items in a row, you only see the menu for the last item you click; however, Designer initiates many requests for information, which may impact its performance.

Linking ION modules using the ION tree

In some cases, you may want to use the ION tree to select the register for linking. The ION tree is a hierarchical listing of every node, manager, module, and register in the Power Monitoring Expert network. It allows you to select a register on a node without opening the node diagram. Generally, you use the ION tree to create links across nodes.

The ION tree is also the only way to select registers from devices that are not ION-compliant (and use translators to make data available) such as 3000 series meters. For example, if you are programming a Virtual Processor node and you want to sum data from several 3720 ACMs, you must access the 3720 ACM register via the ION tree.

Using the ION tree is faster than opening a node diagram. It is useful if you want to link to a register on a node whose diagram has not yet been opened. It is also useful if you want to link to a register, but you are not acquainted with the configuration of the node in which it resides. You can go straight to the register without having to navigate through an unfamiliar node diagram. Also, since a diagram can only be accessed by one user at a time, you can use the ION tree to link to a register on another node where the diagram is already open.

Linking modules using the ION tree

1. Click the input symbol of the module icon. A list of the module's inputs is displayed.
2. In the list of inputs, select the input you want to link.
3. Click the ION button in the toolbar. (To link a module's setup register, hold the CTRL key while clicking this button.)

   The **Create Link** dialog opens, providing access to the ION tree.

4. Specify a node, manager, module and output register: Double-click the node you want in the Nodes box. All managers within the selected node appear in the Managers box. You can then double-click the manager you want, and repeat this procedure for the modules and registers.
5. Click **OK**. The module whose inputs changed appears grayed-out to indicate it is now pending. If both modules are in the same window of the same node diagram, a line appears to represent the link.
6. Select **File > Send & Save**. The new link is established and the module appears programmed.

The procedure described above can also be performed in the reverse order. You can click the ION button first, select an output register, and then click the input symbol of a module icon to select one of its inputs.

Deleting links

If you want to disassemble a group of linked modules and use them for another function, you can delete the links between the modules rather than deleting the modules. Designer provides several ways to delete links.

Fixed links

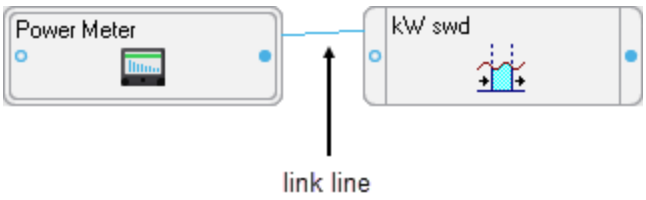
Most links between standard modules can be deleted. However, some links between core modules are fixed and cannot be deleted. These fixed links include:

- Data Acquisition module and all Power Meter modules.
- Data Acquisition module and all FFT modules.
- FFT module and all Harmonics Analyzer modules.
- FFT module and all Symmetrical Components modules.

If you attempt to delete a fixed link, Designer informs you that the link cannot be deleted.

Deleting visible links

If the linked modules are in the same window, simply click on the link line and press the **Delete** key. This works well as long as you know which output register and input are involved. For example, in the image below, to delete the link click on the line joining the Power Meter and the Sliding Window Demand module (its color reverses to indicate it is selected) and press **Delete**.



If there are multiple lines between the same modules and you only want to delete one of the links, you may want to use the method described in Deleting links that are not visible below.

Deleting links that are not visible

If you cannot see a line that links the modules (for example, if they are in different windows), or you need to know which output registers and which inputs are involved, you must use a dialog to delete the link between modules. You can look either at the output register owners of the first module or you can look at the inputs of the second module to see what they are linked to, and then delete the link from there.

Deleting a module's input links

Deleting links at a module's inputs is generally faster than deleting them at the module's output registers because Designer does not need to check the entire node. On the other hand, there is less information available if you view input links. All you see is the label of the output register that is linked to the input. If this is sufficient information, proceed with this method; if not, go to the output registers to delete the link.

Viewing a module's input links

1. Right-click the input symbol of the module icon to open the **Delete Links** dialog.
2. Each input and the label of the output register it is linked to are displayed in the dialog. To delete one or more of these links, select the input and click **Unlink**. The output register label is replaced with dashed lines.
3. When you have unlinked all the registers you need to, click **OK**.
4. Select **Send & Save** to unlink the modules on the node.

Deleting a module's output links

You can also delete links from the Register Owners dialog. This method gives you the most information about the link you are deleting (the output register label and the input and label of the module it is linked to).

Viewing a module's output links

1. Right-click the output symbol side of the module icon to open the **Register Owners** dialog. (To list the module's setup registers, hold the CTRL key while right-clicking on the symbol.)
2. Select the output register you want from the Registers section. The Owners section lists all the module inputs to which the selected register is linked.
3. To delete one or more of these links, select the module input in the Owners list box and click **Unlink**. The input name is replaced with a dashed line.
4. When you have unlinked all of the module inputs you want, click **OK**.
5. Select **Send & Save** to unlink the module inputs on the node.

NOTE: Owners that reside on a different node are NOT displayed in this dialog. If you need to delete a link between modules on different nodes, use the procedure described in Deleting a module's input links.

Configuring ION modules

After you have placed a module in a node diagram, you can configure the various setup parameters of the module. It is not necessary to do this before you link the modules but you should ensure the module is set up correctly before sending the configuration to the node.

⚠ WARNING

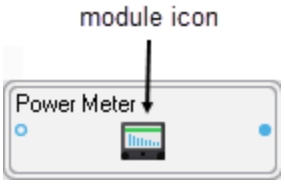
UNINTENDED EQUIPMENT OPERATION

Do not use a controlled output for any safety critical application due to possible unexpected changes of state during power cycles, power outages, configuration changes, or firmware upgrades.

Failure to follow these instructions can result in death or serious injury.

Only personnel with a thorough understanding of ION architecture and the system in which the meters and software are installed can configure ION modules and registers.

Module setup parameters include the module's label; its setup registers, labels and values; and its output register labels. To access these, right-click the module icon.



The ION Module Setup dialog opens.

The Setup Registers box lists all the setup registers of the module along with their current values or settings. To change any of the settings or assign a custom label to a setup register, select the register, then click **Modify** (or double-click on the register) to open the **Modify Register** dialog where you can make modifications.

In most cases, configuring a setup register is a simple matter of entering a number, entering text, or choosing an option from a list. (To determine the options or ranges available for a setup register, refer to the module's description in the *ION Reference*.)

When you have completed all your modifications to the module, click **OK** to return to the node diagram. The module icon appears pending until you send and save your changes.

Modifying enumerated, numeric bounded, and string setup registers

If the register you have selected is an enumerated, numeric bounded or string register, one of the following dialogs appear when you click **Modify**:

Enumerated registers

To modify an enumerated register, select an option from the Options list.

Numeric bounded registers

To modify a numeric bounded register, type a number in the Value box. The allowable range is shown under the Value box; you are alerted if you type a number outside this range.

To enter a formatted numeric value, click **Format**. In the **Time Interval Value** dialog, you can enter the numeric value as a date (offset from Jan 1, 1970) or a time interval.

String registers

To modify a string register, type your text in the String box.

Note that when you click **Modify** for a string register that is the connection string for a Log Acquisition module or Query module, the **Modify Database Connection Properties** dialog opens.

Modifying calendar setup registers

The ION Scheduler module has a special class of setup register called a calendar register. Configuring a calendar register is only necessary for nodes that have a Scheduler module. For detailed information on how to configure a calendar register, see the description of the Scheduler module in the *ION Reference*.

Modifying address setup registers

All Distributed Numeric, Distributed Boolean, and Distributed Pulse modules contain an address setup register that references another register. You can specify a new value or clear an existing value as required. (Currently, the Virtual Processor is the only node offering these types of modules.)

NOTE: Currently, you can only link the address setup register to External Numeric, External Boolean, and External Pulse registers.

Modifying an address setup register

1. Right-click a Distributed Numeric, Distributed Boolean or Distributed Pulse to open the **ION Module Setup** dialog.
2. In the Setup Registers section, select a register then click **Modify** to open the **Modify Address Register** dialog.
3. In the **Modify Address Register** dialog, double-click on the node, manager, module and output register you want to use. Click **OK** to continue.
4. Click **OK** in the **ION Module Setup** dialog.

NOTE: You can clear the value of an address setup register. On the **Modify Address Register** dialog, select **Reset Register Value** and then click **OK**.

Parent module and shared setup registers

Setup registers that are surrounded by asterisks (for example, “**PM1 PT Sec**”) indicate that the module shares its setup registers with another (“parent”) module. An example of this is the High-Speed Power Meter or Meter Units Power Meter module (“HS Power Meter”, “MU Power Meter”). They share their setup registers with the parent Power Meter module.

If you try to modify a shared setup register, a prompt identifies the register as shared and gives the name of the parent module.

Navigate to the parent module and change the setup register there.

Using custom labels

You can assign custom labels to modules, setup registers, output registers, and Boolean ON/OFF conditions. All modules and registers have a default label and this label is what you see in node diagrams, user diagrams and event logs unless you specify a custom label.

Creating custom labels allows you to clearly describe what the module and its registers have been set up to do.

However, carefully consider which modules and registers should be assigned custom labels. There is a fixed number of labels available, but there are thousands of registers you can assign them to. Many of these registers do not benefit from custom labels. For example, most setup registers can be left at their default names since the only place their names might appear is in the event log.

NOTE: Some devices, such as the ION7330 and ION7700, have a 15-character limit for labels.

Customizing a module label

The ION Module Setup dialog allows you to edit the module label. The module label is the text that appears across the top of the module icon in the node diagram. It is also the label that is used in event logs and in the dialog for the ION tree.

1. In the **ION Module Setup** dialog, do one of the following:
   - To create a custom label, select **Use Custom Label** and then type a name for the label in the box.
   - To use the default label, select **Use Default Label**.
2. Click **OK** to return to the node diagram.

Customizing an output register label

By providing a custom label for an output register, you can clearly indicate the information that register contains. For example, if you have linked the VIna output register of a Power Meter module to a Thermal Demand module, and in turn linked the ThrmDemand output register to a Maximum module, you may want to label the Maximum module's output register as “Va TD Maximum” (instead of using the default name of “Maximum 1”).

1. In the **ION Module Setup** dialog, select the output register in the Output Registers area and then click **Modify** to open the **Modify Label** dialog.
2. Do one of the following:
   - To create a custom label, select **Use Custom Label** and then type a name for the label in the box.
   - To use the default label, select **Use Default Label**.
3. Click **OK** to return to the **ION Module Setup** dialog.

Customizing Boolean ON/OFF labels

If the output registers of the module are Boolean, you can create custom labels to associate with the ON and OFF conditions of these registers. These labels can clarify exactly what the ON or OFF conditions represent. For example, if a Boolean output register is used to switch a fan on and off, you could create a Boolean ON label called “Fan Running” and an OFF label called “Fan Not Running.”

1. In the **ION Module Setup** dialog, select the Boolean output register and then click **Modify** to open the **Modify Boolean Register** dialog.
2. Do one of the following:
   - To create custom labels, select **Use Custom Labels** and then type names for the Register Label, ON Label and OFF Label in the appropriate fields.
   - To use the default labels, select **Use Default Labels**.
3. Click **OK** to return to the **ION Module Setup** dialog.

Customizing a setup register label

1. In the **ION Module Setup** dialog, select the setup register and click **Modify**.
2. Do one of the following:
   - To create a custom label, select **Use Custom Label** and then type a name for the label in the field.
   - To use the default label, select **Use Default Label**.
3. Click **OK** to return to the **ION Module Setup** dialog.

Resetting ION modules in a node diagram

Designer allows you to undo certain changes you have made in a node diagram since the last time you saved and sent your changes to the node. It refreshes the selected module icons so they reflect what is actually on the node. Reversible changes include:

- Changing the value of a setup register.
- Changing module or register labels.
- Changing the links between modules.

NOTE: Since adding and deleting modules happens immediately on a node, you cannot undo the deletion or the creation of a module.

To reset ION Modules:

1. Select the module(s) you want to reset.
2. Select **Edit > Reset**.

All the changes made to the selected modules since the last time you sent and saved the node diagram are discarded. Modules not included in the selection are unaffected (that is, if they had pending changes, the changes are still pending.)

Fast-linking ION modules in the Log Inserter

When linking modules in the Log Inserter, you can save time by using the Fast Linker utility. The Fast Linker automates much of the linking process, enabling you to quickly link any combination of event, data or waveform recorders. To access the Fast Linker options, press the CTRL key and click on the Log Inserter inputs.

For more information on using the Fast Linker utility, refer to the description for the Log Acquisition module in the *ION Reference*.

Copying and pasting ION modules

You can easily create a new function in a node diagram by copying and pasting modules. You can copy and paste a single module, a group of modules, grouping icons, text objects, or the entire node.

You can copy modules from one node and paste them into another, as long as the node you are pasting to supports the selected modules and has sufficient resources. When pasting modules, you can replace existing modules or add new ones.

You can also copy modules and save them as a framework. You and other users can then reuse this framework in other nodes. Saving a node's configuration as a framework provides a fast and easy way to program a large number of nodes at once.

NOTE: Persistent modules cannot be deleted, but they can be overwritten during a framework paste. Overwriting a persistent module effectively relinks its outputs and rewrites its label, but its core functionality remains intact (for example, the Master Reset module may be relabeled, but pulsing this module still initiates a master reset). When pasting a default framework onto a meter, use lock-paste to ensure that all persistent modules in the "old" default framework are overwritten by the corresponding persistent module in the "new" default framework. Persistent modules are listed in the "ION Device Template Reference".

Copying modules

Designer offers two ways to create copies of modules: copy and paste using the product's clipboard or copy or paste using a framework.

NOTE: The Power Monitoring Expert Clipboard is a temporary storage area that holds any information cut or copied from Designer. This clipboard should not be confused with the Windows Clipboard.

When you copy a selection of ION modules, you can use **Copy**, **Cut**, or **Copy to Framework**:

- **Copy** saves the selection to the clipboard and leaves the original module(s) intact.
- **Cut** saves the selection to the clipboard and removes the original module(s).
- **Copy to framework** saves the selection as a file and leaves the original modules intact.

Additional considerations include pasting with shortcuts, modules that cannot be pasted, and cloning a node (copying and pasting an entire node configuration from one node diagram to another).

Cutting or copying ION modules to the clipboard

Use the Cut or Copy command to save a temporary copy of the selected modules to the clipboard. You can then use the Paste command to transfer the selection from the clipboard into any node diagram. Each copy retains the setup register values, custom labels, link information and layout of the original selection.

NOTE: When selecting modules to be cut or copied, you can also include grouping icons and text objects. If you select a grouping icon, all modules within the group are copied, as well as any nested grouping icons.

1. Select the module(s) you want to cut or copy.
2. Do one of the following:
   - To cut the selection to the clipboard and remove the original, select **Edit > Cut**.
   - To copy the selection to the clipboard and retain the original, select **Edit > Copy**.

   Designer copies the requested information to the clipboard.

After the selection has been copied to the clipboard, you can select **Edit > Paste** to paste it into any user diagram.

Copying ION modules to a framework

You can use the **Copy to framework** command to create a framework from the selected modules. A framework is a template that you can use to reproduce a group of modules. Unlike regular copying and pasting, a framework is stored as a file so you can paste it later.

When you select **Edit > Copy to framework**, Designer copies the layout, linking and configuration information of each module in the selected group. It saves the framework as an .fwn file. You can then use the **Paste from framework** command to paste the group in another node diagram.

You can use frameworks to simplify the process of programming multiple devices with similar configurations. For example, if you wanted to program a single function into several nodes, you could program the first node and then copy the configuration to a framework. You could then quickly program the other nodes by simply opening their node diagrams and pasting the framework you created. You can also use frameworks to program an entire node at once, considerably reducing the amount of time required to set up a large installation.

Before you save a group of modules as a framework, consider carefully which modules you want to include. If you include core modules in your framework, you will not be able to paste them unless you overwrite the existing core modules that correspond to those in your framework. Another approach is to select the modules “downstream” of the core module and save them as a framework. Then when you paste the framework into another node diagram, you can use the Maintain External Inputs option to preserve your links to the original core modules. (See Using the Paste Summary dialog for more information.)

NOTE: After you have saved a framework, it can be used in another node diagram, as long as the node supports the modules included in the framework. Although it is possible to create a framework from one node type and use it with another node type, it is advisable to restrict your use of frameworks to nodes of the same type.

Copying a group of ION Modules to a framework

1. Select the group of module icons you want to copy.
2. Select **Edit > Copy to Framework** to open the **Copy to Framework** dialog.
3. In the File Name field, type a name for the framework, then click **Save**. The framework filename extension (.fwn) is added automatically and the selection is saved as a framework file.

After you have copied a group to a framework, you can select **Edit > Paste from framework** to paste it into a node diagram.

Pasting ION modules

You can paste a saved copy of one or more modules into any node diagram. Designer offers two ways to paste modules:

- **Paste** inserts a selection that has been placed on the clipboard using the **Cut** or **Copy** command
- **Paste from framework** inserts a selection that has been saved as a file.

Pasting modules is a little more complicated than copying them, because the action of adding modules to the node may require you to replace existing modules. Whether you choose **Paste** or **Paste from framework**, Designer displays a Paste Summary dialog that explains each aspect of the proposed changes.

You can use the Paste Summary box to define how to integrate the source modules into the destination modules. For example, if a source module is being pasted to a destination that is already occupied, you can either lock paste the new module over the existing one or free paste the new module into the next available destination.

If you paste a selection that contains a shortcut, Designer may paste the shortcut as a module. (See Pasting shortcuts for more information.)

In some cases, Designer may not paste every module in your selection. (See Modules that cannot be pasted for more information.)

Pasting ION modules from the clipboard or a framework

When pasting modules, the first thing to do is select the node diagram and window where you want the modules to go. If you have more than one window open, you can click on the title bar of the window you want to make it the active window.

NOTE: You can paste modules into the same node diagram they were copied from or into a different one.

You can paste modules from two sources: the clipboard or a framework. When you paste a selection from either source, Designer describes the proposed changes in the Paste Summary dialog. You can use the Paste Summary area to review your changes and make modifications as necessary.

NOTICE
UNINTENDED DEVICE OPERATION Do not use the lock paste option to overwrite existing destination modules. **Failure to follow these instructions can result in operational differences in required modules.**

Only use the lock paste option if you are an advanced user familiar with ION architecture.

NOTE: The lock paste option overwrites an existing module but the outputs from that module are retained as inputs of other modules. Consequently, the module may not operate as expected. (See Using the Paste Summary dialog for more information.)

Pasting ION modules into a node diagram

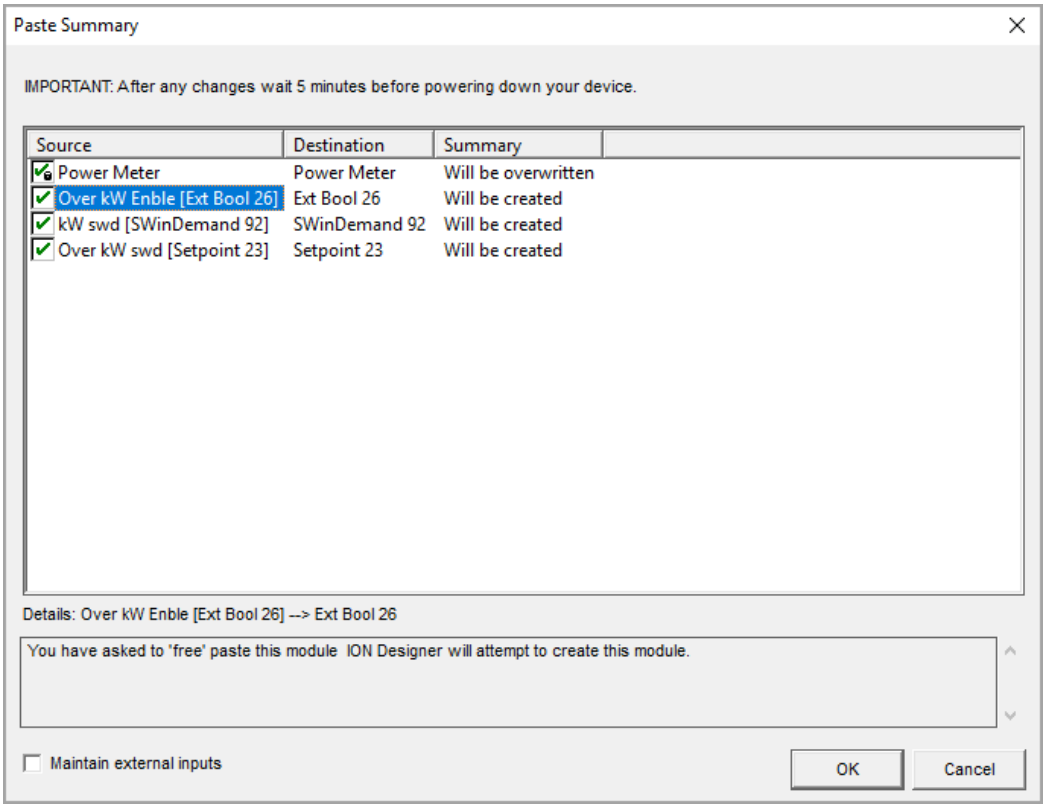
1. Open the window where you want the modules to go. Click in the background of the window to clear any selected modules.
2. Do one of the following:
   - To paste a selection from the clipboard, select **Edit > Paste**.
   - To paste a selection from a framework, select **Edit > Paste from Framework**. In the Paste from Framework box, select the file you want and then click **Open**.
3. The **Paste Summary** dialog opens. Use the Paste Summary area to review the proposed changes (see Using the Paste Summary dialog, below, for more information). When you are satisfied with the summary, click **OK** to complete the procedure.

The selection is pasted into the active window. The entire selection is automatically selected so you can easily move it to a clear area in the window. All module icons in the selection appear as pending until you click **Send & Save** to save the changes to the node.

Using the Paste Summary dialog

Before Designer pastes a selection, it displays the **Paste Summary** dialog. Use the **Paste Summary** dialog to review and modify the proposed changes to the node diagram.

The **Paste Summary** dialog lists each module to be pasted and indicates its destination in the node. For each module, a short summary of the proposed modification as well as a more detailed description of how the module is pasted or why it cannot be pasted as requested displays in the dialog.



The following sections describe the various areas of the Paste Summary dialog.

Source

The Source column lists each module that was copied to the clipboard or framework. Each source module is listed by its default label unless a custom label has been specified (in which case the default name appears in brackets after the label). Select a module in this column to view additional information in the **Details** area at the bottom of the dialog.

Destination

The Destination column indicates where the copy of each source module will be placed in the node diagram. The module label listed in the Destination column may or may not match the module label listed in the Source column. (If the destination module is to be overwritten, it is reused; otherwise, the next available module is used.)

Summary

The Summary column indicates whether the source module is copied into the destination as a new module or if it replaces (overwrite) an existing module. This column also indicates if a module will not be pasted.

NOTE: You can sort the paste summary information alphabetically by source or destination, or by importance of summary. Click on the **Source**, **Destination**, or **Summary** column headers to sort the list by the chosen criteria.

Details

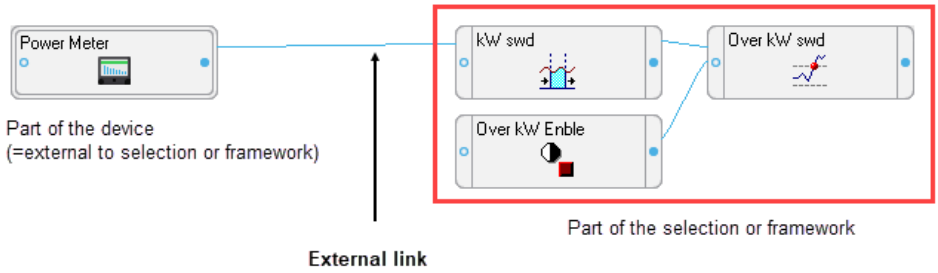
The Details area located at the bottom of the dialog provides more detail than the description in the Summary column. When you click on a module in the Source column, you can view a description of the proposed transaction in the Details box. This description explains how a module is pasted or offers reasons why it will not be pasted.

TIP: You can create a copy of the information displayed in the Details section of the Paste Summary box. To copy it, use the mouse to highlight the text you want, right-click the selection, then select **Copy**. You can then paste this selection into a word-processing program.

Maintain external inputs

The **Maintain External Inputs** check box allows you to paste the module selection with all external links intact. If this check box is cleared, all external links (links to modules outside the selection) are discarded.

The following example depicts an external link to a Power Meter module.



If you copied the modules on the right but omitted the Power Meter module from the selection, the link to the Power Meter module would be external. Upon pasting the selection, the external link to this module would be lost unless you selected “Maintain external inputs” on the Paste Summary box.

Check Boxes (Free Paste/Lock Paste/No Paste)

The check boxes to the left of each module indicate the proposed action (that is, how the module will be pasted):

- A green check mark indicates a free paste.
- A check mark with a lock symbol indicates a lock paste.
- A red “X” symbol indicates the module will not be pasted.
- An “X” symbol without a check box identifies a module that has no possible destination and cannot be pasted.

You can click on a check box to change the proposed action. For example, if you click on a “free paste” or a “will not be pasted” symbol, it changes to a “lock paste” symbol. When you change the type of paste, the descriptions in the Summary column and the Details box also change to describe the new action. (See Free paste or lock paste?, below, for more information.)

TIP: To change multiple module check boxes in the paste summary at the same time, click the first check box in your list, hold down the **Shift** key, and then click the last check box in the list you want to change.

Free paste or lock paste?

You can use the free paste and lock paste options to instruct Designer how to respond to potential conflicts. For example, if you want to paste the module “Setpoint 1” into a diagram that already has a “Setpoint 1” module, you have two options. You can either add the new module under a new name (for example, “Setpoint 2”) or you can overwrite the existing module with the new one and reuse the old name.

The first option in the above example is a free paste. It can be used to paste new modules into a diagram without deleting any existing modules. This is useful for integrating new functions into a node without disrupting the node's existing functionality. Although this may seem desirable, another option is available. By leaving existing modules intact, a free paste can result in needless duplication of functions. In addition, some groups of modules are interdependent and may require a lock paste to operate correctly.

The second option in the above example is a lock paste. It instructs Designer to recreate the source modules exactly, even if this requires Designer to overwrite existing modules in the diagram. When used to quickly replace old modules with new ones, lock pasting is an efficient alternative to the time-consuming process of deleting a module, adding a new one and then configuring it.

You can use a combination of both free paste and lock paste within a single paste operation.

NOTE: You can pre-select modules for Designer to reuse when free pasting. In the actual diagram where you paste the selection, press the SHIFT key and then click on any module icons that you don't want. When you paste the new selection, Designer has the option of replacing any of the selected modules with the new ones.

NOTE: Overwriting a module is not the same as deleting the module and then pasting a replacement module. If a module is overwritten, links from the outputs of that module are retained as the inputs of other modules. If a module is deleted, these links are also deleted and do not exist after the replacement module is pasted.

Pasting shortcuts

Identified by the symbol , a shortcut icon is a representation of a module icon that is located in another window.

You can copy a shortcut in the same way you copy the original module, but when you paste a shortcut, one of two things happens: It is either pasted as a shortcut to an existing module (if one is available) or as a new module. In either case, it continues to perform its function as before.

There is a basic reason for replacing a shortcut with a module: a shortcut cannot exist in a node without the module it represents. When you paste a selection containing a shortcut, Designer searches both the selection to be pasted and the destination to locate the module the shortcut represents. If it finds the module, it pastes the shortcut as a shortcut. If it doesn't find the module, it replaces the shortcut with a copy of the module. In this way, Designer functions so that the pasted selection is complete and not dependent on a module that is unavailable in the destination node.

Designer performs this process automatically; it requires no input from you.

Modules that cannot be pasted

Some modules cannot be pasted because their settings are non-transferable between nodes. All Factory, Communications, and Diagnostics modules must be individually configured for each node.

When pasting a selection that contains a Factory, Communications or Diagnostics module, Designer pastes the location of the icons only.

Cloning a node

You can quickly configure multiple nodes by cloning a node. Essentially, cloning a node involves copying a node's entire configuration to a framework then pasting it onto another node. This effectively reprograms the node receiving the framework as an exact copy of the original.

NOTE: When you paste an entire node's configuration, the Factory, Communications, and Diagnostics modules are not pasted because they could disrupt the operation of the device's communications. If you need to change the settings of these modules, you can do so manually.

Copying a node's entire configuration

1. Open the node diagram of the node you want to copy. Ensure that you are in the main or root window of the diagram.
2. Select **Edit > Select All**. All core modules, standard modules, grouping windows and text icons are selected.
3. Select **Edit > Copy to framework** to open the **Copy to framework** dialog.
4. In the File name box, type a name for the framework and then click **Save**. The framework filename extension (.fwn) is added automatically and the entire node configuration is saved in this framework file.

After you have saved the source node's configuration as a framework, you can paste it to other nodes of the same type. This file can also serve as a backup in case you want to restore the configuration of the source node.

Pasting a node's entire configuration into another node

1. Open the node diagram of the node to which you want to paste the configuration. Ensure that you are in the main or root window of the diagram.
2. Select **Edit > Select All**. Press the **Delete** key to remove the node's existing configuration. A dialog opens listing the standard modules that will be deleted and the core modules that cannot be deleted. Click **OK** to continue.

The standard modules and text icons are deleted, and the core modules (and any grouping windows containing core modules) remain.

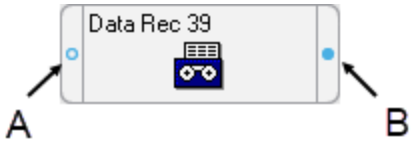
3. Select **Edit > Select All** to select the remaining module (and grouping) icons.
4. Select **Edit > Paste from framework** to open the **Paste from framework** dialog, select the framework file that contains the node configuration you want to paste, and then click **Open**.

   The **Paste Summary** dialog opens. (See Using the Paste Summary dialog for information on using the Paste Summary box.)
5. Select all modules in the list (click last item, hold the SHIFT key, and then click first list item - the entire list appears highlighted).
6. Change the paste type to lock paste (hold the SHIFT key and then click the paste type check box until all modules are set to lock paste).
7. Click **OK** to complete the procedure.

The selected framework is pasted into the node diagram. All module icons in the selection appear as pending until you select **Send & Save** to save the changes to the node.

Viewing output registers, setup registers, and inputs

Each module icon has an input symbol and an output symbol. The input symbol (on the left) provides access to the module's inputs and the output symbol (on the right) provides access to the module's output and setup registers.



A	Input
B	Output

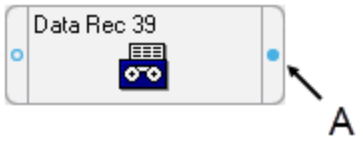
A register is a type of memory bank that stores a module's linking and configuration information. Each module uses two types of registers:

- Output registers store data that has been processed by the module (such as numeric values, event log entries, and waveform data).
- Setup registers store the module's configuration information.

Both types of registers serve as storage locations for the module.

Viewing output register information

Output register information includes the module's available output registers, the real-time values of the output registers and the owners of the output registers. Each of these can be accessed from the output symbol located on the right side of the module icon.



A	Click the output symbol to access the module's output register information

Viewing available output registers

Click the output symbol.

Viewing the real-time values of output registers

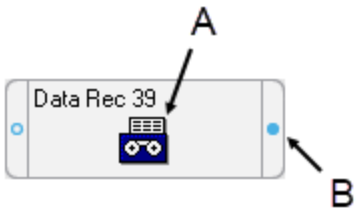
Press the SHIFT key and click the output symbol.

Viewing the owners of output registers

Right-click the output symbol. This displays an output register's owners so you can identify all dependent modules on the node and determine the purpose of each dependent module. This is useful when determining the effects and consequences of deleting a module.

Viewing setup register information

A module's setup registers contain its configuration information. When a module processes data, it manipulates the data according to the guidelines stored in its setup registers. Setup register information includes the module's available setup registers, the setup register settings, and the setup register owners. Each of these can be accessed from the output symbol located on the right side of the module icon.



A	Right-click the graphic to access the ION Module Setup dialog.
B	Press CTRL and click the output symbol to access the ION Module Setup dialog. Press CTRL+SHIFT and click the output symbol to display the ION Module Setup dialog to view Setup Register settings. Press CTRL and right-click the output symbol to view SetupRegister owners.

Viewing setup registers

Press the CTRL key and click the output symbol or right-click the graphic in the center of the module to display the ION Module Setup dialog.

Viewing setup register settings

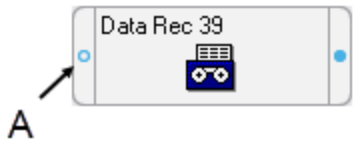
Press CTRL+SHIFT and click the output symbol or right-click the graphic in the center of the module to display the ION Module Setup dialog.

Viewing setup register owners

Press the CTRL key and right-click the output symbol.

Viewing input information

Input information includes the module's inputs and a sample of its real-time input values. Each of these can be accessed from the module's input symbol.



A	Click the input symbol to access the module's input information

Viewing inputs

Click the input symbol.

Viewing real-time input values

Press the SHIFT key and click the input symbol.

Setting Values for External Input Modules

You can set the value for an External Numeric, External Boolean, or External String (only available for the VIP) module through Designer. You can also trigger an External Pulse module through Designer.

To set the value for an External module,

1. Right-click the module icon to open the module setup.
2. Highlight the output register and click **Modify**.
3. Enter the value you want to set into the **Value** box or the string into the **String** box and click **OK** in the Modify Register dialog.

   NOTE: External Boolean modules only accept a value of 0 or 1.

4. Click **OK** in the ION Module Setup dialog to close it.
5. Send and save the changes in Designer.

To trigger an External Pulse module,

1. Right-click the module icon to open the module setup.
2. Click **Trigger** and confirm the operation.
3. Click **OK** in the ION Module Setup dialog to close it.

Device Manager

TIP: You can open Device Manager from **SETTINGS** > **System** > **Device Manager** in the Web Applications banner.

⚠ WARNING

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Do not use the software to control time-critical functions.
- Do not use the software to control remote equipment without proper access control and status feedback.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

NOTICE

NETWORK INOPERABILITY

Do not make unauthorized changes in the network configuration.

Failure to follow these instructions can result in an unstable or unusable network.

Use Device Manager to:

- Configure devices and sites.
- Import device and site configurations from other applications, such as ION Setup.
- Export device and site configuration in CSV format for use in another PME system.
- Import device and site configuration in CSV format for efficient configuration of large systems.

Device Manager or Management Console?

Device Manager shares the site and device configuration with Management Console. That means you can use either application to configure sites and devices. Depending on your workflow you might prefer to work in one or the other application. Device Manager is limited to configuring sites and devices. Management Console offers additional configuration functions, such as modem configuration or setting up connection schedules. Management Console also provides access to maintenance and programming tools.

NOTE: You cannot add direct serial sites or modem sites with Device Manager. Use Management Console to add these sites.

Use Device Manager for:

- exporting device and site configuration in CSV format
- importing device and site configuration in CSV format
- configuring devices and sites in the web interface

Use Management Console for:

- adding direct serial or modem sites
- configuring modems and connection schedules
- configuring managed circuits and logical devices
- configuring devices with advanced security
- accessing any of the maintenance and programming tools
- configuring devices and sites in a Windows application on an Engineering client

For more information and details on network configuration, see Management Console.

Definitions

Sites

A site is a group of devices in the system that share a common communications link. A site can be a direct site, a modem site, an Ethernet gateway site, or an OPC site.

Devices

A device is a meter or other component that communicates and gathers data and is installed on a network.

To configure devices and sites, see:

Devices

- Adding a device
- Editing a device
- Deleting a device
- Connecting or disconnecting an Ethernet device

- Enabling or disabling a device
- Viewing a device diagram

Sites

- Adding a site
- Editing a site
- Deleting a site
- Connecting or disconnecting a site
- Enabling or disabling a site

Network

- Exporting network configuration for use in a different system
- Importing network configuration from a different system

For reference information see:

- Device Manager
- Device Manager user interface
- Viewing system device license status

Adding a device

Add a device to make this device and its data available for monitoring and analysis in PME. You can add one device at a time using the Device Manager user interface. You can also import many devices at once using configuration import.

To add a device using the Device Manager user interface:

1. In Device Manager, select the **Devices** tab, and then click **Add Ethernet Device** or click the down arrow next to it to add a serial or OPC device. This opens the New Device dialog.

   TIP: The right-click context menu for a device in the table has a **Duplicate Device** option to create a copy of an existing device.

2. In New Device, enter the required information such as group name, device name, device type and IP address.

   TIP: Click **Show Advanced** to access advanced configuration settings. These settings have factory defaults and only need to be changed for specific application needs.

3. (Optional) Enter **Description** information.
4. Click **OK**.

TIP: To add a device directly to a site, go to the Sites tab and right-click the site to open the context menu.

To add one or more devices using configuration import:

1. In Device Manager, click **Import**. This opens the Import Devices and Sites dialog.
2. In Import Devices and Sites, download the configuration import template CSV file.
3. Open the downloaded configuration import template in a text editor and add the configuration information for the devices you want to add.
4. Save the file in CSV format.
5. Return to the Device Manager Import Devices and Sites dialog and click **Next**.
6. Click **Upload Files**. This opens the Upload new files dialog.
7. In Upload new files, click **Choose Files** and find the configuration import template CSV file. Click **Open**. Click **Finish**.

   TIP: You can also drag and drop the configuration import file into the designated area in Upload new files.

8. Follow the steps in the import wizard to complete the configuration import.
9. Click **Finish** in the import wizard.

Related topics:

Devices

- Adding a device
- Editing a device
- Deleting a device
- Connecting or disconnecting an Ethernet device
- Enabling or disabling a device
- Viewing a device diagram

Sites

- Adding a site
- Editing a site
- Deleting a site
- Connecting or disconnecting a site
- Enabling or disabling a site

Network

- Exporting network configuration for use in a different system
- Importing network configuration from a different system

For reference information see:

- Device Manager
- Device Manager user interface
- Viewing system device license status

Editing a device

Edit a device to update its group name or name, or to change its configuration settings. You can edit devices using the Device Manager user interface or configuration import.

To edit a single device using the Device Manager user interface:

1. In Device Manager, select the **Devices** tab.
2. In the devices table, select the row of the device you want to edit, then right-click in the row and select **Edit Device** in the context menu. This opens the Device Configuration dialog.

   TIP: Double-click a row to open the Device Configuration dialog.

3. In Device Configuration, update the configuration settings as needed.
4. Click **OK**.

To edit multiple devices using the Device Manager user interface:

1. In Device Manager, select the **Devices** tab.
2. In the devices table, select the rows of the devices you want to edit, then right-click in the selected row area and select **Edit <*number*> Devices** in the context menu. This opens the Device Configuration dialog.

   TIP: Use `Ctrl+Click` to select individual devices. Use `Shift+click` to select a block of devices.

3. In Device Configuration, update the configuration settings as needed.

   NOTE: Only those settings that are common to all selected devices can be configured at the same time.

4. Click **OK**.

To edit devices using configuration import:

1. In Device Manager, select the **Devices** tab.
2. Export the existing configuration in one of the following ways:
   a. To export the configuration for a single device:
      - In the devices table, select the row of the device for which you want to export the configuration, then right-click in the row and select **Export Device Configuration for Editing** in the context menu. This exports the configuration and saves it in CSV file format to your local Downloads folder.

   b. To export the configuration for multiple devices:
      - In the devices table, select the rows of the devices for which you want to export the configuration, then right-click in the selected row area and select **Export Configuration for <*number*> Devices for Editing** in the context menu. This exports the configuration and saves it in CSV file format to your local Downloads folder.

> **TIP**: Use `Ctrl+Click` to select individual devices, use `Shift+click` to select a block of devices.

c. To export the configuration for all devices:

   – Click **Options** in the top right corner of the Devices pane, and then click **Export Devices Configuration for Editing** in the options menu. This exports the configuration and saves it in CSV file format to your local Downloads folder.

3. Open the exported configuration file in a text editor and edit the configuration information for the devices as needed.

   > **NOTE**: Do not edit the content of the UniqueSystemId column.

4. Save the file in CSV format.
5. In Device Manager, click **Import**. This opens the import wizard.
6. Follow the steps in the import wizard to complete the configuration import.
7. Click **Finish** in the import wizard.

Related topics:

Devices

- Adding a device
- Editing a device
- Deleting a device
- Connecting or disconnecting an Ethernet device
- Enabling or disabling a device
- Viewing a device diagram

Sites

- Adding a site
- Editing a site
- Deleting a site
- Connecting or disconnecting a site
- Enabling or disabling a site

Network

- Exporting network configuration for use in a different system
- Importing network configuration from a different system

For reference information see:

- Device Manager
- Device Manager user interface
- Viewing system device license status

Deleting a device

Delete a device if it is no longer needed, for example if the device has been removed from service.

NOTE: When a device is deleted in Device Manager it is marked as Historical device in the system and removed from the default view of the devices table. All historical data associated with the deleted device remains in the system and is still available for analysis and reporting.

TIP: Adjust the filter options in the devices grid in Device Manager to see Historical devices in the system. See Device Manager user interface for details on the Devices filter.

To delete a device:

1. In Device Manager, select the **Devices** tab.
2. In the devices table, select the row of the device you want to delete, then right-click in the row and select **Delete Device** in the context menu. This opens the Delete Device confirmation dialog.
3. In the confirmation dialog box, click **OK** .

To delete multiple devices:

1. In Device Manager, select the **Devices** tab.
2. In the devices table, select the rows of the devices you want to delete, then right-click in the selected row area and select **Delete *<number>* Devices** in the context menu. This opens the Delete Device confirmation dialog.

   TIP: Use `Ctrl+Click` to select individual devices, use `Shift+click` to select a block of devices.

3. In the confirmation dialog box, click **OK** .

Related topics:

Devices

- Adding a device
- Editing a device
- Deleting a device
- Connecting or disconnecting an Ethernet device
- Enabling or disabling a device
- Viewing a device diagram

Sites

- Adding a site
- Editing a site
- Deleting a site

- Connecting or disconnecting a site
- Enabling or disabling a site

Network

- Exporting network configuration for use in a different system
- Importing network configuration from a different system

For reference information see:

- Device Manager
- Device Manager user interface
- Viewing system device license status

Connecting or disconnecting an Ethernet device

Disconnect an Ethernet device to temporarily remove it from the communication network, for example for system testing. Connect an Ethernet device, that was previously disconnected, to restore its communication network connection.

To connect a single Ethernet device:

1. In Device Manager, select the **Devices** tab.
2. In the devices table, select the row of the device you want to connect.
3. Right-click in the row and select **Connect Ethernet Device** in the context menu.

   TIP: Inspect the **Communication Status** column for the device in the devices table to confirm that the device is connected. Note that there can be a time delay until the communication status is updated in the table.

To connect multiple Ethernet devices:

1. In Device Manager, select the **Devices** tab.
2. In the devices table, select the rows of the devices you want to connect.

   TIP: Use `Ctrl+Click` to select individual devices, use `Shift+click` to select a block of devices.

3. Right-click in the selected row area and select **Connect <*number*> Ethernet Devices** in the context menu.

   TIP: Inspect the **Communication Status** column for the devices in the devices table to confirm that the devices are connected. Note that there can be a time delay until the communication status is updated in the table.

To disconnect a single Ethernet device:

1. In Device Manager, select the **Devices** tab.
2. In the devices table, select the row of the device you want to disconnect.
3. Right-click in the row and select **Disconnect Ethernet Device** in the context menu.

   TIP: Inspect the **Communication Status** column for the device in the devices table to confirm that the device is disconnected. Note that there can be a time delay until the communication status is updated in the table.

To disconnect multiple Ethernet devices:

1. In Device Manager, select the **Devices** tab.
2. In the devices table, select the rows of the devices you want to disconnect.

   TIP: Use `Ctrl+Click` to select individual devices, use `Shift+click` to select a block of devices.

3. Right-click in the selected row area and select **Disconnect <*number*> Ethernet Devices** in the context menu.

> **TIP**: Inspect the **Communication Status** column for the devices in the devices table to confirm that the devices are disconnected. Note that there can be a time delay until the communication status is updated in the table.

Related topics:

Devices

- Adding a device
- Editing a device
- Deleting a device
- Connecting or disconnecting an Ethernet device
- Enabling or disabling a device
- Viewing a device diagram

Sites

- Adding a site
- Editing a site
- Deleting a site
- Connecting or disconnecting a site
- Enabling or disabling a site

Network

- Exporting network configuration for use in a different system
- Importing network configuration from a different system

For reference information see:

- Device Manager
- Device Manager user interface
- Viewing system device license status

Enabling or disabling a device

Disable a device to remove it from the communication network. For example, disable a device that is out of service. Enable a device that was previously disabled to reconnect it to the communication network.

To enable a single device:

1. In Device Manager, select the **Devices** tab.
2. In the devices table, select the row of the device you want to enable.
3. Right-click in the row and select **Enable Device** in the context menu.

   TIP: Inspect the **Communication Status** column for the device in the devices table to confirm that the device is enabled. Note that there can be a time delay until the communication status is updated in the table.

To enable multiple devices:

1. In Device Manager, select the **Devices** tab.
2. In the devices table, select the rows of the devices you want to enable.

   TIP: Use `Ctrl+Click` to select individual devices, use `Shift+click` to select a block of devices.

3. Right-click in the selected row area and select **Enable *<number>* Devices** in the context menu.

   TIP: Inspect the **Communication Status** column for the devices in the devices table to confirm that the devices are enabled. Note that there can be a time delay until the communication status is updated in the table.

To disable a single device:

1. In Device Manager, select the **Devices** tab.
2. In the devices table, select the row of the device you want to disable.
3. Right-click in the row and select **Disable Device** in the context menu.

   TIP: Inspect the **Communication Status** column for the device in the devices table to confirm that the device is disabled. Note that there can be a time delay until the communication status is updated in the table.

To disable multiple devices:

1. In Device Manager, select the **Devices** tab.
2. In the devices table, select the rows of the devices you want to disable.

   TIP: Use `Ctrl+Click` to select individual devices, use `Shift+click` to select a block of devices.

3. Right-click in the selected row area and select **Disable <*number*> Devices** in the context menu.

   TIP: Inspect the **Communication Status** column for the devices in the devices table to confirm that the devices are disabled. Note that there can be a time delay until the communication status is updated in the table.

Related topics:

Devices

- Adding a device
- Editing a device
- Deleting a device
- Connecting or disconnecting an Ethernet device
- Enabling or disabling a device
- Viewing a device diagram

Sites

- Adding a site
- Editing a site
- Deleting a site
- Connecting or disconnecting a site
- Enabling or disabling a site

Network

- Exporting network configuration for use in a different system
- Importing network configuration from a different system

For reference information see:

- Device Manager
- Device Manager user interface
- Viewing system device license status

Viewing a device diagram

Device diagrams are device type specific diagrams in the Diagrams application that show historical and real-time data for a device. You can open a device diagram for a device directly from Device Manager.

NOTE: To see data in a diagram, the device must be connected to and communicating with PME.

To view a device diagram:

1. In Device Manager, select the **Devices** tab.
2. In the devices table, select the row of the device for which you want to open the diagram, then right-click in the row and select **View Device Diagram** in the context menu. This opens the device type specific diagram for this device in a new tab in your browser.

Related topics:

Devices

- Adding a device
- Editing a device
- Deleting a device
- Connecting or disconnecting an Ethernet device
- Enabling or disabling a device
- Viewing a device diagram

Sites

- Adding a site
- Editing a site
- Deleting a site
- Connecting or disconnecting a site
- Enabling or disabling a site

Network

- Exporting network configuration for use in a different system
- Importing network configuration from a different system

For reference information see:

- Device Manager
- Device Manager user interface
- Viewing system device license status

Adding a site

A site is a gateway to establish a connection between the software and a group of devices. Add sites to connect devices with serial communication or to connect OPC devices.

NOTE: You do not add sites for Ethernet devices. You add Ethernet devices directly to the system. See Adding a device for details. The software automatically sets up an internal site for each Ethernet device. These internal sites are not visible in Device Manager.

NOTE: You cannot add direct serial sites or modem sites with Device Manager. Use Management Console to add these sites.

You can add sites through the Device Manager user interface, one site at a time. You can also add one or more sites at the same time through importing site configuration information.

To add a site through the Device Manager user interface:

1. In Device Manager, select the **Sites** tab, and then click **Add Ethernet Gateway** or click the down arrow next to it to add an OPC site. This opens the New Site dialog.

   TIP: The right-click context menu for a site in the table has a **Duplicate Site** option to create a copy of an existing site.

2. In New Site, enter the required information such as name, IP address, and so on.

   TIP: Click **Show Advanced** to access advanced configuration settings. These settings have factory defaults and only need to be changed for specific application needs.

3. (Optional) Enter **Description** information.
4. Click **OK**.

To add one or more sites through configuration import:

1. In Device Manager, click **Import**. This opens the Import Devices and Sites dialog.
2. In Import Devices and Sites, download the configuration import template CSV file.
3. Open the downloaded configuration import template in a text editor and add the configuration information for the sites you want to add.
4. Save the file in CSV format.
5. Return to the Device Manager Import Devices and Sites dialog and click **Next**.
6. Click **Upload Files**. This opens the Upload new files dialog.
7. In Upload new files, click **Choose Files** and find the configuration import template CSV file. Click **Open**. Click **Finish**.

   TIP: You can also drag and drop the configuration import file into the designated area in Upload new files.

8. Follow the steps in the import wizard to complete the configuration import.
9. Click **Finish** in the import wizard.

Related topics:

Devices

- Adding a device
- Editing a device
- Deleting a device
- Connecting or disconnecting an Ethernet device
- Enabling or disabling a device
- Viewing a device diagram

Sites

- Adding a site
- Editing a site
- Deleting a site
- Connecting or disconnecting a site
- Enabling or disabling a site

Network

- Exporting network configuration for use in a different system
- Importing network configuration from a different system

For reference information see:

- Device Manager
- Device Manager user interface
- Viewing system device license status

Editing a site

Edit a site to update its name or to change its configuration settings. You can edit sites through the Device Manager user interface or through exporting, editing, and then re-importing the site configuration.

To edit a single site through the Device Manager user interface:

1. In Device Manager, select the **Sites** tab.
2. In the sites table, select the row of the site you want to edit, then right-click in the row and select **Edit Site** in the context menu. This opens the Site Configuration dialog.

   TIP: You can also double-click a row to open the Site Configuration dialog.

3. In Site Configuration, update the configuration settings as needed.
4. Click **OK**.

To edit multiple sites through the Device Manager user interface:

1. In Device Manager, select the **Sites** tab.
2. In the sites table, select the rows of the sites you want to edit, then right-click in the selected row area and select **Edit *<number>* Sites** in the context menu. This opens the Site Configuration dialog.

   TIP: Use `Ctrl+Click` to select individual sites, use `Shift+click` to select a block of sites.

3. In Site Configuration, update the configuration settings as needed.

   NOTE: Only those settings that are common to all selected sites can be configured at the same time.

4. Click **OK**.

To edit sites through configuration import:

1. In Device Manager, select the **Sites** tab.
2. Export the existing configuration in one of the following ways:
   a. To export the configuration for a single site:
      - In the sites table, select the row of the site for which you want to export the configuration, then right-click in the row and select **Export Site Configuration for Editing** in the context menu. This exports the configuration and saves it in CSV file format to your local Downloads folder.

   b. To export the configuration for multiple sites:
      - In the sites table, select the rows of the sites for which you want to export the configuration, then right-click in the selected row area and select **Export Configuration for *<number>* Sites for Editing** in the context menu. This exports the configuration and saves it in CSV file format to your local Downloads folder.

> **TIP**: Use `Ctrl+Click` to select individual sites, use `Shift+click` to select a block of sites.

c. To export the configuration for all sites:

   – Click **Options** in the top right corner of the Sites pane, and then click **Export Sites Configuration for Editing** in the options menu. This exports the configuration and saves it in CSV file format to your local Downloads folder.

3. Open the exported configuration file in a text editor and edit the configuration information for the sites as needed.

   > **NOTE**: Do not edit the content of the UniqueSystemId column.

4. Save the file in CSV format.
5. In Device Manager, click **Import**. This opens the import wizard.
6. Follow the steps in the import wizard to complete the configuration import.
7. Click **Finish** in the import wizard.

Related topics:

Devices

- Adding a device
- Editing a device
- Deleting a device
- Connecting or disconnecting an Ethernet device
- Enabling or disabling a device
- Viewing a device diagram

Sites

- Adding a site
- Editing a site
- Deleting a site
- Connecting or disconnecting a site
- Enabling or disabling a site

Network

- Exporting network configuration for use in a different system
- Importing network configuration from a different system

For reference information see:

- Device Manager
- Device Manager user interface
- Viewing system device license status

Deleting a site

Delete a site if this site is no longer needed, for example if all the devices connected to the site have been removed from service.

To delete a site:

1. In Device Manager, select the **Sites** tab.
2. In the sites table, select the row of the site you want to delete, then right-click in the row and select **Delete Site** in the context menu. This opens the Delete Site confirmation dialog.
3. In the confirmation dialog box, click **OK** .

To delete multiple sites:

1. In Device Manager, select the **Sites** tab.
2. In the sites table, select the rows of the sites you want to delete, then right-click in the selected row area and select **Delete *<number>* Sites** in the context menu. This opens the Delete Site confirmation dialog.

   TIP: Use `Ctrl+Click` to select individual sites, use `Shift+click` to select a block of sites.

3. In the confirmation dialog box, click **OK** .

Related topics:

Devices

- Adding a device
- Editing a device
- Deleting a device
- Connecting or disconnecting an Ethernet device
- Enabling or disabling a device
- Viewing a device diagram

Sites

- Adding a site
- Editing a site
- Deleting a site
- Connecting or disconnecting a site
- Enabling or disabling a site

Network

- Exporting network configuration for use in a different system
- Importing network configuration from a different system

For reference information see:

- Device Manager
- Device Manager user interface
- Viewing system device license status

Connecting or disconnecting a site

Disconnect a site to temporarily remove the devices on this site from the communication network, for example for system testing. Connect a site, that was previously disconnected, to reestablish its communication network connection.

To connect a single site:

1. In Device Manager, select the **Sites** tab.
2. In the sites table, select the row of the site you want to connect.
3. Right-click in the row and select **Connect Site** in the context menu.

   TIP: Inspect the **Communication Status** column for the site in the sites table to confirm that the site is connected. Note that there can be a time delay until the communication status is updated in the table.

To connect multiple sites:

1. In Device Manager, select the **Sites** tab.
2. In the sites table, select the rows of the sites you want to connect.

   TIP: Use `Ctrl+Click` to select individual sites, use `Shift+click` to select a block of sites.

3. Right-click in the selected row area and select **Connect <*number*> Sites** in the context menu.

   TIP: Inspect the **Communication Status** column for the sites in the sites table to confirm that the sites are connected. Note that there can be a time delay until the communication status is updated in the table.

To disconnect a single site:

1. In Device Manager, select the **Sites** tab.
2. In the sites table, select the row of the site you want to disconnect.
3. Right-click in the row and select **Disconnect Site** in the context menu.

   TIP: Inspect the **Communication Status** column for the site in the sites table to confirm that the site is disconnected. Note that there can be a time delay until the communication status is updated in the table.

To disconnect multiple sites:

1. In Device Manager, select the **Sites** tab.
2. In the sites table, select the rows of the sites you want to disconnect.

   TIP: Use `Ctrl+Click` to select individual sites, use `Shift+click` to select a block of sites.

3. Right-click in the selected row area and select **Disconnect *<number>* Sites** in the context menu.

   TIP: Inspect the **Communication Status** column for the sites in the sites table to confirm that the sites are disconnected. Note that there can be a time delay until the communication status is updated in the table.

Related topics:

Devices

- Adding a device
- Editing a device
- Deleting a device
- Connecting or disconnecting an Ethernet device
- Enabling or disabling a device
- Viewing a device diagram

Sites

- Adding a site
- Editing a site
- Deleting a site
- Connecting or disconnecting a site
- Enabling or disabling a site

Network

- Exporting network configuration for use in a different system
- Importing network configuration from a different system

For reference information see:

- Device Manager
- Device Manager user interface
- Viewing system device license status

Enabling or disabling a site

Disable a site to remove this site from the communication network, for example if the devices on this site are out of service for a longer period of time. Enable a site, that was previously disabled, to reestablish its communication network connection.

To enable a single site:

1. In Device Manager, select the **Sites** tab.
2. In the sites table, select the row of the site you want to enable.
3. Right-click in the row and select **Enable Site** in the context menu.

   TIP: Inspect the **Communication Status** column for the site in the sites table to confirm that the site is enabled. Note that there can be a time delay until the communication status is updated in the table.

To enable multiple sites:

1. In Device Manager, select the **Sites** tab.
2. In the sites table, select the rows of the sites you want to enable.

   TIP: Use `Ctrl+Click` to select individual sites, use `Shift+click` to select a block of sites.

3. Right-click in the selected row area and select **Enable *<number>* Sites** in the context menu.

   TIP: Inspect the **Communication Status** column for the sites in the sites table to confirm that the sites are enabled. Note that there can be a time delay until the communication status is updated in the table.

To disable a single site:

1. In Device Manager, select the **Sites** tab.
2. In the sites table, select the row of the site you want to disable.
3. Right-click in the row and select **Disable Site** in the context menu.

   TIP: Inspect the **Communication Status** column for the site in the sites table to confirm that the site is disabled. Note that there can be a time delay until the communication status is updated in the table.

To disable multiple sites:

1. In Device Manager, select the **Sites** tab.
2. In the sites table, select the rows of the sites you want to disable.

   TIP: Use `Ctrl+Click` to select individual sites, use `Shift+click` to select a block of sites.

3. Right-click in the selected row area and select **Disable <*number*> Sites** in the context menu.

> **TIP**: Inspect the **Communication Status** column for the sites in the sites table to confirm that the sites are disabled. Note that there can be a time delay until the communication status is updated in the table.

Related topics:

Devices

- Adding a device
- Editing a device
- Deleting a device
- Connecting or disconnecting an Ethernet device
- Enabling or disabling a device
- Viewing a device diagram

Sites

- Adding a site
- Editing a site
- Deleting a site
- Connecting or disconnecting a site
- Enabling or disabling a site

Network

- Exporting network configuration for use in a different system
- Importing network configuration from a different system

For reference information see:

- Device Manager
- Device Manager user interface
- Viewing system device license status

Exporting network configuration for use in a different system

Export the device and site configuration of a system for importing into another system. For example, configure the sites and devices in a test system and then export this configuration for use in a production system.

NOTE: You cannot import the configuration back into the same system from which it was exported.

To export the network configuration for use in a different system:

1. In Device Manager, select the **Devices** or the **Sites** tab.
2. Click **Options** in the top right corner of the display pane, and then click **Export Network Configuration for Use in a Different System** in the options menu. This exports the configuration and saves it in CSV file format to your local Downloads folder.
3. Transfer the exported configuration file to the target system.
4. Import the configuration file into the target system. See Importing network configuration from a different system for details.

NOTE: Keep the configuration file secure during and after the transfer to prevent unauthorized access.

⚠ WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

Use cybersecurity best practices to help prevent unauthorized access to the software.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

Work with facility IT System Administrators to ensure that the system adheres to the site-specific cybersecurity policies.

Related topics:

Devices

- Adding a device
- Editing a device
- Deleting a device
- Connecting or disconnecting an Ethernet device
- Enabling or disabling a device
- Viewing a device diagram

Sites

- Adding a site
- Editing a site

- Deleting a site
- Connecting or disconnecting a site
- Enabling or disabling a site

Network

- Exporting network configuration for use in a different system
- Importing network configuration from a different system

For reference information see:

- Device Manager
- Device Manager user interface
- Viewing system device license status

Importing network configuration from a different system

Import the device and site configuration that was exported from another system. For example, to create a copy of an existing system or to transfer the configuration from a test system into a production system. You can also import the configuration from configuration tools, such as ION Setup.

NOTE: You cannot import the configuration back into the same system from which it was exported.

To import the network configuration from a different system:

1. In Device Manager, click **Import**. This opens the import wizard.
2. Follow the steps in the import wizard. Select the configuration file from the other system when prompted by the wizard to upload the import file.
3. Complete the configuration import in the import wizard.
4. Click **Finish** in the import wizard.

Related topics:

Devices

- Adding a device
- Editing a device
- Deleting a device
- Connecting or disconnecting an Ethernet device
- Enabling or disabling a device
- Viewing a device diagram

Sites

- Adding a site
- Editing a site
- Deleting a site
- Connecting or disconnecting a site
- Enabling or disabling a site

Network

- Exporting network configuration for use in a different system
- Importing network configuration from a different system

For reference information see:

- Device Manager
- Device Manager user interface
- Viewing system device license status

Viewing system device license status

View device license status to verify that the required device licenses are activated in your system. For example, confirm that enough free licenses are available before adding a number of new devices to the system.

NOTICE
LOSS OF COMMUNICATION • Activate product and component licenses prior to the expiry of the trial license. • Activate sufficient licenses for the servers and devices in your system. **Failure to follow these instructions can result in loss of data.**

To view system device license status:

1. In Device Manager, select the **Devices** tab.
2. Click **Options** in the top right corner of the display pane, and then click **View Device Licenses** in the options menu. This opens the Device License Information dialog.

Related topics:

Devices

- Adding a device
- Editing a device
- Deleting a device
- Connecting or disconnecting an Ethernet device
- Enabling or disabling a device
- Viewing a device diagram

Sites

- Adding a site
- Editing a site
- Deleting a site
- Connecting or disconnecting a site
- Enabling or disabling a site

Network

- Exporting network configuration for use in a different system
- Importing network configuration from a different system

For reference information see:

- Device Manager
- Device Manager user interface

- Viewing system device license status

Device Type Editor

TIP: You can open Device Type Editor in the Management Console from the **Tools > System > Device Type Editor** link.

NOTE: The Device Type Editor replaces the Modbus Device Importer (MDI) tool that was available in older versions of the software.

Use the Device Type Editor to create device drivers for Modbus and OPC devices, in Power Monitoring Expert, for which pre-configured drivers or downloadable add-on drivers do not exist . You can also edit existing Modbus and OPC device drivers with the Device Type Editor.

Device drivers are called Device Types in Power Monitoring Expert.

NOTE: Before creating a new device type with the Device Type Editor, check if it is available as a pre-configured device type or as a downloadable add-on.

NOTE: The device types you can create with the Device Type Editor are limited to reading numeric and Boolean data from the device, and writing simple 16-bit values to the device. These device types cannot access complex data such as historical logs, event logs, or waveform captures.

NOTE: Drivers created with the Device Type Editor require mid-range (M) type device licenses.

⚠ WARNING

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Do not use the software to control time-critical functions.
- Do not use the software to control remote equipment without proper access control and status feedback.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

For information on how to use the Device Type Editor to create device types, see:

For Modbus

- Creating a Modbus Device Type
- Editing a Modbus Device Type
- Adding Software Logging to a Modbus Device Type
- Installing a Device Type on the System

For OPC

- Creating an OPC Device Type
- Editing an OPC Device Type
- Installing a Device Type on the System

For reference information see:

- Device Type Editor User Interface
- Configuring Logging and Calculation User Interface
- Modbus Data Formats
- Modbus Register Properties
- Measurement Tree
- OPC Tags
- Default device type support

Creating a Modbus Device Type

A Modbus device type translates between the register based data structure on the Modbus device and the ION based data structure in Power Monitoring Expert.

When you create the device type with the Device Type Editor, you first define the Modbus registers that you want to access on the device, and then you map these registers to ION managers, modules, and registers. You can enter the Modbus register information manually in the Device Type Editor user interface, or use Microsoft Excel to define the register list and then copy and paste it into the Device Type Editor. The mapping of Modbus to ION registers is done by dragging Modbus registers onto ION registers, or the reverse, using the mouse pointer.

Prerequisites

To create a device type for a device, you need to know the details of its Modbus register map. At a minimum, you need the Modbus addresses, data formats, and possible scaling values for the measurements you want to access on the device. You can get this information from the device documentation or the device manufacturer.

NOTE: Before creating a new device type with the Device Type Editor, check if it is available as a pre-configured device type or as a downloadable add-on.

References

See the following references for information on how to use the Device Type Editor or information related to Modbus register definitions:

- Device Type Editor User Interface
- Configuring Logging and Calculation User Interface
- Modbus Data Formats
- Modbus Register Properties
- Measurement Tree

To create a Modbus device type:

1. In Device Type Editor, click **File > New > Modbus Device Type** to open a New Mapping template.
2. Enter the Modbus register information into the Modbus Map table in the right display pane, in one of two ways:
   - Add each Modbus register manually in the Device Type Editor, using the available editing controls (right-click to open the context menu).
   - Use Microsoft Excel to define the register list, copy it, and paste it into the Modbus Map table.

     NOTE: The register list columns in the Excel sheet must match the column content and positions in the Device Type Editor Modbus Map table. Confirm that the format entries match one of the supported Modbus Data Formats and that there are no spelling mistakes, such as added space characters or different capitalization.
3. Map each Modbus register in the Modbus Map to a measurement in the Measurement Tree in the left pane. To see the measurements in the tree, expand the managers and modules, for example Current > Phase Current > Current A,B,C, ... Map the registers in one of two ways:
   - Using the mouse, drag the measurement you want to map in the Measurement Tree onto the corresponding measurement in the Modbus Map.
   - Using the mouse, drag the Modbus register you want to map in the Modbus Map onto the corresponding measurement in the Measurement Tree.

   NOTE: If you cannot find a suitable measurement in the Measurement Tree, add a new manager, module, and register to represent this measurement. To do this, right-click any of the existing managers in the Measurement Tree and choose the appropriate menu options.
4. Configure the device type name and template name.
   a. In the Measurement Tree, click **Factory Information > Factory 1 > FAC1 Device Type** to open the String Register Details dialog for this register. In String Register Details, enter a device type name in the **Value** box. This name will be visible in the Management Console when you select a device type for a new device. Choose a name that identifies the device, but does not match any of the existing device types.

Example: For a device called "PM123", you could use a device type name of "DTE_PM123". The device type name does not have to include DTE, but it is a good practice to choose a string that identifies this device type as a DTE type.

b. In the Measurement Tree, click **Factory Information > Factory 1 > FAC1 Template** to open the String Register Details dialog for this register. In String Register Details, enter a template name in the **Value** box. This name is used to match your new device type with a default Vista diagram, if you choose to create such a diagram. The template name should include the device type name followed by a version number that represents the version of your new device type.

   Example: For a device type called "DTE_PM123", you could use a template name of "DTE_PM123_V1.0.0".

5. (Optional) Click **Tools > Clean Measurement Tree** to remove any Measurement Tree elements that have not been mapped to Modbus registers. This makes it easier to find the relevant measurements in the Measurement Tree in Vista or OPC clients for example.
6. Click **File > Save**, to save the new device type.

Related topics

- Creating a Modbus Device Type
- Editing a Modbus Device Type
- Adding Software Logging to a Modbus Device Type
- Installing a Device Type on the System

Editing a Modbus Device Type

You can use the Device Type Editor to modify existing Modbus device types. This includes your own, as well as factory types, which means pre-configured and downloadable add-on device types. The factory device types have been designed and tested for compatibility with the devices and the Power Monitoring Expert software. If you see a need to modify a factory device type, save the modified type under a new name that does not match any of the factory device type names. This ensures that you can identify this type as custom and it prevents it from being overwritten during a system upgrade.

References

See the following references for information on how to use the Device Type Editor or information related to Modbus register definitions:

- Device Type Editor User Interface
- Configuring Logging and Calculation User Interface
- Modbus Data Formats
- Modbus Register Properties
- Measurement Tree

To edit a Modbus device type:

1. In Device Type Editor, click **File > Open**, find and select the device type you want to edit, and click **Open**.
2. Modify the Modbus Map registers, the Measurement Tree mappings, or the software logging to meet your needs.

   See Creating a Modbus Device Type for details on how to perform these tasks.
3. Click **File > Save**, to save the modified device type under the same name. Click **File > Save As**, to save the modified device type under a new name.

Related topics

- Creating a Modbus Device Type
- Editing a Modbus Device Type
- Adding Software Logging to a Modbus Device Type
- Installing a Device Type on the System

Adding Software Logging to a Modbus Device Type

The Modbus device types you create with the Device Type Editor are limited to reading numeric and Boolean data from the device. These device types cannot access complex data such as historical logs, event logs, or waveform captures. However, it is possible to automatically log the measured values in Power Monitoring Expert after they are read from the device. In addition to logging the measured values, Power Monitoring Expert can also calculate and log average, low, and high values for these measurements.

NOTE: The data logs are timestamped with the date and time at which the software logs the value, not the date and time the measurement was taken on the device. Device communications and system delays determine the time delay between when the measurement is taken by the device and when it is logged by the software.

To add software logging:

1. In Device Type Editor, open the Modbus device type for which you want to add logging.
2. Click **Tools > Configure Software Logging** to open the Configure Logging and Calculation dialog.
3. In Configure Logging and Calculation, select the measurements you want to log and calculate, and set the logging intervals.

   NOTE: Only numeric output registers can be calculated and logged. All other types of registers (for example, enumerated) do not appear on the Configure Logging and Calculation screen.

   See Configuring Logging and Calculation User Interface for information on the controls and options available in the user interface.
4. Click **OK** to save the changes.

Related topics

- Creating a Modbus Device Type
- Editing a Modbus Device Type
- Adding Software Logging to a Modbus Device Type
- Installing a Device Type on the System

Creating an OPC Device Type

An OPC device type translates between the tag based data structure on the OPC server and the ION based data structure in Power Monitoring Expert.

When you create the device type with the Device Type Editor, you first define the OPC tags that you want to access on the server, and then you map these tags to ION managers, modules, and registers. You can enter the OPC tag information manually in the Device Type Editor user interface, or use Microsoft Excel to define the tag list and then copy and paste it into the Device Type Editor. The mapping of OPC tags to ION registers is done by dragging tags onto ION registers, or the reverse, using the mouse pointer.

NOTE: The software logging of values is not available for OPC device types.

Prerequisites

To create a device type for an OPC server, you need to know the details of its tag list. You can get this information from the OPC server documentation or the OPC server vendor. You can also get the tag list by browsing the OPC server with an OPC client such as the OPC Test Client we ship with PME. You can find the OPC Test Client, `OpcTestClient.exe`, in `...\Power Monitoring Expert\system\bin\`

References

See the following references for information on how to use the Device Type Editor or information related to OPC tag definitions:

- Device Type Editor User Interface
- Measurement Tree
- OPC Tags

To create an OPC device type:

1. In Device Type Editor, click **File > New > OPC Device Type** to open a New Mapping template.
2. Enter the OPC tag information into the OPC Map table in the right display pane, in one of two ways:
   - Add each tag manually in the Device Type Editor, using the available editing controls.
   - Use Microsoft Excel to define the tag list, copy it, and paste it into the OPC Map table.

     NOTE: The tag list columns in the Excel sheet must match the column content and positions in the Device Type Editor OPC Map table. .

NOTE: When entering a tag, only specify the tag name, with a leading period (.), do not include the OPC server or device name. For example, for the tag `Opcda://Server/OpcDa.1.Channel_1.Powers.Real_Power` enter `.Powers.Real_Power` as the tag name in the OPC Map.

3. Map each OPC tag in the OPC Map to a measurement in the Measurement Tree in the left pane. To see the measurements in the tree, expand the managers and modules, for example Current > Phase Current > Current A,B,C, ... Map the tags in one of two ways:
   - Using the mouse, drag the measurement you want to map in the Measurement Tree onto the corresponding tag in the OPC Map.
   - Using the mouse, drag the OPC tag you want to map in the Modbus OPC Map onto the corresponding measurement in the Measurement Tree.

NOTE: If you cannot find a suitable measurement in the Measurement Tree, add a new manager, module, and register to represent this measurement. To do this, right-click any of the existing managers in the Measurement Tree and choose the appropriate menu options.

4. Configure the device type name and template name.
   a. In the Measurement Tree, click **Factory Information > Factory 1 > FAC1 Device Type** to open the String Register Details dialog for this register. In String Register Details, enter a device type name in the **Value** box. This name will be visible in the Management Console when you select a device type for a new device. Choose a name that identifies the OPC server, but does not match any of the existing device types.

      Example: Use "OPC_ABC" as the device type name, where ABC identifies the server.

   b. In the Measurement Tree, click **Factory Information > Factory 1 > FAC1 Template** to open the String Register Details dialog for this register. In Edit String Register, enter a template name in the **Value** box. This name is used to match your new device type with a default Vista diagram, if you choose to create such a diagram. The template name should include the device type name followed by a version number that represents the version of your new device type.

      Example: For a device type called "OPC_ABC", you could use a template name of "OPC_ABC_V1.0.0".

5. (Optional) Click **Tools > Clean Measurement Tree** to remove any Measurement Tree elements that have not been mapped to OPC tags. This makes it easier to find the relevant measurements in the Measurement Tree in Vista or an OPC client for example.
6. Click **File > Save**, to save the new device type.

Related topics

- Creating an OPC Device Type
- Editing an OPC Device Type
- Installing a Device Type on the System

Editing an OPC Device Type

You can use the Device Type Editor to modify existing OPC device types.

References

See the following references for information on how to use the Device Type Editor or information related to OPC tag definitions:

- Device Type Editor User Interface
- Measurement Tree
- OPC Tags

To edit an OPC device type:

1. In Device Type Editor, click **File > Open**, find and select the device type you want to edit, and click **Open**.
2. Modify the OPC tags or the Measurement Tree mappings to meet your needs.

   See Creating an OPC Device Type for details on how to perform these tasks.
3. Click **File > Save**, to save the modified device type under the same name. Click **File > Save As**, to save the modified device type under a new name.

Related topics

- Creating an OPC Device Type
- Editing an OPC Device Type
- Installing a Device Type on the System

Installing a Device Type on the System

Before a device type can be used by Power Monitoring Expert to communicate with a device, it must be installed on the system. Follow the steps below to install a new device type or a modified device type.

To install a new or modified device type:

1. In Device Type Editor, click **Tools > Install Device Type**, to open the Device Type Installer.
2. In Device Type Installer, specify the device type you want to install.

   (Optional) Specify a diagram and icon to be used for this device type in the Vista and Diagrams applications if you want to use the default diagram feature.

   (Optional) Specify a measurement extension file for exposing the device measurements through the OPC server, if desired.
3. Check the Device Type Name and Template. If you need to make changes, exit the Device Type Installer, open the device type for editing in the Device Type Editor and correct the names, then run the installer again.
4. Select the **Protocol** for your device type, **Modbus** or **OPC**.

   (Optional) Select **Ethernet Support** if the device has Ethernet communication capabilities.
5. Click **Install Device Type**, to install the device type on the system.

Related topics

- Creating a Modbus Device Type
- Editing a Modbus Device Type
- Adding Software Logging to a Modbus Device Type
- Creating an OPC Device Type
- Editing an OPC Device Type
- Installing a Device Type on the System

Downstream Device Assistant

Downstream Device Assistant lets you manage downstream devices. With this tool, you can rename downstream sources, change which measurement is associated with specific data from a source, and apply these changes to previously recorded data in ION_Data (historical database). You can also display and manage all the physical sources (devices) in your network.

Downstream Device Assistant is an advanced application and should only be used by users with advanced technical skills and a clear understanding of how data is interpreted and stored in the Power Monitoring Expert databases.

⚠ CAUTION

INACCURATE DATA RESULTS

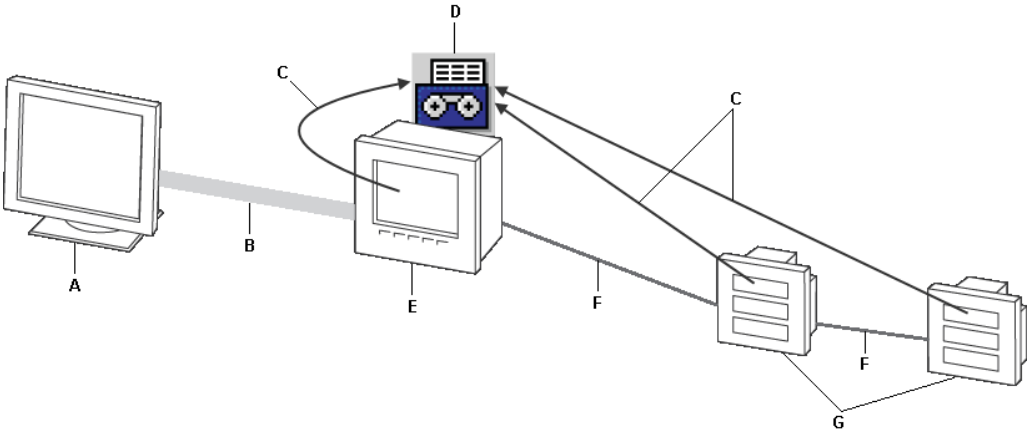
- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.

Failure to follow these instructions can result in injury or equipment damage.

Detecting downstream devices

A downstream device is one whose data is logged by a remote data recorder, for example:

- A Modbus slave device whose output registers are logged by a device with Modbus Mastering capability (see illustration below).
- Any of various multiple sources in which the same measurement is being logged on a single device, for example, an RTU that is collecting kWh pulses from multiple sources or a single branch circuit monitor that is collecting current readings on multiple circuits.



A	Power Monitoring Expert server	B	Ethernet	C	kW	D	Data Recorder
E	Physical source (Modbus Master)	F	RS-485	G	Downstream Devices (Modbus Slaves)		

Power Monitoring Expert automatically detects downstream devices. The Log Inserter component does this by looking for devices (called “physical sources”) that record or host data coming from various downstream devices (for example, an ION meter that utilizes a Modbus Import module to pass through data originating from a “downstream” Modbus device).

Log Inserter resolves the data from each of these downstream devices to the appropriate measurement (for example, the label “Vll ab” resolves to the measurement “Voltage Phases AB”). For data that cannot be resolved, Log Inserter creates measurements whose names are based on the ION register labels.

Log Inserter uses a logical naming scheme to assign names to the downstream devices. For example, “Modbus.34” is the name assigned to the downstream Modbus device with a slave address “34”.

Downstream Device Assistant basics

Use Downstream Device Assistant to edit the names assigned to downstream devices or to assign the correct measurement label for a register that has an incorrect measurement mapping.

IMPORTANT: Before using the Downstream Device Assistant, make sure you save a copy of the ION_Network and ION_Data databases, in case you need to revert to the original configuration of these databases.

Starting the Downstream Device Assistant

1. Run the program named “DownstreamDevices.DownstreamAssistant.exe” in the ...\Power Monitoring Expert\system\bin folder.
2. Log in using your Power Monitoring Expert credentials.

   A message displays to remind you to back up your ION_Network and ION_Data databases. Click **OK** to continue.
3. Downstream Device Assistant opens in Basic view or Advanced view, depending on the last view it was in before it was closed. The first time Downstream Device Assistant is started, it opens in Basic view.

Basic view versus Advanced view

The view determines what columns are available as well as whether an action is global (applied to all rows containing a parameter) or specific to a row.

Columns descriptions

Columns in Both Basic and Advanced View	
Column Name	**Description**
IsDownstream[1]	The **IsDownstream** column identifies which devices in the **Assigned Source** column are downstream devices. If **IsDownstream** is selected, it means that the device identified in the **Assigned Source** column is downstream to a physical device, whose name is indicated in the **Physical Source** column. If **IsDownstream** is cleared, this indicates that the device is a physical source. Note also that a physical source has the same **Assigned Source** name and **Physical Source** name, by default.
Assigned Source	This is the default name that Log Inserter assigned to a downstream or physical device. For example, “Modbus.109:MainFeed.PM7650” is the default name assigned for the downstream Modbus device with unit ID “109”, whose measurements are being logged to a data recorder on a Modbus Master device named “PM7650” that is part of the “MainFeed” site (group).
Updated Assigned Source	This text field allows you change the current name under **Assigned Source**. In Basic view, all rows that contain the same **Assigned Source** name are automatically updated to the new name when you enter it in the **Updated Assigned Source** column. In Advanced view, you can select one or more rows and rename the source using the **Updated Assigned Source** column, while leaving the other rows unchanged. See Renaming the assigned source for more details.
Physical Source[2]	This identifies the name of the physical device, for example a Modbus Master device, that is performing the data logging for a downstream device.
Measurement	This column displays either the ION label (for example, “VIn avg”) or the descriptive name of the measurement (for example, “Average Voltage Line-to-Neutral”), depending on the setting in the Options dialog; see Downstream Device Assistant options.
Additional Columns in Advanced View	
Updated Measurement	This lets you redefine what is currently assigned in the Measurement column. Click the cell to display the list of measurements to choose from. Depending on the setting in the Options dialog, you can select from a list containing only the most common measurement definitions or from a list of all available measurements; see Downstream Device Assistant options.

Columns in Both Basic and Advanced View	
Handle	This column displays a measurement's register handle either in hexadecimal format or decimal format, depending on the setting in the Options dialog; see Downstream Device Assistant options.
Entered By	This identifies which user made a change to the source-measurement definition.
Update Historical Database	The **Update Historical Database** check box is automatically selected after entering changes in the **Updated Assigned Source** or **Updated Measurement** cell. This means that all historical database entries that contain the old **Assigned Source** name or **Measurement** will be updated with the new name or measurement. If you want to leave the existing data in the database unchanged, clear the **Update Historical Database** check box before saving the changes.
Manual (see the Note below)	By default, Log Inserter automatically associates the proper measurement to the appropriate piece of data in the data log. Normally, the **Manual** check box should remain cleared. However, if you want to specifically change the measurement or register handle associated with a particular address definition, select the **Manual** check box for that measurement. This manually overrides Log Inserter so that it uses this new address mapping from now on (i.e., Log Inserter does not attempt to resolve that address ever again).

[1] Do not change the value of "IsDownstream" when making changes to source/measurement definitions, as it is automatically set by the Downstream Device Assistant
[2] Do not use the Physical Source column to modify the existing name of a valid physical device, as Log Inserter uses this name to perform proper data logging.

NOTE: It is **not** recommended that you select the Manual check box. This reserves the ION register for which Manual is checked for the selected measurement. This mapping remains in place even if the device is reconfigured such that this register is used in an entirely different context. This may cause unexpected problems in the ION_Data database. It should be used only if you are certain that the configuration you have chosen will not change.

Basic view

To switch to Basic view, click **View > Options**. In the **Advanced** section of the **Options** dialog, clear the **enable advanced features** check box. Click **OK**.

In Basic view, when you enter a new name in the **Updated Assigned Source** column, all rows that contain the same **Assigned Source** name are automatically filled in with the new name. Existing data in the historical database (ION_Data) is also automatically updated to reflect the change.

Advanced view

To switch to Advanced view, click **View > Options**. In the **Advanced** section of the Options dialog, select the **enable advanced features** check box. Click **OK**.

In addition to the columns displayed in Basic view, Advanced view displays all the other columns for editing individual source-measurement definitions (i.e., Updated Measurement, Handle, Entered By, Update Historical Database, and Manual). In Advanced view, you can:

- Select and make changes to a specific row without affecting the other rows. For example, you may want to change the source name for one particular measurement while leaving the original source name unchanged for all the other measurements.
- Select a different measurement for one that is incorrectly mapped to a particular register handle.
- Select whether or not to update historical data for a changed source name or measurement definition, by selecting or clearing the **Update Historical Data** check box, respectively. Changing a name or definition automatically selects this check box.
- Select whether or not to allow Log Inserter to resolve the register handle to a particular source measurement, by clearing or selecting the **Manual** check box, respectively. The default setting is cleared (i.e., Log Inserter automatically resolves the register handle to the source measurement definition). If you want to force the change so Log Inserter does not resolve the handle to the new measurement, select the **Manual** check box.

Displaying physical sources

The default view for Downstream Device Assistant displays only the downstream devices. To display the physical sources as well:

1. Click **View > Select Physical Sources**.
2. Select the check box beside the physical sources you want to display. Select the **Select/Clear All** check box to select all physical sources or clear it to select none. Click **OK**.

NOTE: The Physical Sources are not displayed if you restart Downstream Device Assistant. By default, only downstream devices are displayed when Downstream Device Assistant is started.

Sorting data

Click a column heading to sort the row entries in ascending or descending alphanumeric order, according to that column.

Downstream Device Assistant options

Click **View > Options** to open the **Options** dialog. The dialog contains Measurements, Historical Data, and Advanced options.

Certain options such as “show all measurements” and the “Handles” display options are disabled in Basic View. To enable them, switch to Advanced View first (see Advanced).

Measurements

This section allows you to select whether to display the default ION label (for example, “Vln avg”) in the Measurement column or to display the full descriptive name of the measurement (for example, “Average Voltage Line-to-Neutral”).

In Advanced view only, you can also select whether to display all available measurements or only the most common measurements in the list when picking a measurement in the Updated Measurement column.

Displaying ION labels versus measurement names

To change the setting:

1. Click **View > Options**.
2. In the Measurements section, select **display ION labels** to display the ION label or **display measurement names** to display the full name of the measurement.

NOTE: In some situations, if "display ION labels" is selected, the displayed label may not match the label on your meter (for example, if a custom label was used). Instead, it displays the known default label for that particular measurement.

Updated Measurement column display

To change the setting:

1. Click **View > Options** and ensure Advanced is selected.
2. In the Measurements section, select **show all measurements** to display all available measurements in the **Updated Measurement** column. To display only the most common measurements, clear **show all measurements**.

Historical data

If the **show connection dialog** check box is cleared, the ION_Data database is automatically set as the “Default Connection” (for historical data).

If you want to select a different database, select the **show connection** dialog. With this setting enabled, the database connection dialog is displayed every time you save your changes. When the dialog opens, select **Custom Connection** and specify your database connection details.

Advanced

The **enable advanced features** check box sets the view to Basic View if it is cleared or Advanced View if it is selected.

Handle

Available in Advanced View only, this option specifies whether register handles are displayed as the hexadecimal value (with the “0x” prefix) or as the decimal value.

To change the setting:

1. Click **View > Options** and ensure the Advanced is selected.
2. In the Handles section, select **display hex** to display the register handle in hexadecimal format or **display decimal** to display it in decimal format.

If you want to manually resolve a register handle to a specific measurement, edit the value in the **Handle** cell, then select the **Manual** check box before saving the changes.

Downstream Device Assistant functions

This section describes different functions you can perform using the Downstream Device Assistant.

⚠ CAUTION

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.

Failure to follow these instructions can result in injury or equipment damage.

Renaming the assigned source

One of the primary reasons for using the Downstream Device Assistant is to change the default name assigned to a downstream device by the Log Inserter. For instance, instead of “Modbus.34”, you may want to rename that device to something more meaningful such as “SM_Bldg2_Boiler7”.

Renaming an **Assigned Source** typically only applies to downstream devices.

Renaming the assigned source for all its measurements

1. Switch to Basic view.
2. Find the source you want to rename. Enter the new name in the **Updated Assigned Source** column. All rows with measurements associated with the renamed source are automatically updated.

   If you do not want to assign the existing data in the database to the new source name, switch to Advanced View first, then clear the Update Historical Database check box for all appropriate rows.
3. Click **File > Save**.
4. A dialog opens showing a summary of the changes. Click **Yes** to continue. or **No** to cancel.
5. When the operation completes, click **OK**, then **Close**.

Renaming the assigned source for one or more measurements

1. Switch to Advanced View.
2. Select the row(s) you want to rename. To select a row, click the area just to the left of the first column. The row is highlighted to indicate that it is selected.
3. Click **Edit > Rename Source**.
4. In the **Source Rename** box, type the new name for the downstream source. Click **OK**.

   NOTE: By default, the Update Historical Database check box is selected for all affected rows — this applies the change to existing data in the database. To make the change only to data going into the database from this point forward, clear the Update Historical Database check box for the affected rows.
5. Click **File > Save**. A dialog open showing a summary of the changes.

6. Click **Yes** to continue or **No** to cancel.
7. When the operation has completed, click **OK**, then click **Close**.

Cancelling changes

1. To undo all unsaved changes:
   - Click **Edit > Reset**, or
   - Click **View > Refresh**.
2. Click **Yes** to confirm.

Changing the measurement mapping

Log Inserter automatically associates logged data with a measurement by searching for a mapping between the label and the measurement. However, in cases where no mapping exists, Log Inserter creates a “measurement” that is based on the register label. To manually change this measurement mapping:

1. Switch to Advanced View.
2. Click the **Updated Measurement** cell that you want to change, then select the new measurement you want to map from the list.
3. Select the **Manual** check box.
4. By default, the **Update Historical Database** check box is selected — this applies the change to existing data in the database (if, for example, the source and measurement mapping you are adding already exists). To make the change only to data going into the database from this point forward, clear the **Update Historical Database** check box.
5. Click **File > Save**. A dialog opens showing a summary of the changes. Click **Yes**.
6. If prompted, select which database to update. Click **OK**.

Adding a new downstream device mapping

To add a new address mapping that associates the source and measurement to a specific logged quantity in the database:

1. Scroll down to the end of the table and click the last row (the one with the asterisk beside it).
2. Fill in the **Updated Assigned Source** and **Physical Source** columns. If the source is a physical device (i.e., not downstream), the same name must be entered exactly in both columns.
3. Click the **Updated Measurement** cell, then select the measurement from the list.
4. In the **Handle** cell, type the register handle for this measurement.
5. By default, the **Update Historical Database** check box is selected — this applies the change to existing data in the database (if, for example the source and measurement mapping you are adding already exists). To make the change only to data going into the database from this point forward, clear the **Update Historical Database** check box.
6. Click **File > Save**. A dialog opens showing a summary of the changes. Click **Yes**.
7. If prompted, select which database to update. Click **OK**.

Updating the historical data at a later time

When you save your changes using the Downstream Device Assistant, a record of changes to the source-measurement definitions is saved in the folder:

...\Power Monitoring Expert\config\Diagnostic\Downstream Device Assistant\

with the following filename:

“Downstream Device DefinitionsYYYY-MM-DD_hh.mm.ss.csv”

where “YYYY-MM-DD_hh.mm.ss” means current YEAR-MONTH-DAY_hour.minute.second.

If you cleared the **Update Historical Database** check box when you saved your changes the first time, you can update the existing data in the database at a later time, through the use of this csv file.

How to use the Downstream Device Assistant .csv file

To update the existing data in the database with the source-measurement changes contained in the csv file:

1. Click **Edit > Historical Data**. The Update Historical Data window appears.
2. Click **File > Import CSV**.
3. Downstream Device Assistant opens the folder that contains the csv files. Select the Downstream Device Definitions file you want to use, then click **Open**.
4. Click **File > Update Historical Data**.
5. The Historical Data Update prompt displays how many source-measurement pairs will be updated. Click **Yes**.
6. Click **Yes** at the Historical Data Update prompt.
7. After the operation has completed, click **OK**, then **Close**.

You can update only one ION database at a time. To select a different database, first make sure the **show connection dialog** check box is selected under **View > Options**. You can then use the database connection dialog to specify which database you want to update.

NOTE: If you update address definitions that affect multiple historical databases, only the first historical database you select is automatically updated. To update the remaining historical databases, you must import the address definitions to each one, using **Edit > Update Historical Data**.

Activity log

The saved changes in the Downstream Device Assistant are stored in a log file named “Downstream Device Historical UpdatesYYYY-MM-DD_hh.mm.ss.txt”, that contains a description of the activities carried out when Downstream Device Assistant was updating the source-measurement definitions.

Downstream Device Assistant commands

The following summarizes the commands available in the Downstream Device Assistant:

- **File > Save**: Saves your changes. A copy of the changes are saved for future reference, in a comma-separated value (.csv) data file in the ...\config\Diagnostic\Downstream Device Assistant\ folder.
- **File > Exit**: Closes the Downstream Device Assistant.
- **Edit > Reset**: Clears the modifications made since the last save.
- **Edit > Delete**: Deletes the selected rows.
- **Edit > Rename Source**: Lets you change the name of an **Assigned Source**. See Renaming the assigned source.
- **Edit > Update Historical Data**: Opens the “Update Historical Data” window that allows you to open a previously-saved source-measurement definition data file (with a .csv file extension), for the purpose of updating existing data in the database. You can also manually add, edit or delete data entries. See Updating the historical data at a later time.
- **View > Refresh**: Loads the current downstream definitions from the database. Functionally the same as **Edit > Reset**, as this command clears the modifications made since the last save.
- **View > Options**: Displays the **Options** dialog where you can change the settings that control what level of detail is displayed for the source-measurement definitions.
- **View > Select Physical Sources**: Displays the **Select Physical Sources** dialog where you can select which physical devices you want displayed in the Downstream Device Assistant.

Event Watcher Manager

The Event Watcher Manager defines events for the “On Event” selection in report subscriptions. (For more information about report subscriptions, see *Creating report subscriptions* in the online help for Reports in the Web Applications component.)

The Event Watcher Manager interface consists of two tabs:

- **Event Watchers**: An event watcher links a device or group of devices to the conditions defined in a template.
- **Templates**: A template defines the conditions that make up an event.

TIP: For instructions on using filtering, sorting, and column selection to customize the Event Watcher Manager interface, see Customizing and navigating interface displays.

Opening Event Watcher Manager

Open Management Console and select **Tools > Event Watcher**.

Symbols used in the Updated column

The following symbols are used in the **Updated** column to display the status of information in a row:

*	Information in the row has been modified since it was last saved.
!	Information in the row is inaccurate or incomplete.
+	The row is new since the user or group information was last saved.

Creating a template

Before adding an event watcher, you must have a template that defines the conditions to be watched. You can use one of the default templates or create your own. Use the **Templates** tab to define and edit templates.

Event Watcher Manager comes with default templates that can be modified for specific devices. Test any changes to the default template to ensure that events are available for selection for report subscriptions. In cases where a device is not supported by the default templates, you can create custom templates to define what you need.

To define a custom template:

1. Click **New** in the top right corner of the tab. A new row appears in the main table for the new template.
2. Type a name for the template. Type a description for the template if desired.
3. Use the Template Conditions section to set the conditions to be watched. See Using the Template Conditions section, below.
4. Click **Apply** to save your changes, click **OK** to save your changes and exit Event Watcher Manager, or click the **Event Watchers** tab to set up an event watcher.

Using the Template Conditions section

Use this section of the interface to configure the condition the template watches for.

1. Add a condition:
   - To add a condition from the event log, click **Select from Event Log** to open the **Select Event Log Lines** dialog. To select an event, click on the boxes at the left of the table to select a check box. Click on the check box again to clear the check mark. Click **OK** to return to the Templates tab.
   - To add a condition without selecting from the event log, click **New**. A new row appears in the table for the new condition.

   NOTE: It is recommended that you use **Select From Event Log** to add conditions. This helps ensure that the syntax is correct. If the syntax is not correct, the event watcher will not work. Conditions only appear in the Select Event Log Lines dialog after they have occurred in the system.

2. Select the parameters you want to include in the condition by selecting or clearing the check boxes below the Template Conditions table. The available parameters are: Priority, Cause, Cause Value, Effect, Effect Value. You must include at least one parameter. If you select multiple parameters, the event watcher only activates when all parameters are met.

The Logic of the Template Conditions

The conditions within a row of the Template Conditions table must all be true for the condition to be met. For example, if you have a row with a Priority of greater than 220 and an Effect Value of Disturbance, both of these must be met for the condition to be true. If you have multiple rows in the table, the condition is met if any of the rows are true. For example, if you have a row with Priority greater than 220 and a row with an Effect Value of Disturbance, the condition is met if either of these are true.

Deleting and reverting

To delete a template condition, select the condition from the Template Condition table and click the **Delete** button in the Edit <Template> section. To delete a template, select the template from the main table and click the **Delete** button in the top right corner of the tab.

To undo changes, click **Revert**.

Adding an event watcher

To add an event watcher, you need a template. You can use one of the default templates or define your own (see Creating a template). Use the **Event Watchers** tab to define and edit event watchers.

1. Click **New** to add a new event watcher. A new row appears in the main table for the new event. Use the Event Watcher Editing Area to define the event watcher.
2. Type a name for the event watcher.
3. Select the template you want to use from the Template dropdown list.
4. Type a description of the event watcher if desired.
5. From the Devices table, select the devices you want to include in the event watcher. Click the

check boxes to the left side of the devices to select or clear a device.

NOTE: Checking **Select All** will include any Query Server, Log Inserter or Virtual Processor instances in the system. It also includes any devices or software nodes added in the future.

6. Click **Apply** to save your changes, click **OK** to save your changes and exit Event Watcher Manager, or click the **Templates** tab to edit the templates.

Deleting and reverting

To delete an event watcher, select the event watcher from the table and click **Delete**.

To undo changes, click **Revert**.

Generator Performance Configuration Tool with EPSS Test Module

TIP: You can open the Generator Performance Configuration Tool from the **Power Monitoring Expert > Configuration Tools** folder on your desktop.

Use the Generator Performance Configuration Tool to configure the Backup Power Module and the Capacity Management Module. With this tool you define Generators, Transfer Switches, Equipment, and Groups for the Generator Activity, Generator Battery Health, Generator Test EPSS, Generator Load Summary, Equipment Capacity, and Generator Capacity reports. You also use this tool to generate the EPSS Vista diagrams, and to manage the Run History of the Generators.

The report templates have different configuration requirements. Not all of the components and properties available in the configuration tool have to be configured for all of the report templates. See Backup Power Module configuration and Capacity Management Module configuration for details.

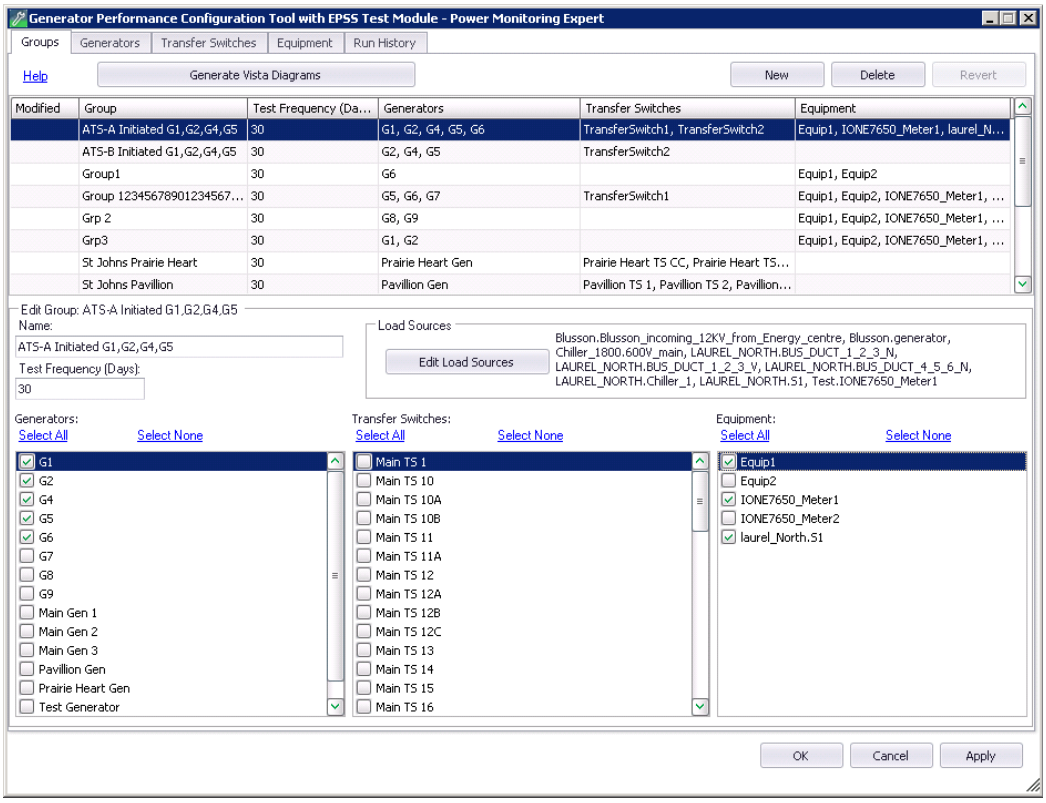
Prerequisites

- The monitoring devices that are recording the generator, transfer switch, and equipment data must be configured in the PME Management Console and must be communicating before you can configure the components and properties in the configuration tool.

Starting the Generator Performance Configuration Tool with EPSS Test Module

To start the Generator Performance Configuration Tool with EPSS Test Module, open the PME folder on the desktop and double-click the Generator Performance Configuration Tool shortcut.

The Generator Performance Configuration Tool with EPSS Test Module window contains these tabs: **Groups**, **Generators**, **Transfer Switches**, **Equipment**, and **Run History**.



First Define Generators, Define Transfer Switches, and Define Equipment. Then Define Groups. After you had the first generator test, you can View the Run History.

Use the following common controls for the tabs:

- **Help** - Click this to view online help for the tab.
- **New** - Creates a new entry in the grid.
- **Delete** - Deletes the selected entry from the grid.
- **Revert** - Returns a modified record to its original values, if **OK** or **Apply** have not been clicked.
- **OK** - Saves all changes and exits the configuration tool.
- **Cancel** - Exits the tool without saving changes.
- **Apply** - Saves all changes and leaves the tool open.

The **Modified** column in the grid area shows the status of the row data:

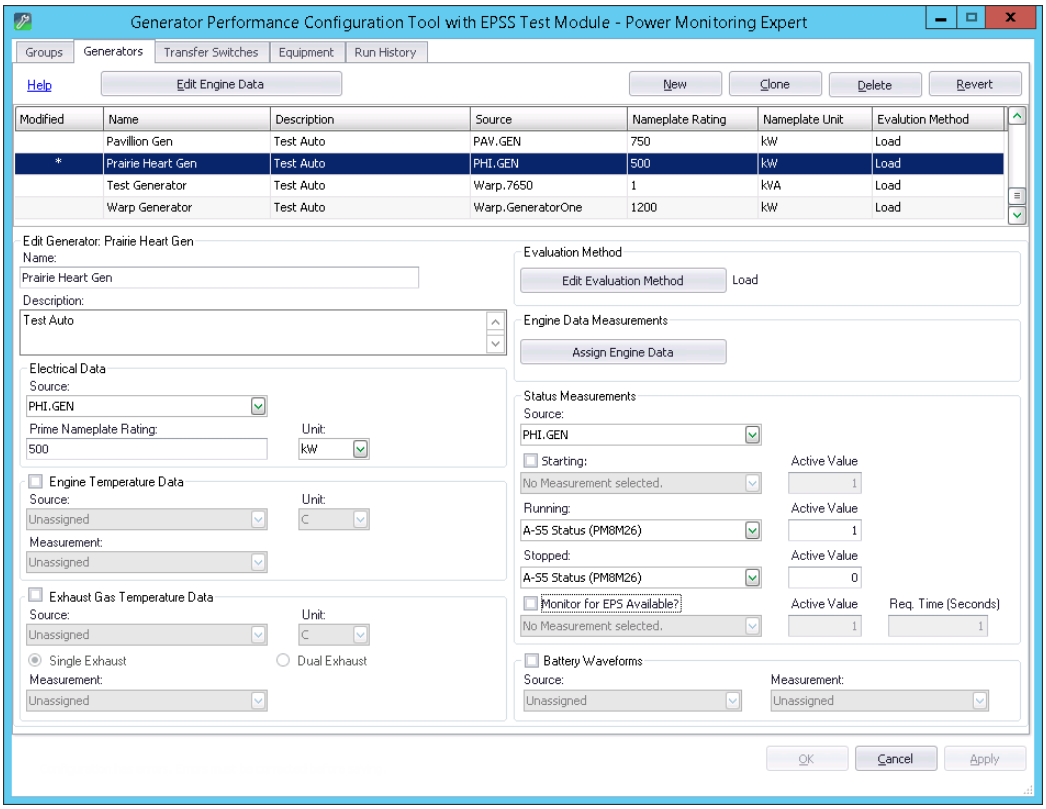
+ (plus) - a new entry.

***** (asterisk) - a modified entry.

! (exclamation mark) - entry needs more information before it can be saved.

Define Generators

Use the **Generators** tab to add new Generators or edit existing ones.



You can perform the following actions on this tab:

- Click **New** to add a new Generator to the system. See Adding a new generator for details.
- Click **Clone** to add a copy of an existing Generator. The tool copies many of the existing device settings into the new entry. You can then enter the unique details of the new device. See Cloning a Generator for details.
- Click **Delete** to remove records from the system.
- Click **Revert** (before you click **Apply** or **OK**) if you make changes to a record and want to revert to your initial settings.

Adding a new generator

To add a new generator:

1. On the **Generator** tab, click **New**.
2. Complete the following fields to define the generator:
   - **Name** - Enter a unique name to identify the generator.
   - **Description** - (Optional) Add information about the generator, such as make and model.
   - **Electrical Data**
     - **Source** - Select the monitoring device that records the electrical data of the generator.
     - **Prime Nameplate Rating** - Enter the rated generator power output. Refer to the

generator's nameplate for this value.

  - **Unit** - Select the unit of measurement for the generator rating value.

- **Engine Temperature Data** - Select the check box to enable this property. Complete the following fields:
  - **Source** - Select the monitoring device that records the engine temperature of the generator.
  - **Measurement** - Select the engine temperature measurement.
  - **Unit** - Select either F (for Fahrenheit) or C (for Celsius) for the temperature unit of measurement.

    NOTE: The same unit is used for the generator test Evaluation Method setting.

- **Exhaust Gas Temperature Data** - Select the check box to enable this property. Complete the following fields:
  - **Source** - Select the monitoring device that records the exhaust gas temperature of the generator.
  - **Single Exhaust** or **Dual Exhaust** - Select whether the exhaust gas temperature is measured for a single exhaust or a dual exhaust generator.
  - **Measurement** - Select the exhaust gas temperature measurement.
  - **Unit** - Select either F (for Fahrenheit) or C (for Celsius) for the temperature unit of measurement.
- **Edit Evaluation Method** - Set the evaluation method and the pass/fail criteria for generator tests. See Editing the generator Evaluation Method for more details.
- **Assign Engine Data** - Associate data from the monitoring device with engine data measurements defined in the tool. See Assigning engine data for more information.

  NOTE: You can define Engine data measurements in the **Edit Engine Data** editor at the top of the Generators tab. See Editing Engine Data for more details.

- **Status Measurements** - Configure the monitoring device and the measurements used to record the generator states.
  - **Source** - Select the monitoring device that records the generator states.
  - **Starting** - Select the check box to enable this property. This state indicates that the generator is starting. Select the measurement that provides the Starting state input, and enter the Active Value for the measurement.
  - **Running** - This state indicates that the generator is running. Select the measurement that provides the Running state input, and enter the Active Value for the measurement.
  - **Stopped** - This state indicates that the generator has stopped. Select the measurement that provides the Stopped state input, and enter the Active Value for the measurement.

NOTE: Two stop signals could be sent from the generator controller: the initial stop signal which is followed by 3- to 5-minute cooling period, and the final stop signal after the cooling period is complete. If the generator has two stop signals, use the measurement for the first stop signal before the generator goes into the cooling mode. Do not use the stop signal after the cooling period.

Example:

Assume that the system has been configured with measurements of `GENStarting`, `GENRunning`, and `GENStopped`. You assign these measurements to the **Starting**, **Running**, and **Stopped** states respectively and enter `1` as the Active Value for each.

- When the generator starts, the active value for `GENStarting` becomes `1`, and **Starting** is the state for the generator.
- When the generator is running, the active value for `GENRunning` becomes `1`, and **Running** is the state for the generator.
- When the generator stops, the active value for `GENStopped` becomes `1`, and **Stopped** is the state for the generator.

Additional notes about the Status Measurements:

If there is only one measurement to indicate that the generator is either running or stopped, then you select that measurement for both the **Running** and **Stopped** states, and assign a different active value for each. For example, if the measurement used to indicate whether a generator is running or not is `GenRunningStopped`, define the states like this:

For the **Running** state:

- Select `GenRunningStopped` as the measurement.
- Set the Active Value to `1`.

  When the generator is running, the active value for `GenRunningStopped` is `1`, and **Running** is the state for the generator.

For the **Stopped** state:

- Select `GenRunningStopped` as the status measurement.
- Set the Active Value to `0`.

  When the generator is stopped, the active value for `GenRunningStopped` is `0`, and **Stopped** is the state for the generator.

- **Monitor for EPS Available** - Select the check box to enable this property. This state indicates that the emergency power source (EPS) is available. Select the measurement that provides the EPS Available state, enter the active value for the state measurement, and enter the Required Time (Seconds). The Required Time value specifies the amount of time required to be considered a pass for a generator test evaluation.

- **Battery Waveforms** - Select the check box to enable this property. Complete the following fields:

- **Source** - Select the monitoring device that captures the battery voltage signature (waveform).
- **Measurement** - Select the battery voltage signature (waveform capture) measurement, for example `V4 Waveform`.

3. Click **Apply** to save the changes and keep the configuration tool open. Click **OK** to save the changes and close the configuration tool.
4. (Optional) Repeat these steps to define other generators.

> **TIP**: Use **Clone** to define additional generators with similar settings. See Cloning a Generator.

Editing a Generator

To edit a generator:

1. On the Generators tab, select the generator in the overview table.
2. Edit the fields that define the generator properties.
3. Click **Apply** to save the changes and keep the configuration tool open. Click **OK** to save the changes and close the configuration tool.

Cloning a Generator

Clone a Generator to create a copy of an existing Generator. When you clone a Generator, many of the settings are copied into the new Generator. Some settings are reset to default values. Update the settings for the cloned Generator and save it.

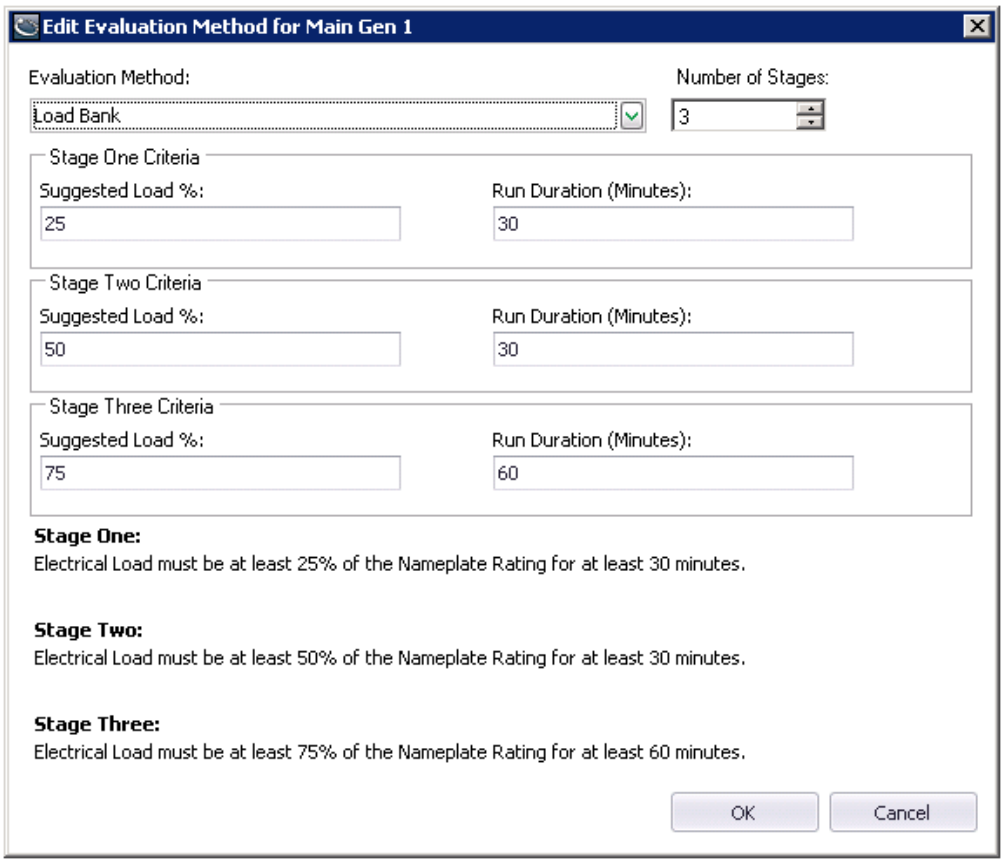
To clone a Generator:

1. On the **Generators** tab, select the Generator you want to use as the base for the cloned copy.
2. Click **Clone** to create a new, cloned Generator. Review the copied settings and update them as necessary. Update the following settings that have been reset to default values:
   - **Name** - Enter a unique name to identify the Generator.
   - **Electrical Data** - **Source** - Select the monitoring device that records the electrical data of the generator.
   - **Status Measurements** - **Source** - Select the monitoring device that records the generator states.

   See Adding a new generator for information on generator properties.
3. Click **Apply** to save the changes and keep the configuration tool open. Click **OK** to save the changes and close the configuration tool.

Editing the generator Evaluation Method

Use the Evaluation Method editor to select the evaluation method and the decision criteria for the Pass/Fail assessment of a generator test.



To edit the Evaluation Method:

1. Click **Edit Evaluation Method** to open the evaluation method editor.
2. Complete the following fields:
   - **Evaluation Method** - Select an evaluation method. Define the evaluation criteria.

     NOTE: Different evaluation criteria are displayed depending on which evaluation method is selected. See the table below for details.
3. Click **OK** to save the configuration and close the Edit Evaluation Method window.

The following table shows the evaluation methods and their respective pass/fail criteria:

Evaluation Method	Pass/Fail Criteria
Load (= Default)	To Pass, the generator must run at the **Suggested Load %**(*) for the **Run Duration (Minutes)**.
Engine Temperature	To Pass, the generator must run at or above the **Minimum Engine Temperature °C/°F** for the **Run Duration (Minutes)**.
Exhaust Gas Temperature	To Pass, the generator must run at or above the **Minimum Exhaust Gas Temperature °C/°F** for the **Run Duration (Minutes)**.

Evaluation Method	Pass/Fail Criteria
Load Bank	To Pass, the generator must pass the selected stages consecutively. For each stage, it must run at the **Suggested Load %**(*) for the **Run Duration (Minutes)**.
Load OR Engine Temperature	To Pass, the generator must pass either the Load or the Engine Temperature test.
Load OR Exhaust Gas Temperature	To Pass, the generator must pass either the Load or the Exhaust Gas Temperature test.
Load AND Exhaust Gas Temperature	To Pass, the generator must pass either the Load and the Exhaust Gas Temperature test.
Load AND Engine Temperature	To Pass, the generator must pass either the Load and the Engine Temperature test.
Load OR Engine Temperature OR Exhaust Gas Temperature	To Pass, the generator must pass either the Load, or the Engine Temperature, or the Exhaust Gas Temperature test.
Load OR Engine Temperature AND Exhaust Gas Temperature	To Pass, the generator must pass either the Load test, or the Engine Temperature and the Exhaust Gas Temperature test.
Load AND Engine Temperature OR Exhaust Gas Temperature	To Pass, the generator must pass both the Load and the Engine Temperature test, or the Exhaust Gas Temperature test.
Load AND Engine Temperature AND Exhaust Gas Temperature	To Pass, the generator must pass the Load and the Engine Temperature test and the Exhaust Gas Temperature test.

(*) The Suggested Load % is based on the generator nameplate rating.

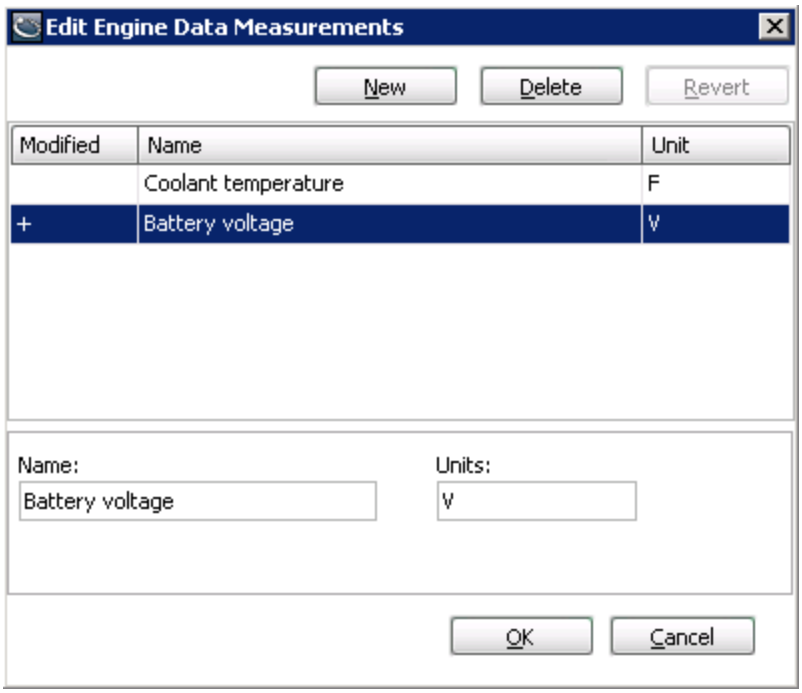
The following table shows the default test criteria for each evaluation method:

NOTE: Update these values to meet the regulations mandated by your local jurisdictions, or to meet the manufacturer recommendations.

Test Name	Stage	Minimum	Run Duration
Load	n/a	30 %	30 minutes
Engine Temperature	n/a	900 °C/°F	30 minutes
Exhaust Gas Temperature	n/a	900 °C/°F	30 minutes
Load Bank	1	25 %	30 minutes
Load Bank	2	50 %	30 minutes
Load Bank	3	75 %	60 minutes

Editing Engine Data

The **Engine Data Measurements** editor is used to define measurements in PME that are related to generator engine operation, for example battery voltage, or coolant temperature. You can then map these measurements to engine data that is recorded by a monitoring device for the generator engine. The items being measured, typically analog data, can differ from generator to generator. Battery voltage and coolant temperature are two common measurements.



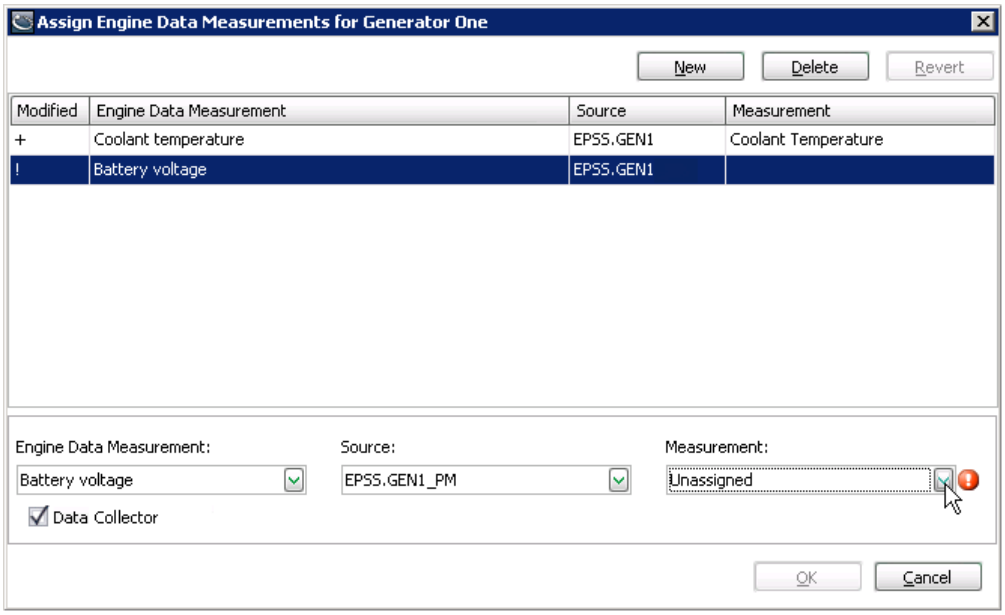
To add engine data measurements:

1. Click **Edit Engine Data** to open the Edit Engine Data Measurements editor.
2. Click **New** to add a new measurement.
3. Complete the following fields:
   - **Name** - Enter a name for the measurement.
   - **Units** - Enter a unit for the measurement.
4. (Optional) Repeat steps 2 and 3 to add additional measurements.
5. Click **OK** to save the new measurement and close the Edit Engine Data Measurements window.

Next, map the measurements that you create to the registers/measurements recorded by the monitoring device for the generator engine. See Assigning engine data for details.

Assigning engine data

The **Assign Engine Data Measurements** editor is used to map PME engine measurements to engine data that is recorded by a monitoring device for the generator engine.



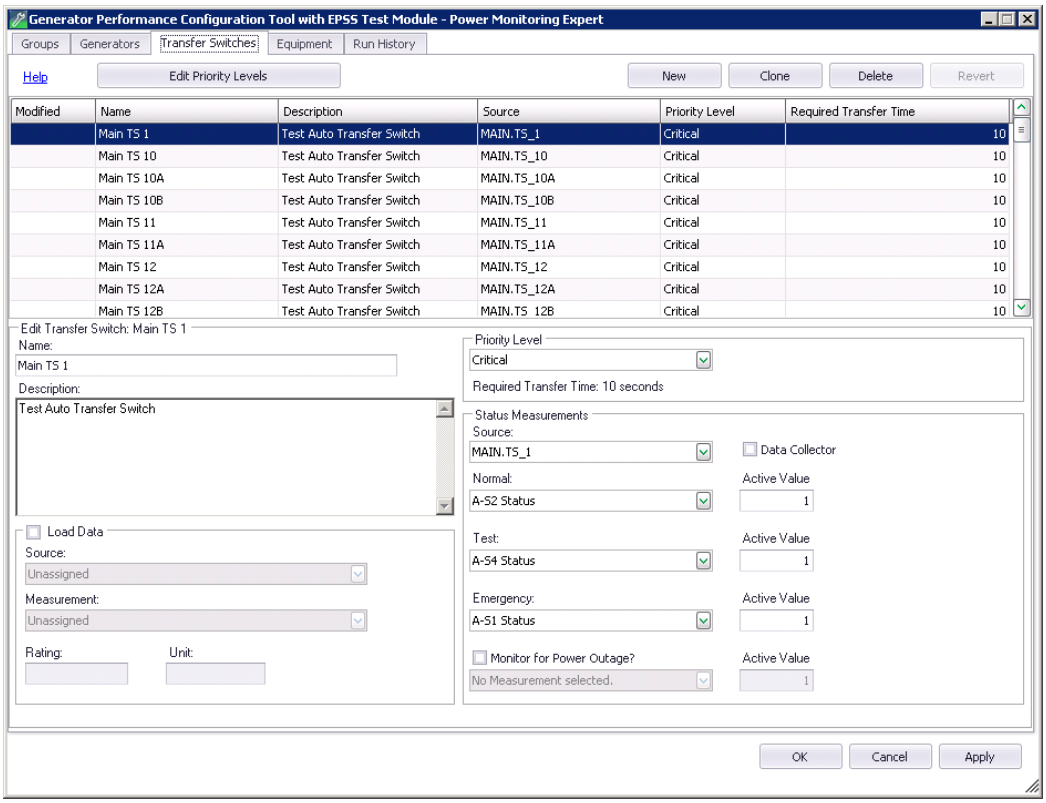
To assign engine data:

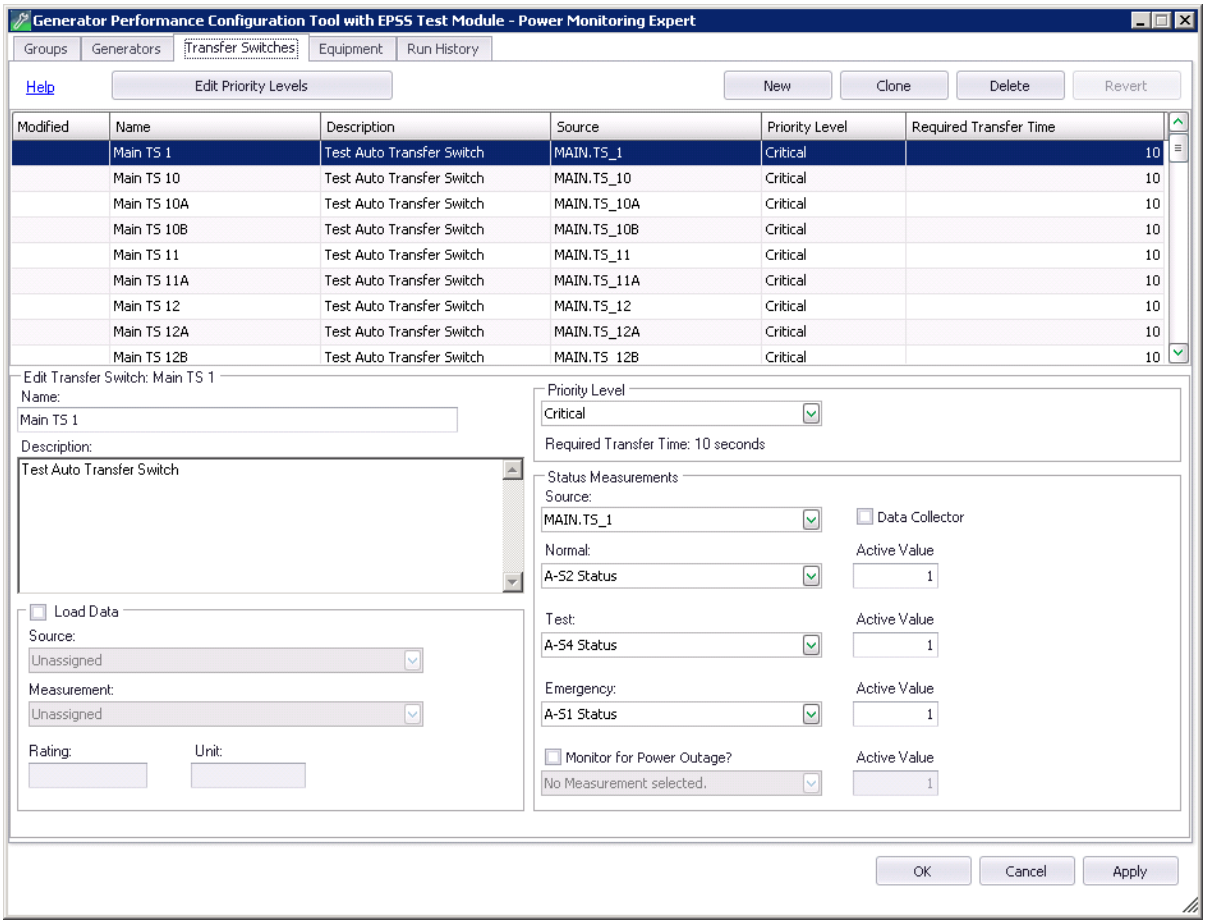
1. Click **Assign Engine Data** to open the Assign Engine Data Measurement editor.
2. Click **New** to add a new assignment. Complete the following fields:
   - **Engine Data Measurement** - Select the measurement you want to assign.
   - **Source** - Select the monitoring device that records the engine data of the generator.
   - **Measurement** - Select the monitoring device data that you want to map to the engine measurement.
3. (Optional) Repeat step 2 to map additional measurements.
4. Click **OK** to save the measurement mapping and close the Edit Engine Data Measurements window.

TIP: See Editing Engine Data for information on how to define engine measurements.

Define Transfer Switches

Use the **Transfer Switches** tab to add new (Automatic) Transfer Switches (ATS) or edit existing ones.





You can perform the following actions on this tab:

- Click **New** to add a new Transfer Switch to the system. See Adding a new Transfer Switch for details.
- Click **Clone** to add a copy of an existing Transfer Switch. The tool copies many of the existing device settings into the new entry. You can then enter the unique details of the new device. See Cloning a Transfer Switch for details.
- Click **Delete** to remove records from the system.
- Click **Revert** (before you click **Apply** or **OK**) if you make changes to a record and want to revert to your initial settings.

Adding a new Transfer Switch

To add a new Transfer Switch:

1. On the **Transfer Switch** tab, click **New**.
2. Complete the following to define the transfer switch:
   - **Name** - Enter a unique name to identify the transfer switch.
   - **Description** - (Optional) Add information about the transfer switch.
   - **Load Data** - Select the check box to enable this property. Complete the following fields:
     - **Source** - Select the monitoring device that records the electrical data of the transfer switch.

  - **Measurement** - Select the electrical measurement you want to track for the transfer switch, for example Current Phase Average.
  - **Rating** - Enter the rating value for the measurement, such as 400.
  - **Unit** - Enter the unit of measurement, such as A.

- **Priority Level** - Select a priority level for this transfer switch. The Required Transfer Time associated with the selected priority is displayed below the list box.

  NOTE: You can define priority levels in the **Edit Priority Levels** editor at the top of the Transfer Switches tab. See Editing Transfer Switch priority levels for more details.

- **Status Measurements** - Configure the monitoring device and the measurements used to record the transfer switch states.
  - **Source** - Select the monitoring device that records the transfer switch states.
  - **Normal** - This state indicates that the transfer switch is in the Normal position and power is supplied to the load by the utility. Select the measurement that provides the Normal state input, and enter the Active Value for the measurement.
  - **Test** - This state indicates that the transfer switch is in Test mode. Select the measurement that provides the Test state input, and enter the Active Value for the measurement.
  - **Emergency** - This state indicates that the transfer switch is in the Emergency position and power is supplied to the load by the generator. Select the measurement that provides the Emergency state input, and enter the Active Value for the measurement.
  - **Monitor for Power Outage** - Select the check box to enable this property. Select the measurement that indicates a power outage occurred, and enter the Active Value for the measurement.

    For example, assume that the system has measurements called `EPSS_Norm`, `EPSS_Test`, `EPSS_Emerg`, and `EPSS_Util`. You assign these measurements to the **Normal**, **Test**, **Emergency**, and **Power Outage** states and enter `1` as the active value for each.

    When the ATS is in the Normal position, the active value for `EPSS_Norm` is `1`, and **Normal** is the state for the ATS. When the ATS is set to the Test mode, the active value for `EPSS_Test` is `1`, and **Test** is the state for the ATS. When the ATS is in the Emergency position, the active value for `EPSS_Emerg` is `1`, and **Emergency** is the state for the ATS. If a power outage occurs, the active value for `EPSS_Util` is `1`, and **Power Outage** is the state for the ATS.

    In the EPSS Test Report, the states for the ATS and the time when they occurred are included in the Events Summary section.

    NOTE: The Transfer Switch states are used to calculate the Transfer Time and Emergency Time shown in the Generator Test EPSS Report:
    Transfer Time = The time (in seconds) it takes to switch from Normal state to Emergency state. For testing, the switch is triggered by the test signal, for an actual

power outage it is triggered by the power outage signal.
Emergency Time = The duration (in hours, minutes, and seconds) the transfer switch receives power from the generators. This is the time the generator is in the Emergency state.

3. Click **Apply** to save the changes and keep the configuration tool open. Click **OK** to save the changes and close the configuration tool.
4. (Optional) Repeat these steps to define other transfer switches.

TIP: Use **Clone** to define additional transfer switches with similar settings. See Cloning a Transfer Switch.

Editing a Transfer Switch

To edit a transfer switch:

1. On the Transfer Switches tab, select the transfer switch in the overview table.
2. Edit the fields that define the transfer switch properties.
3. Click **Apply** to save the changes and keep the configuration tool open. Click **OK** to save the changes and close the configuration tool.

Cloning a Transfer Switch

Clone a Transfer Switch to create a copy of an existing Transfer Switch. When you clone a Transfer Switch, many of the settings are copied into the new Transfer Switch. Some settings are reset to default values. Update the settings for the cloned Transfer Switch and save it.

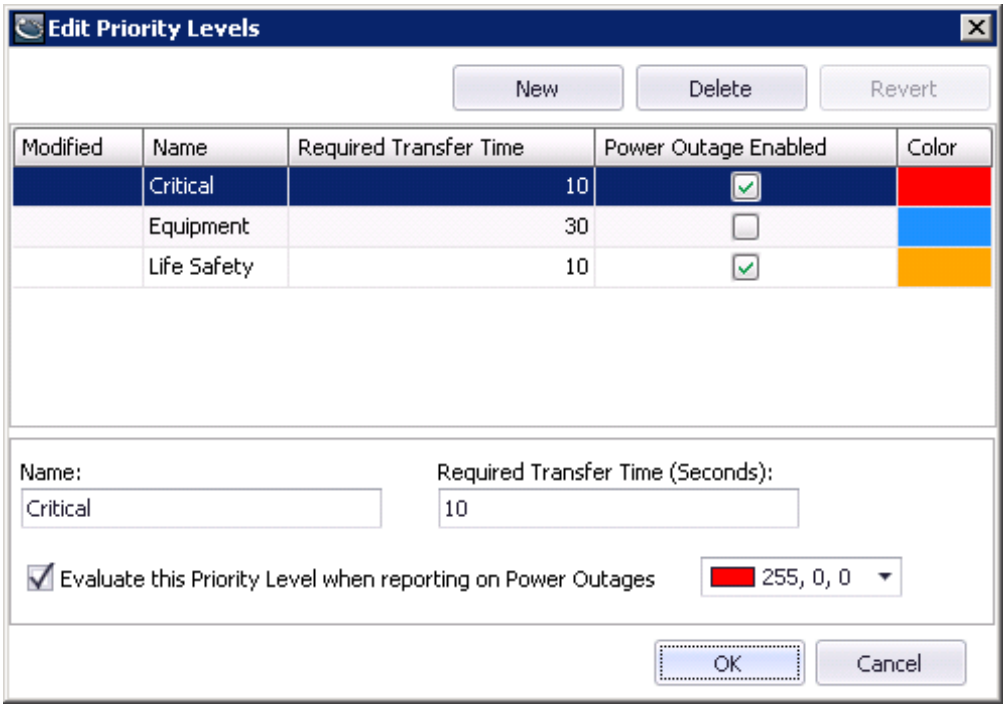
To clone a Transfer Switch:

1. On the **Transfer Switches** tab, select the Transfer Switch you want to use as the base for the cloned copy.
2. Click **Clone** to create a new, cloned Transfer Switch. Review the copied settings and update them as necessary. Update the following settings that have been reset to default values:
   - **Name** - Enter a unique name to identify the transfer switch.
   - **Status Measurements** - **Source** - Select the monitoring device that records the transfer switch states.

   See Adding a new Transfer Switch for information on transfer switch properties.
3. Click **Apply** to save the changes and keep the configuration tool open. Click **OK** to save the changes and close the configuration tool.

Editing Transfer Switch priority levels

Use the **Edit Priority Levels** editor to edit existing transfer switch Priority Levels, or add custom ones.



To edit the Priority Levels:

1. Click **Edit Priority Levels** to open Edit Priority Levels.
2. Click **New** to add a priority level.
3. Complete the following fields:
   - **Name** - Enter a unique name to identify the priority level.
   - **Required Transfer Time (Seconds)** - Enter the transfer time in seconds. This value indicates the maximum acceptable time for the transfer switch to switch from the Test state to the Emergency state.
   - **Evaluate this Priority Level when reporting on Power Outages** - Select this check box to include a priority level in the pass or fail grading. Clear the check box to exclude the priority level from grading. By excluding a priority level, you can exclude non-critical switches from evaluation.

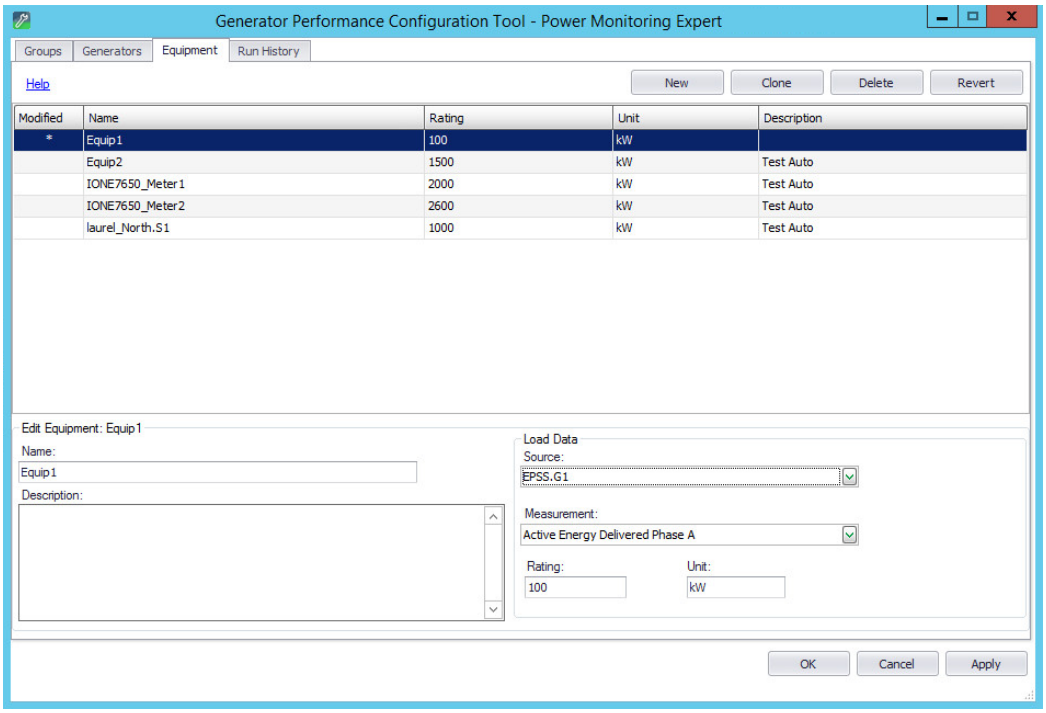
     For example, if a transfer switch has a priority level of Life Safety and it must be graded because of a power outage, then select this check box. Conversely, if a transfer switch has a priority level of Equipment, this transfer switch may not have to be graded because of a power outage. In this case, clear the check box.
   - **Color Picker** - Select the display color for the priority level in the report.
4. Click **OK** to save the configuration and close the Edit Priority Levels window.

The following table shows the default Priority Levels:

Name	Required Transfer Time	Power Outage Enabled
Life Safety	10	True
Critical	10	True
Equipment	30	False

Define Equipment

Use the **Equipment** tab to add new Equipment or edit existing ones. An Equipment represents a real life apparatus such as a piece of switch gear, or a distribution panel. You can map the Equipment to a measurement and rating. Equipment can be added to a Group and be included in the reports.



You can perform the following actions on this tab:

- Click **New** to add a new Equipment to the system. See Adding Equipment for details.
- Click **Clone** to add a copy of an existing Equipment. The tool copies many of the existing device settings into the new entry. You can then enter the unique details of the new device.
- Click **Delete** to remove records from the system.
- Click **Revert** (before you click **Apply** or **OK**) if you make changes to a record and want to revert to your initial settings.

Adding Equipment

To add a new equipment:

1. On the Equipment tab, click **New**.
2. Complete the following fields to define the equipment:
   - **Name** - Enter a unique name to identify the equipment.
   - **Description** - (Optional) Add information about the equipment.
   - **Source** - Select the monitoring device that records the measurement data of the equipment.
   - **Measurement** - Select the equipment measurement, for example current.

- **Rating** - Enter the rating for the equipment measurement, for example rated current.
- **Unit** - Enter the unit of the measurement.

3. Click **Apply** to save the changes and keep the configuration tool open. Click **OK** to save the changes and close the configuration tool.
4. (Optional) Repeat these steps to define other equipment.

TIP: Use **Clone** to define additional equipment with similar settings.

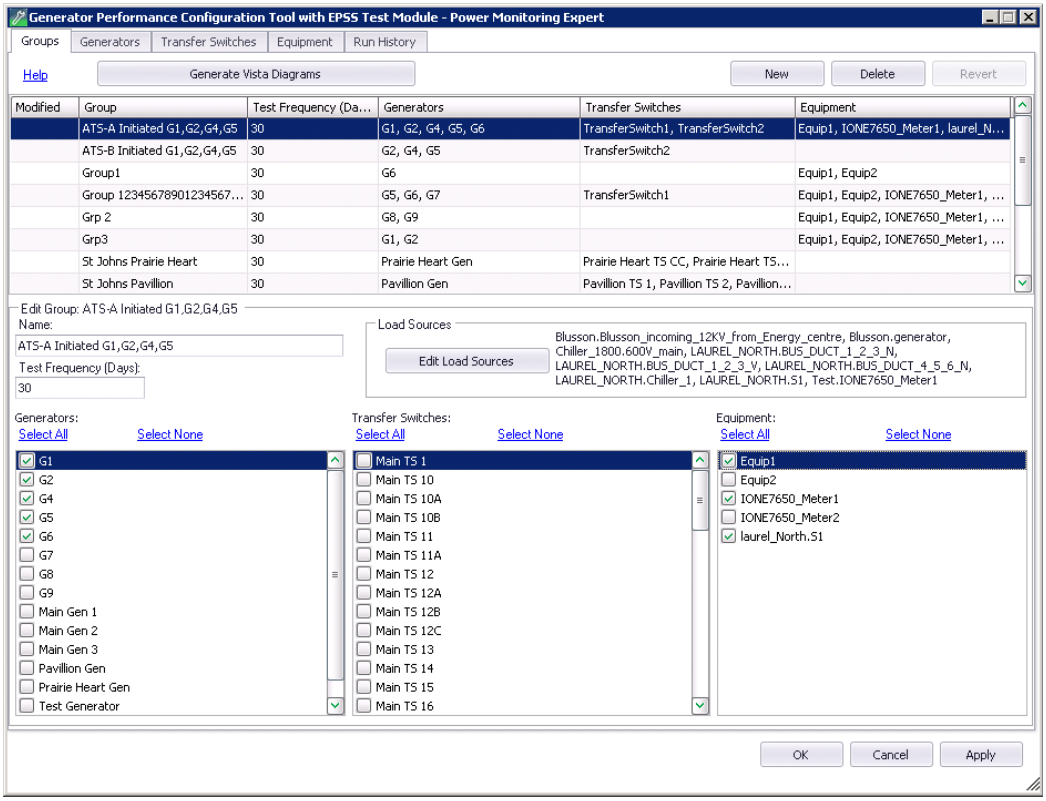
Editing Equipment

To edit an equipment:

1. On the **Equipment** tab, select the equipment in the overview table.
2. Edit the fields that define the equipment properties.
3. Click **Apply** to save the changes and keep the configuration tool open. Click **OK** to save the changes and close the configuration tool.

Define Groups

Use the **Groups** tab to add new Groups or edit existing ones. A Group combines generators, transfer switches, and other equipment. This is used for reporting and generating Vista diagrams.



You can perform the following actions on this tab:

- Click **New** to add a new Group to the system. See Adding a new Group for details.
- Click **Delete** to remove records from the system.
- Click **Revert** (before you click **Apply** or **OK**) if you make changes to a record and want to revert to your initial settings.

Adding a new Group

NOTE: You must define the Generators, Transfer Switches, and Equipment first, before you can add them to a Group.

To add a group:

1. On the **Groups** tab, click **New**.
2. Complete the following fields to define the group:
   - **Name** - Enter a unique name to identify the group.
   - **Test Frequency** - Enter how often, in days, the group should be tested. Select the Time Zone you want to use for reporting.
   - **Generators** - From the list, select the generators you want to include in the group.
   - **Equipment** - From the list, select the equipment you want to include in the group.

- **Transfer Switches** - From the list, select the transfer switches you want to include in the group.

3. Click **Apply** to save the changes and keep the configuration tool open. Click **OK** to save the changes and close the configuration tool.
4. (Optional) Repeat these steps to define other groups.

Editing a Group

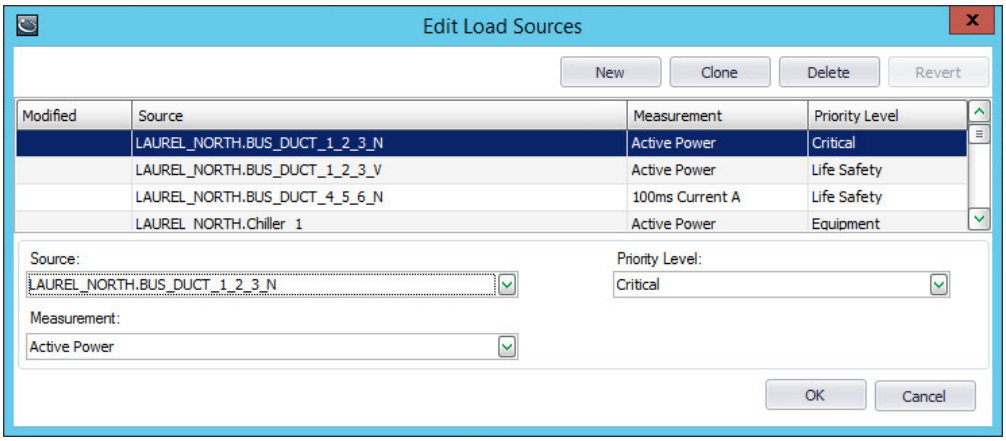
To edit a group:

1. On the **Groups** tab, select the group in the overview table.
2. Edit the fields that define the group properties.
3. Click **Apply** to save the changes and keep the configuration tool open. Click **OK** to save the changes and close the configuration tool.

Adding/Editing Group Load Sources

Define Load Sources to associate a Group with the electrical loads that the generators in the group must supply with power during an outage.

NOTE: Before configuring Load Sources, define the Priority Levels for the system. See Editing Transfer Switch priority levels for details.



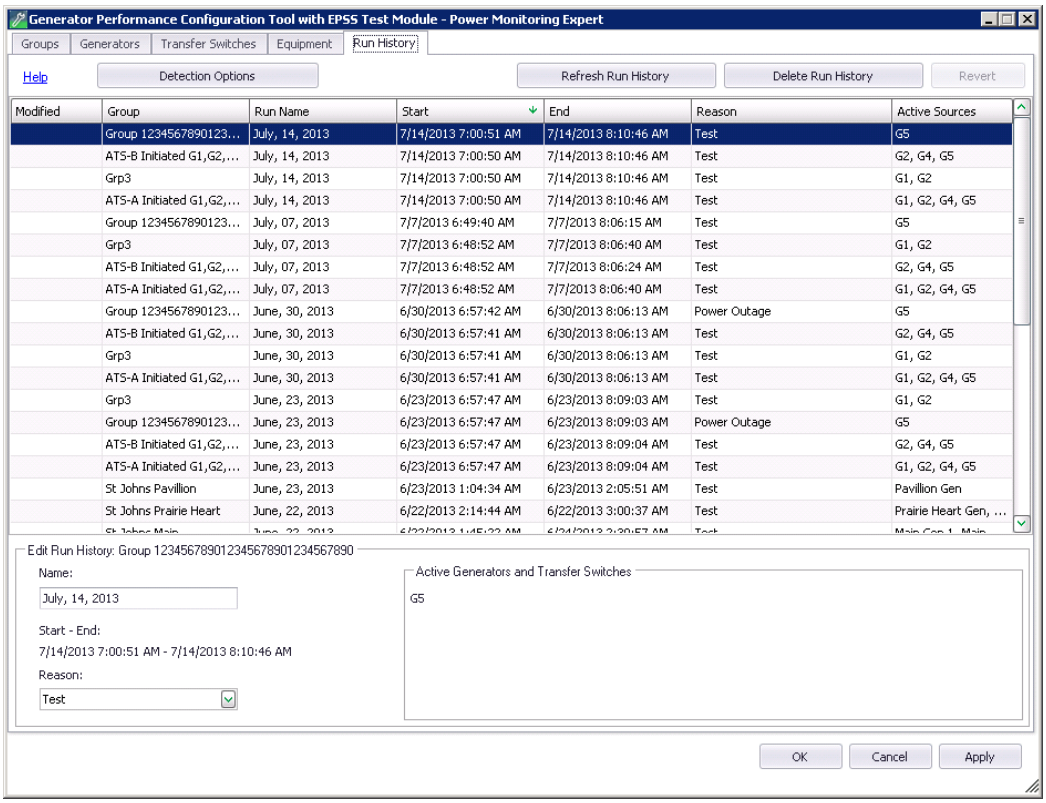
To add/edit group load sources:

1. Click **Edit Load Sources** to open the load sources editor.
2. In Edit Load Sources, click **New** to add a load source.
3. Complete the following fields:
   - **Source** - Select the monitoring device that records the electrical data of the load.
   - **Measurement** - Select the load measurement.
   - **Priority Level** - Select the priority level to assign to the load.
4. Click **OK** to save the configuration and close the Edit Load Sources window.

   TIP: Use **Clone** to define additional loads with similar settings.

View the Run History

The Run History is a record of the generator run activities. Use the **Run History** tab to view or modify individual generator run instances. The Run History can be used as input for Reports and Dashboards in Power Monitoring Expert.



Click **Refresh Run History** to update the display to show the latest run activities.

Run Histories are based on Groups. Refresh the Run History after every configuration change to the Groups, Generators, Transfer Switches, or Equipment. For example, if you remove a generator from a group, the run history for that group needs to be rebuilt because that generator may have been the reason for the detection of a run. Now that the generator is not part of the group, the system needs to build the run history again to have accurate data.

NOTE: When you view the Run History for the first time, the processing of the existing run information in the database can take some time.

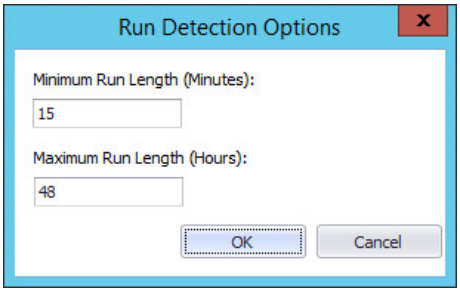
You can perform the following actions on this tab:

- Click **Detection Options** to define the criteria for detecting a run event that will cause it to appear on this tab. See Defining run detection options.
- Click **Refresh Run History** to update the tab with the latest run events that have occurred in the system.
- Click **Delete Run History** to remove all run event records from the tab.
- Edit the details of a run instance. See Editing run history details for details.

Defining run detection options

Use run detection options to define the criteria for the system to detect and record a generator run, and to display it as part of the Run History. You can set a minimum and a maximum run length.

Set a minimum run length to prevent commissioning or maintenance activities from being recorded. Set a maximum run length to eliminate "hanging" runs. A hanging run occurs when the stop signal for a generator is not recorded.



To define run detection options:

1. Click **Detection Options** to open Run Detection Options.
2. In Run Detection Options, set Minimum Run Length (default = 15 minutes), and Maximum Run Length (default = 48 hrs).
3. Click **OK** to save the changes and close the dialog box.

NOTE: In Run History, click **Refresh Run History** to update the tab with the run events that match the new detection criteria.

Editing run history details

The system defines the following information as part of the Run History: Run Name, Start, End, Reason, and Active Sources.

You can edit the Run Name and the Reason for a run. Other run details cannot be modified

NOTE: The default Run Name is the start date of the run, such as `June 12 2011`. If a group has multiple runs on the same date, the subsequent runs have the same date with the run number appended, such as `June 12 2011 Run 2` and `June 12 2011 Run 3`.
The default Reason is based on the Transfer Switch Status Measurements, for Test and Power Outage.

To edit the run history details:

1. Click the run record you want to modify. The run details are shown in the editor below the grid.
2. In the **Name** field, change the run name as necessary.
3. In the **Reason** list, select the correct reason for the run.
4. Click **Apply** to save the changes and keep the configuration tool open. Click **OK** to save the changes and close the configuration tool.

EPSS Vista Diagrams

EPSS Vista diagrams provide real-time information about the status of the generators, transfer switches, and other components of the system. You can view the diagrams in the Diagrams Web Application of PME.

After the Generators, Transfer Switches, and Groups are configured, you can generate the Vista diagrams for the configured devices. The same information can be built manually in Vista, but the Generator Performance Configuration Tool with EPSS Test Module provides a way to build these diagrams automatically.

See Setting up the EPSS template diagram and Generating the EPSS Vista diagrams for instructions.

After the diagrams are generated, you can open them in Vista and optimize the designs. See EPSS Vista diagram examples for descriptions and examples of the generated diagrams.

Setting up the EPSS template diagram

Use the template diagram to produce a consistent structure for the generated diagrams. The template file is used as a basis for the dynamically generated EPSS diagrams. The template is a normal diagram file that the system uses to apply common elements to the generated diagrams.

With the template, you can apply linked-button elements to the generated diagrams, which will help you reduce the amount of time to configure the diagrams.

To set up the EPSS template diagram:

1. Open Vista
2. In Vista, open the following diagram:
   `...\config\diagrams\ud\EPSS\templates\Epss_Template.dgm`.
3. Add buttons with the appropriate links to the left side of the diagram.
4. Do not link the EPSS button to any diagram, because you will already be on the EPSS pages when they are generated.
5. Save and close the template diagram.

When the configuration tool generates diagrams, the template is read and any objects in the template are added to every diagram created by the tool.

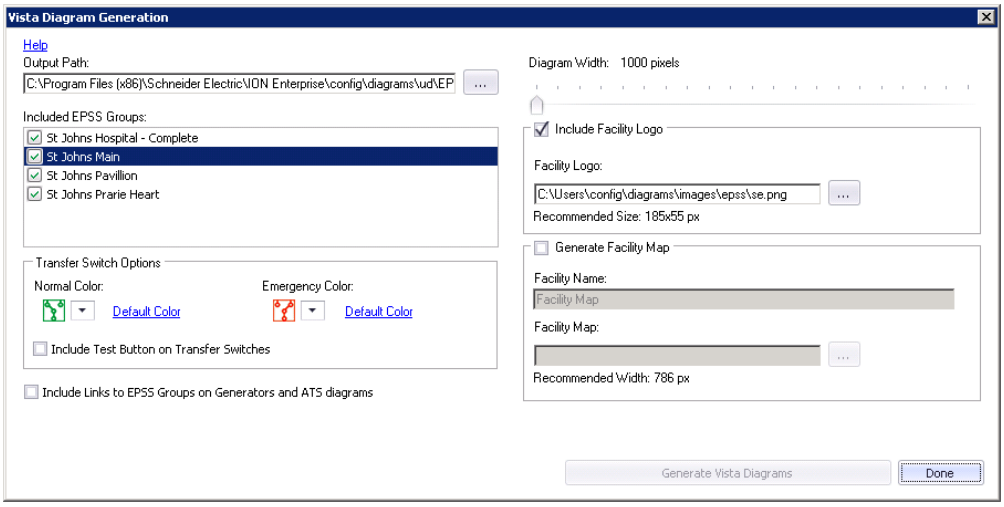
NOTE: On the generated diagrams, the background image is dynamically created. The background does not come from the EPSS template diagram.

Generating the EPSS Vista diagrams

NOTE: Before you generate the EPSS Vista diagrams:
- configure all devices and groups
- save the changes you have made to the EPSS configuration
- create an EPSS template diagram (see Setting up the EPSS template diagram)

To generate the EPSS Vista diagrams:

1. Click the **Groups** tab.
2. Click **Generate Vista Diagrams**to open the Vista Diagram Generation dialog.



3. In the **Output Path** field, enter or select the folder where you want to store the diagrams.
4. (Optional) In the **Included EPSS Groups** box, select the device groups that you want to generate diagrams for. Clear the check box for any groups you do not want to generate.
5. (Optional) In the **Transfer Switch Options** box, select the colors you want to use for normal and emergency status.
6. (Optional) Check **Include Test Button on Transfer Switches**if you want to add a control object for each ATS on the diagrams. This object allows you to manually test the ATS from the diagram. The control must be manually linked using Vista after the diagrams have been created.
7. (Optional) Check **Include Links to EPSS Groups...** if you want the device diagrams to have a link to the EPSS Group diagram.
8. In the **Diagram Width** field, select the horizontal width in pixels of the diagrams.
9. (Optional) Select **Facility Logo** and enter the image file if you want the diagrams to include the customer logo at the top-left of every diagram.
10. (Optional) Select **Generate Facility Map** if you want to include a map with the diagrams. If you do this, you will be able to add the generator and transfer switch device locations to the map.
    a. Enter the **Facility Name** to appear on the map.
    b. Select the image file for the map.
11. Click **Generate Vista Diagrams** to generate and store the diagrams in the selected output folder.

Several diagrams will be created: the homepage that lists all EPSS groups, summary pages that list all generators and transfer switches, and the detail pages for each EPSS Group, Generator and ATS in the system.

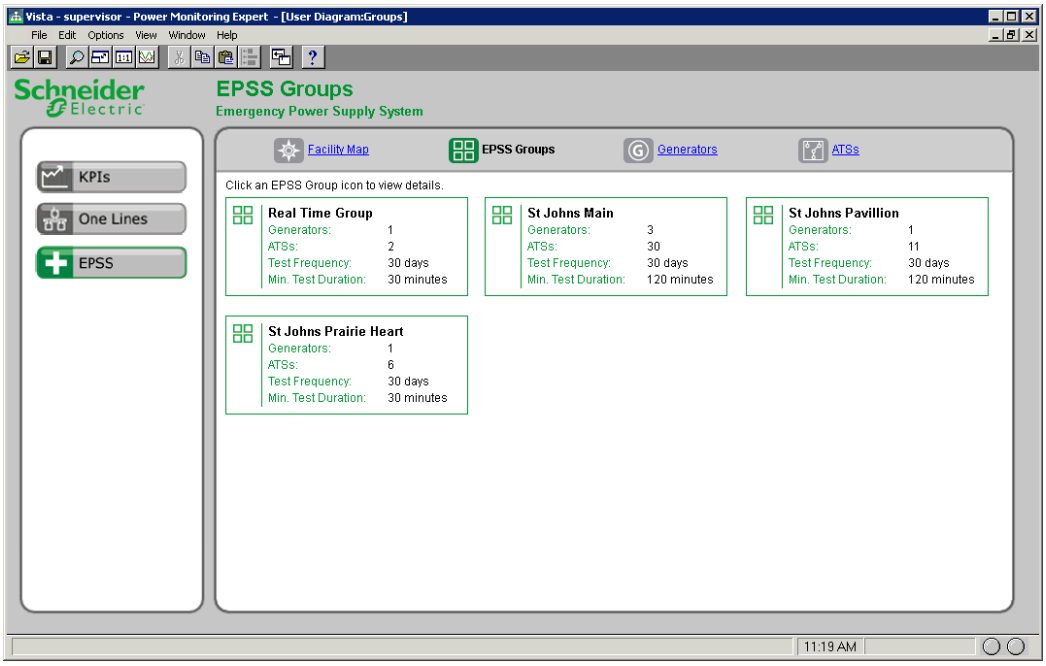
You can open the diagrams in Vista and optimize the designs if necessary.

EPSS Vista diagram examples

When you generate the Vista diagrams, the following diagrams are produced:

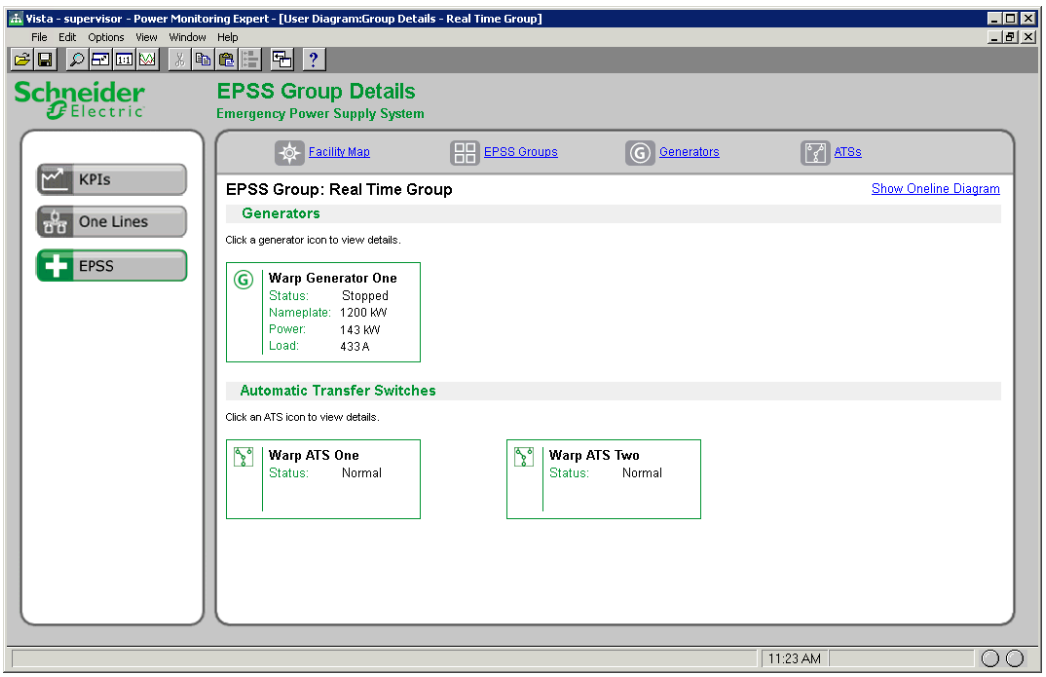
Home Page Diagram

One Home Page diagram is generated. This diagram contains a navigation bar that has links for the facility map, device group diagrams, and device diagrams.



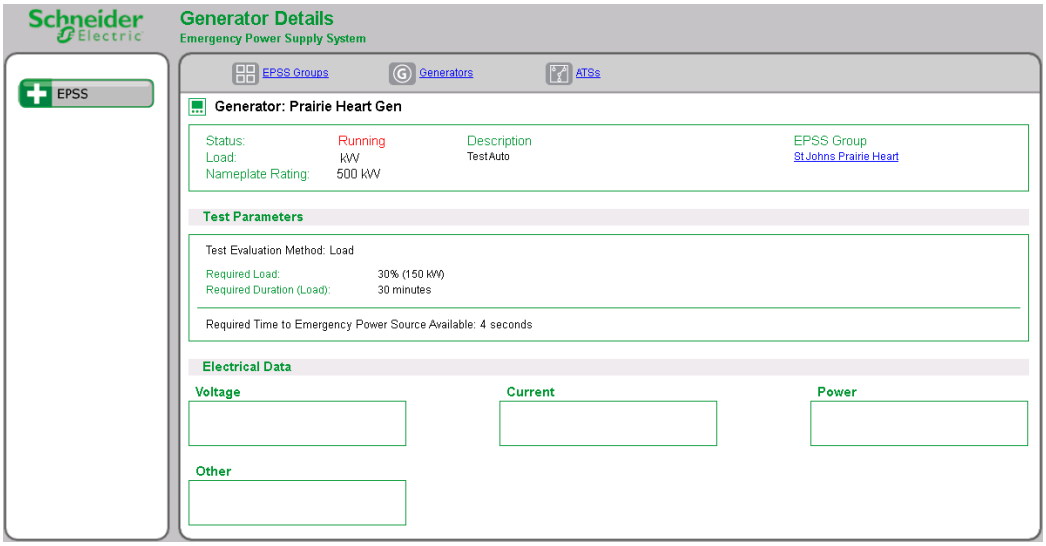
EPSS Group Diagram

For each group selected on the configuration screen, one group diagram is generated. This diagram contains an object for each generator or transfer switch in the group. A Oneline diagram for each group is also generated and linked to the diagrams. You will need to manually configure the generated Oneline diagrams. Several default objects are included for assistance.



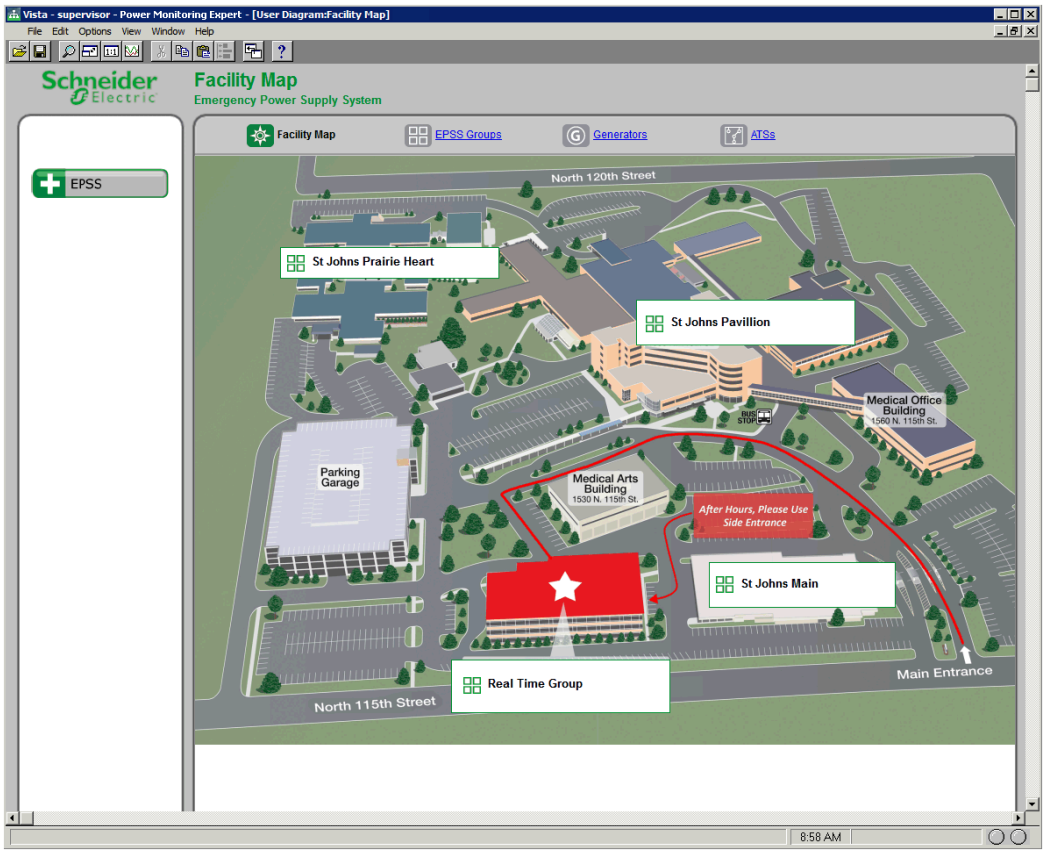
Device detail Diagram

For each generator and transfer switch in a group, a diagram is generated. The device diagram includes status information for the device, including run status, test parameters, and real-time electrical data.



Facility Map

This diagram is generated if the option was selected on the configuration screen. This diagram includes a moveable icon for each generator and transfer switch in all the selected device groups. On the map diagram, you can drag and drop the device icons to the map to represent the physical locations of those devices.



Generator Power Configuration Utility

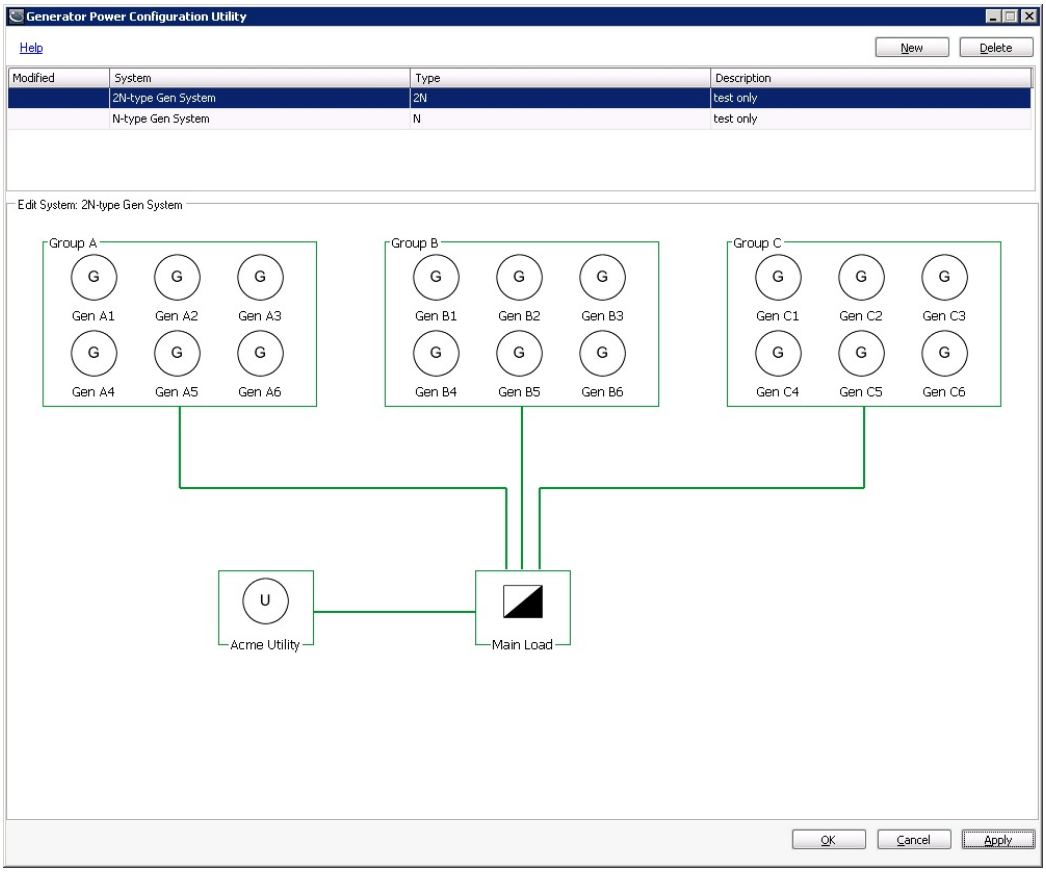
TIP: You can open the Generator Power Configuration Tool from the **Power Monitoring Expert > Configuration Tools** folder on your desktop.

Use the Generator Power Configuration Utility to configure the Capacity Management Module. With this tool you define Generator Systems for the Generator Power Report.

See Capacity Management Module configuration for details.

Prerequisites

- The monitoring devices that are recording the load data must be configured in the PME Management Console and must be communicating before you can configure the components and properties in the configuration tool.



User Interface

Control	Description
Help	Opens the help for the utility.
New	Creates a new entry in the grid.
Delete	Deletes the selected entry from the grid.
OK	Saves all changes and exits the utility.

Control	Description
Cancel	Exits the utility without saving changes.
Apply	Saves all changes and leaves the utility open.

Grid Area Columns	Description
Modified	Displays a status symbol for the record.
+ (plus)	A new entry.
* (asterisk)	An existing entry has been modified.
! (exclamation mark)	The entry is incorrect.
System	Displays the system name.
Type	Displays the Generator system type (N, 2N, N+2, etc.)
Description	Displays a description of the system

TIP: The tool indicates if there configuration errors. Point at the red exclamation icon to see configuration error details.

Generator Power configuration restrictions

The Generator Power configuration tool enforces certain rules when creating a generator system, group, or generator:

- **Generator System**
  - Name must be unique.
  - One or more systems are allowed.
- **Generator Groups**
  - Name must be unique.
  - At least one group must be present in each system.
  - All groups are connected to the same load.
  - For N, N+1, and N+2 system types:
    - Only one group is allowed.
    - Each generator in the group must have the same nameplate rating (kVA) value.
    - Each generator in the group must have the same derated nameplate rating (kW) value.
  - For 2N, 2(N+1) and 2(N+2) system types:
    - Up to three groups are allowed.
    - All groups must have the same number of generators.
    - All generators in the groups must have the same nameplate rating (kVA) value.
    - All generators in the groups must have the same derated nameplate rating (kW) value.

- **Generators**
  - Name must be unique.
  - At least one generator must be present in each group.
  - A maximum of 12 generators is allowed in each group.

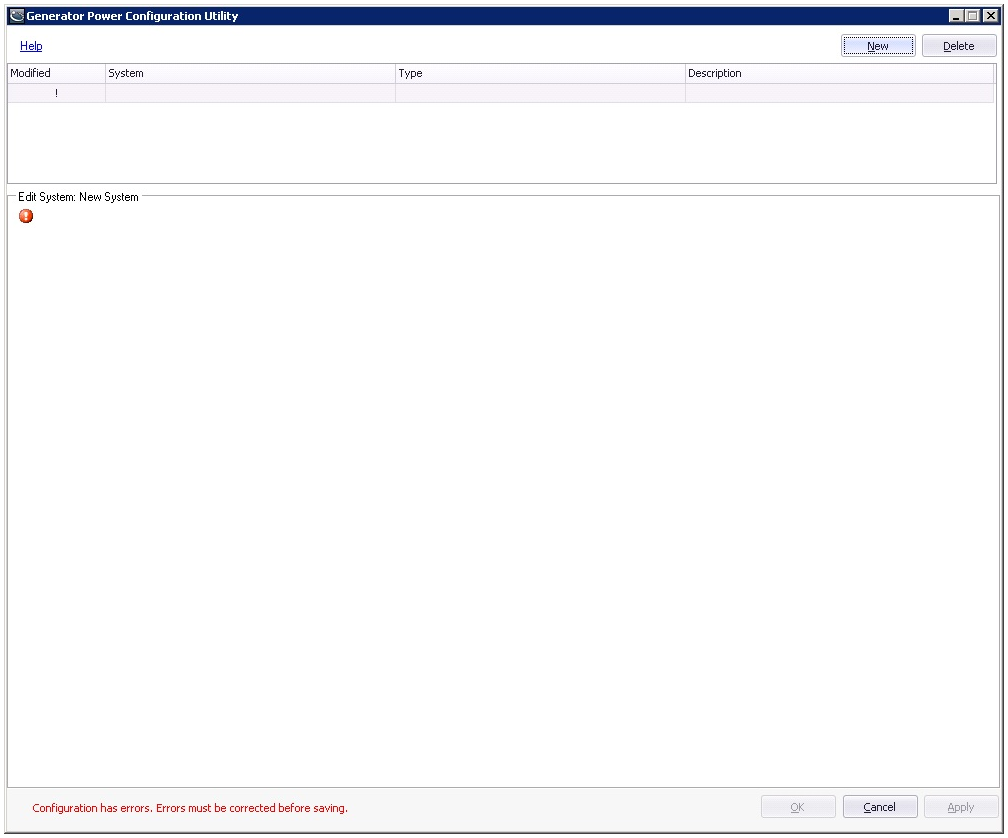
For information on generator redundancy types, see Generator system redundancy types.

Defining generator systems

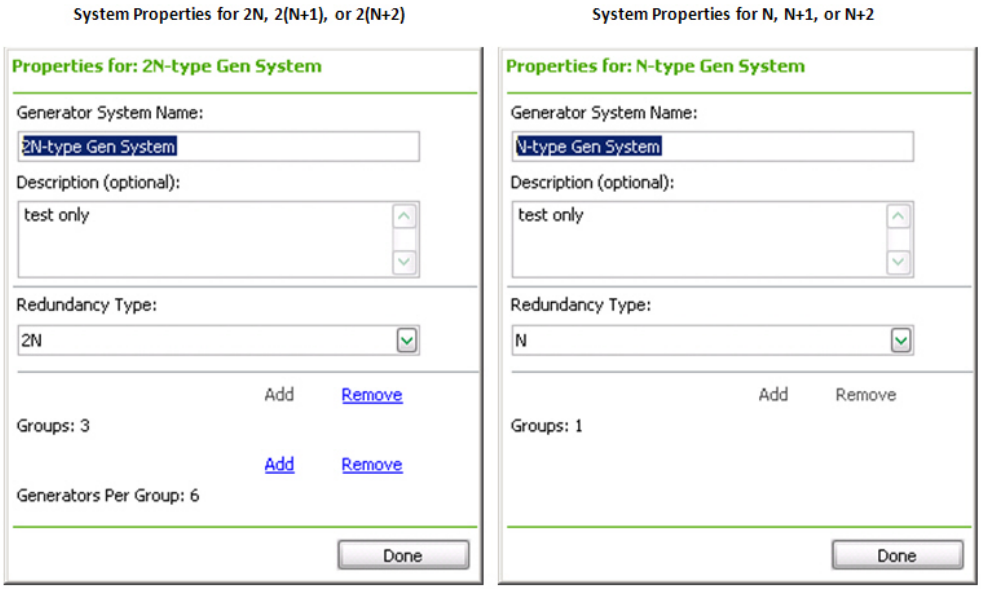
A generator system is a logical system configuration that is used for reporting power capacity.

To define a generator system:

1. Click **New**. The Edit System: New System area appears below the grid.



2. Click anywhere in the editor area. The Properties screen appears.



3. Complete the details for the generator system:
   a. **Generator System Name:** Enter a name for the generator system. Each generator system must have a unique name.
   b. **Description:** (Optional) Enter a description for the generator system.
   c. **Redundancy Type:** Select the redundancy type for the generator system. The different redundancy types are explained in Generator system redundancy types.
   d. **Groups:** Shows the number of generator groups contained in the generator system. Click **Add** to add groups to the generator system. Click **Remove** to delete groups.
   e. **Generators Per Group:** Shows the number of generators in each generator group in the system. Click **Add** to add generators to the group. Click **Remove** to delete generators.

   NOTE: This property is only available when the system redundancy type is 2N, 2(N+1) or 2(N+2). To define the number of generators for a system with redundancy type N, N+1 or N+2, use the generator group properties. See Defining generator groups for more information.

4. Click **Done** to save the generator system.

Related Topics:

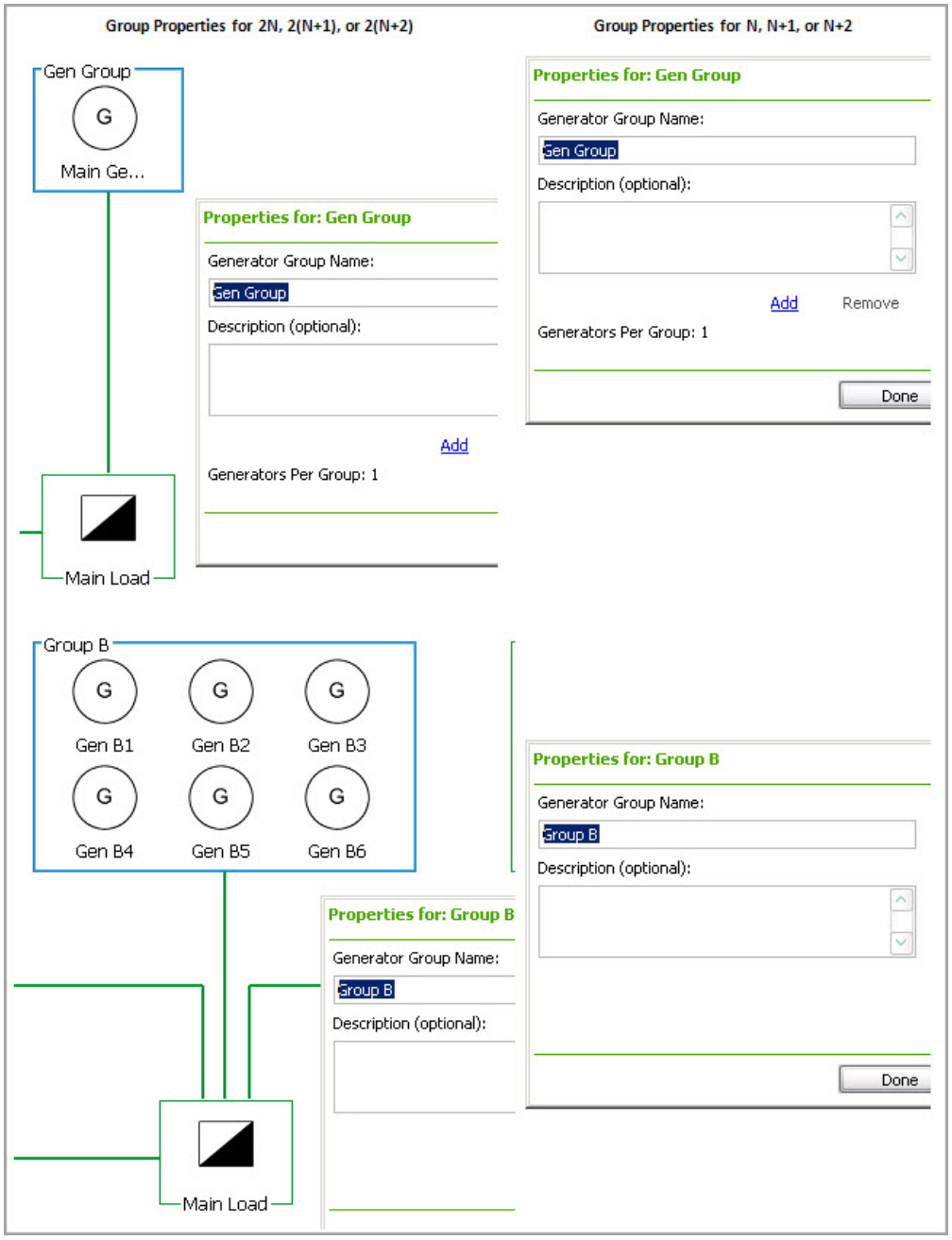
- Defining generator groups
- Defining generators
- Defining generator loads
- Defining utilities

Defining generator groups

A generator group represents a logical grouping of generators. The system contains at least one group and can contain multiple groups. Depending on the system type, the group properties may be different, as shown below. See Generator Power configuration restrictions for more information.

To define a generator group:

1. Click on the group object border. The Properties screen appears.



2. Complete the details for the generator group:
   a. **Generator Group Name:** Enter a name for the group.

      Each generator group must have a unique name.

   b. **Description:** Enter a description for the group. This field is optional.

c. **Generators Per Group:** Click **Add** to increase the number of generators in the group. Click **Remove** to decrease the number. This property is available only for system redundancy types N, N+1 or N+2.

3. Click **Done** to save the generator group.

Related Topics:

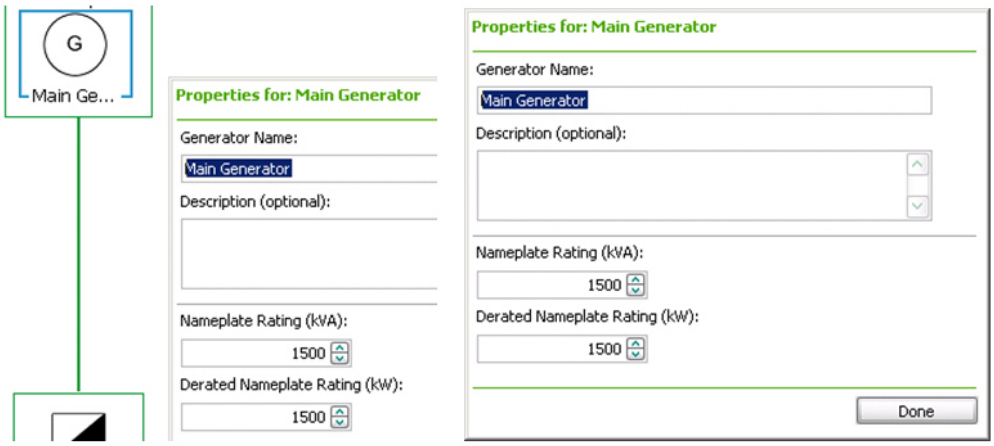
- Defining generator systems
- Defining generators
- Defining generator loads
- Defining utilities

Defining generators

A generator represents an actual generator device. A group contains at least one generator and can contain multiple generators. For some system types, each group must contain the same number of generators. See Generator Power configuration restrictions for more information.

To define a generator:

1. Click on the generator object border. The selected generator will be highlighted in blue and the Properties screen appears.



2. Complete the details for the generator:
   a. **Generator Name:** Enter the name for the generator.

      This name must be unique for each generator in the system.

   b. **Description:** Enter a description for the generator. This field is optional.

   c. **Nameplate Rating (kVA):** Enter the maximum output power (kVA) of the generator. This value must be greater than zero.

   d. **Derated Nameplate Rating (kW):** Enter the maximum power capacity (kW) that the generator is expected to support. This value must be equal or less than the nameplate rating value, and greater than zero.

3. Click **Done** to save the generator.

Related Topics:

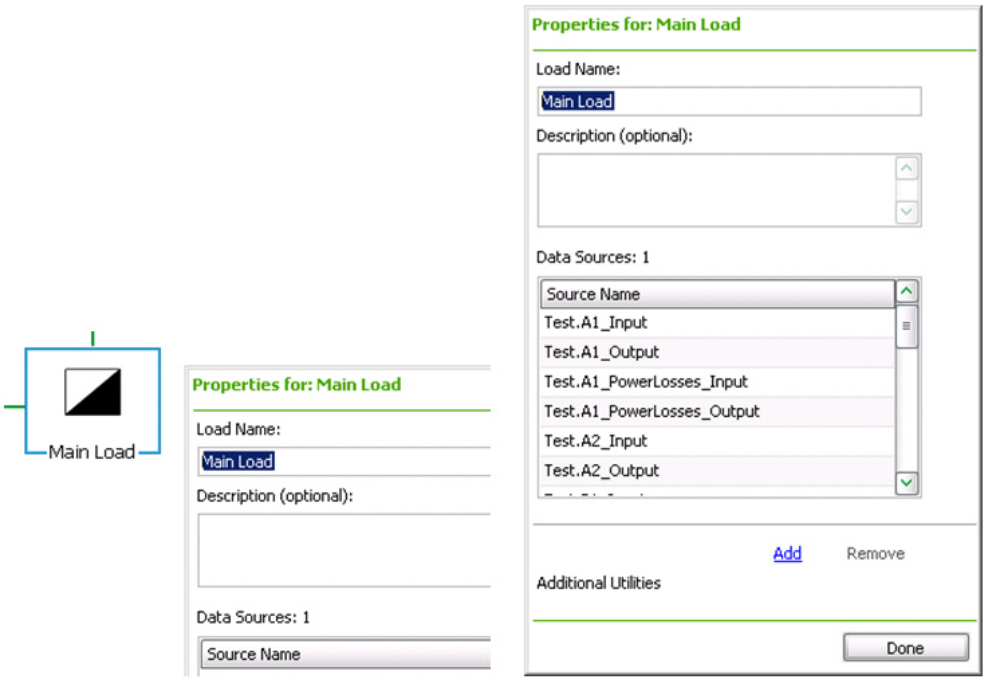
- Defining generator systems
- Defining generator groups
- Defining generator loads
- Defining utilities

Defining generator loads

A generator load represents the logical load attached to a generator group. Each generator system must have only one load.

To define a generator load:

1. Click the generator load element in the system diagram. The Properties screen appears.



2. Complete the details for the generator load:
   a. **Load Name:** Enter a name for the load.
   b. **Description:** Enter a description for the load. This field is optional.
   c. **Data Source:** Select one or more meter sources where load data is logged for this load.
   d. **Additional Utilities:** Click **Add** to increase the number of utility objects for the load. Click **Remove** to decrease the number of utility objects.
3. Click **Done** to save the generator load.

Related Topics:

- Defining generator systems
- Defining generator groups

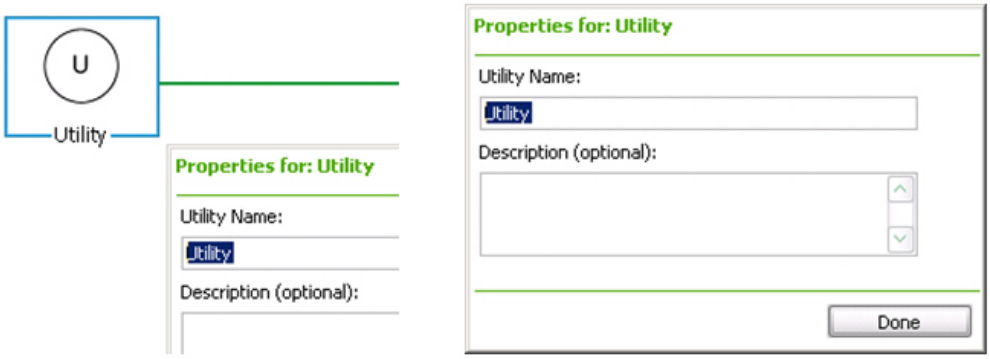
- Defining generators
- Defining utilities

Defining utilities

A utility represents the logical utility provider that feeds a load under normal operation. This logical utility has no functional purpose in the calculations for power redundancy. It is used to provide a more complete diagram representation for the generator system. A system may have one or two utilities represented in the diagram.

To define a utility:

1. Click the utility element in the diagram. The Properties screen appears.



2. Complete the details for the utility:
   a. **Utility Name:** Enter a name for the utility.
   b. **Description:** Enter a description for the utility. This field is optional.
3. Click **Done** to save the utility.

Once the configuration of the generators, loads, and utilities are complete, click **Apply** to save, or click **OK** to save the configuration and exit the utility.

Related Topics:

- Defining generator systems
- Defining generator groups
- Defining generators
- Defining generator loads

Generator system redundancy types

You can create a generator system to achieve power redundancy for IT equipment loads in different ways, depending on how the generators are grouped together and how they are connected to the equipment power supplies. This configuration tool supports several industry standard configurations.

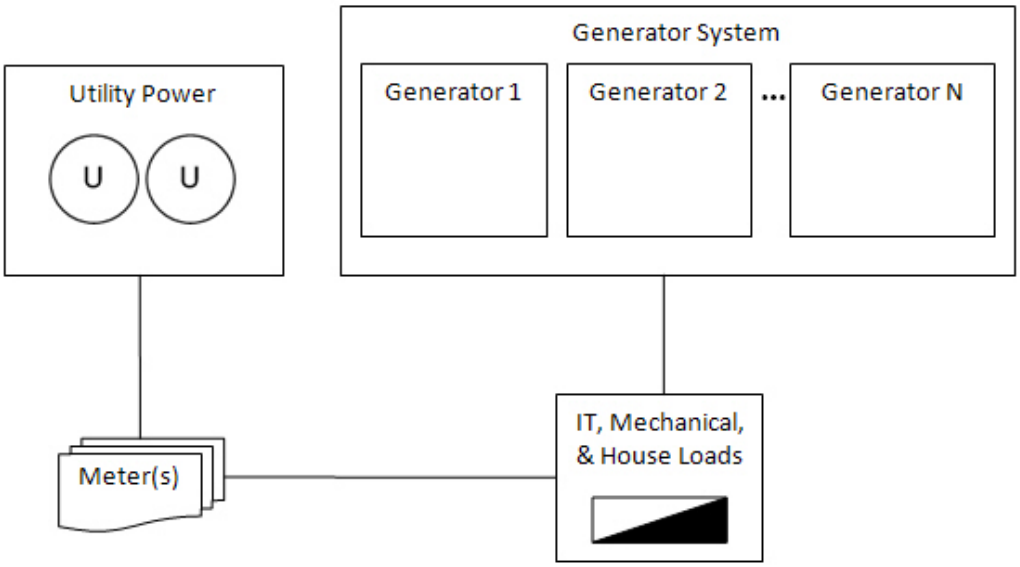
The generator system supports the following redundancy design types:

- N Type
- N+1 Type
- N+2 Type
- 2N Type
- 2(N+1) Type
- 2(N+2) Type

Before generator-related reports can be produced you need to define a generator system in the Generator Power Configuration Utility.

N Type

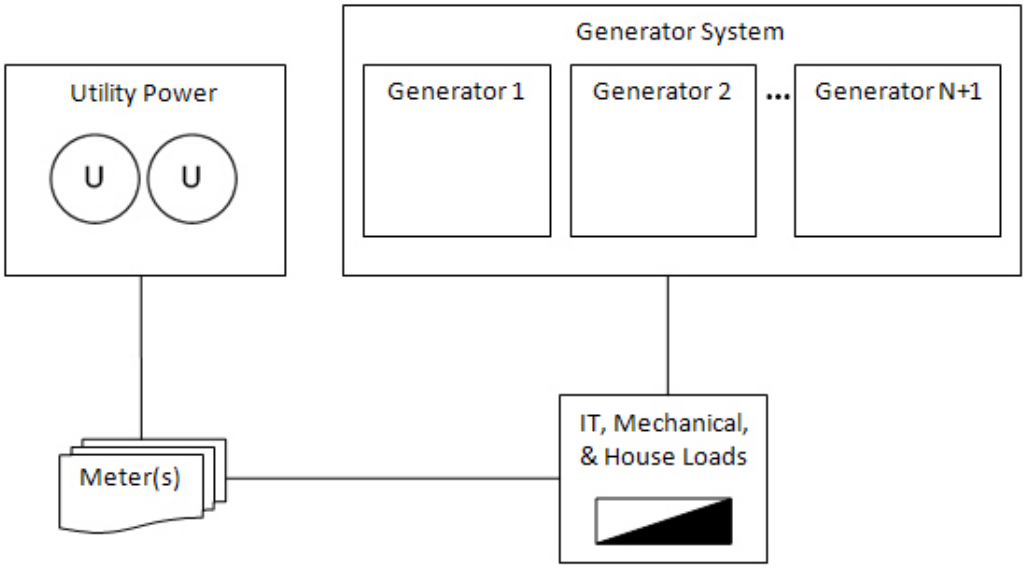
The N system configuration is for one or more generators that work together to supply power to the IT load, when the utility or utilities' power is unavailable. There is no redundancy. The intention is to size the generator system to match the peak IT load on the utility power.



N+1 Type

The N+1 system configuration is for one or more generators that work together to supply power to the IT load. There is simple generator redundancy in that one of the generators can stop functioning or be taken off-line, if the utility power is interrupted. The load is spread among all generators, but the peak load is such that if one generator stops working, the others will be able to assume its load. Another way to look at it is, N generators will be able to support the peak IT load. If the peak IT load is more than N can support, then system design redundancy will be lost.

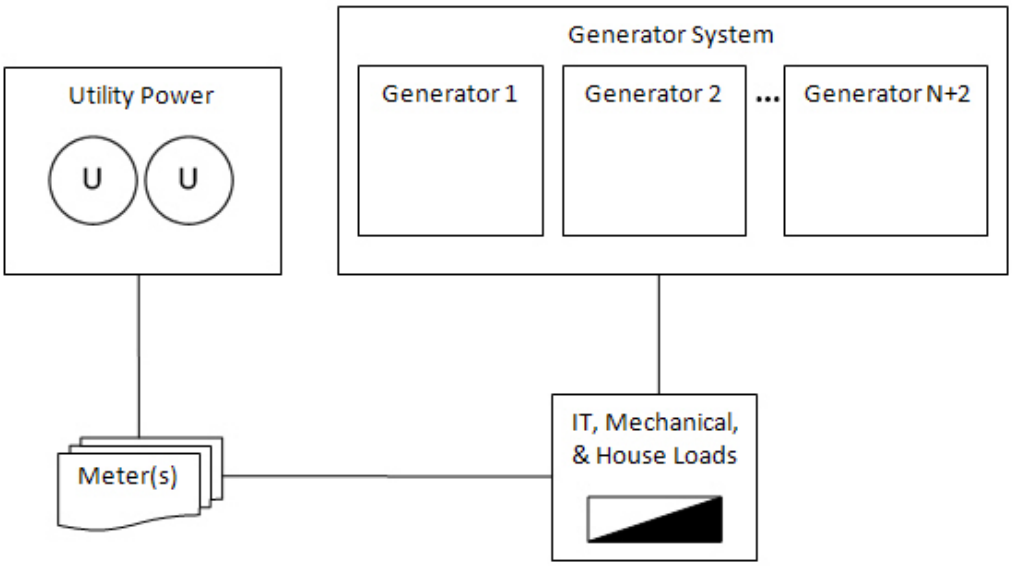
For example, if three generators are connected to the IT loads, in an N+1 system, the peak utility load must not exceed the non-redundant capacity of two of the generators. If it does, the designed redundancy will be lost.



N+2 Type

The N+2 system configuration is for a group of generators that work together to supply power to a medium voltage substation and is then distributed to low voltage loads. There is simple generator redundancy in that any two of the generators can stop functioning or be taken off-line, if the utility power is interrupted. The load is spread among all generators, but the utility peak load is such that if two generators stop working, the others will be able to assume their load. Another way to look at it is, N generators will be able to support the peak utility load. If the peak utility load is more than N can support, then system design redundancy will be lost.

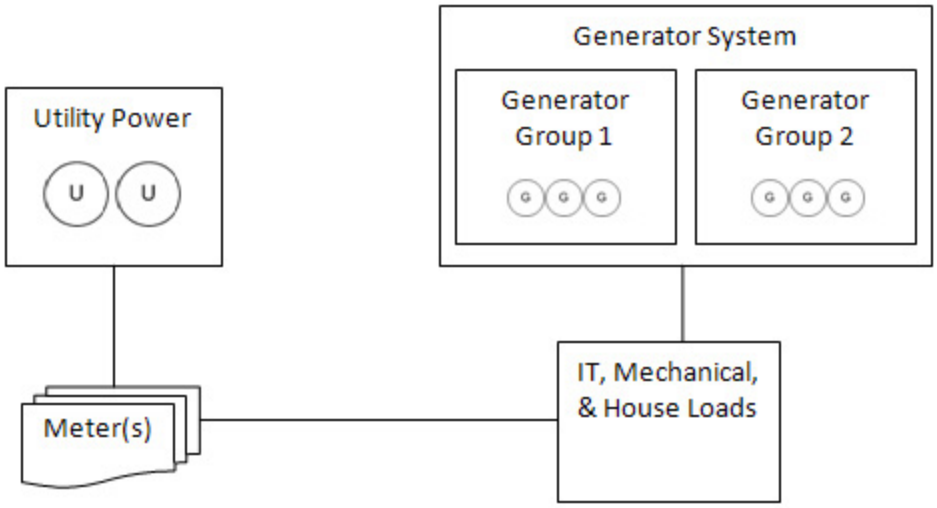
For example, if five generators are connected to the IT loads, in an N+2 system, the peak utility load must not exceed the non-redundant capacity of three of the generators. If it does, the designed redundancy will be lost.



2N Type

The 2N system configuration is for two groups of generators that supply power to the IT loads. In a 2N system, an entire group of generators can stop functioning or be taken off-line and the equipment will still be supplied with power, if the utility power is interrupted. The load is spread among all generators, but the peak load is such that, if an entire group of generators stop working, the remaining generators will be able to assume the entire load. Another way to look at it is, N generators will be able to support the peak utility load. If the peak utility load is more than N can support, then system design redundancy will be lost.

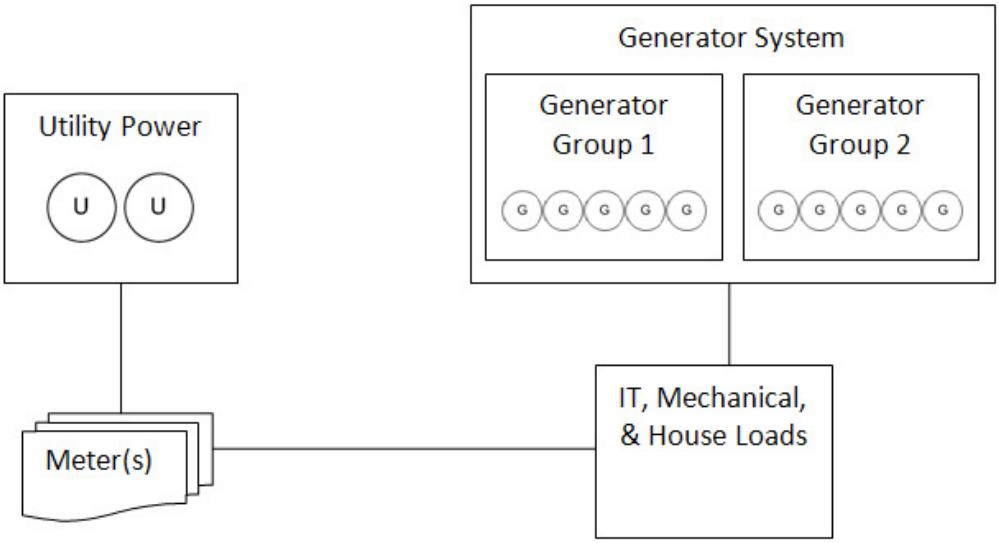
In this example, there are two groups with three generators in each. In a 2N configuration, one group of generators can go offline and the system will still have the designed redundancy. Therefore, the value for N is three. So, the total peak utility load cannot exceed the derated nameplate of three of the generators.



2(N+1) Type

The 2(N+1) system configuration is for two groups of generators that supply power to the IT loads. In a 2(N+1) system, an entire group of generators plus one more generator from each of the remaining groups can stop functioning or be taken off-line, and the equipment will still be supplied with power, if the utility power is interrupted. The load is spread among all generators, but the peak load is such that if an entire group's worth of generators goes offline, plus one more from each of the other groups stop working, the remaining generators will be able to assume the entire load. Another way to look at it is, N generators will be able to support the peak utility load. If the peak utility load is more than N can support, then system design redundancy will be lost.

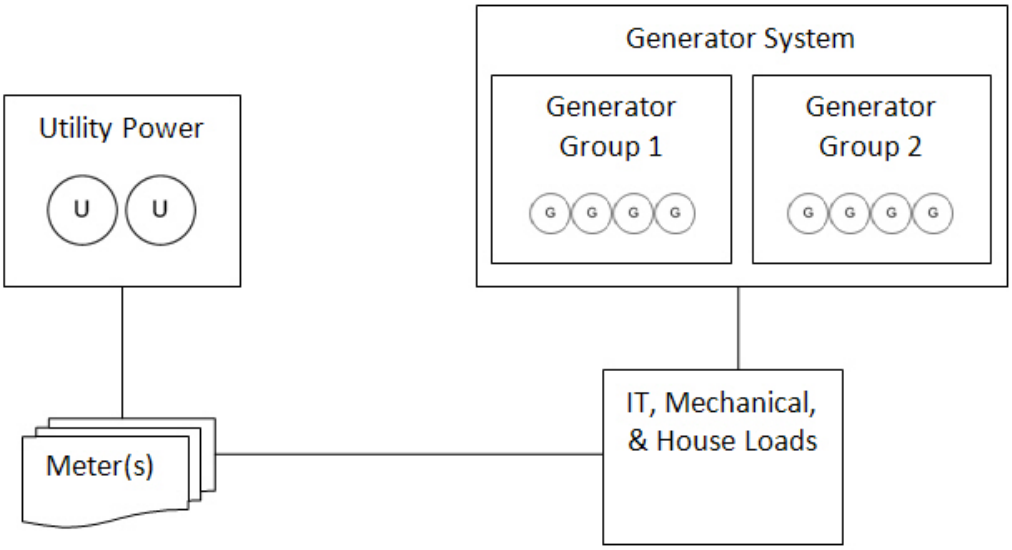
In this example, there are two groups with five generators in each. In a 2(N+1) configuration, one group of generators can go offline, plus one more generator from the remaining group and the system will still have the designed redundancy. Therefore, the value for N is four. So, the total peak utility load cannot exceed the derated nameplate of four of the generators.



2(N+2) Type

The 2(N+2) system configuration is for two groups of generators that supply power to the IT loads. In a 2(N+2) system, an entire group of generators plus two more generators from each of the remaining groups can stop functioning or be taken off-line and the equipment will still be supplied with power, if the utility power is interrupted. The load is spread among all generators, but the peak load is such that if an entire group's worth of generators goes offline, plus two more from each of the other groups goes offline, the remaining generators will be able to assume the entire load. Another way to look at it is, N generators will be able to support the peak utility load. If the peak utility load is more than N can support, then system design redundancy will be lost.

In this example, there are two groups with four generators in each. In a 2(N+2) configuration one group of generators can stop working, plus two more generators from the remaining group and the system will still have the designed redundancy. Therefore, the value for N is two. So, the total peak utility load cannot exceed the derated nameplate of two of the generators.



Hierarchy Configuration Utility

The Hierarchy Configuration Utility is intended for Application Engineers or advanced users working with hierarchies in PME.

The utility is a command-line executable that allows you to save, restore, or add hierarchy content.

The primary purpose of the utility is to give you a way to add a large number of entries to a hierarchy rather than creating individual entries in Hierarchy Manager. This task consists of:

- Saving a skeleton hierarchy configuration in a CSV file.
- Editing the CSV file to associate the devices listed in the file to the nodes of the hierarchy.
- Populating Hierarchy Manager with the updated contents of the hierarchy configuration CSV file.

The utility also provides options for:

- Saving or replacing a hierarchy configuration currently defined in Hierarchy Manager.
- Installing or saving a hierarchy template.
- Refreshing a configuration cache to ensure that all devices are included when you save a hierarchy configuration.
- Deleting a hierarchy configuration prior to restoring a saved configuration.

Throughout this document, references to "configuration" and "template" should be interpreted as follows:

- **configuration** – the entries representing the node types, devices, and virtual meters that comprise the content of a hierarchy.
- **template** – defines the node names, attributes, relationships, and views in Hierarchy Manager.

Hierarchy Configuration Utility command and options

Run the Hierarchy Configuration Utility command, `HierarchyConfig.exe`, from a Command Prompt.

To open a Command Prompt window:

1. Use Windows Explorer to navigate to:

   `...\Power Monitoring Expert\Applications.`

2. Click the bin folder and press **Shift + Right-click** and select **Open command window here** on the context menu.

The command syntax is:

`HierarchyConfig.exe` *`option`* `<file path>\<file name>`, where:

- *`option`*: see Command options below.
- `<file path>`: the location of the file that the command runs on.
- `<file name>`: the name of the CSV or XML file, including the `.csv` or `.xml` file extension, respectively.

Command options

Use the command as follows (type the command and press **Enter**):

Running the command without options

- To see a brief description of available command options:

```
HierarchyConfig.exe
```

Running the command using the `config` option

- To create a skeleton configuration CSV file that you can use to define a hierarchy configuration:

```
HierarchyConfig.exe export config <file path>\<file name>.csv
```

Note that this process creates a header row in the CSV file with percentage, node type names, and virtual meter column headings. It also includes a list of the devices in the system that are **not** included in a hierarchy. This allows you to specify which devices you want to include in the hierarchy when you import the configuration.

Optional: Including all devices

Add the `alldevices` option at the end of the export config command to create a CSV file that lists all of the devices, whether or not they are included in a hierarchy. This option ensures that apportioned devices or devices that constitute a virtual meter are included in the file.

To include all devices, type the following:

```
HierarchyConfig.exe export config <file path>\<file name>.csv
alldevices
```

Note that the CSV file created with the `alldevices` option is intended for reference purposes only and not for updating an existing hierarchy.

- To add the contents of the updated skeleton configuration CSV file to Hierarchy Manager:

```
HierarchyConfig.exe import config <file path>\<file name>.csv
```

> **NOTICE**
>
> **LOSS OF DATA**
>
> - Do not use the hierarchy configuration CSV file to incrementally update an existing hierarchy.
> - Use the Hierarchy Manager application to incrementally update an existing hierarchy.
>
> **Failure to follow these instructions can result in the corruption of hierarchy data.**

Optional: Adding a timestamp to configuration entries

You can also add a timestamp to the configuration entries. Adding year, month, and day information adds a start date to the imported references corresponding to the date entered. If no date information is provided, the start date of the hierarchy information is the system start date.

To add a timestamp, type `HierarchyConfig.exe import config <file path>\<file name>.xml [yyyy/mm/dd]` where `[yyyy/mm/dd]` is the year, month and day that the imported hierarchy references use as a start date.

- To back up a complete representation of the hierarchy and all virtual meters in an XML file:

  ```
  HierarchyConfig.exe export config <file path>\<file name>.xml
  ```

  This creates a backup of the hierarchy before you modify the hierarchy entries in Hierarchy Manager.

- To restore a hierarchy configuration from a backup configuration XML file:

  ```
  HierarchyConfig.exe import config <file path>\<file name>.xml
  ```

NOTICE
LOSS OF DATA • Do not use the hierarchy configuration XML file to incrementally update an existing hierarchy. • Use the Hierarchy Manager application to incrementally update an existing hierarchy. **Failure to follow these instructions can result in the corruption of hierarchy data.**

  This process deletes the current hierarchy configuration defined in Hierarchy Manager and replaces it with the hierarchy configuration in the XML file.

- To refresh a configuration cache to ensure that all devices are included in the saved configuration:

  ```
  HierarchyConfig.exe refresh config
  ```

- To delete a hierarchy configuration:

  ```
  HierarchyConfig.exe delete config
  ```

  Only use this process if you have previously saved your configuration.

Running the command using the `template` option

- To save the hierarchy template used in Hierarchy Manager:

  ```
  HierarchyConfig.exe export template <file path>\<file name>.xml
  ```

  The template defines the node names, attributes, and relationships used in Hierarchy Manager.

- To replace an existing hierarchy template used in Hierarchy Manager with a different one:

  ```
  HierarchyConfig.exe import template <file path>\<file name>.xml
  ```

Populating a hierarchy

After installing and commissioning PME, you can populate Hierarchy Manager by associating devices to nodes in a skeleton configuration CSV file and importing the entries into Hierarchy Manager. Following a successful import, you can use Hierarchy Manager to modify your hierarchy information. You can then use hierarchies in other PME applications, such as in view-enabled reports in the Web-based Reports application, and in the Dashboards application.

For illustration purposes, the default hierarchy template in Hierarchy Manager is used as a reference for this task.

The skeleton configuration CSV file created from the default hierarchy template used in Hierarchy Manager includes a header row with column headings of **Devices_Full Name**, **_Percentage**, **Site_Name**, **Buildings_Name**, **Areas_Name**, and **Virtual Meter_Name**. It also includes a list of the devices in the system that are **not** included in a hierarchy so that you can associate the devices to the hierarchy nodes.

	A	B	C	D	E	F	G
1	Devices_Full Name	_Percentage	Site_Name	Buildings_Name	Areas_Name	Virtual Meter_Name	
2	Test_Site.Device1						
3	Test_Site.Device2						
4	Test_Site.Device3						
5	Test_Site.Device4						
6	Test_Site.Device5						
7	Test_Site.Device6						
8	Test_Site.Device7						
9	Test_Site.Device8						
10	Test_Site.Device9						
11							

Different hierarchy templates can be used in Hierarchy Manager. Each hierarchy template determines the information that is included in the configuration CSV file. For example, the `Site Building Area Tenant.xml` hierarchy template file results in column headings of **Devices_Full Name**, **_Percentage**, **Site_Name**, **Buildings_Name**, **Areas_Name**, **Tenants_Name**, **Tenants_Contact**, **Tenants_email**, **Tenants_Phone**, and **Virtual Meter_Name** in the configuration CSV file.
(Sample and generic hierarchy templates are located in the: `...\Applications\HierarchyManager\SampleTemplates` folder.)

The procedure for updating a skeleton configuration CSV file follows a consistent pattern regardless of the template used in Hierarchy Manager.

The process for adding a large number of entries to a hierarchy consists of:

- Saving a skeleton hierarchy configuration in a CSV file.
- Editing the CSV file.
- Updating Hierarchy Manager with the new entries and verifying the outcome.

NOTICE

LOSS OF DATA

- Do not use the hierarchy configuration CSV file to incrementally update an existing hierarchy.
- Use the Hierarchy Manager application to incrementally update an existing hierarchy.

Failure to follow these instructions can result in the corruption of hierarchy data.

Editing and saving a localized version of a CSV file

If you edit and save a skeleton configuration CSV file that is created from a localized version of Hierarchy Manager with Excel, the UTF-8 encoding in the file is not preserved. This results in an unsuccessful update in Hierarchy Manager when you import the CSV file contents.

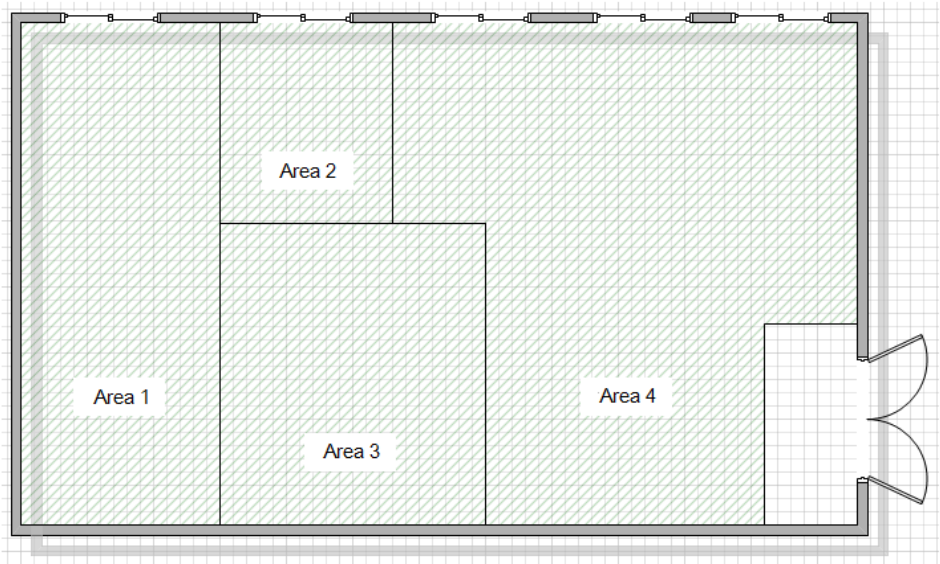
To resolve this situation, it is recommended that you use the Google Sheets spreadsheet application. Editing and saving a skeleton configuration CSV file with Google Sheets preserves the UTF-8 encoding, which results in a successful import of the CSV file contents to Hierarchy Manager.

Before you begin

Before you export the skeleton configuration CSV file from Hierarchy Manager, make sure that you complete the following tasks:

- Plan how the hierarchy is going to be configured, such as: naming conventions, which devices are going to be mapped to which Node, and how the different elements are grouped together. This can save time when you enter content in the configuration CSV file and it is very important when dealing with a large number of devices.

  For illustration purposes in this task, devices are going to be mapped to a physical layout consisting of 4 areas within a building.



- Install Microsoft Excel, or another spreadsheet application that you can use to open and edit CSV files on your system. (See Editing and saving a localized version of a CSV file for

information about editing and saving a skeleton configuration CSV file from a localized version of Hierarchy Manager.)

- Add devices, logical devices, and/or managed circuits to PME. You can add additional devices at a later time, but you need to have an initial number of devices before you export the skeleton configuration CSV file.

Saving a hierarchy configuration in a CSV file

This process creates a skeleton hierarchy configuration CSV file with a header row that includes percentage, node type names, and virtual meter column headings. It also includes a list of the devices in the system that are **not** included in a hierarchy. This allows you to specify which of those devices you want to include in the hierarchy when you import the contents of the hierarchy configuration CSV file.

If devices have recently been added, use the refresh command to update the configuration cache before proceeding. (See Refreshing the hierarchy cache for more information.)

1. Open a Command Prompt window:
   a. Use Windows Explorer to navigate to:

      `...\Power Monitoring Expert\Applications.`

   b. Click the bin folder and press **Shift + Right-click** and select **Open command window here** on the context menu.
2. Type `HierarchyConfig.exe export config <file path>\<file name>` and press **Enter**.

   Where `<file path>` is the location for the exported CSV file, and `<file name>` is the name of the file, including the `.csv` file extension. If you do not specify a file path, the current directory is used.

   NOTE: If you include spaces in the CSV file name and/or file path, you must enclose the file path and file name in quotation marks. For example, `HierarchyConfig.exe export config "C:\test file.csv"`.

   The items in the skeleton hierarchy configuration CSV file includes a list of devices **not** included in a hierarchy, the heading **_Percentage**, headings for the node types, and the heading **Virtual Meter_Name**.

Adding content to the configuration CSV file

The following steps describe:

- Defining the main elements (instances of a node) of the hierarchy.
- Associating devices to areas.
- Adding a virtual meters and associating devices.

Defining the main elements of the hierarchy

Define the site, building, and area names in the file as follows:

1. Open the hierarchy configuration CSV file in Excel.
2. On an empty row below the list of devices, type the names that you want to use for the site,

the building, and an area association in their respective columns.

	A	B	C	D	E	F	G
1	Devices_Full Name	_Percentage	Site_Name	Buildings_Name	Areas_Name	Virtual Meter_Name	
2	Test_Site.Device1						
3	Test_Site.Device2						
4	Test_Site.Device3						
5	Test_Site.Device4						
6	Test_Site.Device5						
7	Test_Site.Device6						
8	Test_Site.Device7						
9	Test_Site.Device8						
10	Test_Site.Device9						
11							
12			Test Site	Building 1	Area 1		
13							

As indicated in the previous description of the physical layout, there are 4 building areas. You now need to define the association of the 3 remaining areas to the building and site.

3. Repeat the previous step for each of **Area 2**, **Area 3** and **Area 4**, as shown in the following image.

	A	B	C	D	E	F	G
1	Devices_Full Name	_Percentage	Site_Name	Buildings_Name	Areas_Name	Virtual Meter_Name	
2	Test_Site.Device1						
3	Test_Site.Device2						
4	Test_Site.Device3						
5	Test_Site.Device4						
6	Test_Site.Device5						
7	Test_Site.Device6						
8	Test_Site.Device7						
9	Test_Site.Device8						
10	Test_Site.Device9						
11							
12			Test Site	Building 1	Area 1		
13			Test Site	Building 1	Area 2		
14			Test Site	Building 1	Area 3		
15			Test Site	Building 1	Area 4		
16							

This completes the association of the 4 areas to the building instance, **Building 1**, and the site instance, **Test Site**.

If there are additional buildings on the site, you can repeat the pattern that you entered. For example, if there is a Building 2 on the site, your entries would include the same site name, **Test Site**, but the building name is **Building 2**. Note that you should use unique names for the areas. For example, for **Building 2**, define the area names like **B2-Area 1**, **B2-Area 2**, and so on.

Associating devices to areas

Complete the following steps to associate devices to specific areas:

1. Type the area name that you defined in the previous set of steps, in the **Areas_Name** column on the row identifying the device full name.

   For example, to associate device **Test_Site.Device1** to **Area 1**, type **Area 1** in the **Areas_Name** column in that row.

	A	B	C	D	E	F	G
1	Devices_Full Name	_Percentage	Site_Name	Buildings_Name	Areas_Name	Virtual Meter_Name	
2	Test_Site.Device1				Area 1		
3	Test_Site.Device2						
4	Test_Site.Device3						
5	Test_Site.Device4						
6	Test_Site.Device5						
7	Test_Site.Device6						
8	Test_Site.Device7						
9	Test_Site.Device8						
10	Test_Site.Device9						
11							
12			Test Site	Building 1	Area 1		
13			Test Site	Building 1	Area 2		
14			Test Site	Building 1	Area 3		
15			Test Site	Building 1	Area 4		
16							

2. Continue to associate any of the remaining devices to their respective areas. Note that you can assign multiple devices to the same area. For example, the following image shows two devices assigned to **Area 3** and two to **Area 4**.

	A	B	C	D	E	F	G
1	Devices_Full Name	_Percentage	Site_Name	Buildings_Name	Areas_Name	Virtual Meter_Name	
2	Test_Site.Device1				Area 1		
3	Test_Site.Device2				Area 2		
4	Test_Site.Device3						
5	Test_Site.Device4						
6	Test_Site.Device5				Area 2		
7	Test_Site.Device6				Area 3		
8	Test_Site.Device7				Area 3		
9	Test_Site.Device8				Area 4		
10	Test_Site.Device9				Area 4		
11							
12			Test Site	Building 1	Area 1		
13			Test Site	Building 1	Area 2		
14			Test Site	Building 1	Area 3		
15			Test Site	Building 1	Area 4		
16							

Adding a virtual meter and associating devices

To define a virtual meter:

1. Type the virtual meter name in the **Virtual Meter_Name** column on the row identifying each device full name that you want to associate with the virtual meter.

	A	B	C	D	E	F	G
1	Devices_Full Name	_Percentage	Site_Name	Buildings_Name	Areas_Name	Virtual Meter_Name	
2	Test_Site.Device1				Area 1		
3	Test_Site.Device2				Area 2		
4	Test_Site.Device3					VM1	
5	Test_Site.Device4					VM1	
6	Test_Site.Device5				Area 2		
7	Test_Site.Device6				Area 3		
8	Test_Site.Device7				Area 3		
9	Test_Site.Device8				Area 4		
10	Test_Site.Device9				Area 4		
11							
12			Test Site	Building 1	Area 1		
13			Test Site	Building 1	Area 2		
14			Test Site	Building 1	Area 3		
15			Test Site	Building 1	Area 4		
16							

2. To apportion a percentage of a device's value to the virtual meter, type a percent value for the applicable device in the **_Percentage** column. For example, apportion 25% of **Test_Site.Test_**

8600_C and 75% of **Test_Site.Test_8600_D** to virtual meter **VM1**.

	A	B	C	D	E	F	G
1	Devices_Full Name	_Percentage	Site_Name	Buildings_Name	Areas_Name	Virtual Meter_Name	
2	Test_Site.Device1				Area 1		
3	Test_Site.Device2				Area 2		
4	Test_Site.Device3	25				VM1	
5	Test_Site.Device4	75				VM1	
6	Test_Site.Device5				Area 2		
7	Test_Site.Device6				Area 3		
8	Test_Site.Device7				Area 3		
9	Test_Site.Device8				Area 4		
10	Test_Site.Device9				Area 4		
11							
12			Test Site	Building 1	Area 1		
13			Test Site	Building 1	Area 2		
14			Test Site	Building 1	Area 3		
15			Test Site	Building 1	Area 4		
16							

3. To associate a virtual meter to a specific area, add the virtual meter name to the **Devices_Full Name** column on a row defining the area. For example, to associate **VM1** to **Area 2**, add **VM1** to line **13** (in this example) in the CSV file.

	A	B	C	D	E	F	G
1	Devices_Full Name	_Percentage	Site_Name	Buildings_Name	Areas_Name	Virtual Meter_Name	
2	Test_Site.Device1				Area 1		
3	Test_Site.Device2				Area 2		
4	Test_Site.Device3	25				VM1	
5	Test_Site.Device4	75				VM1	
6	Test_Site.Device5				Area 2		
7	Test_Site.Device6				Area 3		
8	Test_Site.Device7				Area 3		
9	Test_Site.Device8				Area 4		
10	Test_Site.Device9				Area 4		
11							
12			Test Site	Building 1	Area 1		
13	VM1		Test Site	Building 1	Area 2		
14			Test Site	Building 1	Area 3		
15			Test Site	Building 1	Area 4		
16							

You can also associate a virtual meter (**VM1**) to another virtual meter by including the virtual meter name in the **Devices_Full Name** column and adding the additional virtual meter name on the same row under the **Virtual Meter_Name** column.

	A	B	C	D	E	F	G
1	Devices_Full Name	_Percentage	Site_Name	Buildings_Name	Areas_Name	Virtual Meter_Name	
2	Test_Site.Device1				Area 1		
3	Test_Site.Device2				Area 2		
4	Test_Site.Device3	25				VM1	
5	Test_Site.Device4	75				VM1	
6	Test_Site.Device5				Area 2		
7	Test_Site.Device6				Area 3		
8	Test_Site.Device7				Area 3		
9	Test_Site.Device8				Area 4		
10	Test_Site.Device9				Area 4		
11	VM1					VM2	
12			Test Site	Building 1	Area 1		
13	VM1		Test Site	Building 1	Area 2		
14			Test Site	Building 1	Area 3		
15			Test Site	Building 1	Area 4		
16							

When you complete your updates in the hierarchy configuration CSV file, you can now update Hierarchy Manager by importing the contents of the CSV file.

Adding your entries to Hierarchy Manager

Complete the following steps to add the contents of the hierarchy configuration CSV file to Hierarchy Manager:

1. Open a Command Prompt window:
   a. Use Windows Explorer to navigate to:

      `...\Power Monitoring Expert\Applications.`

   b. Click the bin folder and press **Shift + Right-click** and select **Open command window here** on the context menu.
2. Type `HierarchyConfig.exe import config <file path>\<file name>` and press **Enter**.

   Where `<file path>` is the location of the file you are importing, and `<file name>` is the name of the file, including the `.csv` file extension. If you do not specify a file path, the current directory is used.

   The import process provides feedback during each stage of the import. If the import operation is unsuccessful, the utility provides information about possible reasons for the unsuccessful operation.

   NOTE: If the CSV file name and/or file path contains spaces, you must enclose the file path and file name in quotation marks. For example, `HierarchyConfig.exe import config "C:\test file.csv".`
3. Verify the correct hierarchy configuration in Hierarchy Manager.

Saving and restoring a hierarchy configuration

The Hierarchy Configuration utility allows you to save (export) the configuration as an XML file. The file contains a full representation of the current hierarchy in Hierarchy Manager, including:

- Nodes.
- Relationships between nodes, including their time dimensions.
- All apportionment nodes.

This lets you back up the hierarchy before modifying it in the Hierarchy Manager application. You can import the hierarchy configuration saved in the XML file to restore your hierarchy in Hierarchy Manager.

NOTE: Restoring (importing) a configuration XML file deletes the current hierarchy configuration and replaces it with the one represented in the file.

NOTICE

LOSS OF DATA

- Do not use the hierarchy configuration XML file to incrementally update an existing hierarchy.
- Use the Hierarchy Manager application to incrementally update an existing hierarchy.

Failure to follow these instructions can result in the corruption of hierarchy data.

Saving the entire hierarchy configuration in an XML file

To save a configuration XML file:

1. Open a Command Prompt window:
   a. Use Windows Explorer to navigate to:

      `...\Power Monitoring Expert\Applications.`

   b. Click the bin folder and press **Shift + Right-click** and select **Open command window here** on the context menu.
2. Run `HierarchyConfig.exe export config <file path>\<file name>`, where `<file path>` is the location where you want to save XML file, and `<file name>` is the name of the XML file, including `.xml` as the file extension. If you do not specify a file path, the current directory is used.

   NOTE: If the XML file name and/or file path contains spaces, you must enclose the file path and file name in quotation marks. For example, `HierarchyConfig.exe export config "C:\test file.xml"`.

Restoring the entire hierarchy configuration from an XML file

NOTE: Restoring a configuration XML file deletes the current hierarchy configuration and replaces it with the one represented in the file.

NOTICE

LOSS OF DATA

- Do not use the hierarchy configuration XML file to incrementally update an existing hierarchy.
- Use the Hierarchy Manager application to incrementally update an existing hierarchy.

Failure to follow these instructions can result in the corruption of hierarchy data.

To restore the configuration XML file:

1. Open a Command Prompt window:
   a. Use Windows Explorer to navigate to:

      `...\Power Monitoring Expert\Applications.`

b. Click the bin folder and press **Shift + Right-click** and select **Open command window here** on the context menu.

2. Type `HierarchyConfig.exe import config <file path>\<file name>`, where `<file path>` is the location of the file you are importing, and `<file name>` is the name of the XML file, including `.xml` as the file extension, to be imported. If you do not specify a file path, the current directory is used.
3. Verify the correct hierarchy configuration in Hierarchy Manager.

Installing or saving a hierarchy template

The `import template` command option lets you install a hierarchy template as a replacement for the template used in Hierarchy Manager. The `export template` command option lets you save a copy of the hierarchy template used in Hierarchy Manager. Prior to using these commands, you should back up your existing hierarchy configuration (see Saving the entire hierarchy configuration in an XML file).

Installing a hierarchy template

Use the import template option to replace the template currently installed in your system with a different one.

NOTICE
LOSS OF DATA The new template overwrites the existing template, which permanently removes all information contained in the original. Export the existing hierarchy template from PME before importing a new template. **Failure to follow these instructions can result in a loss of data.**

When you import the hierarchy template XML file, the Hierarchy Configuration Utility performs a validation test on the file. If the file validation is not successful, the utility does not import the file and provides information indicating where the validation process stopped. Check for any discrepancies in the file, save the changes and reimport the file.

To import a hierarchy template XML file:

1. Open a Command Prompt window:
   a. Use Windows Explorer to navigate to:

      `...\Power Monitoring Expert\Applications.`

   b. Click the bin folder and press **Shift + Right-click** and select **Open command window here** on the context menu.
2. Type `HierarchyConfig.exe import template <file path>\<file name>`, where `<file path>` is the location of the XML file, and `<file name>` is the name of the XML file, including `.xml` as the file extension, to be imported. If you do not specify a file path,

the current directory of the Hierarchy Configuration Utility is used.

The utility provides feedback for each stage of the import. If the import operation is unsuccessful, the utility provides information about why the import is unsuccessful.

NOTE: If the XML file name and/or file path contains spaces, you must enclose the file path and file name in quotation marks. For example, `HierarchyConfig.exe import template "C:\test file.xml`.

3. Verify that the template has been successfully imported in Hierarchy Manager.

   Hierarchy Manager should now display the nodes defined in the newly imported template.

Saving a hierarchy template

Use the export template option to save the Hierarchy Manager template currently installed in the system as an XML file. The file defines the node names, attributes, relationships, and views for Hierarchy Manager.

To export a hierarchy template XML file:

1. Open a Command Prompt window:
   a. Use Windows Explorer to navigate to:

      `...\Power Monitoring Expert\Applications`.

   b. Click the bin folder and press **Shift + Right-click** and select **Open command window here** on the context menu.
2. Type `HierarchyConfig.exe export template <file path>\<file name>`, where `<file path>` is the location where you want to save the XML file, and `<file name>` is the name of the XML file, including `.xml` as the file extension. If you do not specify a file path, the current directory is used.

   NOTE: If the XML file name and/or file path contains spaces, you must enclose the file path and file name in quotation marks. For example, `HierarchyConfig.exe export template "C:\test file.xml"`.

3. Navigate to the location you specified to confirm that the XML file is successfully saved.

Refreshing the hierarchy cache

Use the refresh config option to refresh the configuration cache. If you recently added new devices to PME , use this command before you export a hierarchy configuration CSV file so that an up-to-date list of devices is included in the file. If the refresh configuration is not run, there is a possibility that devices recently added to PME may not be present in the device list in the hierarchy configuration CSV file. The best practice is to run the refresh config command before exporting any CSV or XML file from Hierarchy Manager.

To refresh the configuration cache:

1. Open a Command Prompt window:
   a. Use Windows Explorer to navigate to:

      `...\Power Monitoring Expert\Applications`.

b. Click the bin folder and press **Shift + Right-click** and select **Open command window here** on the context menu.

2. Run `HierarchyConfig.exe refresh config`.

   The message `Configuration cache refresh complete` indicates that the refresh operation has finished.

Deleting hierarchy configuration content

Use the delete config option to remove all hierarchy configuration content from Hierarchy Manager, such as names and properties. This allows you to start with new content. Note that this delete process does not remove virtual meters. You need to use Hierarchy Manager to delete virtual meters.

NOTICE
LOSS OF DATA Performing this operation permanently removes configuration content from the system. Ensure that this operation is necessary before proceeding. This procedure cannot be undone. **Failure to follow these instructions can result in a loss of data.**

To delete configuration content:

1. Open a Command Prompt window:

   a. Use Windows Explorer to navigate to:

      `...\Power Monitoring Expert\Applications`.

   b. Click the bin folder and press **Shift + Right-click** and select **Open command window here** on the context menu.

2. Type `HierarchyConfig.exe delete config`. Type `yes` when prompted. The utility deletes all hierarchy configuration content. To confirm the deletion, open Hierarchy Manager. There should be no hierarchy content displayed.

Hierarchy template structure

PME includes a number of standard hierarchy templates that provide a structure for modeling the different aspects of your organization. This section describes the structure of a hierarchy template XML file.

Sample and generic hierarchy templates are included with your software. You can use any of these templates if they more closely represent the hierarchy organization you want to implement. However, you need to have a thorough understanding of the structure of a template before making any changes. Always back up your files before proceeding with any changes. The additional hierarchy templates are located in:
`...\Applications\HierarchyManager\SampleTemplates`

NOTE: Any time you change a hierarchy template, you need to import it into Hierarchy Manager before those changes take effect. See Installing a hierarchy template.

Localizing a hierarchy template XML file

You can localize a hierarchy template XML file to display national language text on the tabs and views in Hierarchy Manager, and also wherever hierarchies are enabled in the Web Applications component. For example, localized hierarchy node names will display in the **Source Selector** in the Reports application.

To localize the text you need to edit the displayName attribute that is used throughout a hierarchy template XML file. For example, the display name attribute for `Site` in the hierarchy template file is `displayName="Site"`. Change the text within the quotation marks to the national language equivalent.

The displayName attribute is used in `<Type>`, `<Attribute>`, `<Reference>`, and `<View>` xml elements in a hierarchy template file. (See The XML elements in the template file for descriptions of these elements.) In some cases the same text is used on displayName attributes more than once in the hierarchy template file. Be sure to change every occurrence in the file.

When you complete the edits, follow the process described in Installing a hierarchy template to update the hierarchy template used by Hierarchy Manager.

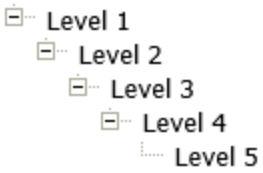
The hierarchy template

The hierarchy template XML file defines the Node types, attributes, and relationships used in Hierarchy Manager. Each element of the template is defined using information contained within the various XML tags. For example, assume that `Generic 5 Level Template.xml` is imported into Hierarchy Manager. (See the Generic 5 Level Template.)

The initial page in Hierarchy Manager shows the node types and attributes defined in the hierarchy template file. The bottom three node types are configured for devices to be connected to them.

(See Additional notes for considerations related to associating devices to more that one node level in a hierarchy.)

The hierarchy view defined in the template is represented on the Hierarchy Manager **Tree View** page as a physical layout:



The following table summarizes the major elements in a hierarchy template XML file.

Tag	Description	Example
<Template>	Contains template namespace information	<Template version="1.0" xmlns="uri:application-modules/power/model/template#">
<Types>	Container tag for Type and Attribute elements	<Types> </Types>
<Type>	Defines elements that define characteristics used by the node . Each type represents a tab in Hierarchy Manager.	<Type displayName="level_1"…/>
<Attribute>	Defines the characteristics used in each type.	<Attribute displayName="id" dataType="String" uri="uri::application-modules/power/model/attribute#name" />
<Reference>	Used to create relationships between nodes. For a relationship to exist between nodes, each Type element must contain reference information for every other element it is associated with.	<Reference displayName="level_2" isReverse="true" target="uri:application-modules/power/model/type#level_2" uri="uri:application-modules/power/model/relation#1_2" />
<Views>	Contains elements that define how the Node types are presented in different hierarchical views.	<Views> </Views>
<View>	Specifies the node type the view starts at. Contains Relation elements.	<View displayName="Generic Layout" rootNodeTypeUri="uri:application-modules/power/model/type#level_1">
<Relation>	Contained in a View element. Defines the order that the node types are displayed in.	<Relation follow="uri:application-modules/power/model/relation#1_2" reverse="true" />

The XML elements in the template file

This section describes each element in the template XML file.

<Template>

The `<Template>` element is the container for all of the XML tags.

```
<Template version="1.0" xmlns="uri:application-
modules/power/model/template#">
```

<Types>

This is a containment tag for all `<Type>` elements. Make sure any `<Type>` elements are inside this containment tag.

```
<Types>
    <Type...>
     ...
    </Type>
    ...
</Types>
```

<Type>

The `<Type>` tag contains all the information required to define the Node. Each defined type adds a tab in Hierarchy Manager. The tab name is defined by `displayName`. The `<Type>` tag also contains one or more `<Attribute>` and `<Reference>` tags.

```
<Types>
    <Type displayName="level_1" uri="uri:application-
modules/power/model/type#level_1">
       <Attribute... />
       <Attribute... />
       ...
       <Reference... />
       ...
    </Type>
    <Type>
     ...
    </Type>
</Types>
```

To change the tab name in Hierarchy Manager from `level_1` to `new_name`, modify `displayName` in the template file from:

```
<Type displayName="level_1" uri= "uri:application-
modules/power/model/type#level_1">
```

to:

```
<Type displayName="new_name" uri="uri:application-
modules/power/model/type#new_name">
```

<Attribute>

The `<Attribute>` tag defines the characteristics of the `<Type>`. It uses `dataType` to determine the format of the edit dialog that opens in Hierarchy Manager.

You need to define at least one `<Attribute>` element with `attribute#name` in the uri: `uri:application-modules.com/power/model/attribute#name`.

The datatypes on the `<Attribute>` element can be such things as name, floor number, or breaker ratings, depending on the template layout.

- `dataType="String"` - For short blocks of text (for example, name).
- `dataType="LongText"` - For long blocks of text (for example, notes, contact information).
- `dataType="Number"` - For numeric fields (for example, breaker rating in Amps).
- `dataType="Boolean"` - For checkboxes (for example Rack Circuit).

```
<Types>
    <Type displayName="level_1" uri="uri:application-
modules/power/model/type#level_1">
        <Attribute displayName="id" dataType="String" uri="uri:application-
modules/power/
         model/attribute#name" />
        <Attribute... />
        ...
       <Reference... />
        ...
    </Type>
    <Type>
     ...
    </Type>
</Types>
```

To add an attribute to a node, determine the characteristic you need to capture with that attribute, determine the appropriate `dataType`, and create the attribute. To define **Name** as one of the characteristics for a type, the `Attribute` tag is written as:

```
<Attribute displayName="Name" dataType="String" uri="uri:application-
modules/power/model/
 attribute#name" />
```

<Reference>

The `<Reference>` tag defines the relationship between types. To establish a relationship, each `<Type>` element needs a `<Reference>` element, and each `<Reference>` element needs to refer to the `displayName` of the related `<Type>`.

The following example contains references establishing a relationship between the `<Type>` with `displayName="level_1"`, and the `<Type>` with `displayName="level_2"`.

Since the types are in a parent-child relationship, the reference in the child needs to contain `isReverse="true"`.

The last portion of the `<Reference>` element includes a relation name. It is used in the `Relation` element within the `<View>` structure to define what appears on the **Tree View** page in Hierarchy Manager.

```
<Types>
    <Type displayName="level_1" uri="uri:application-
modules/power/model/type#level_1">
       <Attribute displayName="id" dataType="String" uri="uri:application-
modules/power
         /model/attribute#name" />
        <Attribute... />
        ...
        <Reference displayName="level_2" uri="uri:applications-
modules/power/model/
         relation#1_2" target="uri:application-
modules/power/model/type#level_2 />
        ...
    </Type>
    <Type displayName="level_2" uri="uri:application-
modules/power/model/type#level_2">
       <Attribute displayName="id" dataType="String" uri="uri:application-
modules/
        power/model/attribute#name" />
       <Attribute... />
       ...
       <Reference displayName="level_1" isReverse="true"
uri="uri:applications-modules/
        power/model/relation#1_2" target="uri:application-
modules/power/model/
        type#level_1 />
       ...
    </Type>
</Types>
```

A physical or logical device, or managed circuit can be associated with any type. To configure a type to connect with a device, create a `Reference` tag similar to the example below. Note that `meteredBy` is a keyword, and it must be entered exactly as shown to correctly reference a device.

```
<Reference displayName="device" uri="uri:application-
modules/power/model/relation#meteredBy"
 target="uri:application-modules/power/model/type#device" />
```

<Views>

This is a containment tag for all `<View>` elements. Views are the means by which other applications such as Dashboards and Reports discover the set of devices that are aggregated together. All `<View>` elements need to be inside this containment tag.

```
<Types>
    <Type...>
     ...
```



```
    </Type>
    <Type...>
     ...
    </Type>
</Types>
<Views>
    <View... >
    </View>
</Views>
```

<View>

The `<View>` tag defines how a hierarchy can be viewed in PME. These different views provide different ways that a hierarchy can be displayed, or different ways the device data associated with the hierarchy types can be grouped together.

The view `displayName` (for example **Generic Layout**) is defined here. The name appears on the **Tree View** page of Hierarchy Manager. You can select the view as a data source in the Dashboards and Reports applications.

The `<View>` tag groups together the `<Relation>` elements whose order determines how the view appears.

```
<Types>
    <Type>
     ...
    </Type>
    <Type...>
     ...
    </Type>
</Types>
<Views>
    <View displayName="Generic Layout"
rootNodeTypeUri="uri:application-modules/power/model/
     type#level_1 >
       <Relation... />
       <Relation... />
       ...
    </View>
</Views>
```

<Relation>

The `<Relation>` tag is used to establish how the different views of the hierarchy are structured. The initial relation is defined in the `<Reference>` element within a `<Type>`. Specify the node type to start at (the initial `<Relation>` entry), then add `<Relation>` entries to complete the tree.

If a `<View>` element contains a `<Relation>` with `reverse="true"`, then the view presented follows the relationship in the reverse order.

```
<Types>
    <Type displayName="level_1" uri="uri:application-
modules/power/model/type#level_1">
       <Attribute displayName="id" dataType="String" uri="uri:application-
modules/power/
        model/attribute#name" />
        ...
       <Reference displayName="level_2" uri="uri:applications-
modules/power/model/
        relation#1_2" target="uri:application-
modules/power/model/type#level_2 />
    </Type>
    <Type displayName="level_2" uri="uri:application-
modules/power/model/type#level_2">
       <Attribute displayName="id" dataType="String"
uri="uri:application-modules/
         power/model/attribute#name" />
        <Attribute... />
        ...
        <Reference displayName="level_1" isReverse="true"
uri="uri:applications-modules/
         power/model/relation#1_2" target="uri:application-
modules/power/model/
         type#level_1 />
    </Type>
    <Type...>
     ...
    </Type>
</Types>
<Views>
    <View displayName="Generic Layout"
rootNodeTypeUri="uri:application-modules/power/model/
      type#level_1 >
       <Relation follow="uri:application-modules/power/model/relation#1_2"
/>
       <Relation follow="uri:application-modules/power/model/relation#2_3"
/>
       <Relation follow="uri:application-modules/power/model/relation#3_4"
/>
       <Relation follow="uri:application-modules/power/model/relation#4_5"
/>
       ...
    </View>
</Views>
```

Additional notes

Considerations when selecting a hierarchy view in a Web-based report

If devices are associated with more than one node in a parent-child relationship in a hierarchy tree, only those devices first encountered in the tree are included in generated reports. All devices lower in the hierarchy tree are ignored in generated reports.

For example, if a hierarchy tree is structured as:

Site 1

Building 1 (including associated devices)

Area 1 (including associated devices)

and you select **Building 1** on the **Views** page of the **Source Selector** in a report, the generated report includes data for the devices associated with **Building 1**, but not for devices in the lower node in the tree – **Area 1**.

Similarly, if you select **Site 1**, which does not include a device association in the hierarchy, the generated report includes data for the devices associated with the **Building 1** level only, the level in the hierarchy where devices are first encountered.

Using comment tags

If you do not require all the levels provided in the example hierarchy template XML file, you can comment out the types you do not need, from the bottom type up. Commenting out the type, rather than just deleting the type preserves the structure of the template file and allows you to reinstate the type with a minimum of effort. Enclose the `<Type>` element within the start comment tag `<!--` and the end comment tag `-->` to comment it out. For example:

```
<!-- <Type... >
...
</Type> -->
```

Remove the comment tags to restore the type.

If you want to remove one or more view elements defined in a template, add comment tags around the applicable `<View>` tags. Remove the comment tags to restore the View elements.

When you import the hierarchy template XML file, the Hierarchy Configuration utility performs a validation test on the file. If the file validation is not successful, the utility does not import the file and provides information indicating where the validation process stopped. Check for any discrepancies in the file, save the changes and reimport the file.

Generic 5 Level Template

```
<Template version="1.0" xmlns="uri:application-modules/power/model/template#">

<!-- This is a template for a simple 5 level hierarchy. All the relations and nodes have been pre-configured. To customize for your purposes, search and replace "level_1" with the name of your top-level type (e.g. Site),
...
"level_5" with the name of your lowest-level type (e.g. Room)
With this template you can attach "devices" to the lower 3 levels.
-->

<Types>

<Type displayName="level_1" uri="uri:application-modules/power/model/type#level_1">
<!-- every Type must have attribute#name - change displayName as needed -->
<Attribute displayName="id" dataType="String" uri="uri:application-modules/power/model/attribute#name" />
<!-- use these elements to add attributes to nodes -->
<Attribute displayName="string" dataType="String" uri="uri:application-modules/power/model/attribute#str" />
<Attribute displayName="notes" dataType="LongText" uri="uri:application-modules/power/model/attribute#note" />
<Attribute displayName="number" dataType="Number" uri="uri:application-modules/power/model/attribute#num" />
<Attribute displayName="boolean" dataType="Boolean" uri="uri:application-modules/power/model/attribute#bool" />

<!-- this is how to create one half of the relationship between two nodes, you need a similar reference on the other end of the relationship -->

<Reference displayName="level_2" uri="uri:application-modules/power/model/relation#1_2" target="uri:application-modules/power/model/type#level_2" />
</Type>

<Type displayName="level_2" uri="uri:application-modules/power/model/type#level_2">
<Attribute displayName="id" dataType="String" uri="uri:application-modules/power/model/attribute#name" />
<!-- this is the other end of the relationship marked above - isReverse is opposite, relation#... must be equal -->
<Reference displayName="level_1" isReverse="true" uri="uri:application-modules/power/model/relation#1_2" target="uri:application-modules/power/model/type#level_1" />
<Reference displayName="level_3" uri="uri:application-modules/power/model/relation#2_3" target="uri:application-modules/power/model/type#level_3" />
</Type>

<Type displayName="level_3" uri="uri:application-modules/power/model/type#level_3">
<Attribute displayName="id" dataType="String" uri="uri:application-modules/power/model/attribute#name" />
<Reference displayName="level_2" isReverse="true" uri="uri:application-modules/power/model/relation#2_3" target="uri:application-modules/power/model/type#level_2" />
<Reference displayName="level_4" uri="uri:application-modules/power/model/relation#3_4" target="uri:application-modules/power/model/type#level_4" />
<Reference displayName="device" uri="uri:application-modules/power/model/relation#meteredBy" target="uri:application-modules/power/model/type#device" />
</Type>

<Type displayName="level_4" uri="uri:application-modules/power/model/type#level_4">
<Attribute displayName="id" dataType="String" uri="uri:application-modules/power/model/attribute#name" />
<Reference displayName="level_3" isReverse="true" uri="uri:application-modules/power/model/relation#3_4" target="uri:application-modules/power/model/type#level_3" />
<Reference displayName="level_5" uri="uri:application-modules/power/model/relation#4_5" target="uri:application-modules/power/model/type#level_5" />
<Reference displayName="device" uri="uri:application-modules/power/model/relation#meteredBy" target="uri:application-modules/power/model/type#device" />

</Type>

<Type displayName="level_5" uri="uri:application-modules/power/model/type#level_5">
<Attribute displayName="id" dataType="String" uri="uri:application-modules/power/model/attribute#name" />
<Reference displayName="level_4" isReverse="true" uri="uri:application-modules/power/model/relation#4_5" target="uri:application-modules/power/model/type#level_4" />
```

```
<!-- this is how to connect up a logical/physical device to provide metered data to a node this can appear anywhere in the hierarchy e.g. main meter for building, metering points for specific loads, managed circuits for multi-circuit monitors -->
<Reference displayName="device" uri="uri:application-modules/power/model/relation#meteredBy" target="uri:application-modules/power/model/type#device" />
</Type>

</Types>

<Views>

<!-- View displayName shows up in the drop-down of Reports/Gadgets -->
<!-- specify the node type to start at, then add the relations to follow -->
<View displayName="Generic Layout" rootNodeTypeUri="uri:application-modules/power/model/type#level_1">
<Relation follow="uri:application-modules/power/model/relation#1_2" />
<Relation follow="uri:application-modules/power/model/relation#2_3" />
<Relation follow="uri:application-modules/power/model/relation#3_4" />
<Relation follow="uri:application-modules/power/model/relation#4_5" />
</View>

<!-- do not need to add the "meteredBy" relation in the View if a "meteredBy" relation has a mapped device no matter what level of the hierarchy then the aggregation will return the value from the mapped device -->
</Views>
</Template>
```

Hierarchy Manager

Depending on the number of devices you are currently monitoring, organizing the data coming from those devices can be a difficult task. Hierarchy Manager allows you to organize the devices in EcoStruxure™ Power Monitoring Expert into recognizable views by defining their relationships as parts of a system model. Once the model has been created, energy data associated with the hierarchy can be grouped, aggregated, and used by other components of Power Monitoring Expert.

The Hierarchy Manager views are intended to represent the real world electrical, physical, and business characteristics of your organization. The items contained in a view, and how those items relate to each other are specified using a template approach. There are several example templates included in the product to help you create the views applicable to your organization. One of these templates is configured when Power Monitoring Expert is first installed.

Open the Hierarchy Manager from **Settings** > **System** > **Hierarchies** in the Web Applications banner. You can also open Hierarchy Manager from the **Tools** > **Web Tools** menu in the Management Console.

The following topics provide specific information regarding the features and use of the Hierarchy Manager application:

- Hierarchy templates
  - Nodes
  - Node properties
  - Common elements of hierarchy templates
- Creating a hierarchy
- Creating an apportioned meter
- Creating a virtual meter
- Dynamic hierarchy
- Meter apportionment
- Virtual meter
- Using hierarchies in other applications

After you have configured the views of the hierarchy structure, you can use them in different areas of Power Monitoring Expert.

NOTE: Before using Hierarchy Manager, ensure that devices, logical devices, or managed circuits have been added to Power Monitoring Expert through the Management Console component.

Hierarchy templates

When the Hierarchy Manager application opens, everything displayed in the application is based on the hierarchy template defined in the system. This template defines the parameters of the model. If you were to describe the physical layout of a building for example, you could describe the name of

the building, each floor of the building, and the rooms or areas that each floor contains. The hierarchy template for a building's physical layout does the same thing, using Nodes to represent the different aspects of the model.

Note that a **Virtual Meter** Node is included in the hierarchy template. You can define virtual meters without associating them with a hierarchy, or you can include virtual meters in a hierarchy the same way that you include devices. You can select virtual meters for many of the reports in the Reports application.

Each Node contains instances of that particular Node type, which in turn are defined by a set of properties. These properties not only define the different parts of the model, they also define the relationships that exist between the different Nodes. This is useful when aggregating the device data used in other parts of Power Monitoring Expert.

Once the model has been created, the devices that are collecting data can be associated with the different levels of the hierarchy that are defined in the template.

Nodes

A Node can be described as the building block of a hierarchy. Nodes are used to model a customer system and can represent:

- Electrical equipment
- Logical concepts
- Physical locations
- Other real-world objects

Nodes are displayed in Hierarchy Manager as a set of tabs. Each tab is labeled with the name of the part of the model it represents. Each Node displays a number of Node instances in a grid format. In Hierarchy Manager, a Node can be described as the type of object required to model a system, while Node instances can be thought of as the reference to the real-world objects in that system. For example, if 'Car' is used as an example of a Node, then 'my Corvette' could describe an instance of the Car Node.

A hierarchy that represents the physical layout of a company's industrial site might have a Site Node, a Building Node, and an Areas Node. Each of those Nodes can contain instances of that Node type. Under the Building Node for example, you could list the different buildings located in a particular site. The Properties of each of these Nodes are specified by the user.

Each Node instance is represented in the system as a set of properties that define the characteristics of that instance. These properties can be further broken down into Attributes and References.

Node properties

Attributes and References can be used to describe the properties of a Node, and their relationships to other Nodes. These properties provide the context that helps to describe the different parts of the

model. For example, a Node called Floors might contain attributes such as floor number, and references such as the association between the Floors Node and the Building Node, or the association between Floors and Areas.

Attributes

The Attributes of a Node describe the properties of that Node, such as its name and characteristics. These Attributes could include the breaker rating of an electrical panel or contact information of a tenant. For example, a Node called Buildings that is part of a physical layout hierarchy could have an Attribute such as the building name.

Attributes are configurable by entering information into an Attribute field. To add Attribute content to a new Node instance, select a tab and click **Add**. To edit existing Attribute content, double-click a Node instance, or highlight it and click **Edit**. When the **Properties** dialog opens, select an attribute field by clicking in the applicable field and entering the necessary information. Click **OK** when you finish specifying all of the necessary attributes for the Node.

References

References describe how a Node in a hierarchy is associated with other Nodes. For example, in a hierarchy that describes the physical layout of a company's building, a Node called Floor could have a reference that describes its association with a Node called Areas. These references indicate which offices are part of each floor. In this example, since a Floor can contain many offices, it is considered a one-to-many association. Since an office can only be associated with a single floor, it is considered a one-to-one association. By making these connections between the Nodes, the hierarchy structure of the model begins to take shape.

Reference fields require clicking **Add**, **Edit**, or **Delete**. To add reference content to a Node instance, click **Add** for the reference, then select the appropriate entry from the list that appears. You can also enter dynamic hierarchy time ranges in this section.

To edit existing reference content, double-click the entry in the grid, or highlight it and click **Edit**, and then make the necessary changes. In most cases, this change would involve either the start or end dates of the particular reference.

To delete existing reference content, select an entry from the applicable reference type and click **Delete**.

NOTE: The Delete button should not be used to end an association with a particular Node instance. When a relationship between two Node instances ends after a certain date, the ideal solution is to edit the references and change the **To** field to a specific end date that defines the time range for the relationship. See Creating a hierarchy for more information.

Common elements of hierarchy templates

The components that make up Hierarchy Manager can appear differently depending on the hierarchy template installed in the system. Although these different hierarchy templates can have different tab and property names, and the relationships between the Nodes differ, the method used to modify the hierarchy is similar for most templates. This section provides information regarding the basic steps to modifying a hierarchy, regardless of the template used.

Hierarchy Manager has a series of tabs across the top of the page. These tabs are the representation of the Nodes. Clicking on any of these tabs displays the instances of the Node types in a grid format.

The process involved with creating an instance of a Node type is the same for most hierarchy templates. To create a new instance, select the applicable tab and click **Add**. The **Properties** window opens, containing fields that represent the properties for that particular Node instance. Any required fields are identified with a **Required** message. Click in the attribute fields and enter the necessary information. Reference fields are selected from a grid and can also have a time dimension associated with them (see Dynamic hierarchy for additional information). Click **Add** to open the **Select** dialog and select the applicable item from the grid. If there are no items to choose from, you might need to create a new instance for that Node type.

To edit an instance of a Node type, click the applicable tab, double-click an instance in the grid, or select it and click **Edit**. Make the changes to the applicable fields in the **Properties** dialog and click **OK**.

To delete an existing instance of a Node type, select the applicable tab, select an instance on that tab and click **Delete**. After you confirm the delete action, the instance disappears from the grid, and any reference information regarding the deleted instance is removed from all affected Node instances.

Tree View

Displaying the views of a template is also similar for most template types. You can see the view of a hierarchy by clicking the **Show Views** link. The view shows the different levels of the hierarchy, and the date range for each entry of the hierarchy.

Date Range: Use the **To** and **From** fields to select the date range to display the hierarchy.

Available Views: Use this section to switch between different views if there is more than one view available. The available views are determined by the hierarchy template. Click **Update** when you change the date range, the scale, or view.

Scale: Select **Days** or **Months** to provide the appropriate scale to the hierarchy view.

Beside each hierarchy level is a bar that indicates when in the date range the Node was part of the hierarchy. If the bar has a rounded edge, the Node reference has an end date within the date range. If the bar has a square edge, the Node reference continues beyond the date range.

You can click the pencil (edit) icon to the left of the bars to open and edit the properties for the related item.

If you do not see a node in the hierarchy view, make sure the date range includes the date that Node was part of the hierarchy. You can view the date range for a hierarchy entry by hovering the pointer on it.

Creating a hierarchy

The following example uses the default hierarchy template (with Site, Buildings, and Areas nodes) to illustrate the basic functionality of Hierarchy Manager.

In this scenario, we are the facility manager for Faber College. The college includes three buildings, two of which have already been added to Hierarchy Manager. Building Three has just been completed, and we must add this building to our hierarchy using Hierarchy Manager. This involves creating a new building and areas entries, and adding devices to the areas, all beginning on a specific date.

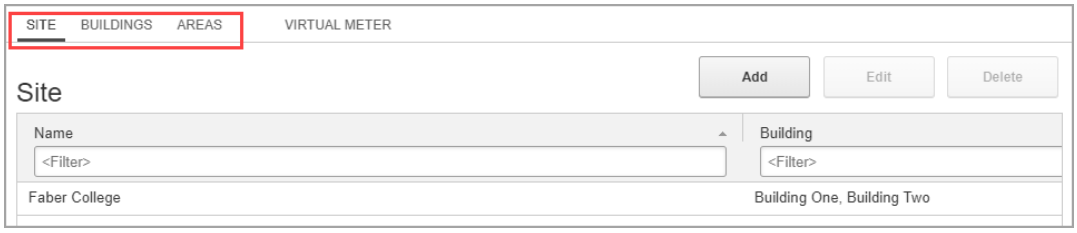
At the same time, renovations to Building Two have just been completed which include the replacement of a meter. We need to swap the old device with the new one in our hierarchy by setting the end date for the existing device and the start date for the new device. The new device must be associated with the correct area.

Open Hierarchy Manager

NOTE: Access to this application or function is controlled by user privileges. See Default User Access Level Privileges and Customizing Access Level Privileges for details.

1. Open Hierarchy Manager in one of the following ways:
   - From Web Applications **Settings** > **System** > **Hierarchies**
   - From Management Console **Tools** > **Web Tools** > **Hierarchy Manager**.
2. Type a user name and password in the Log In dialog, if required, and click **OK** to open Hierarchy Manager.

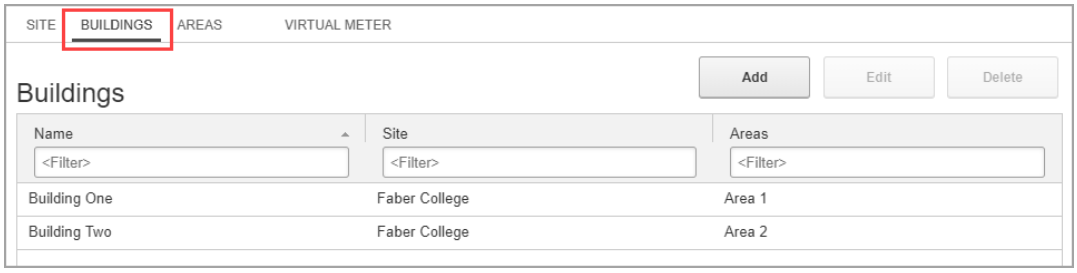
   NOTE: In the following steps, devices have already been added to the system, and the hierarchy has been populated with site, building, and area information.



   Site, **Buildings**, and **Areas** tabs represent each Node type.

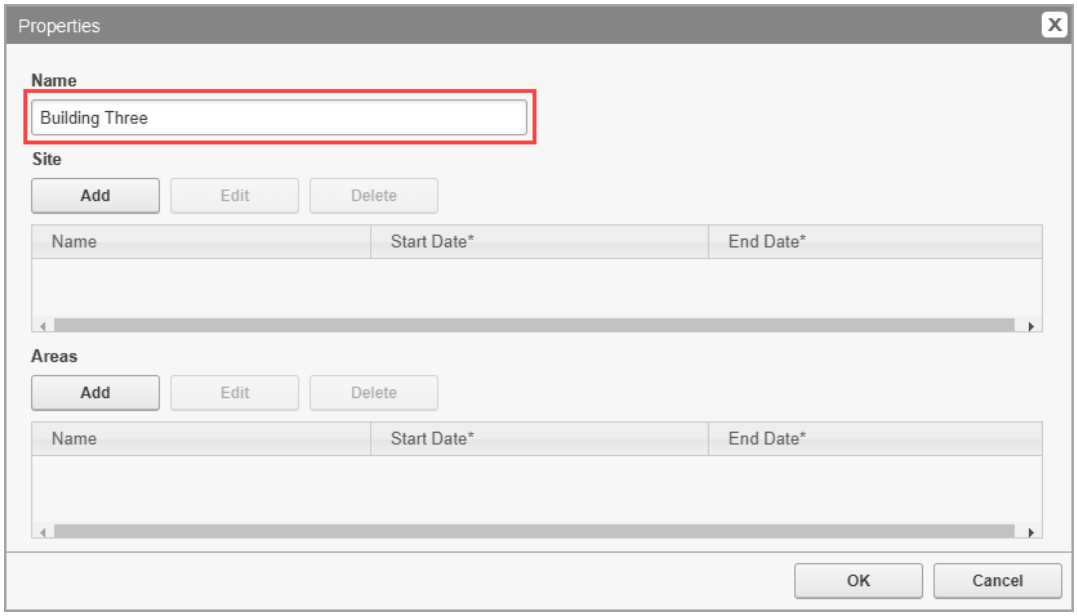
Add a building to the hierarchy

1. Click the **Buildings** tab.

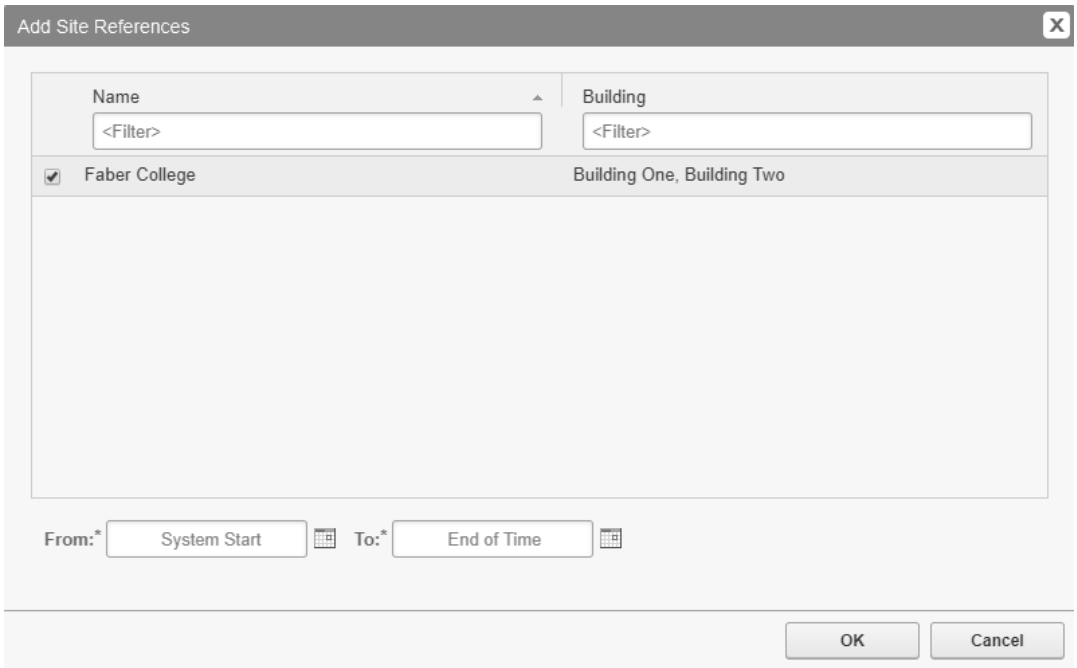


   The **Buildings** grid includes Building One and Two, the site they are associated with, and the areas defined for each building.

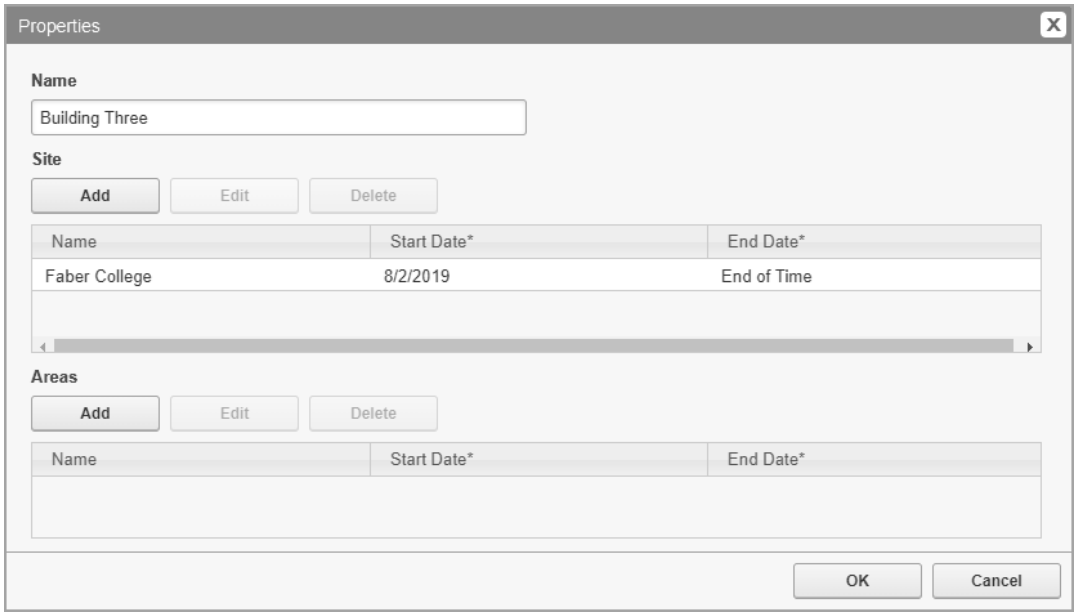
2. To add Building Three, click **Add** above the Buildings grid to open the **Properties** dialog for the Buildings node, then enter the building name in the **Name** field.



3. Click **Add** above the Site grid, in the properties dialog, to open the **Add Site References** dialog and select the Faber College site name in the grid. Then click the **From** date field or click the calendar icon beside it at the bottom of the dialog. Select a start date in the calendar.



4. Confirm that the date has changed in the **Start Date** column under **Sites**, then click **OK**.

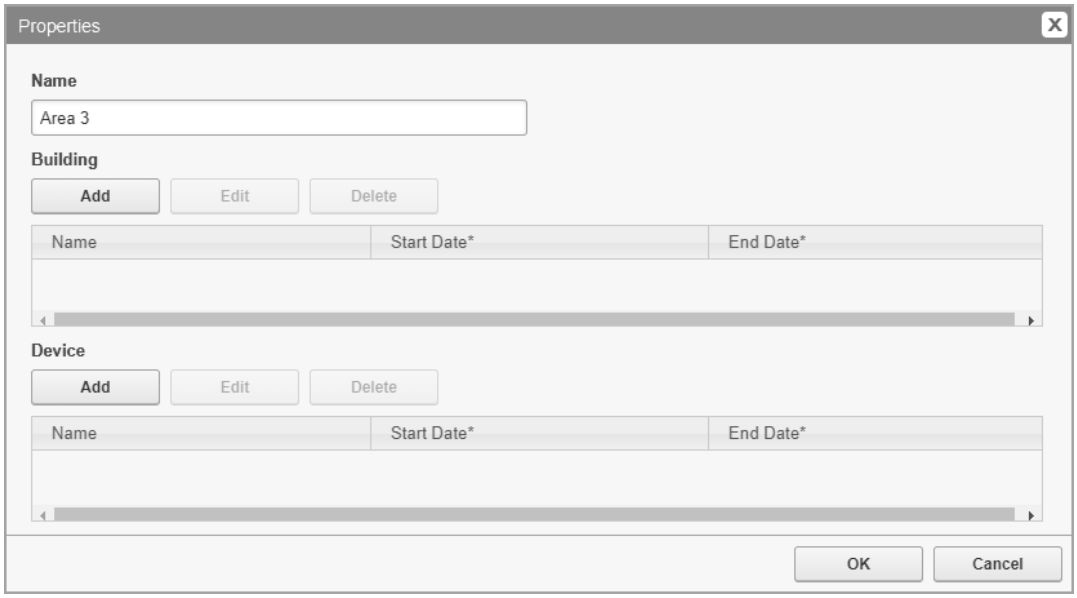


Associate areas and devices to Building Three

1. Click the **Areas** tab.

   A new area needs to be created, Area 3. Associate this area with the new building, assign a device to the area, and set the start date.

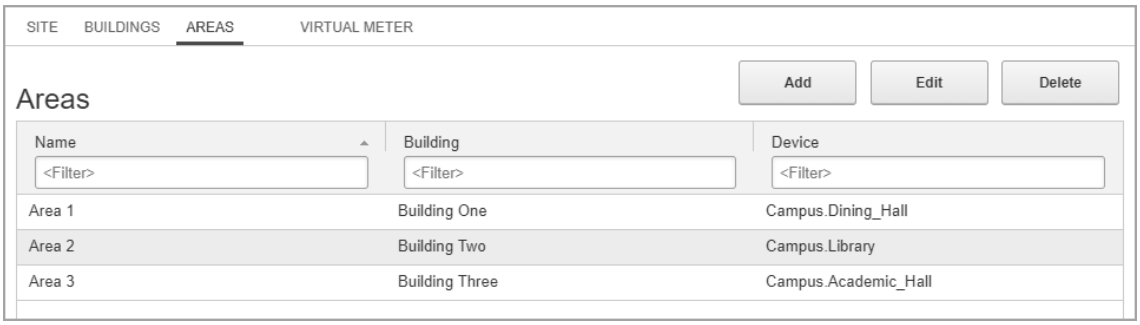
2. Click **Add** above the **Areas** grid to open the **Properties** dialog for the Areas node, then type Area 3 in the **Name** field.



3. Click **Add** above the **Building** grid to open the **Add Building References** dialog.
4. Select Building Three in the grid.
5. Click the **From** field or click the calendar icon and select a start date.
6. Confirm that the date has changed in the **From** field under **Building**, then click **OK**.
7. Click **Add** above the **Device** grid to open the **Add Device References** dialog.
8. Select a device.

9. Click the **From** field or click the calendar icon and select a start date.
10. Confirm that the date has changed in the **Start Date** column under **Device**, then click **OK**.

The following image shows the complete set of entries on the **Areas** tab.

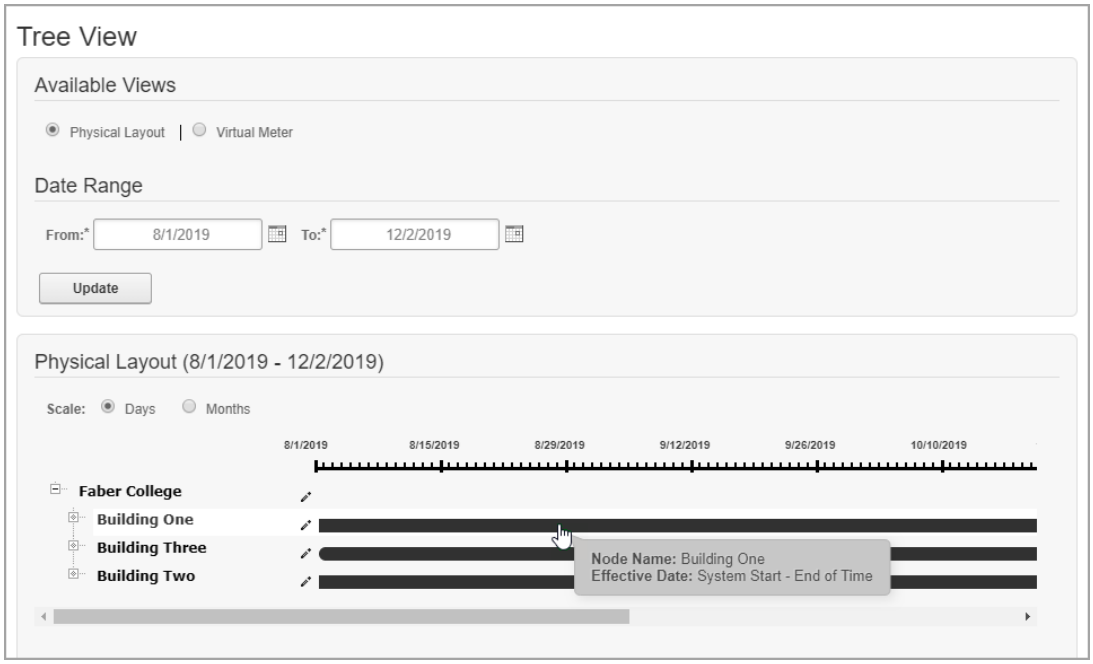


View the hierarchy in a tree configuration

To see the hierarchy in a tree organization, switch to the **Tree View** by clicking **Show Views**, in the top right corner of the Hierarchy Manager window. You can use this window to select the type of view you want to see (if multiple views are available), and the date range for the view. Click **Update** to refresh the view after you make your selections.

Click:

- The plus sign in the view to expand that entry.
- The minus sign beside an entry to collapse that part of the hierarchy.
- The pencil (edit) icon to open and edit the properties for the related item.
- The bar for each entry to see the Node name and the effective date range for that entry.



- Click **Show Types** to return to the initial Hierarchy Manager page.

Adding and removing devices

This part of the example involves replacing a device in Building Two after a renovation. Set the end date for the device you are replacing to the date they are removed. Then assign a new device to the area with the start date set to the day the device is installed.

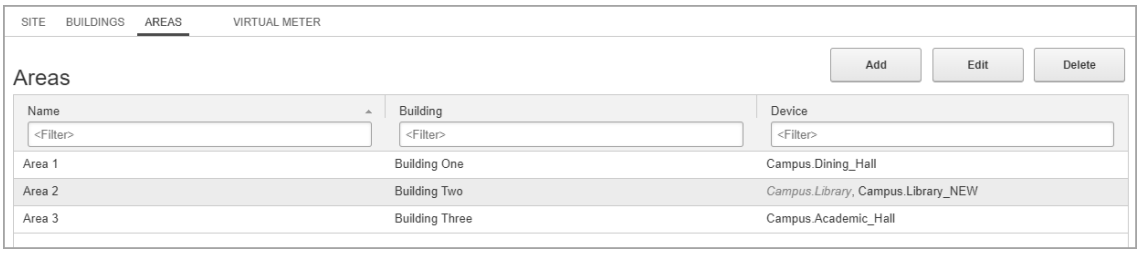
The device that you are replacing is associated with Area 2 in Building Two.

When this task is complete:

- The entry for the old device is dimmed and italicized in the hierarchy if the **End Date** is the current date or earlier.
- Any reports that include the area only include data collected by the device up to this new end date.

NOTE: Date ranges extend from start of day to start of day. This means that the end date does not include data collected for that day.

1. Open Hierarchy Manager and click the **Areas** tab.
2. Double-click Area 2 in the grid or select it and click **Edit** to open the properties dialog.
3. Double-click Campus.Library device in the **Device** grid, or select it and click **Edit** to open the **Edit Device References** dialog.
4. Click the **To** field, or click the calendar icon beside it, and select the end date.
5. Confirm that the date has changed in the **End Date** column under **Device**, then click **OK**.
6. Click **Add** above the **Device** grid to open the **Add Device References** dialog.
7. Select the new device, Campus.Library_NEW.
8. Click the **From** field or click the calendar icon beside it. Select the start date.
9. Confirm that the date has changed in the **Start Date** column under **Device**, then click **OK**.



When you complete these tasks, any reports that include this area with a date range that extends beyond the device start date includes data collected by the new device as of their start date. The reports do not include any data for the removed device as of their end date.

Creating an apportioned meter

You can create an apportioned meter when you add a device to a hierarchy node by changing the value in the **Percentage** field in the Add Device References dialog. The default value is 100 percent.

The percentage can be a negative, positive, or integer value. The percentage field is restricted to 15 characters. Time intervals for apportioned meters function in the same way as devices. See Meter apportionment for more information.

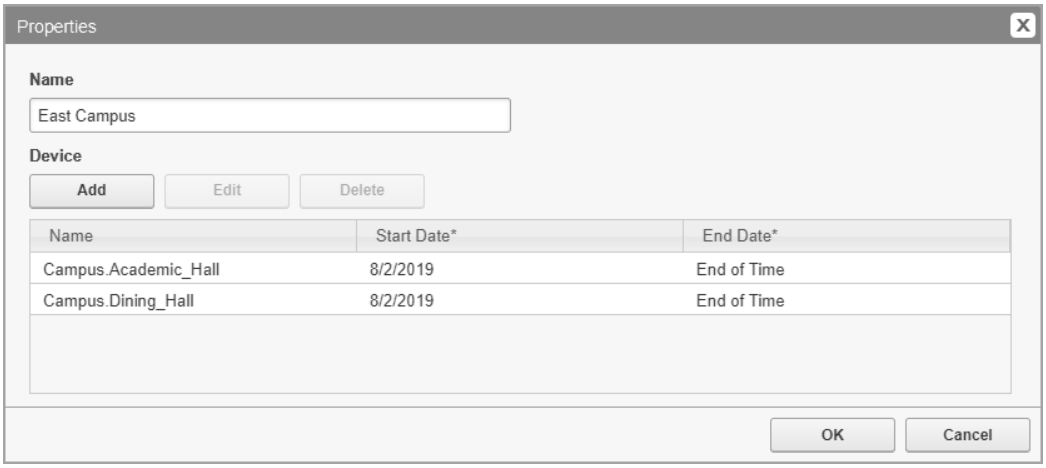
To create an apportioned meter:

1. In Hierarchy Manager, open the **AREAS** tab.
2. Select the area for which you want to create an apportioned meter and click **Edit** to open the properties dialog.
3. In the area properties dialog, under Devices, select the device and click **Edit**. This opens the Edit Device References dialog.
4. Change the value in the **Percentage** field.
5. If required, click the **From** or **To** fields to change the start and end dates for the apportioned meter.
6. Click **OK**.

Creating a virtual meter

The **Virtual Meter** tab includes **Add**, **Edit**, and **Delete** controls above a data grid showing any previously created virtual meters.

Add: Selecting **Add** opens the Properties dialog. Type a name for the virtual meter and click **Add** in the **Devices** area to select devices to attach to it. You can attach a device, a previously created virtual meter, or an apportioned meter in the same way you attach a device to a hierarchy node.



Time intervals for start and end dates work the same as on meters attached to hierarchy nodes.

Edit: Editing a virtual meter is like editing the relationship between a hierarchy node and a device. You can add, edit, or delete virtual meters but you need to ensure that your changes respect time intervals.

For example, if you are replacing a meter, you need to update the **End Date** for it, and you need to specify an appropriate **Start Date** for the new meter. Do not delete the original meter as this removes the meter historically.

Delete: You can delete a virtual meter, but you need to take care when doing so. When you delete a virtual meter, the relationships between all hierarchy nodes and the virtual meter are removed.

Adding a virtual meter to a hierarchy node

After you create a virtual meter, it appears in device lists with the other devices. You can attach a virtual meter to a hierarchy node in the same way as the other devices.

See Virtual meter for more information.

Dynamic hierarchy

Another feature of Hierarchy Manager is the ability to assign devices or Node instances for discrete units of time. Instead of devices existing in either an assigned or unassigned state independent of time, a device can be assigned to one Node instance for a specific length of time, then assigned to another instance for another length of time.

With this time dimension, Hierarchy Manager can be used by organizations that require an ever-changing representation of their system. If one tenant moves out and another moves in, that change can be reflected in the hierarchy. Energy and power usage can be tracked for each tenant over time, and billing information can be collected, aggregated, and displayed in a report.

NOTE: If your hierarchy does not change over time you do not need to set the date ranges for the various devices or Node instances. In Power Monitoring Expert, these static hierarchies exist from the date when the system was first commissioned (system start), to the farthest date the system recognizes (end of time).

Replacing or reconfiguring a device can also be captured in a hierarchy. If a device requires replacement or reconfiguring, it can be unassigned from an instance on a specific date, and the new or reconfigured device assigned to the same instance. The entry for the unassigned device is grayed-out and italicized in the hierarchy if the **End Date** is the current date or earlier.

Dynamic hierarchies are established when you create or edit the properties of a Node instance that is associated with a device. For example, if Customer A is set to lease a rack from a data center, you can assign the racks and circuits to that customer on a specific date. When tenant A's lease expires, you can remove the assignment of the racks and circuits on the expiration date and reallocate them to tenant B.

See Creating a hierarchy for details on how to use the dynamic hierarchies function.

Meter apportionment

Meter apportionment allows you to assign a percentage of a device that has been assigned to an area. For example, if a common area is monitored by a single meter but shared by two tenants, for billing purposes you might want to allocate only a portion of the meter to each tenant. If tenant 1 uses 60% of the common area and tenant 2 uses 40%, you can attach 60% of a meter's reading to the tenant 1 area node and the other 40% to the tenant 2 area node.

See Creating an apportioned meter for more information.

Virtual meter

A virtual meter allows you to aggregate measurements from any combination of devices, apportioned meters, or other virtual meters available in Hierarchy Manager. The newly created virtual meter can be assigned to a node in Hierarchy Manager just like any other device and appears in dialogs that have a **Views** selection. You can even create an apportioned meter from a virtual meter.

Examples:

- Assume that there are several feeder meters connected to the main power bus and you want to calculate the total power usage. You can create a virtual meter that includes each of the feeder meters. Then you can choose one of the reports supporting virtual meters to generate a report showing the total power usage for the virtual meter.
- Assume that there is a large area monitored by a single meter (M1). Within that area is a single room that is monitored by a separate meter (M2). Tenant 1 is using the small room and Tenant 2 is using the remaining area. To calculate Tenant 2's power usage, the readings from M2 must be subtracted from the readings of M1. This can be accomplished by assigning M1 and an apportioned meter of M2 with an allocation of -100%, removing M2's readings from Tenant 2's power usage calculation.

  The alternative is to create a virtual meter. For example, create a new virtual meter **Tenant_2_Net_Meter**, and assign the two devices, M1 and M2 (-100%), to the virtual meter. The virtual meter is assigned to Tenant 2's node. If at some time in the future a new meter is added, you can edit the virtual meter to include the new meter.

See Creating a virtual meter for more information.

Data aggregation in Hierarchies

A Hierarchy aggregates the measurements from the device nodes all the way up through the different hierarchy levels. For example, a hierarchy with the levels Building > Floor > Areas, where the monitoring devices are associated with the Areas, will show the aggregation of all the area measurements for a floor at the Floor level and the aggregation of all floor measurements at the Building level.

Example: Measurements aggregating up the hierarchy

Hierarchy Level 1	Hierarchy Level 2	Hierarchy Level 3	Hierarchy Level 4
Building [22kWh] (aggregated)			
	Floor 1 [10kWh] (aggregated)		
		Area 1 [7kWh] (aggregated)	
			Device - 5kWh (measured)
			Device - 2kWh (measured)
		Area 2 [3kWh] (aggregated)	
			Device - 3kWh (measured)

Hierarchy Level 1	Hierarchy Level 2	Hierarchy Level 3	Hierarchy Level 4
	Floor 2 [12kWh] (aggregated)		
		Area 3 [12kWh] (aggregated)	
			Device - 12kWh (measured)

The starting point for the aggregation in the Hierarchy is a device node. The Hierarchy will not include measurements from nodes below the device node in the aggregation.

Example: Device nodes are the beginning of the aggregation.

Hierarchy Level 1	Hierarchy Level 2	Hierarchy Level 3	Hierarchy Level 4
Building [14kWh] (aggregated)			
	Floor 1 [2kWh] (aggregated)		
		Device - 2kWh (measured)	
		Area 1 [7kWh] (aggregated)	
			Device - 5kWh (measured)
			Device - 2kWh (measured)
		Area 2 [3kWh] (aggregated)	
			Device - 3kWh (measured)
	Floor 2 [12kWh] (aggregated)		
		Area 3 [12kWh] (aggregated)	
			Device - 12kWh (measured)

By associating a device with the Floor 1 node, this node becomes the starting point for the aggregation. The measurements of the child nodes Area 1 and Area 2 are ignored. Only the device measurement associated with Floor 1 is included in the aggregation.

NOTE: Not all Hierarchy nodes can have devices associated with them. If devices can be associated with a certain node level in a hierarchy or not, is defined in the template for this hierarchy.

Using hierarchies in other applications

You can use hierarchies in the following Power Monitoring Expert (PME) applications:

- Dashboards
- Reports
- Trends

In the Dashboards application, you can use hierarchies in the gadget data series selector to select data from a source based on its location in the hierarchy. Selecting a hierarchy **View** allows you to group device data at different aggregation points in the hierarchy. For example, it is possible to create a dashboard that depicts the energy usage of a single floor in a building as a single data series even though there are multiple meters monitoring different circuits.

You can also use hierarchies in several of the reports available in the Reports application. You can use the source selector for these reports to select items from the hierarchy to include in the report.

As in the Dashboards application, a hierarchy View groups device data at different aggregation points, which are then displayed in a report. In addition to the default reports, hierarchies can also be used in custom reports that have been created for use in different solutions.

You can use hierarchies in the Trends application to select data from a source based on its location in the hierarchy.

Insulation Monitoring Configuration Tool for ANSI

TIP: You can open the Insulation Monitoring Tool from the **Power Monitoring Expert > Configuration Tools** folder on your desktop.

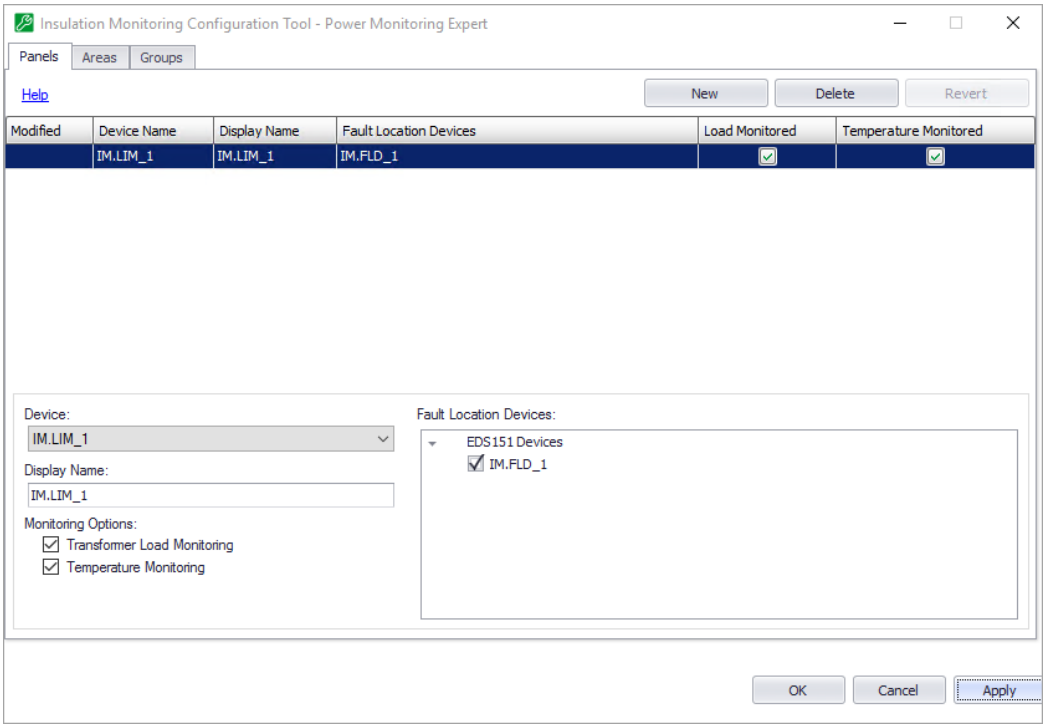
NOTE: This version of the Insulation Monitoring Tool is for the ANSI market.

Use the Insulation Monitoring Tool to configure the Insulation Monitoring Module. With this tool you define Isolated Power Panels, Areas, and Groups for the Insulation Monitoring Report (ANSI), and you generate Vista diagrams (ANSI).

See Insulation Monitoring Module configuration for details.

Prerequisites

- The isolated power panel monitoring devices that are recording the panel data must be configured in the PME Management Console and must be communicating before you can configure the components and properties in the configuration tool.



User Interface

Each tab contains a grid area and an editor area. The grid area is empty initially, but it will be populated with entries that you define. Use the editor area to define the settings for new items or to update the settings for existing items.

The following controls are common for the tabs:

- **Help** - Click this to view online help for the tab.
- **New** - Creates a new entry in the grid.
- **Delete** - Deletes the selected entry from the grid.

- **Revert** - Returns a modified record to its original values, if **OK** or **Apply** have not been clicked.
- **OK** - Saves all changes and exits the configuration tool.
- **Cancel** - Exits the tool without saving changes.
- **Apply** - Saves all changes and leaves the tool open.

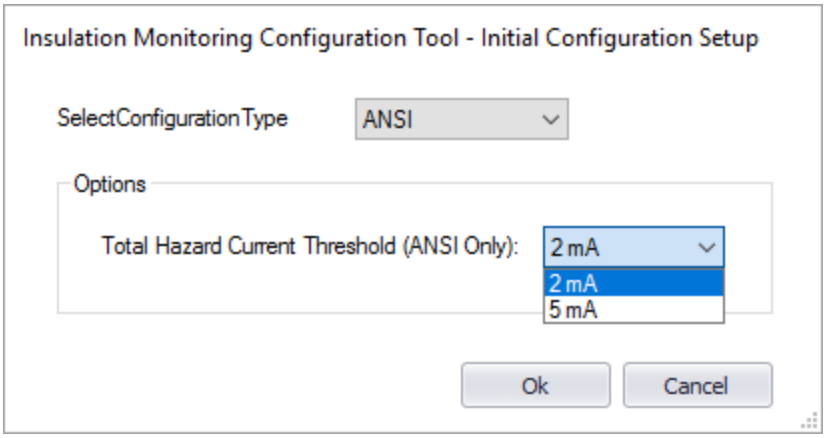
The **Modified** column in the grid area shows the status of the row data:

+ (plus) - a new entry.

***** (asterisk) - a modified entry.

! (exclamation mark) - entry needs more information before it can be saved.

NOTE: The first time you open the Insulation Monitoring Tool, you must set the Configuration Type. Choose between ANSI and IEC. For ANSI, you must also set the Total Hazard Current Threshold. The Initial Configuration Setup dialog is only displayed the first time you open the tool. After the initial selection, the tool remains in the selected type for future startups. To show this dialog again and choose different settings, hold down `Shift` when opening the tool.



Defining Isolated Power Panels (ANSI)

Associate Line Isolation Monitoring devices (LIM-IG6) and Fault Location monitors (Bender EDS) with power panels.

To add a new Isolated Power Panel:

1. Click the **Panels** tab and then click **New**.
2. Enter the following information:
   - **Device**: Select a Line Isolation Monitor device for this panel.
   - **Display Name**: Enter a name for the device.
   - **Fault Location Devices**: (Optional) Select the fault location monitoring devices that are connected to the Line Insulation Monitor.
   - **Monitoring Options**: (Optional) Select the monitoring options that are configured for the Line Isolation Monitor device.

NOTE: All Fault Location monitoring devices, Bender EDS, that are configured in the system are displayed automatically in the Fault Location Devices list. If no devices are displayed, that means that none are configured in the system.

3. (Optional) Repeat steps 1 - 2 to add additional Isolated Power Panels.
4. Click **Apply** to save the changes and keep the configuration tool open. Click **OK** to save the changes and close the configuration tool.

To update an existing Isolated Power Panel:

1. On the **Panels** tab, click the Isolated Power Panel you want to update.
2. Change the name, panel, and monitoring device selections as needed.
3. Click **Apply** to save the changes and keep the configuration tool open. Click **OK** to save the changes and close the configuration tool.

To delete an existing Isolated Power Panel:

1. On the **Panels** tab, click the Isolated Power Panel you want to delete.
2. Click **Delete**.

NOTE: Regenerate the Vista diagrams after changing the Isolated Power Panel configuration.

Defining Areas

Associate Isolated Power Panels with areas.

To add a new Area:

1. Click the **Areas** tab and then click **New**.
2. Enter the following information:
   - **Name**: Enter a name for the area.
   - **Panels**: Select the panels that are associated with the area. The panels listed are the ones you configured on the Panels tab.
3. (Optional) Repeat steps 1 - 2 to add additional areas.
4. Click **Apply** to save the changes and keep the configuration tool open. Click **OK** to save the changes and close the configuration tool.

To update an existing Area:

1. On the **Areas** tab, click the area you want to update.
2. Change the name and panel selection as needed.
3. Click **Apply** to save the changes and keep the configuration tool open. Click **OK** to save the changes and close the configuration tool.

To delete an existing Area:

1. On the **Areas** tab, click the area you want to delete.
2. Click **Delete**.

NOTE: Regenerate the Vista diagrams after changing the Areas configuration.

Defining Groups

Combine areas into groups.

To add a new Group:

1. Click the **Groups** tab and then click **New**.
2. Enter the following information:
   - **Name**: Enter a name for the group.
   - **Areas**: Select the areas that you want to be part of the group. The areas listed are the ones you configured on the Areas tab.
3. (Optional) Repeat steps 1 - 2 to add additional groups.
4. Click **Apply** to save the changes and keep the configuration tool open. Click **OK** to save the changes and close the configuration tool.

To update an existing Group:

1. On the **Groups** tab, click the Group you want to update.
2. Change the name and area selections as needed.
3. Click **Apply** to save the changes and keep the configuration tool open. Click **OK** to save the changes and close the configuration tool.

To delete an existing Group:

1. On the **Groups** tab, click the Group you want to delete.
2. Click **Delete**.

NOTE: Regenerate the Vista diagrams after changing the Groups configuration.

Generating Vista diagrams

Create diagrams to view real-time status information on the areas in a group.

To generate Vista diagrams:

1. In the Insulation Monitoring Configuration Tool, click the **Groups** tab, and then click **Generate Vista Diagrams** to open the Vista Diagram Generation dialog.

   NOTE: At least one group must be configured for the Generate Vista Diagrams command to be available.

2. In Vista Diagram Generation, select the output path for the diagram files and select the groups for which you want to generate diagrams.
3. (Optional) Select **Include Custom Logo** and then select the logo image file for the diagrams. By default, a Schneider Electric logo is used.

4. Under **Options**, drag the indicator to define the width of Vista diagrams you generate.

   NOTE: The Diagram Width setting determines the width of the actual Vista diagrams, the width of the background image inside the diagrams, and the width of the boxes that show the groups, areas, and area details information. Choose a larger value for this setting if you have many groups or areas. Choose a smaller value if you only have a small number of groups and areas.

5. Click **Generate Vista Diagrams** to generate the diagram files, then click **OK** and **Close**.
6. Check the Vista diagrams and repeat steps 4.-5. if you need to adjust the diagram width.

Insulation Monitoring Configuration Tool for IEC

TIP: You can open the Insulation Monitoring Tool from the **Power Monitoring Expert > Configuration Tools** folder on your desktop.

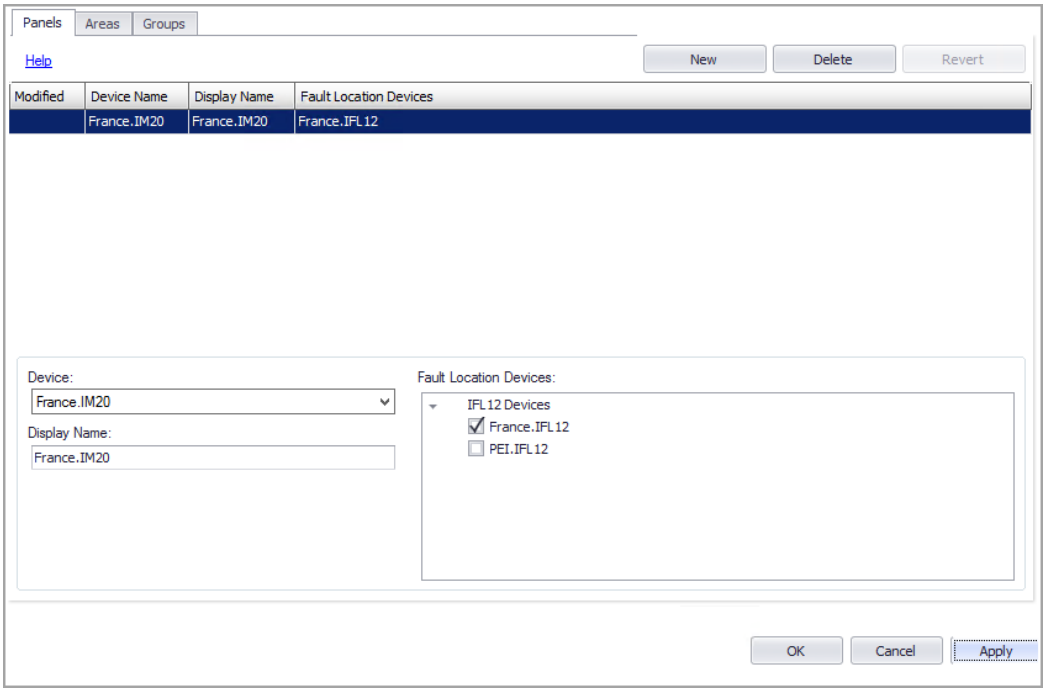
NOTE: This version of the Insulation Monitoring Tool is for the IEC market.

Use the Insulation Monitoring Tool to configure the Insulation Monitoring Module. With this tool you define Isolated Power Panels, Areas, and Groups for the Insulation Monitoring Report (IEC), and you generate Vista diagrams (IEC).

See Insulation Monitoring Module configuration for details.

Prerequisites

- The isolated power panel monitoring devices that are recording the panel data must be configured in the PME Management Console and must be communicating before you can configure the components and properties in the configuration tool.



User Interface

Each tab contains a grid area and an editor area. The grid area is empty initially, but it will be populated with entries that you define. Use the editor area to define the settings for new items or to update the settings for existing items.

The following controls are common for the tabs:

- **Help** - Click this to view online help for the tab.
- **New** - Creates a new entry in the grid.
- **Delete** - Deletes the selected entry from the grid.
- **Revert** - Returns a modified record to its original values, if **OK** or **Apply** have not been clicked.

- **OK** - Saves all changes and exits the configuration tool.
- **Cancel** - Exits the tool without saving changes.
- **Apply** - Saves all changes and leaves the tool open.

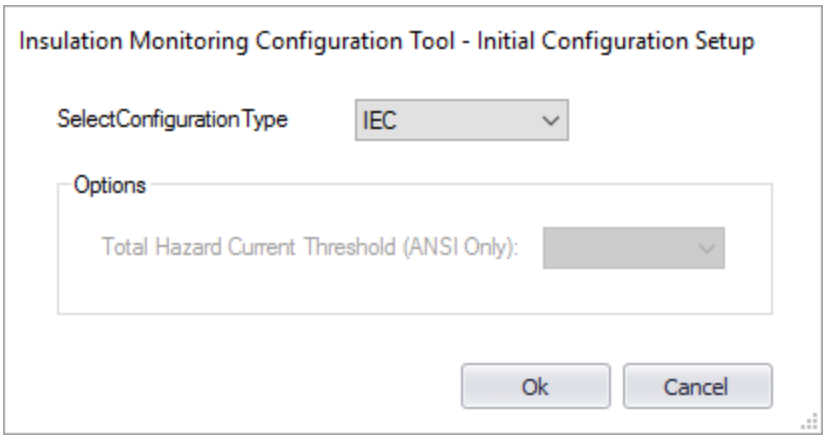
The **Modified** column in the grid area shows the status of the row data:

+ (plus) - a new entry.

***** (asterisk) - a modified entry.

! (exclamation mark) - entry needs more information before it can be saved.

NOTE: The first time you open the Insulation Monitoring Tool, you must set the Configuration Type. Choose between ANSI and IEC. For ANSI, you must also set the Total Hazard Current Threshold. The Initial Configuration Setup dialog is only displayed the first time you open the tool. After the initial selection, the tool remains in the selected type for future startups. To show this dialog again and choose different settings, hold down `Shift` when opening the tool.



Defining Isolated Power Panels (IEC)

Associate Insulation Monitoring (IM) devices and Insulation Fault Locator (IFL) devices with power panels.

To add a new Isolated Power Panel:

1. Click the **Panels** tab and then click **New**.
2. Enter the following information:
   - **Device**: Select the IM device for this panel.
   - **Display Name**: Enter a name for the device.
   - **Fault Location Devices**: (Optional) Select the IFL device for this power panel.

   NOTE: All IFL devices that are configured in the system are displayed automatically in the Fault Location Devices list. If no devices are displayed, that means that none are configured in the system.
3. (Optional) Repeat steps 1 - 2 to add additional Isolated Power Panels.
4. Click **Apply** to save the changes and keep the configuration tool open. Click **OK** to save the changes and close the configuration tool.

To update an existing Isolated Power Panel:

1. On the **Panels** tab, click the Isolated Power Panel you want to update.
2. Make the changes as needed.
3. Click **Apply** to save the changes and keep the configuration tool open. Click **OK** to save the changes and close the configuration tool.

To delete an existing Isolated Power Panel:

1. On the **Panels** tab, click the Isolated Power Panel you want to delete.
2. Click **Delete**.

NOTE: Regenerate the Vista diagrams after changing the Isolated Power Panel configuration.

Defining Areas

Associate an Isolated Power Panels with areas.

To add a new Area:

1. Click the **Areas** tab and then click **New**.
2. Enter the following information:
   - **Name**: Enter a name for the area.
   - **Panels**: Select the panel that is associated with the area. The panels listed are the ones you configured on the Panels tab.

     NOTE: With IEC, you can have only one panel per area.
3. (Optional) Repeat steps 1 - 2 to add additional areas.
4. Click **Apply** to save the changes and keep the configuration tool open. Click **OK** to save the changes and close the configuration tool.

To update an existing Area:

1. On the **Areas** tab, click the area you want to update.
2. Change the name and panel selection as needed.
3. Click **Apply** to save the changes and keep the configuration tool open. Click **OK** to save the changes and close the configuration tool.

To delete an existing Area:

1. On the **Areas** tab, click the area you want to delete.
2. Click **Delete**.

NOTE: Regenerate the Vista diagrams after changing the Areas configuration.

Defining Groups

Combine areas into groups.

To add a new Group:

1. Click the **Groups** tab and then click **New**.
2. Enter the following information:
   - **Name**: Enter a name for the group.
   - **Areas**: Select the areas that you want to be part of the group. The areas listed are the ones you configured on the Areas tab.
3. (Optional) Repeat steps 1 - 2 to add additional groups.
4. Click **Apply** to save the changes and keep the configuration tool open. Click **OK** to save the changes and close the configuration tool.

To update an existing Group:

1. On the **Groups** tab, click the Group you want to update.
2. Change the name and area selections as needed.
3. Click **Apply** to save the changes and keep the configuration tool open. Click **OK** to save the changes and close the configuration tool.

To delete an existing Group:

1. On the **Groups** tab, click the Group you want to delete.
2. Click **Delete**.

NOTE: Regenerate the Vista diagrams after changing the Groups configuration.

Generating Vista diagrams

Create diagrams to view real-time status information on the areas in a group.

To generate Vista diagrams:

1. In the Insulation Monitoring Configuration Tool, click the **Groups** tab, and then click **Generate Vista Diagrams** to open the Vista Diagram Generation dialog.

   NOTE: At least one group must be configured for the Generate Vista Diagrams command to be available.

2. In Vista Diagram Generation, select the output path for the diagram files and select the groups for which you want to generate diagrams.
3. (Optional) Select **Include Custom Logo** and then select the logo image file for the diagrams. By default, a Schneider Electric logo is used.
4. Under **Options**, drag the indicator to define the width of Vista diagrams you generate.

   NOTE: The Diagram Width setting determines the width of the actual Vista diagrams, the width of the background image inside the diagrams, and the width of the boxes that show the groups, areas, and area details information. Choose a larger value for this setting if you have many groups or areas. Choose a smaller value if you only have a small number of groups and areas.

5. Click **Generate Vista Diagrams** to generate the diagram files, then click **OK** and **Close**.
6. Check the Vista diagrams and repeat steps 4.-5. if you need to adjust the diagram width.

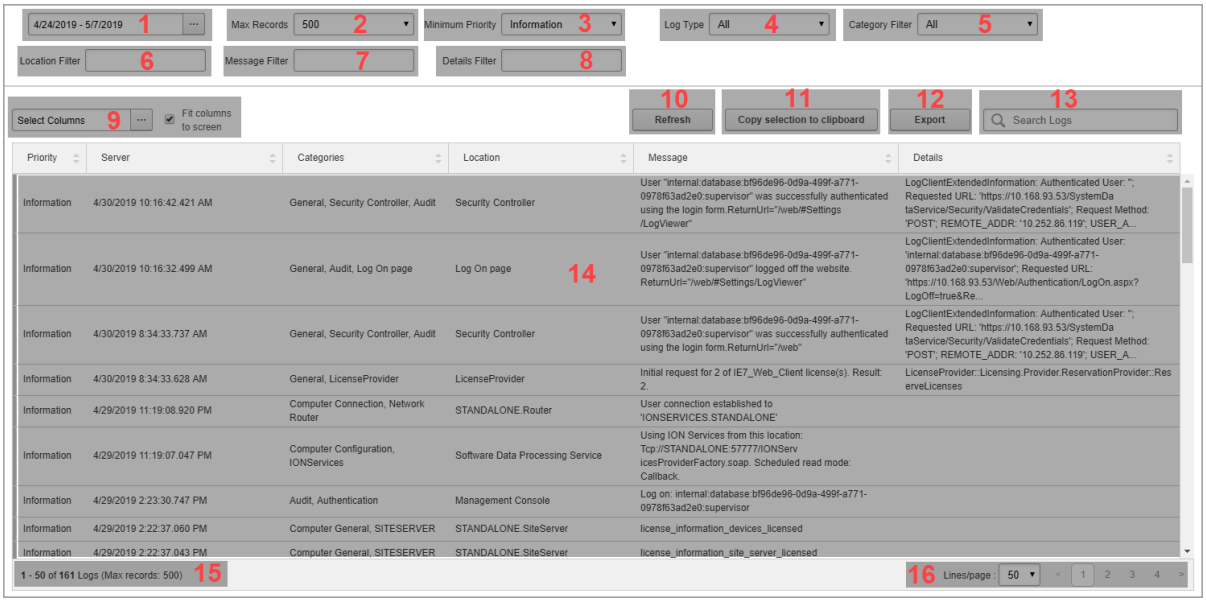
Log Viewer

TIP: You can open Log Viewer from the **SETTINGS > System > System Log** page in Web Applications.

Use Log Viewer to view PME system events. System events are logged by the software and its components to record certain system activities. Examples of system events include a user logging on, a user logging off, time synchronization sent from the system to the devices, system warnings, and so on.

NOTE: The Log Viewer only shows system events, it does not show device-based events or historical data. To view device event log data, use Alarm Views. To view device historical data, use Dashboards, Diagrams, or Reports.

Log Viewer User Interface



1	**Date Range Selector.** Select the time range for which you want to display the system log entries.
2	**Max Records.** Set the maximum number of entries to be displayed in the system log table.
3	**Minimum Priority.** Filter lower priority log entries from the system log table view. The available options, in increasing priority order, are: Diagnostics, Information, Warning, Error, Critical.
4	**Log Type.** Filter log entries in the system log table view based on the area of the software where they originated. The available options are: All, Application (= web application components), System (= platform components).

5	**Category Filter.** Filter log entries in the system log table view based on the component or function they relate to. The large number of different category options is available for this filter. **TIP**: Selecting the **Audit** category shows user login and logoff activity.
6	**Location Filter.** Enter a filter string into the text box to filter the system log table view based on the **Location** column information.
7	**Message Filter.** Enter a filter string into the text box to filter the system log table view based on the **Message** column information.
8	**Details Filter.** Enter a filter string into the text box to filter the system log table view based on the **Details** column information.
9	**Column Selector.** Select which columns are displayed in the system log table.
10	**Refresh.** Reload the content of the system log table.
11	**Copy Selection to Clipboard.** Copy the content of selected system log table entries to the clipboard, for use in another application. Information for all possible columns is included in the copied details, regardless if the columns are displayed in the table view or not. **TIP**: Use `Shift + click` or `Ctrl + click` to select multiple rows in the table.
12	**Export** Export the content of selected system log table entries in `.csv` file format, for use in another application. Information for all possible columns is included in the copied details, regardless if the columns are displayed in the table view or not. **TIP**: Use `Shift + click` or `Ctrl + click` to select multiple rows in the table.
13	**Search Logs** Enter a filter string into the text box to filter the system log table view based on the **Details** column information.
14	**System log table** The System log table shows system events for the selected time range and filter settings. See 1-8 above. **TIP**: Double-click a row in the table or select a row and hit `Enter` to view details for this log entry.
15	**Number of displayed items** Shows the number of items visible on this page, and the total number for the selected time range and filter settings. See 1-8 above.

16	**Page selector.** Use the page selector to navigate between pages. Set the number of items that are displayed on a page.

Logical Device editors

The logical device functionality allows you to assign logical names to output registers on physical devices, and associate the generic inputs with standard measurements, including WAGES measurements.

Before you can create a logical device, the physical device that it references must be created. You can create one or more logical devices from a single physical device, or you can also create a single logical device from several physical devices.

After you create a logical device, you can view its real-time data in the following components:

- Vista.
- The Diagrams application in the Web Applications component.

⚠ CAUTION

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.

Failure to follow these instructions can result in injury or equipment damage.

Each logical device has a logical device type associated with it. Each logical device type is defined with a collection of output measurements. The measurements defined by the device type become the output measurements for instances of that device type, that is, for the logical devices. You use the Logical Device Type Editor to create logical device types. See Using the Logical Device Type Editor for information about viewing, creating, editing, and deleting logical device types.

The Logical Device Editor in Management Console allows you to configure specific logical devices by mapping input registers to output measurements that are defined in the associated device type. See Using the Logical Device Editor for information about creating, configuring, editing, and deleting logical devices.

Open the Logical Device editor applications from the **Tools** menu in the Management Console.

NOTE: Access to this application or function is controlled by user privileges. See Default User Access Level Privileges and Customizing Access Level Privileges for details.

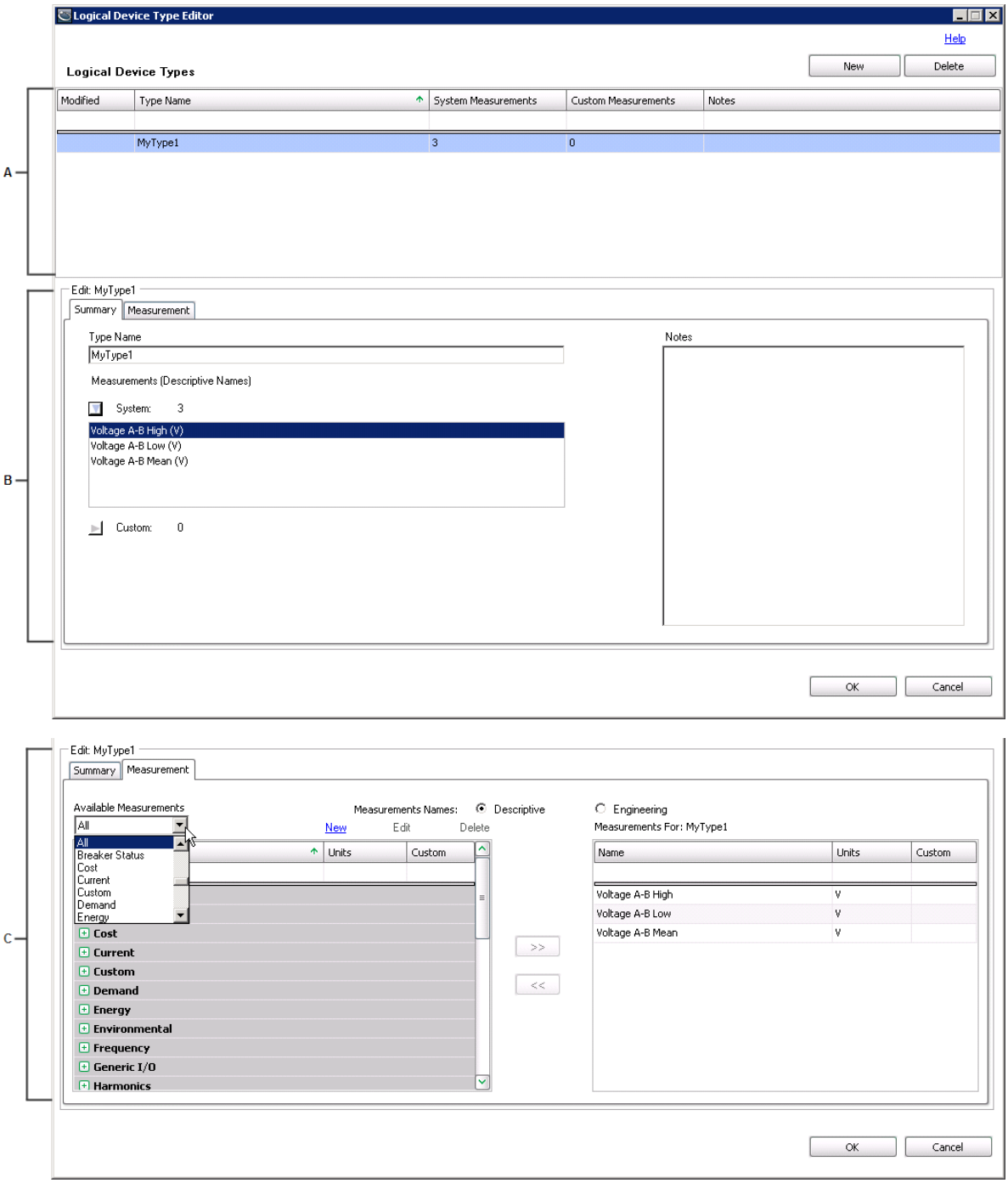
Using the Logical Device Type Editor

Use the Logical Device Type Editor to define a collection of output measurements for each logical device type. Logical device types created with this editor are available for selection in the Logical Device Editor, where you map input registers to output measurements.

Open the Logical Device Type Editor

1. Start Management Console and log in using an account with supervisor-level access.
2. Select **Tools > Logical Device > Logical Device Type Editor**.

The top portion of the editor contains a logical device type display grid listing the logical device types that have been defined. The bottom portion is an edit area where you can modify existing device types and their measurements, or create new ones.



A	Display grid area	B	Edit area - Summary tab	C	Edit area - Measurement tab

The display grid area

The **Modified** column displays one of the following characters indicating a change of status of an entry:

+ (plus) - a new entry.

* (asterisk) - an existing entry has been modified.

! (exclamation mark) - the entry is incomplete or in error.

The **Type Name** column contains the names for the defined device types. Type names must be unique.

The **System Measurements** and **Custom Measurements** columns show the number of measurements that have been defined for each device type.

The edit area

When a device type is selected in the display grid, the current information for that device type is displayed in the edit area. The edit area has a **Summary** tab and a **Measurement** tab.

The **Summary** tab contains the following:

- A **Type Name** field showing the name of the device type that is selected in the display grid at the top.
- In the **Measurements** area, expand **System** and **Custom** to view the measurements defined for these respective categories. You can expand each list to show all of the measurements that have been defined for the selected device type.
- A **Notes** input field that you can use to describe the device type.

The **Measurement** tab contains the following:

- Options that indicate whether to display the measurements with descriptive names or engineering names.
- An **Available Measurements** dropdown list that contains category names for the measurements, such as **Air**, **Current**, and **Voltage**. When you select one of these categories, only those measurements associated with the selected category appear in the grid.

  The default **All** in the list displays all of the categories and their respective measurements in the grid.
- An available measurements grid listing the measurements available for selection when you define a device type. Measurements that are grayed out indicate that they have been added to the selected device type. Clicking **New** opens a dialog for defining a new, custom measurement. An X in the **Custom** column identifies the entry as a custom measurement. The **Edit** and **Delete** links give you the option to modify or delete custom measurements only.

  NOTE: It is recommended that you add a new custom measurement *only if* an existing measurement does not suffice. Factory-defined System Measurements contain considerable information about their type and usage, which is then used throughout the system to provide intelligent assistance in Dashboard controls and Report selections. Since custom measurements do not have this information, their usage may not provide the expected results.
- A **Measurements For** grid that lists the measurements that comprise the device type that is

selected in the display grid area. Use the **>>** button to add a measurement that you selected in the list of available measurements to the **Measurements For** list for the device type. Measurements that you select for a device type are grayed out to indicate that they have been assigned to the device type. Use the **<<** button to remove a selected measurement from the **Measurements For** grid. Measurements that are removed are no longer grayed out in the list of available measurements and they are available for selection.

Note that if you attempt to delete a custom measurement that has been mapped to any logical device, a message indicates that the measurement cannot be deleted. You need to unmap the custom measurement from the logical devices before you can delete it.

In all grids:

- Each of the columns can be sorted in ascending or descending order when you click on the column heading.
- When you place your cursor on a column heading, a filter icon appears on the right side of the heading area. Click this icon to open a list of items that are available for filtering. Click the item that you want to use as the filter. When you do this, the filter condition displays on the left side of the status area at the bottom of the grid. Click the X icon in the status area to turn off the filter.
- The blank area immediately below a column heading is an entry field for filtering on an entry you type in that area. For example, to filter on a specific name, enter a name under the **Name** column to automatically filter the entries in the grid.
- You can drag and drop the grid column headers to rearrange the order of the columns in the grid.

Creating a new logical device type

Complete the following steps to create a new logical device type:

1. Click **New** on the top right of the editor.

   This clears the **Type Name** field and resets **System measurements** and **Custom measurements** to 0 (zero) on the **Summary** tab.

   All is selected by default in the **Available Measurements** list on the **Measurements** tab.

2. Enter a device type name in the **Type Name** field.

   The name appears in the logical device type display grid and an ! (exclamation) appears in the **Modified** column to indicate that the device type entry is incomplete.

3. Click the **Measurements** tab to go to the list of measurements that are available for selection.
4. Locate and click an available measurement that you want to associate with the device type, then click **>>** to add it to the **Measurements For** list. Repeat this step for each measurement that you want to associate with the device type.
5. To delete a device type, click the device type in the display grid and click **Delete** on the top right of the editor.

   Note that **Delete** is disabled if any logical devices are associated with the logical device type.

Custom measurements

The following sections describe how to create, modify, or delete custom measurements. Because factory-defined System Measurements contain considerable information about their type and usage, custom measurements should only be created in exceptional circumstances, and only with an understanding of the expected results from their usage.

⚠ CAUTION

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.

Failure to follow these instructions can result in injury or equipment damage.

Creating a new custom measurement

Complete the following steps to create a new, custom measurement:

1. Click **New** beside the **Available Measurements** dropdown list to open the **New Measurement** dialog. (You can also edit a new custom measurement by clicking **Edit** and modifying the entries.)
2. Enter a descriptive name and an engineering name for the new measurement in the respective fields. For example, `Voltage A-B Low` is the descriptive name, and `Vll ab low` is the engineering name.
3. Select the unit of measure from the **Units** list or add a custom unit of measure by typing it in the **Units** field.

   Note that the combination of the descriptive name, the engineering name, and the unit of measure must be unique for each custom measurement.
4. Select a type of information to be measured from the **Quantity** list.
5. Click **OK** to add the measurement.

   The new measurement is added as an available measurement in the grid and an X in the **Custom** column indicates that it is a custom measurement.

   You need to select **All** or **Custom** in the **Available Measurements** list to see the custom measurement in the grid.

Modifying or deleting a custom measurement

Complete the following steps to modify a custom measurement. Note that you cannot modify or delete system measurements.

1. Go to the **Measurements** tab of the Logical Device Type Editor.
2. Select the custom measurement that you want to modify or delete.

Custom measurements that have been associated with a logical device type can be edited but not deleted. Selecting **Delete** results in a message indicating that the custom measurement cannot be deleted because it is mapped either to a logical device type or to a logical device that is logging data.

3. To modify the custom measurement, click **Edit** to open the **Edit Measurement** dialog, update the entries or selections in the dialog, and click **OK** to apply to changes.
4. To delete a custom measurement, click **Delete**.

   A message confirms the deletion.

   Note that if you attempt to delete a custom measurement that is associated with any logical devices, a message indicates that the measurement cannot be deleted.

Using the Logical Device Editor

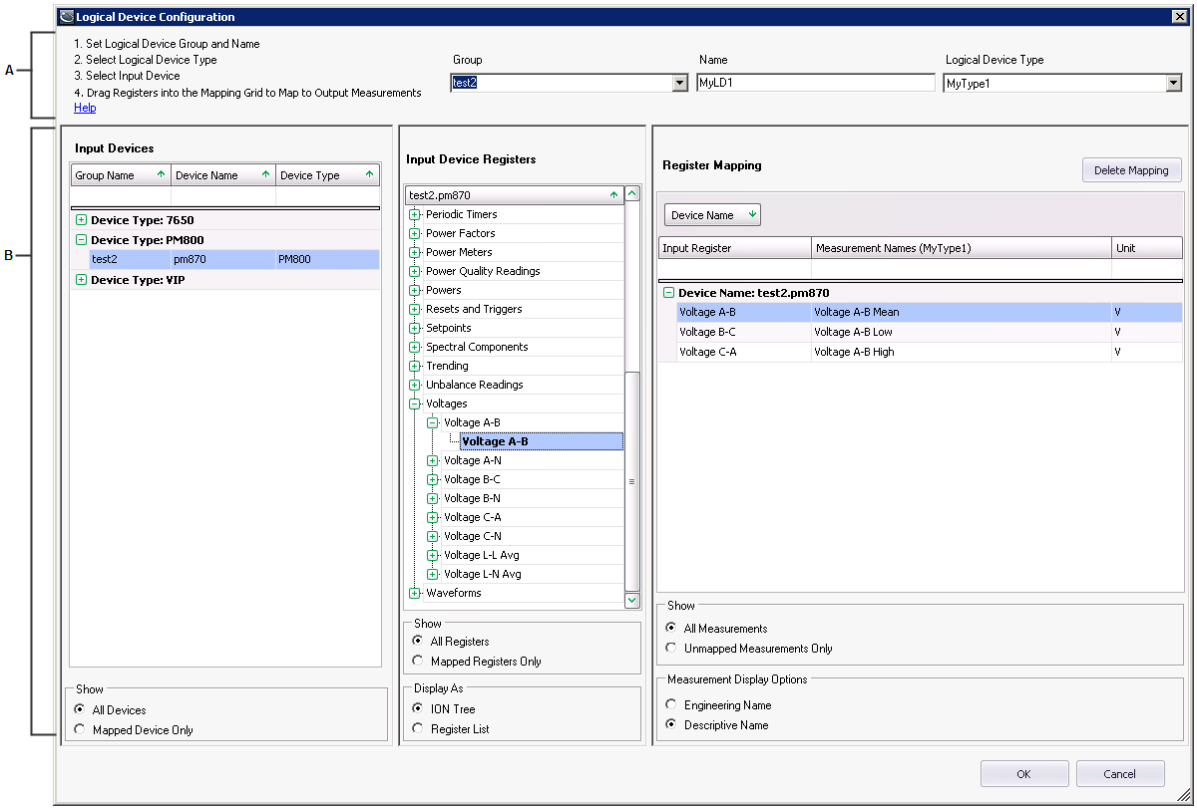
Use the Logical Device Editor to map measurements from physical devices to measurements provided by the logical device type that is associated with a logical device.

Open the Logical Device Editor

Start Management Console and log in using an account with supervisor-level access.

Click the **Devices** icon, then right-click the Display window and select **New > Logical Device**.
The devices defined in Management Console are listed in the **Input Devices** area of the Logical Device Editor.

The top portion of the editor consists of a header area that contains instructions, selection lists, and input fields. The bottom portion is the mapping area that allows you to map the input registers of a physical device to a list of measurements provided by the associated device type.



A	Header area	B	Mapping area

The header area

The instructions indicate the steps required to create a logical device.

The **Group** field is a combination input field and dropdown list. You can either enter a name for the group or select a group from the list.

The **Name** field identifies the name of the logical device that you are defining. Enter the name of the logical device in the field.

The **Logical Device Type** dropdown list contains the names of logical device types that are available for selection.

The mapping area

The **Input Devices** grid lists the devices that are in your system. When you select a device, its output registers are listed in the **Input Device Registers** area.

The **Register Mapping** grid is populated with a list of the output measurements that are defined for the logical device type that you select in the **Logical Device Type** dropdown list. They are listed under a generic **Device Name** label pending their mapping to the logical device name that you specified. Drag an entry from the **Input Device Registers** list to an output measurement in the **Register Mapping** grid to map the two values.

Defining a logical device

1. Select a logical device type from the **Logical Device Type** dropdown list.

   The output measurements defined for the selected logical device type are listed in the **Output Measurement** column in the **Register Mapping** area.

2. Either select an existing group name from the **Group** dropdown list, or enter a group name in the field.
3. Enter a name for the new logical device in the **Name** field.
4. Select one of the input devices from the **Input Devices** area of the editor.

   The registers for the selected input device appear in the **Input Device Registers** area. Note that if you choose to display the registers for the input device in an ION tree format, delays in displaying the registers can occur for devices with a large volume of registers.
5. Map an input device register to an output measurement by dragging it to the output measurement listed in the **Register Mapping** area of the editor.

   The input device registers appear in bold font when they are mapped to an output measurement.
6. Click **OK** to save the logical device configuration in Management Console.

   Any unmapped measurements are displayed in red.
7. To edit a logical device that is in the **Device** panel of Management Console, double-click the device name, or right-click the device name and select **Configure Device** to open the Logical Device Editor, or click the device then select **Edit > Configure Device**.

   Note that:
   - If you choose to edit the configuration of the logical device, delays can occur in displaying the registers for devices with a large volume of configured registers.
   - **Duplicate and Configure** in Management Console's **Edit** menu cannot be used with logical devices. See Creating multiple logical devices for information about creating more than one logical device.

Considerations regarding logical devices and historical data

When a logical device is configured, historical data for an output register (that is, an output measurement) on the physical device is automatically routed to the corresponding output measurement on the logical device.

When a logical device is configured, historical data is logged to the logical device and not the related physical device.

If multiple logical devices include the same input measurement from the same physical device, historical data from that input measurement is routed to the logical device that was configured last.

Deleting a physical device that is mapped to a logical device

If a physical device that is mapped to a logical device is deleted, the mapping of input measurements for the logical device can no longer be resolved. A message dialog opens to indicate the result of the delete action and asks whether you want to continue with the deletion.

If you right-click the logical device in Management Console and select **Configure Device** to open the Logical Device Editor after you have deleted the physical device, a message indicates that the physical device has been deleted. The **Register Mapping** grid for the logical device shows the deleted physical device/ION handle in the **Input Register** column.

If you re-create the physical device, the input measurement mapping for the logical device is automatically restored.

Renaming a physical device that is mapped to a logical device

If a physical device that is mapped to a logical device is renamed, a message dialog opens to indicate the result of the rename action and asks whether you want to continue with renaming.

If you right-click the logical device in Management Console and select **Configure Device** to open the Logical Device Editor after you have renamed the physical device, the **Register Mapping** grid for the logical device shows the renamed physical device in the **Device Name** column.

Deleting a site which has a physical device mapped to a logical device

If a site with a physical device mapped to a logical device is deleted, the physical device is also deleted and the mapping of input measurements for the logical device can no longer be resolved.

If you right-click the logical device in Management Console and select **Configure Device** to open the Logical Device Editor after you have deleted the site, a message indicates that the physical device has been deleted. The **Register Mapping** grid for the logical device shows the deleted physical device/ION handle in the **Input Register** column.

Creating multiple logical devices

You can create multiple logical devices by:

- Exporting a logical device configuration to a comma-separated values (CSV) file.
- Modifying the CSV file to add multiple logical device configurations based on the original logical device configuration.
- Importing the CSV file in Management Console to add the logical devices to the system.

Export a logical device configuration

Complete the following steps to export one or more logical device configurations to a CSV file.

1. Use the Logical Device Editor to create at least one logical device in the Devices area of Management Console.
2. Select one or more logical devices, right-click and select **Export** to open the **Export Status** dialog.

   Note that if you choose to export the registers for the logical device, delays in the export process can occur for logical devices with a large volume of configured registers.
3. Click the browse button on the right of the **Selected File** field to open the **Save As** dialog.
4. Navigate to the location where you want to save the file and enter a name for the file in the **File name** field.

   `Text files (*.csv)` is pre-selected in the **Save as type** field.
5. Click **Save** to return to the **Export Status** dialog.

   The **Selected File** field is populated with the location and file name that you specified.
6. Click **Export**.

   The **Status** column in the grid area of the dialog indicates **Exported** for a completed export operation. If the export operation is not successful, for example if the input registers cannot be retrieved for the logical device being exported, it is indicated in the **Status** column. Click the

link to open the log file to view additional information.

Configuration information for all of the selected logical devices is exported to the CSV file.

Create multiple entries in the CSV file

Use Microsoft Excel or a similar spreadsheet editor to open the CSV file. The column headings in the spreadsheet are labeled as follows:

- Logical device name
- Logical device type
- Physical device name
- Physical device type
- Input register
- Output measurement
- Handle - this column heading is required but the entries are not required unless there are duplicate labels, that is, input registers with the same name but with a different ION handle. In this case the ION handle is required. You can view the ION handles by exporting the input measurements from the Logical Device Type Editor.

NOTE: The column headings remain in English for localized versions of the product. This is required for CSV file-processing purposes.

To create multiple entries for the logical device configuration, use the copy and paste function in Excel. It is recommended that only users with supervisor-level access create multiple entries.

1. Select the rows that you want to duplicate and press Ctrl+C to copy them.
2. Place the cursor in the left-most cell of the first blank row and press Ctrl+V to paste copies of the selected rows.
3. Continue the paste operation for as many logical device configurations that you want to create.
4. After completing the paste operation, be sure that you use unique device names to avoid duplicates.

You can also export all of the register names of a physical device as well as all of the measurement names of a logical device type. This gives you the ability to use these additional CSV files to copy and paste additional register names and measurement names into the CSV file you are using to create the multiple logical devices.

To export all of the register names of a physical device:

1. Open the Logical Device Editor and select a physical device.
2. Right-click anywhere in the register list in the **Input Device Registers** area to open a menu and select **Export Device Input Registers**.
3. Enter a name for the file and click **OK**.

To export all of the measurement names of a logical device type:

1. Open Management Console and select **Tools > System >** Logical Device Type Editor.
2. Select a logical device type in the logical device types area of the editor.
3. Click the **Measurements** tab.
4. Right-click anywhere in the grid under **Measurements For** and select **Export Measurements**.
5. Enter a name for the file and click **OK**.

Import multiple logical device configurations

Complete the following steps to import the CSV file with the multiple logical device configurations. It is recommended that only users with supervisor-level access import logical device configurations.

1. Open Management Console and select **Tools > Import Logical Device** in the **Devices** panel of Management Console to open the **Logical Device Import Form** window.

   Logical Device Import Form is available only when you are in the **Devices** panel of Management Console,
2. Use the Browse button to navigate to and select the CSV file to import.
3. Select **Overwrite Existing Devices** if you want overwrite logical devices with the same name that were previously created.

   Logical devices with the same name can occur as a result of a previous import operation.
4. Click **Import** to add the multiple logical devices to the Devices area of Management Console.

   The system performs a validation of the configuration data during the import operation. If an error occurs during the import operation:
   - The **Status** column in the grid area indicates **Failed** for any logical device that is not imported. Click **Failed** to view details about the cause of the unsuccessful import.
   - Logical devices are created for all correct entries in the CSV file. Logical device entries that are incorrect are not created in Management Console.

Management Console

Use Management Console to add, remove or configure system components, such as metering devices, in your Power Monitoring Expert power management system. You can set up different types of sites (communication links such as Ethernet or serial), and set up connection schedules for these sites.

In addition, the Management Console **Tools** menu provides access to device and system configuration, maintenance and programming tools.

NOTE: Run Management Console as Administrator user. To do this, right-click the Management Console program icon and select **Run as administrator** from the context menu. If you do not run it as Administrator, then certain tools such as **Update EWS Server** are not functional.

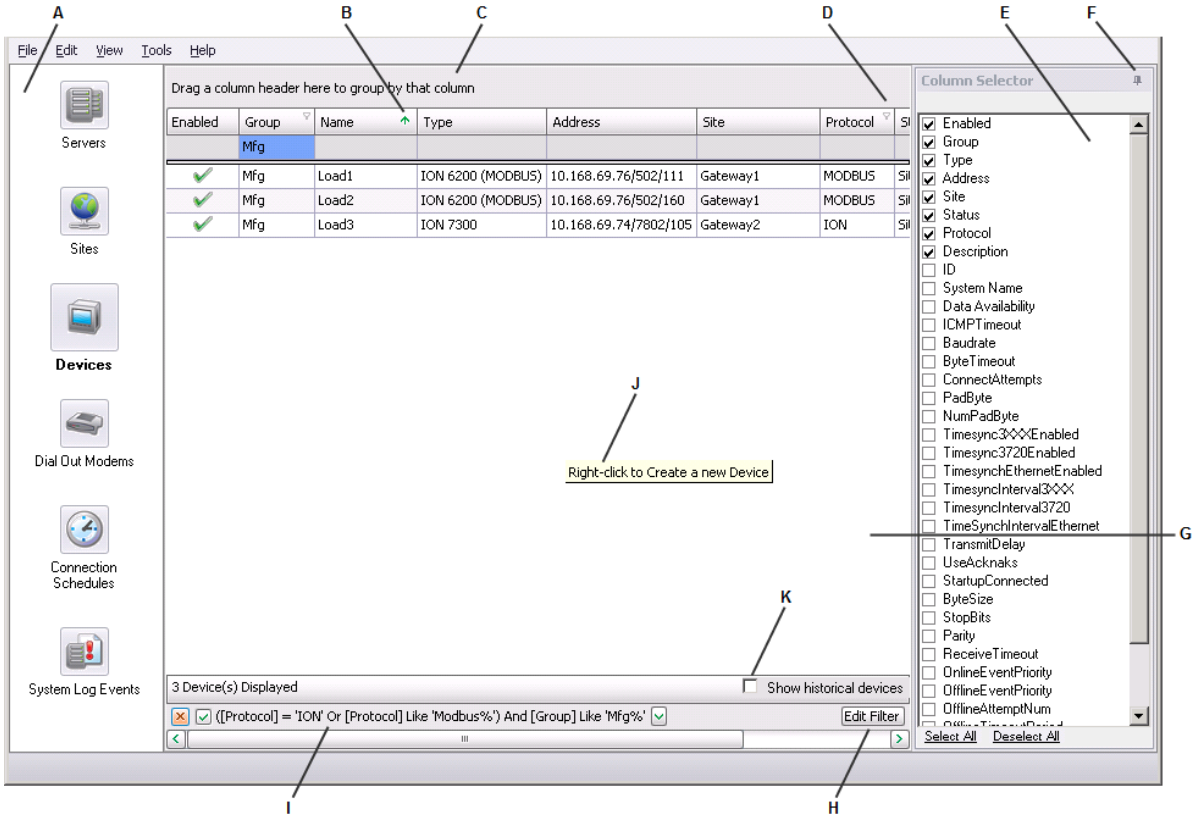
NOTICE

NETWORK INOPERABILITY

Do not make unauthorized changes in the network configuration.

Failure to follow these instructions can result in an unstable or unusable network.

The Management Console interface



A	System Setup pane and icons	B	Sort indicator	C	Group By Box area	D	Filter indicator
E	Column Selector	F	Pin/Unpin icon	G	Display window[1]	H	Edit Filter button
I	Current filter applied	J	Hover text	K	Show historical devices option		
[1] This area displays the contents of the selected System Setup icon							

Window title

The window title displays the name of the software program and the current user.

System Setup pane

The icons in the System Setup pane represent categories of items you can add, remove, set up, and view. Click an icon to go to the associated display window.

Display window

The Display window shows the contents of the item currently selected in the System Setup pane.

Refresh

To manually refresh Management Console and reload its contents, select **View > Refresh** (or press F5).

Options

Select **Tools > Options** to open the Options dialog. Use this dialog to change display settings for the System Log Events display window.

Highlighting

Highlighting controls how Error events are displayed in the System Log Events display window. Select or clear the Enable Highlighting check box to turn highlighting on or off. Click **Set Highlight Color** to change the highlight color for Critical or Error events in the System Log Events display window.

Events

The Events section of the dialog lets you control how many records appear in the System Log Events display window and how date and time are displayed.

Customizing the Management Console interface

You can customize what is displayed in the Management Console interface and the tables within the display windows:

- Select which columns appear in tables.
- Filter, sort and group data in tables.

For instructions on using these features, see Customizing and navigating interface displays.

Display window shortcut menus

To access shortcut menus in the Display window, first click the icon of the System Setup item you are interested in. Then right-click the display window area or on a network component to display the shortcut menu. The menu items available vary depending on the network component selected.

- **New** displays the options available for adding new network items.
- **Duplicate and Configure** lets you perform batch cloning of devices. When multiple devices are selected, this right-click shortcut becomes **Configure Selected Devices** which lets you perform setup functions such as batch renaming of devices.
- **Delete** removes the selected items.
- **Connect** and **Disconnect** lets you manually connect to or disconnect from the selected site.

  NOTE: You cannot connect or disconnect an individual serial device in a site; you can only connect or disconnect the site for that serial device.

- **Connect Ethernet** and **Disconnect Ethernet** let you manually connect to or disconnect from the selected Ethernet device.
- **Security** accesses the Meter Security Settings dialog. This is used by the software to gain access to security-enabled devices (for example, ION8600 or ION7650); it is only available from the shortcut menu for the Devices display pane.
- **Configure <Network Component>** opens the <Network Component> Configuration dialog (where <network component> is the component selected). Use this dialog to make changes to the properties for the selected network component.

For Devices only:

- **Rename** opens the Rename Device dialog. Use this to change the device Name.
- **Change Group** opens the Change Group dialog. Use this to change the device Group.

Management Console network components

This section describes the different components in Management Console: Servers, Sites, Devices, Dial Out Modems, Connection Schedules, and System Log Events.

See Setting up your network in Management Console for information on adding these components to your network.

NOTE: Do not use names such as CON, AUX, COM1, and LPT1 when naming sites and devices. Consult Microsoft documentation regarding restrictions for naming files, paths, and namespaces.

Servers

A server is a computer in the Power Monitoring Expert system that runs administrative software to control access to the network and its resources, such as metering devices.

Sites

A site is a group of devices in the system that share a common communications link. A site can be a direct site, a modem site, an Ethernet gateway site, or an OPC site.

Direct site

In a direct site, serial communications occur between a computer and one or more meters. The standards most commonly used on computers are RS-232 (for connecting one device) and RS-485

(for connecting a loop of up to 32 devices). When connecting to more than one serial device, use an RS-232 to RS-485 converter. Note that you should keep the number of devices on a daisy chain to a minimum to reduce the delay in real-time updates.

Modem site

In a modem site, communications occur between a remote modem (at the Modem Site) and a local modem (on the server).

NOTE: Remote sites that use radio modems or leased-line modems are configured as Direct (Serial) Sites, not as Modem Sites.

Modem sites can include traditional hardware modems (those that are configured and controlled by Power Monitoring Expert or WinModems (Windows modems). If multiple modems are set up in the modem site, Power Monitoring Expert selects the first available modem to establish communications (this is referred to as “modem pooling”).

Ethernet gateway site

An Ethernet gateway site (for example, EtherGate or Modbus gateway) consists of an RS-485 chain of devices that communicates with an Ethernet network via an Ethernet device. The Ethernet device acts as a gateway that transfers data between an Ethernet network and the devices connected to it via RS-485. The gateway device converts RS-232/RS-485 communications to and from Ethernet.

OPC site

An OPC site consists of an OPC client that communicates with OPC-compliant devices on the network.

Devices

A device is a meter or other component that communicates and gathers data, and is installed on a network.

Release notes and mapping spreadsheets for device drivers recently added to the product are included in the product's installation location in `...\Power Monitoring Expert\system\doc\Device Support\`. The release notes provide information about the firmware versions supported by the device drivers, implementation details, images of Vista diagrams for the devices, and pertinent safety messages. The device driver mapping spreadsheets contain details such as modbus register addresses and corresponding ION register addresses (handles). Register mapping information is also provided for any devices using PC logging.

Serial devices

Serial devices belong to direct sites, modem sites, or Ethernet gateway sites — they communicate through a modem, RS-232, RS-485, or Ethernet-to-Serial gateway connection. You must have the appropriate sites configured first before you can add serial devices.

Ethernet devices

Ethernet devices are those that are directly connected to the network via Ethernet. You can manually connect or disconnect your Ethernet device through the Management Console.

Logical devices

Logical devices are a collection of measurements from physical and VIP devices grouped into single sources for use in the system.

OPC devices

OPC devices represent physical devices to which the system is communicating through an OPC interface.

Dial Out Modems

A dial-out modem is one that a server computer uses to communicate with a remote modem at a modem site. The modem implemented can be a traditional hardware-based modem or it can be a software-based modem that uses the computer's processor to emulate a traditional hardware-based modem.

When a modem site needs to establish communications, it selects a modem from the list of modems configured in the modem site. You can add hardware modems or WinModems to the modem list.

NOTE: A WinModem is a modem that is directly controlled by the computer's operating system.

Connection schedules

Connection schedules are programmed routines for a server to regularly connect to and disconnect from sites (and their associated devices) and Ethernet devices. See Configuring connection schedules for more information.

System Log Events

System Log Events lists events for the network. You can select what time frame and components you want to view events for. See System Log events for more information.

Setting up your network in Management Console

⚠ WARNING

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Do not use the software to control time-critical functions.
- Do not use the software to control remote equipment without proper access control and status feedback.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

NOTICE

NETWORK INOPERABILITY

Do not make unauthorized changes in the network configuration.

Failure to follow these instructions can result in an unstable or unusable network.

The Primary Server contains all the Power Monitoring Expert programs and it controls the overall operation of your energy management system. The primary server is displayed on the Server screen when you first start Management Console.

To start building your system, add and configure your sites and devices.

Overview

Site and Device Naming restrictions

The following applies to Site, Device Group, and Device Name naming:

- Names cannot contain spaces or the following characters: \ / : * ? " < > { } . , ' & @ | % #
- The maximum length for a `Group.Device` name is 99 characters (+ 1 for the period separation).
- Do not use names such as CON, AUX, COM1, and LPT1 for sites and devices.
- All characters must exist in the system's Windows code pages. For example. on an English Windows operating system, certain non-English language characters are not supported.

Adding network components

For details on adding various components, see the following sections.

Follow the procedure below to add a new network component:

1. In the System Setup pane, select the icon for the type of item that you want to add (**Site**, **Device**, or **Dial Out Modem**).
2. Right-click the display window, select **New**, and then select the specific type of network component from the shortcut menu to open the **Configuration** dialog.

   The options differ depending on which system setup icon you selected.
3. Use the fields and drop-down menus to configure properties. Mandatory items are highlighted in red. To configure advanced properties, right-click the dialog and select **Advanced Properties**. For more shortcut menu options, see Configuration Dialog shortcut menus, below.
4. Click **OK** to add the component.

Configuration Dialog shortcut menus

Right-click the **Configuration** dialog to access the following shortcut menu options:

- **Property Details**: This opens a window that contains information on the selected property, including minimum and maximum allowable values, if applicable.
- **Advanced Properties**: This exposes all the property fields that are hidden in the default (basic) view. For further information about the Time synchronization option. see Time synchronization for ION meters for further information.
- **Reset All To Default**: Resets all properties to their original values.

Adding a server

Click the Servers icon, right-click the display window and select **New > Computer**. Fill in the mandatory **Name** field.

Adding devices

Setting Up devices for direct serial communications

To set up devices for RS-232 or RS-485 communications on a direct serial loop, first add a direct site in Management Console and specify a serial communications port on the computer.

Step1: Adding a direct site

Click the Sites icon. Right-click the display window and select **New > Direct Site**. Fill in the **Name** and **Serial Port** fields. Configure the other fields as you require.

Step 2: Adding a device to the direct site

Click the Devices icon. Right-click the display window and select **New > Serial Device** on **Direct Site**. Fill in these fields:

- **Group**: Type a name for the group or select an existing group from the list.
- **Name**: Type the name you want to give the device.
- **Device Type**: Select the type of the device.
- **Unit ID**: Type the Unit ID of the device; the range is 1-9999 for ION devices or 1-247 for Modbus RTU devices.
- **Site**: Select the direct site you previously set up.
- **Time Zone**: Select the timezone you want the device data to be displayed in, in the software. This setting is only used for the display of timestamped data in the software. It does not affect the configuration of the monitoring device itself.

Configure the other fields as you require.

Setting up devices for Ethernet gateway communications

To set up devices for Ethernet gateway communications, first add and configure an Ethernet gateway site. Ethernet gateways that can be used include those that are simple Ethernet-to-Serial converters, or any gateway or data concentrator that provides ModbusTCP communications.

Step 1: Adding an Ethernet gateway site

Click the Sites icon. Right-click the display window and select **New > Ethernet Gateway Site**.

Complete the **Name**, **IP Address or Host Name** and **TCP/IP Port** fields. (The IP address can be IPv4 or IPv6.) The TCP/IP Port identifies which communications port is used to connect to the serial devices. The port you use depends on the type of Ethernet gateway you want to set up (use 7801 for an EtherGate gateway via COM1 or use port 502 for a Modbus gateway).

Configure the other fields as you require.

Step 2: Adding a Device to the Ethernet Gateway Site

Click the Devices icon. Right-click the display window and select **New > Serial Device on Ethernet Gateway Site**. Fill in these fields:

- **Group**: Type a name for the group or select an existing group from the list.
- **Name**: Type the name you want to give the device.
- **Device Type**: Select the type of device.
- **Unit ID**: Type the Unit ID of the device; the range is 1-9999 for ION devices or 1-247 for Modbus devices.

- **Site**: Select the Ethernet gateway site you previously set up.
- **Time Zone**: Select the timezone you want the device data to be displayed in, in the software. This setting is only used for the display of timestamped data in the software. It does not affect the configuration of the monitoring device itself.

Configure the other fields as you require.

Adding an Ethernet device

Ethernet devices are configured in PME by providing fixed IP addresses (IPv4 or IPv6) and ports, or based on device names. Device names must be used for devices with dynamic address assignment, for example using the DHCP protocol. When device names are used, then a form of name resolution mechanism is required on the network.

To add an Ethernet device, click the Devices icon. Right-click the display window and select **New > Ethernet Device**. Fill in the **Group**, **Name**, **Device Type**, **IP Address or Host Name**, and **Time Zone** fields. (The IP address can be IPv4 or IPv6.) Configure the other fields as you require.

NOTE: For the **Time Zone** field, select the timezone you want the device data to be displayed in, in the software. This setting is only used for the display of timestamped data in the software. It does not affect the configuration of the monitoring device itself.

Setting up devices for OPC communications

To set up devices for OPC communications, first add an OPC site.

Step 1: Adding an OPC site

Click the Sites icon. Right-click the display window and select **New > OPC Site**. Fill in the **Name** and **Address** fields. Configure the other fields as you require.

Make sure you follow the correct syntax when typing in the address for the OPC site. Select the **Address** field to see an example address in the Property Description section (near the bottom of the **OPC Site Configuration** dialog).

Step 2: Adding a device to the OPC site

NOTE: At least one OPC Device Type needs to be preconfigured before an OPC Device can be created in Management Console. Contact Technical Support for assistance.

Click the Devices icon. Right-click the display window and select **New > OPC Device**. Fill in the **Group**, **Name**, **Device Type**, **Site** (select the OPC site you previously set up), and **Time Zone**. Configure the other fields as you require.

NOTE: For the **Time Zone** field, select the timezone you want the device data to be displayed in, in the software. This setting is only used for the display of timestamped data in the software. It does not affect the configuration of the monitoring device itself.

Adding a modem

1. Click the **Dial Out Modems** icon, right-click the display window and select **New**, then select either **Serial Modem** (hardware modem) or **WinModem** (Windows modem).

2. Fill in the values for the mandatory fields:
   - For **Serial modem**, select the Modem Type from the list. If your modem is not in this list, select “Generic ION Modem - Other”. Select the **Serial Port** where your modem is connected.
   - For **WinModems**, select the Modem Name from the list.

   Configure the other fields as you require.
3. Click **OK**.

WinModem installation notes

Before you can use a WinModem, you must first install it on your computer (follow the instructions that came with the WinModem product). After you restart the computer, set up the WinModem:

1. In Microsoft Windows, click **Start > Settings > Control Panel**, then double-click **Phone and Modem Options**.
2. Click the Modems tab, select your WinModem, then click **Properties**.
3. Click the Advanced tab, then click **Change Default Preference**.
4. Set **Port speed** to match the baud rate that is used between the meter and the modem on the remote end of the connection (both modems must be set to the same baud rate).
5. Set **Flow Control** to “None”.
6. Click **OK** to save your changes.

NOTE: You may need to restart your computer for the settings to take effect.

Editing a network component

1. Click the icon in the System Setup pane for the type of component you want to edit.
2. In the display window, right-click the network component you want to edit and select **Configure <Network Component>** (with <Network Component> being the type of component you want to edit).

   You can rename devices or groups displayed in the Devices pane without selecting the **Configure** option. See Renaming devices and groups for more information.

   NOTE: If you rename a group or device, the data that is already stored in the database is associated with the new group or device name. New data will be added to the database using the new name.
3. Make the required changes. To display all configurable fields, right-click the **Configuration** dialog and select **Advanced Properties**.
4. Click **OK** when you are finished to save your changes.

Deleting a network component

1. Click the System Setup icon for the type of component you want to delete.
2. In the display window, right-click the network component you want to delete and select **Delete** (or select the item and press the DELETE key).
3. Click **Yes** to confirm the deletion or **No** to cancel.

NOTE: When you delete a Site or a Server, all devices associated with it are also deleted.

Renaming devices and groups

You can change the display names of devices and groups without losing any of the real-time or historical data associated with them.

In the Devices pane in Management Console:

- **Group** and **Name** are separate columns.
  - The **Name** column is always displayed.
  - The **Group** column is displayed by default, but you can use the **Column Selector** to remove it from the display area. You can now drag and drop the **Group** column to the **Group By Box** area to show the devices organized within each group.
- Use the **Data Availability** column for inclusion in the display area.
  - **Data Availability** indicates **All** for devices that are active and have real-time and historical data, and **Historical only** for devices that have been deleted and only provide historical data. Historical devices are included in the devices displayed when you select the **Show historical devices** checkbox.
- The **Show historical devices** option displays devices that have been deleted. Since the data for these devices still exists in the system, they can be displayed when you select this option.

Renaming a device

Complete the following steps to change the display name of a device. The system (internal) name is not affected by this name change.

1. Right-click the device name in the Devices pane of Management Console and select **Rename** in the menu to open the **Rename Device** dialog.
2. Enter the new name for the device.

   The appearance of the exclamation icon to the right of the field indicates that there are instructions or errors associated with the device name. Hover over the icon to display the text and take appropriate action.
3. Click **OK** to rename the device.

Changing a group name

Change a group name as follows:

1. Right-click a single group name or select multiple group names (Ctrl + left mouse click) in the Devices pane of Management Console and select **Change Group** in the menu to open the **Change Group** dialog. (You can also select the devices and click the **Change Group** option

in the **Edit** menu.)

2. Enter a new group name or select a group name from the list of group names currently used in the system.

   The appearance of the exclamation icon to the right of the field indicates that there are instructions or errors associated with the group name. Hover over the icon to display the text and take appropriate action.

3. Click **OK** to change the group name.

Considerations when renaming devices or groups

Note the following when you rename a device or a group:

- Complete any configuration tasks in progress, such as working in Designer, before changing names.
- Restart any open components such as Vista, Designer, or Web Applications after the name or group change has been completed to refresh the names that appear in them.
- Regenerate network diagrams in Vista to update the top-level grouping objects with the changed Group name.
- Update OPC data mapping after device renaming by selecting the **Update OPC Server** option in Management Console's **Tools > System** menu. You can then update the OPC clients with the new data.
- System (internal) names, not display names, continue to appear in System Log Events in Management Console. You can view the system name of a device, in Device Manager, by selecting **Unique System ID** in the **Column Selector**.

Configure managed circuits

The Managed Circuits function in Management Console allows you to automatically create devices representing the circuits of multi-circuit devices, such as BCPM and PM5350 devices, so that you can then treat each circuit as a source for both real time and historical data in the system.

These sources represent the physical structure in the system. For information about organizing these circuits and other metering points into a recognizable system-specific hierarchy view, see Hierarchy Manager and also the online help in Hierarchy Manager.

The first step in creating managed circuits is to add the multi-circuit device to Management Console and check that it is communicating.

Once this is done, you can create managed circuits as source entries automatically as follows:

1. Right-click the multi-circuit device you added in Management Console to open the menu and click **Configure Managed Circuits**.
2. Click **OK** on the confirmation window to proceed.

   The **Configuring Managed Circuits** dialog opens showing a progress bar as the circuits are being created. The number of circuits created are indicated under the progress bar field.

3. Click **OK** at the completion of the process.

   The multi-circuit device now has an expand control (a plus symbol) on that row.

4. Click the + to expand the entry and view the circuits now associated with the multi-circuit device.

Managed circuits considerations

Because managed circuits are related to a multi-circuit device and are configured as part of that device, you cannot change the name of individual managed circuits, delete individual managed circuits, or change the measurements associated with the individual managed circuits.

However, you can keep the configuration up-to-date through the multi-circuit device configuration changes and then re-running the configure managed circuits process to update the managed circuits. Any circuits that have not changed remain unchanged. Any circuits that have been removed in the multi-circuit device are deleted as managed circuits. Any new circuits are created as new managed circuits.

By mapping managed circuits into a hierarchy, you can specify more recognizable names and organize them into a view that matches the facility or building.

If you rename the group name or device name for the multi-circuit device, the name changes are also applied to the managed circuits associated with the device. See Renaming devices and groups.

If you delete the multi-circuit device, a dialog message indicates that the managed circuits associated with the multi-circuit device will also be deleted.

If you have a number of multi-circuit devices configured in different ways, and you want to see which measurements apply to a specific managed circuit, double-click the specific managed circuit in Management Console to open the **Managed Circuit Properties** window. It provides: information about the managed circuit, its parent device, its group name, and the measurements associated with the circuit.

You can use the **Duplicate and Configure** option in Management Console to create multiple devices and add unit IDs for each device. (See Setting up large systems for additional information.) After multiple multi-circuit devices have been created, you can select them in Management Console, right-click to open the menu and click **Configure Managed Circuits**. In systems with many multi-circuit devices, the managed circuit creation process takes some time, but the progress bar provides feedback on the progress of the creation process.

Accessing meters with advanced security

If you have a meter in your network with Advanced Security enabled, use Management Console to allow ION Windows Services to access the meter:

1. Right-click the device that has Advanced Security enabled and select **Security** to open the **Meter Security Settings** dialog.
2. From the Software Access dropdown list, select the user (configured on the meter using Designer or ION Setup) that has the access settings that you want the services and components to use when accessing the device.
3. Click **Match Password** and type the password for that user in the Password field then re-type it in the **Confirm Password** field.

4. Select the check box if you want to allow the software to send secure time synchronization signals to the meter. Clear the check box if you do not want to send secure time synchronization signals to the device.
5. Click **OK**.

Configuring connection schedules

You can schedule the times when the server connects to a site or Ethernet device.

Adding a connection schedule

Click the Connection Schedules icon, right-click the display window, then select **New > Connection Schedule** to open the **Scheduled Site Connection** dialog.

The following sections describe the available tabs and how to configure them.

General Settings tab

On the **General Settings** tab:

- Type the name of your connection schedule (for example “Daily Reading”) in the Name field.
- Type a description of the connection schedule, if required.
- Select **Enabled** if you want to enable the schedule.
- Select the date from which the schedule is valid.

Sites tab

On the **Sites** tab:

- Click the box beside the sites and devices to select those that you want to include in the connection schedule. A check mark appears beside an item to indicate that it is included in the connection schedule.
- Set your Site Connection Settings. To enter the minimum and maximum time to stay connected, type the time in the fields or use the arrows to change the time.
- Set the Connection Priority. The higher the number, the greater the priority given to that schedule if there are concurrent connection requests.

Schedule tab

On the **Schedule** tab:

- Set up the date schedule for the connection (the default is Daily). Schedule options vary depending on the type of schedule selected.
  - **Daily**: Occurs every day.
  - **Weekly**: Occurs on the selected day at the specified frequency (in number of weeks) and stays active for the specified duration. For example, if you set Frequency to 2, Day of week to Sunday and Active Duration to 2, the connection occurs every second Sunday and stays active for two days.

- **Monthly - Day of Week**: Occurs at the specified frequency (in months), in the week and on the day specified and for the specified duration. For example, if you set Frequency to 3, Day of Month to 2nd and Sunday, and Duration to 1, the connection occurs every third month on the second Sunday and stays active for 1 day.
- **Monthly - Day of Month**: Occurs at the specified frequency (in months), on the specified date of the month, and for the duration specified. For example, if you set Frequency to 2, Day of Month to 15th and Duration to 2, the connection occurs on the fifteenth day of every second month and stays active for 2 days.

- Set up the time period for the connection to occur by setting a start and an end time. In the Start Time and End Time fields, type the time or use the arrows to change the time.

If you configure a full-day (i.e., 24-hour) daily schedule, you need to allow enough time between the end time and the start of the next connection to avoid connection problems. For example, to add a 2-minute gap to a 24-hour schedule, set the Start Time to 0:00:00 and the EndTime to 23:58:00.

System Log events

System Log Events lists events for components in the system. This information comes from the ION_SystemLog database.

TIP: For instructions on filtering and sorting columns and customizing the display, see Customizing and navigating interface displays.

Viewing System Log events

To view System Log Events:

1. Select System Log Events from the System Setup pane.
2. In the **Show** area select the checkboxes for the system components for which you want to view events (i.e., servers, sites, devices).

   If there are no events for a particular system component, that check box is unavailable.
3. Select the minimum priority level of events to be displayed from the **Minimum Priority Level** dropdown list (see below for more information on priority levels).
4. Click **Modify** to change the date/time filter applied to the System Events Log display. See System Log filter setup.
5. To view details of an event, double-click on the entry in the event log.

Priority

Priority classifies what type of event has occurred. The value corresponds to the severity of the event: the higher the number, the more severe the event.

The priority is contained in the ION_SystemLog database as a number. In the System Events Log display, the priority levels are displayed as text strings. The priority numbers are mapped to the text strings as follows:

Diagnostic	0 - 5
Information	6 - 20

Warning	21 - 63
Error	64 - 191
Critical	192 - 255

By default, the *Cutoff* setup register of Log Inserter's System Log Controller module is set to 192. This means that system events with a priority less than 192 are not transferred to the ION_Data database and therefore cannot be viewed in Alarms. If you want to view lower priority events in Alarms, use the above priority mapping as a guide to set the Cutoff setup register to a lower value (using Designer).

System Log filter setup

The System Log Filter Setup dialog lets you change the date and time filter applied to the System Events Log display.

1. Click **Modify** to display the **System Log Filter Setup** dialog.
2. Select the time range by which you want to filter from the dropdown list. To set up a custom filter, select **Custom Date Range** then use the dropdown lists and arrows in the **Select a Date Range** dialog to specify the start and end of the range.
3. Click **OK**.

Setting up large systems

To perform batch network setup of devices, create the first device in Management Console (see Adding network components) using a logical naming scheme. After you create this first device, you can then use it to create multiple duplicate devices and configure their properties.

The Duplicate and Configure interface

NOTE: The Duplicate and Configure function always operates on all devices visible in the table. When table rows are filtered in the Duplicate and Configure tool, changes done using the configuration editors on the top pane of the window affect only the devices that are visible in the Table Editing area. If you want to apply the changes to all devices, clear the filter first before making the changes.

NOTE: The Duplicate and Configure function cannot be used with logical devices. See Creating multiple logical devices for information about creating more than one logical device.

The Duplicate and Configure area

The Duplicate and Configure area has different sections depending on the type of device you are duplicating.

Ethernet devices have the following sections:

- **Configure Names**: Use this section to create the duplicates.
- **Configure TCP/IP Addresses**: Use this section to create a sequence of IP addresses to assign to the duplicates after they have been created.
- **Configure TCP/IP Ports**: The port number used in the original device is automatically assigned to all the duplicates. If required, use this section to select a different port number for all

the displayed devices in the Table Editing area (changes made in this area are applied to all devices, including the original).

- **Configure Unit IDs**: This section is disabled by default, since unit IDs do not apply to typical Ethernet devices. (To enable this section, you must first set up the Table Editing area so that the “Unit ID” column is visible).

Serial devices have the following sections:

- **Configure Names**: Use this section to create the duplicates.
- **Configure Unit IDs**: Use this section to create a sequence of unit IDs to assign to the duplicates after they have been created.
- **Configure Serial Sites**: The serial site used in the original device is automatically assigned to all the duplicates. If required, use this section to select a different serial site for all the displayed devices in the Table Editing area (changes made in this area are applied to all devices, including the original).

OPC devices have the following sections:

- **Configure Names**: Use this section to create the duplicates.
- **Configure OPC Address**: Use this section to create a sequence of addresses to assign to the duplicates after they have been created.
- **Configure OPC Sites**: The OPC site used in the original device is automatically assigned to all the duplicates. If required, use this section to select a different OPC site for all the displayed devices in the Table Editing area (changes made in this area are applied to all devices, including the original).

The Table Editing area

When making configuration changes in the Duplicate and Configure interface, these changes are applied only to the rows that are visible in the Table Editing area.

See Customizing and navigating interface displays for instructions on filtering and sorting data in the table.

NOTE: To discard your changes since the last saved state, click Revert. You can also press CTRL+Z to undo the last action. To redo the last action, press SHIFT+CTRL+Z. You can only undo your last action (one undo).

Creating multiple copies of a device

This section describes how to duplicate and configure devices.

Step 1: Configuring the first device

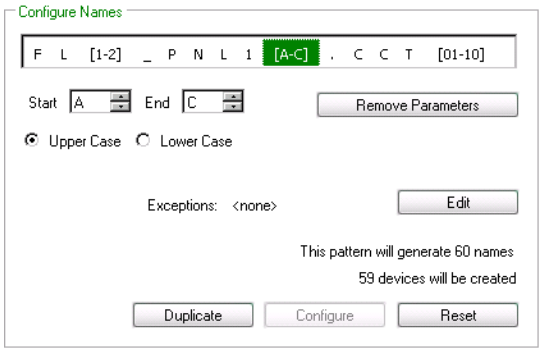
1. Add the first device using your logical naming scheme.

   For example, you can use a scheme like “FL1_PNL1A.CCT01” to name a device that is installed on the “1st Floor” of the building, “electrical panel 1A”, and “Circuit breaker #1”. Type “FL1_PNL1A” as the group name and “CCT01” as the device name when you configure the first device.

2. Right-click the device you want to duplicate and select **Duplicate and Configure**. The Duplicate and Configure interface appears.

Step 2: Configuring names

In the Configure Names area, the device name is displayed. Each letter and number is selectable. A group of numbers is treated as a single entity. For example, in the name “MY8600” the entities you can select are “M”, “Y” and “8600”. Leading zeroes are also supported, so you can set sequences such as “01, 02, 03” or “001, 002, 003”.



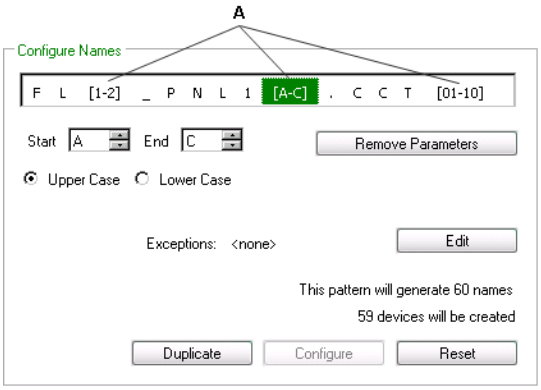
1. Select a letter or number in the device name. The **Start** box displays the selected number/letter, which is the start value. Use the up or down arrow in the spin box to change the start value, or simply type it in the box.
2. Click the up or down arrow on the **End** box edit the range, or type the end value in the box. To clear the range and start over, click **Remove Parameters**.
3. For letters, select Upper Case or Lower Case, depending on whether you require upper case or lower case letters.
4. Set exceptions for individual values or a range of values, if required. Exceptions reduce the number of names created (i.e., total generated names minus the exceptions). See Setting exceptions to generated sequences.

Once you have finished configuring names, you can duplicate the device. See Step 3: Duplicating the device, below, for more information.

Example

For example, if you select the first “1” from the example naming scheme and set the End spin box to “2”, two names are generated (the original, plus one duplicate). If you select a letter and set its Start value to “A” and the End value to “C”, three names are generated (the original, plus two duplicates).

The total number of generated names is the product of the first range multiplied by the next, and so on until the last range, as indicated in the following graphic.

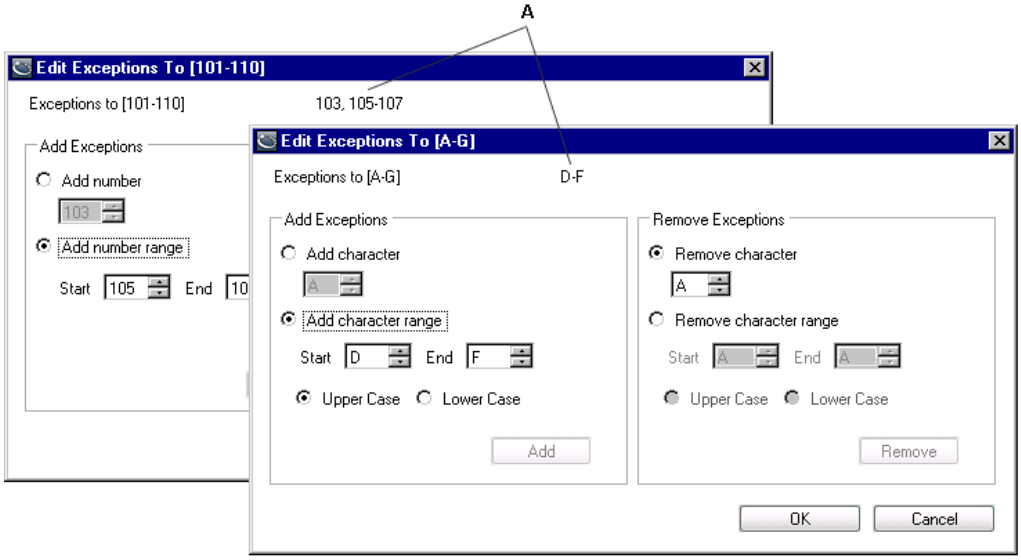


A	The total generated names are the product: [2 X 3 X 10] = 60

Setting exceptions to generated sequences

The **Exceptions** option applies to the **Configure Names** and **Configure TCP/IP Addresses** sections only.

1. To set exceptions to the range of generated values, click **Edit** (this button is unavailable until you change the name or IP value).



A	List of current exceptions

2. Use the **Add number** or **Add character** (as applicable) spin box to set a value to exclude from the range you have specified, then click **Add**. Repeat to set additional values to exclude. To set a range of values to exclude, select **Add number range** or **Add character range**, then use the **Start** and **End** spin boxes to set the range to exclude.

   Click **Add**. Repeat to set additional ranges of values to exclude.

NOTE: You cannot add the same number or letter to the list of exceptions more than once. If the **Add** button is disabled, check that the numbers or letters are not already included in the exceptions list near the top of the window.

3. Use the **Remove number** or **Remove character** spin box to remove the exception that was set for a given value (i.e., put it back in as an acceptable value). Use the **Remove number range** or **Remove character range** spin boxes to remove the exception that was set for a range of values. Click **Remove**.

Step 3: Duplicating the device

Once you have finished configuring names, you are ready to duplicate the device. Click **Duplicate**. The duplicated devices appear in the Table Editing area of the window.

The first device in the list is the original device. The remaining devices are the duplicates. Asterisks next to the device names indicate pending changes that have not yet been saved.

Click **Apply** to save your changes and continue editing devices, click **OK** to save your changes and return to Management Console, or click **Revert** to undo unsaved changes.

In Management Console, duplicated devices are always disabled when they are added.

Step 4: Configuring duplicated devices

See the following section, Configuring multiple devices, for instructions on configuring other properties for multiple devices.

Configuring multiple devices

After you have duplicated the devices, you can select and configure any or all of them.

1. If you have closed the Duplicate and Configure interface, select the devices you want to configure from the Devices display window in Management Console. Right-click and select **Configure Selected Devices** (this option is only available if multiple devices are selected).

   The Configure Selected Devices interface appears. This interface has the same layout and controls as the Duplicate and Configure interface; see The Duplicate and Configure interface for information.

   NOTE: Devices affected by a configuration change (that has not been saved) are identified by an asterisk in the first column of the Table Editing area.

2. Scroll to the right in the Duplicate and Configure area to view the Configure TCP/IP Addresses, Unit IDs, Ports and Sites sections of the interface (depending on the type of device being configured). If the number of items in this area does not match the number of items in the |Table Editing area, a message in red text appears in the area. If the numbers match, the message text is black. Configure these parameters as described in Configuring addresses, ports, unit IDs and sites then click **Configure** at the bottom of the applicable interface section.

   NOTE: Configuration changes only affect the devices that are currently displayed in the Table Editing area. Use the column sorting and filtering features, described in Customizing and navigating interface displays, to control which devices are displayed in the table. If you want to apply the changes to all devices, clear any filtering before making the changes.

3. Click **Apply** to save your changes and continue working or click **OK** to save your changes and return to Management Console.

   NOTE: If you changed the name of one or more devices, a message displays with a list of devices that will be renamed. If data for those devices already exist in the ION_Data database and you still proceed with the renaming, then the existing data associated with the old device name is lost ("orphaned").

   Click **Continue** to proceed or **Cancel** to go back and edit the device configuration.

4. When you have finished, click **OK** to save your changes and return to Management Console or click **Cancel** to discard your changes.

   If you click Cancel, a message prompts you if there are pending (unsaved) changes when you click Cancel. Click **Yes** to discard the changes and return to Management Console, or **No** to return to the configuration window and continue editing.

   If inappropriate values (such as a device that is renamed with the same name as another existing device) are encountered, a message displays with error details. You cannot save the configuration changes until you have corrected the errors.

Configuring addresses, ports, unit IDs and sites

The following sections describe how to configure addresses, ports, and unit IDs.

Configuring TCP/IP addresses

1. Select the section of the IP address that you want to configure. The **Start** box displays the selected number/letter, which is the start value. Use the up or down arrow in the spin box to change the start value, or simply type it in the box.
2. Click the up or down arrow on the **End** box edit the range, or type the end value in the box. To clear the range and start over, click **Remove Parameters**.
3. Set exceptions for individual values or a range of values, if required. Exceptions reduce the number of addresses created (i.e., total generated addresses minus the exceptions). See Setting exceptions to generated sequences.
4. Click **Configure** at the bottom of the Configure TCP/IP Addresses section.

Configuring unit IDs

The following instructions apply to serial devices (and Ethernet devices that require a unit ID).

1. Use the up or down arrow in the **Start** spin box to change the start value, or simply type it in the box.
2. Click the up or down arrow on the **End** box edit the range, or type the end value in the box.
3. Click **Configure** at the bottom of the Configure Unit IDs section.

   NOTE: To edit the unit ID of an Ethernet device, you must first add the Unit ID column to the table in the Table Editing area.

Configuring sites

1. From the dropdown list, select the site you want to use for the selected serial or OPC devices.
2. Click **Configure** at the bottom of the Configure Sites section.

Configuring ports

1. From the dropdown list, select the port you want to use for the selected Ethernet devices.
2. Click **Configure** at the bottom of the Configure Ports section.

Editing duplicated device information

The following sections describe how to quickly edit the properties of duplicated devices in the table editing area.

Copying device information from a spreadsheet

Sometimes device names do not follow any particular naming pattern. In this case, you can use the copy/paste function to apply configuration changes directly to the Table Editing area.

First, you need to add a new device in Management Console, then create as many duplicates of the device as the quantity of items you are pasting.

If you have a Microsoft Excel spreadsheet that contains a list of these devices to add to Management Console, you can use the Configure Names area to create duplicates of that device type, then use the Table Editing area to copy and paste the device properties from the Excel spreadsheet.

Example: Copy and paste 20 Ethernet devices from excel

1. Confirm that the names in the Excel spreadsheet conform to the naming convention “[Group].[DeviceName]”.
2. Add the first device and set up its properties in Management Console. You can assign it a simple device name such as “A.B1” since it will be overwritten when the values are copied and pasted from Excel. Set the Enabled property to No so that Management Console does not attempt to connect to the device.
3. Click **OK** to add the device.
4. Right-click the device and select **Duplicate and Configure**.
5. Select the “1” in the Configure Names box, then use the End spin box to set the value to 20.
6. In the Hide/Show Columns area, clear the check box of all non-editable columns to hide those that contain grayed out values. Also hide the columns you do not want to paste over or those that are not included in the Excel spreadsheet.
7. On the Excel spreadsheet, arrange the columns so they match the order of the columns on the Table Editing area. Hide all columns on the Excel spreadsheet except those corresponding to columns on the Table Editing area.
8. Select the cells in Excel and copy them (CTRL+C).

9. On the Table Editing area, click on the first cell under the Name column to select it, then paste the contents of the clipboard (CTRL+V).
10. Click **Apply** to save your changes or click **OK** save your changes and return to Management Console.

Using Find and Replace to edit device information

Use the **Find and Replace** feature to modify matching characters in the device names or in any other editable columns on the device table. The Find and Replace feature does not work on read-only columns.

1. Right-click the device table and select **Find and Replace** (or press CTRL+H).
2. Type the characters you want to search for in the **Find** box. Do not use wildcard characters ("*"). Note that the search is case-sensitive.
3. **Find in column** lists all available columns. Select the column you want to search in.
4. In the **Replace** box, type the characters you want to use to replace the characters in the **Find** box. If you want to delete characters from a column value, leave the **Replace** box blank.
5. Click **Preview** to list the search results in the table. The **Replace with** column displays the new name or value resulting from the Find and Replace operation.
6. Use the check box in the **Select** column to select the rows for which you want to change values. Click **Select All** to select all the items or **Clear Selected** to clear all.
7. Click **Apply** to save your changes or **Cancel** to discard your changes
8. Click **OK** to save your changes and close the dialog.

Manual Data Editor

TIP: You can open Manual Data Editor in Management Console from the **Tools > System > Manual Data Editor** link.

Use Manual Data Editor to edit logged measurement data or to manually enter measurement data into the PME database. With this tool, you can adjust incorrect data, outliers, roll overs, jitter, and other unexpected or unwanted data records. You can fill data gaps or enter manually collected data, such as clipboard readings from mechanical meters. The Manual Data Editor also has the ability to create new, custom measurements in PME.

NOTE: Manual Data Editor can only be used to edit trend data logs. It cannot be used to edit waveform logs or event logs.

NOTICE

LOSS OF DATA

Back up the database before making manual database edits.

Failure to follow these instructions can result in permanent loss of data.

For information on how to use the Manual Data Editor , see:

- Editing existing logged measurement data
- Adding manually collected measurement data
- Viewing previous change details
- Reverting previous data edits
- Creating new measurements

For reference information see:

- Manual Data Editor user interface

Editing existing logged measurement data

Edit existing data logs to adjust incorrect data, outliers, roll overs, jitter, and other unexpected or unwanted data. You can also fill in missing data and insert missing data records.

To edit existing logged measurement data:

1. In Manual Data Editor, click **Load New Data** to open the Load Data dialog box.

   NOTE: Load Data opens automatically when you start Manual Data Editor.

2. In Load Data:
   - Select the Source for which you want to edit the logged data.
   - Select the Measurement for which you want to edit the logged data.
   - Click **Add Data to Selection** to add the source/measurement to the list of items to be opened in the data editor.
3. (Optional) Repeat step 2 to add additional sources and measurements to the selection list.
4. In Load Data, select the **Time Range** for the logged data you want to open in the data editor.
5. (Optional) In Load Data, set the following data editor options:
   - **Timezone** - Set the timezone for the display of the configurable timestamp in the data editor. The data editor shows two timestamps for each data record, one timestamp in UTC and one in a configurable timezone.
   - **Timestamp Format** - Set the format for the timestamp display in the data editor.
   - **Number Format** - Set the number of decimals that are displayed for the logged data in the data editor.
   - **Is Interval Data** - Select the check box to enable this property. Set the expected logging interval for the data.

     This setting ensures that there is a data row in the editor for every expected log entry. If there is no data record for an expected entry in the database, then the Manual Data Editor inserts a timestamped row with a <no data> data values in the editor. This makes it easier to identify missing records and correct them.

     NOTE: The data editor shows all logged records in the selected time range, regardless of the Interval Data settings. No records are hidden or filtered out.
6. Click **Load Data** to open the source/measurement data in the data editor.
7. (Optional) In the data editor, click **Load New Data** to change which data is loaded, the time range, or the editor options.
8. (Optional) In the data editor, click **View Issue Report** to see which data issues were identified with the loaded data by Manual Data Editor.
9. (Optional) In the data editor, use **Locate Issues** to find and step through the data issues identified by Manual Data Editor. The data editor uses different color highlights to mark data issues.

10. Locate data records that you want to edit and use any of the following tools or methods to edit the data:
    - Click a data record and edit the data value.
    - **Insert Timestamp** - Insert a new data record with a timestamp that you specify. The timestamp must be in the time range of the data that is loaded into the editor. The new record has <no data> data values.

      NOTE: A historical data log timestamp marks the end of the logging interval. For example, a data log with a 15 minute logging interval and timestamp of 17:00 represents data for the time interval of 16:45 - 17:00.
    - **Smart Gap Fill** - Automatically fill missing data values in a selected time range, or the entire time range of the loaded data set. You can choose between different interpolation algorithms to fill the missing data. See Smart Gap Fill UI for more details.
    - Delete a data record or data value. These options are available in the right-click context menu.
    - Set a data value to <null>. This option is available in the right-click context menu.
    - Copy one or more data values and paste them into an external editor, such as Microsoft Excel, for bulk editing. Paste the modified data values back into Manual Data Editor. The copy and paste options are available in the right-click context menu.

      NOTE: Only select the data values for copy/paste, not the timestamps.

    TIP: Modified data values are shown in bold font in the Manual Data Editor.
11. (Optional) In the data editor, use **Locate Changes** to find and step through the edited data records.
12. (Optional) Revert edited data values back to their original value. This option is available in the right-click context menu. Use **Undo all Changes** to revert all edits in the loaded data set.
13. Click **Apply Changes** to write the data log changes to the database.

    NOTE: The Apply Changes command permanently writes the data log changes to the database. There is no undo option for this command. See Reverting previous data edits for more information.
14. (Optional) Click **View Log** to see a historical audit log of all the data log changes.
15. Close Manual Data Editor.

For information on how to use the Manual Data Editor , see:

- Editing existing logged measurement data
- Adding manually collected measurement data
- Viewing previous change details

- Reverting previous data edits
- Creating new measurements

For reference information see:

- Manual Data Editor user interface

Adding manually collected measurement data

Manually add data logs to the database that were collected from data sources that do not have a communication link with the software.

To add manually collected measurement data:

1. In Manual Data Editor, click **Load New Data** to open the Load Data dialog box.

   NOTE: Load Data opens automatically when you start Manual Data Editor.

2. In Load Data:
   - Select the Source for which you want to add data.
   - Select the Measurement for which you want to add data. If the measurement does not exist, click **Create new Measurement** to create a new measurement.

     NOTE: Check the list of available measurements to see if one exists for your application before creating a new measurement.

   - Click **Add Data to Selection** to add the source/measurement to the list of items to be opened in the editor.
3. (Optional) Repeat step 2 to add additional sources and measurements to the selection list.
4. In Load Data, select the **Time Range** for the data you want to add in the data editor.
5. (Optional) In Load Data, set the following data editor options:
   - **Timezone** - Set the timezone for the display of the configurable timestamp in the data editor. The data editor shows two timestamps for each data record, one timestamp in UTC and one in a configurable timezone.
   - **Timestamp Format** - Set the format for the timestamp display in the data editor.
   - **Number Format** - Set the number of decimals that are displayed for the logged data in the data editor.
   - **Is Interval Data** - Select the check box to enable this property. Set the expected logging interval for the data. This setting ensures that there is a data row in the editor for every expected log entry.
6. Click **Load Data** to open the source/measurement data entry fields in the data editor.
7. (Optional) In the data editor, click **Load New Data** to change which data is loaded, the time range, or the editor options.
8. In the data editor enter the measurement data using any of the following tools or methods:
   - Click a data record and edit the data value.
   - **Insert Timestamp** - Insert a new data record with a timestamp that you specify. The timestamp must be in the time range of the data that is loaded into the editor. The new record has <no data> data values.

NOTE: A historical data log timestamp marks the end of the logging interval. For example, a data log with a 15 minute logging interval and timestamp of 17:00 represents data for the time interval of 16:45 - 17:00. That means that the last data log for a day has a timestamp of midnight (or 12 AM) of the following day. For example, the last data log timestamp for January 31 has a timestamp of February 1, 00:00 hrs (or 12 AM).

- **Smart Gap Fill** - Automatically fill missing data values in a selected time range, or the entire time range of the loaded data set. You can choose between different interpolation algorithms to fill the missing data. See Smart Gap Fill UI for more details.
- Delete a data record or data value. These options are available in the right-click context menu.
- Set a data value to <null>. This option is available in the right-click context menu.
- Copy one or more data values and paste them into an external editor, such as Microsoft Excel, for bulk editing. Paste the modified data values back into Manual Data Editor. The copy and paste options are available in the right-click context menu.

NOTE: Only select the data values for copy/paste, not the timestamps.

TIP: Modified data values are shown in bold font in the Manual Data Editor.

9. Click **Apply Changes** to write the new data log entries to the database.

NOTE: The Apply Changes command permanently writes the data log changes to the database. There is no undo option for this command. See Reverting previous data edits for more information.

10. (Optional) Click **View Log** to see a historical audit log of all the data log changes.
11. Close Manual Data Editor.

For information on how to use the Manual Data Editor , see:

- Editing existing logged measurement data
- Adding manually collected measurement data
- Viewing previous change details
- Reverting previous data edits
- Creating new measurements

For reference information see:

- Manual Data Editor user interface

Viewing previous change details

Manual Data Editor maintains an audit log which records all changes to logged data made by the tool. The log is filtered by source/measurement.

To view previous change details:

1. In Manual Data Editor, click **Load New Data** to open the Load Data dialog box.

   NOTE: Load Data opens automatically when you start Manual Data Editor.

2. In Load Data:
   - Select the Source for which you want to see the audit log.
   - Select the Measurement for which you want to see the audit log.
   - Click **Add Data to Selection** to add the source/measurement to the list of items to be opened in the data editor.
3. (Optional) Repeat step 2 to add additional sources and measurements to the selection list.
4. Click **Load Data** to open the source/measurement data entry fields in the data editor.

   NOTE: Ignore the settings for **Time Range** and **Options**, they have no influence on the display of the audit log.

5. (Optional) In the data editor, click **Load New Data** to change which data is loaded, the time range, or the editor options.
6. Click **View Log** to open the audit log for these sources/measurements.
7. View the audit log.
8. Close Manual Data Editor.

For information on how to use the Manual Data Editor , see:

- Editing existing logged measurement data
- Adding manually collected measurement data
- Viewing previous change details
- Reverting previous data edits
- Creating new measurements

For reference information see:

- Manual Data Editor user interface

Reverting previous data edits

It is not possible to directly and automatically revert previous data edits with Manual Data Editor. However, you can use the information available in the audit log to manually revert previous edits.

To revert previous data edits:

1. In Manual Data Editor, click **Load New Data** to open the Load Data dialog box.

   NOTE: Load Data opens automatically when you start Manual Data Editor.

2. In Load Data:
   - Select the Source for which you want to revert previous edits.
   - Select the Measurement for which you want to revert previous edits.
   - Click **Add Data to Selection** to add the source/measurement to the list of items to be opened in the data editor.
3. (Optional) Repeat step 2 to add additional sources and measurements to the selection list.
4. In Load Data, select the **Time Range** for the logged data you want to open in the data editor.
5. (Optional) In Load Data, set the following editor options:
   - **Timezone** - Set the timezone for the display of the configurable timestamp in the data editor. The data editor shows two timestamps for each data record, one timestamp in UTC and one in a configurable timezone.
   - **Timestamp Format** - Set the format for the timestamp display in the data editor.
   - **Number Format** - Set the number of decimals that are displayed for the logged data in the data editor.
   - **Is Interval Data** - Select the check box to enable this property. Set the expected logging interval for the data.

     This setting ensures that there is a data row in the editor for every expected log entry. If there is no data record for an expected entry in the database, then the Manual Data Editor inserts a timestamped row with a null value in the editor. This makes it easier to identify missing records and correct them.

     NOTE: The data editor shows all logged records in the selected time range, regardless of the Interval Data settings. No records are hidden or filtered out.
6. Click **Load Data** to open the source/measurement data in the data editor.
7. (Optional) Click **Load New Data** to change which data is loaded, the time range, or the editor options.
8. Click **View Log** to open the audit log for these sources/measurements.
9. Find the log entries that you want to revert. Using the information provided in the **Original Value** and **New Value** columns, identify the values you want the logs to be reset to.

   TIP: You can copy the values from the audit log and paste them into the data editor or an external editor such as Microsoft Excel.

10. **Close** the Audit Log.
11. In the data editor, locate data records that you want to edit and use any of the following tools or methods to reset the data:
    - Click a data record and edit the data value.
    - **Insert Timestamp** - Insert a new data record with a timestamp that you specify. The timestamp must be in the time range of the data that is loaded into the editor. The new record has <no data> data values.

      NOTE: A historical data log timestamp marks the end of the logging interval. For example, a data log with a 15 minute logging interval and timestamp of 17:00 represents data for the time interval of 16:45 - 17:00.
    - Delete a data record or data value. These options are available in the right-click context menu.
    - Set a data value to <null>. This option is available in the right-click context menu.
    - Paste the data values from the audit log into the data records. The copy and paste options are available in the right-click context menu.

      NOTE: Only select the data values for copy/paste, not the timestamps.

    TIP: Modified data values are shown in bold font in the Manual Data Editor.
12. (Optional) In the data editor, use **Locate Changes** to find and step through the edited data records.
13. (Optional) Revert edited data values back to their original value. This option is available in the right-click context menu. Use **Undo all Changes** to revert all edits in the loaded data set.
14. Click **Apply Changes** to write the data log changes to the database.
15. Close Manual Data Editor.

For information on how to use the Manual Data Editor , see:

- Editing existing logged measurement data
- Adding manually collected measurement data
- Viewing previous change details
- Reverting previous data edits
- Creating new measurements

For reference information see:

- Manual Data Editor user interface

Creating new measurements

You can use Manual Data Editor to create new, custom measurements in PME. These measurements are available anywhere in the software.

To create a new measurement:

1. In Manual Data Editor, click **Load New Data** to open the Load Data dialog box.

   NOTE: Load Data opens automatically when you start Manual Data Editor.

2. In Load Data, click **Create new Measurement** to open the Create new Measurement dialog box.

   NOTE: Check the list of available measurements to see if one exists for your application before creating a new measurement.

3. In Create new Measurement, enter the relevant information for the new measurement.
4. Click **Create** to add the new measurement to the system.
5. (Optional) Repeat steps 2-4 to add additional measurements.
6. Close Manual Data Editor.

For information on how to use the Manual Data Editor , see:

- Editing existing logged measurement data
- Adding manually collected measurement data
- Viewing previous change details
- Reverting previous data edits
- Creating new measurements

For reference information see:

- Manual Data Editor user interface

OPC Server Support

Introduction to OPC

OPC is a set of open standards for connectivity and interoperability of industrial automation and the enterprise system. OPC provides a bridge between Windows based applications and process control hardware, thereby eliminating the need for proprietary or custom interfaces and drivers for the various data types and sources residing in your corporate information network. Having information readily available in a universally-recognized format can cut costs, speed up development and increase operations efficiency. This is especially true when many diverse software applications, hardware, and operating systems exist in the corporate and operations networks.

RECOMMENDATION: Use an OPC tunneling application for OPC data exchange over a network

⚠ WARNING

INACCURATE DATA RESULTS

- Do not incorrectly configure the OPC Server.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

OPC is supported through the implementation of ION Real Time Data Service, a .NET-based system that takes the traditional “register handle-based” ION data and transforms it into structured “measurement-based” data that complies with open standards such as OPC. ION Real Time Data Service facilitates the translation and organization of data in this new measurement classification system.

Power Monitoring Expert supports OPC server and OPC client functionality. The OPC server translates ION data into OPC data, for exporting and viewing in other third-party OPC client systems. The OPC client, on the other hand, takes OPC standardized measurements from third-party systems and translates them into a data format that Power Monitoring Expert can use.

This appendix provides basic configuration and operation instructions for the OPC server component of Power Monitoring Expert.

NOTE: The OPC client is available in all Power Monitoring Expert installations. However, due to the number of different third-party OPC-compliant servers in the industry, as well as different methods and syntax for connecting to these servers and accessing their data, it is highly recommended that you contact Technical Support for assistance in configuring the OPC client.

Optional OPC server license

The OPC Server Assistant is available during the 90-day trial period. After the trial period, you need to purchase a Data Exchange Module license and activate it through the Floating License Manager to enable OPC server functionality.

OPC server type

The Power Monitoring Expert OPC server complies with the "OPC Data Access Custom Interface Standard Version 2.05A". The class of data that the current release of OPC Data Access server is able to provide is Read-Only data (i.e., control functions are not currently supported).

OPC measurement support

OPC measurement support for Power Monitoring Expert allows you to easily translate data from ION devices and compatible Modbus devices into OPC-compliant measurement data formats, then make this measurement data available to OPC clients through the OPC server.

Management Console has a command that lets you export default measurements from compatible devices to the OPC server. In addition, Designer and Device Type Editor user interfaces let you view and select which OPC measurement data you want the OPC server to expose to OPC clients.

Creating/updating default OPC mapping

Power Monitoring Expert can create the default ION-to-OPC data mapping based on the devices contained in the ION_Network database. This default mapping translates the most commonly-used ION data to OPC data and exports the data to the OPC server.

1. Launch Management Console.
2. Click **Tools > System > Update OPC Server**.
3. Click **Yes** to create/update the OPC server.

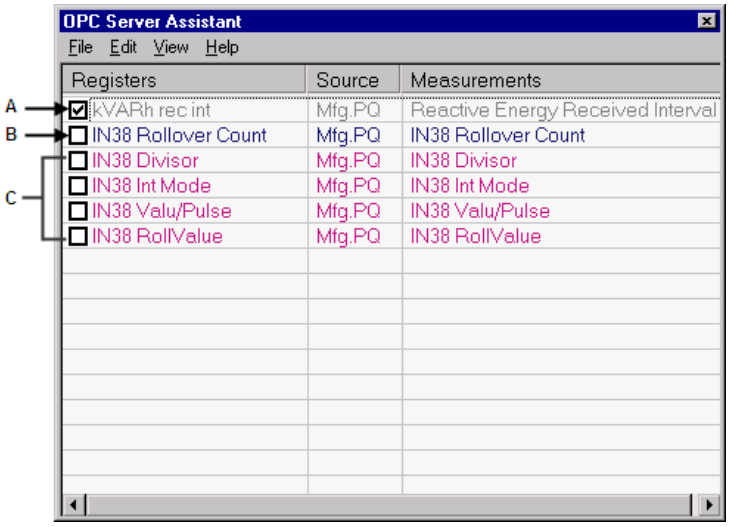
   A summary of the configuration details is displayed.
4. Click **OK**.

NOTE: If you add a new device to the ION_Network database at a later date, you must repeat the above procedure in order to map the new source device's data to the OPC server.

OPC Server Assistant

The OPC Server Assistant is a mechanism that lets you select which OPC measurements to expose to the OPC server. Custom labels are not mapped to OPC server by default. They need to be manually exported to OPC server.

OPC Server Assistant is accessible through Designer.



A	Unavailable registers (Grayed-out)	B	Output Register	C	Setup Registers

Exporting OPC measurements through Designer

If you customized an ION device's default templates (for example, custom labels), those measurements are not exposed to the OPC server by default. To manually export those measurements to OPC server:

1. Launch Designer and open the ION device node.
2. Navigate to the ION module that contains the register that you want to expose to OPC server. Right-click to display the module setup dialog.
3. Click **OPC** to open the OPC Server Assistant.
4. Select (check) the box beside each item you want to expose to the OPC server. Clear (uncheck) the box beside each item you do not want to expose to the OPC server.

   NOTE: Grayed-out items (such as "PF sign a" in the Power Meter module) cannot be selected or changed. Those registers cannot be removed using OPC Server Assistant.

5. Click **File > Export**. Click **Yes** to save your changes.

Description of commands

This section describes the commands available in the OPC Server Assistant.

Command	Result
File > Export	Saves your configuration changes. Items that are selected (checked) in the OPC Server Assistant are exposed to the OPC server, while cleared (unchecked) items are not.
File > Exit	Closes the OPC Server Assistant.
Edit > Reset values	Discards your changes and reverts to the last saved configuration (for the items that are exported to the OPC server).
Edit > Select All	Selects (checks) all registers.

Command	Result
Edit > Clear All	Clears (unchecks) all registers that are not grayed out.
View > Setup Registers	Displays the setup registers, in addition to the output registers, for the module.
View > Measurements	Displays a column containing the measurement names associated with the registers.

Viewing OPC data

A third-party OPC client can connect to the ION OPC server using a valid connection address, which consists of the network node or host machine name where the OPC server is running and the OPC program ID (ION.OpcDaServer). For example:

```
opcda://WORKSTATION3/ION.OpcDaServer
```

NOTE: Syntax use varies across different OPC clients. Refer to your OPC client documentation for details.

Power Losses Configuration Utility

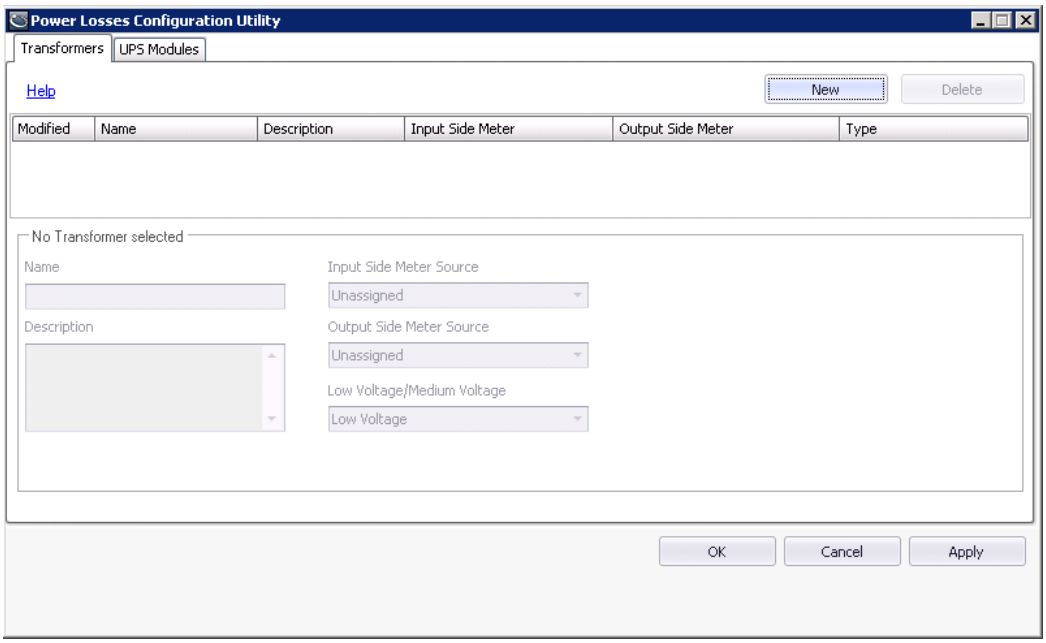
TIP: You can open the Power Losses Configuration Utility from the **Power Monitoring Expert > Configuration Tools** folder on your desktop.

Use the Power Losses Configuration Tool to configure the Capacity Management Module. With this tool you define Transformers and UPS Modules for the Power Losses Report.

See Capacity Management Module configuration for details.

Prerequisites

- The monitoring devices that are recording the transformer and UPS data must be configured in the PME Management Console and must be communicating before you can configure the components and properties in the configuration tool.



User Interface

Control	Description
Help	Opens the help for the utility.
New	Creates a new entry in the grid.
Delete	Deletes the selected entry from the grid.
OK	Saves all changes and exits the utility.
Cancel	Exits the utility without saving changes.
Apply	Saves all changes and leaves the utility open.

Grid Area Columns	Description
Modified	Displays a status symbol for the record.
+ (plus)	A new entry.
* (asterisk)	An existing entry has been modified.
! (exclamation mark)	The entry is incorrect.

Power Losses configuration restrictions

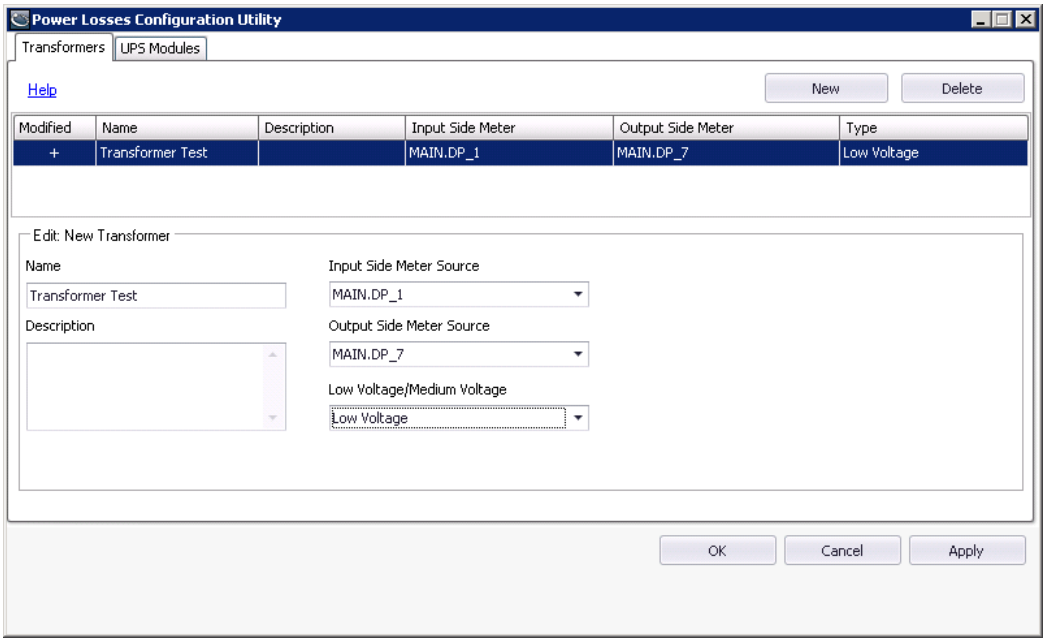
The Power Losses Configuration Utility enforces certain rules when you create a power losses system:

- **All Devices**
  - Name must be unique.
  - A meter source must be assigned only once to a device.
- **Transformers**
  - Zero, one, or more low voltage transformers may be present in the power losses system.
  - Zero, one, or more medium voltage transformers may be present in the power losses system.
- **UPS Modules**
  - Zero, one, or more UPS modules may be present in the power losses system.

Defining transformers for Power Losses

To define a transformer used in your power losses system:

1. Select the **Transformers** tab.
2. Click **New**. The editable fields are enabled.
3. Define the transformer:
   a. **Name:** Enter a unique name for the transformer.
   b. **Description:** (Optional) Enter a description for the transformer. For example: make, model.
   c. **Input Side Meter Source:** Select a source name from the drop-down list. The source represents the Power Monitoring Expert device that records the electrical data from the input side of the transformer.
   d. **Output Side Meter Source:** Select a source name from the dropdown list. The source represents the Power Monitoring Expert device that records the electrical data from the output side of the transformer.
   e. **Low Voltage/Medium Voltage:** Select Low Voltage or Medium Voltage from the drop-down list to indicate the transformer voltage rating type.
4. Click **OK** to save the transformer.

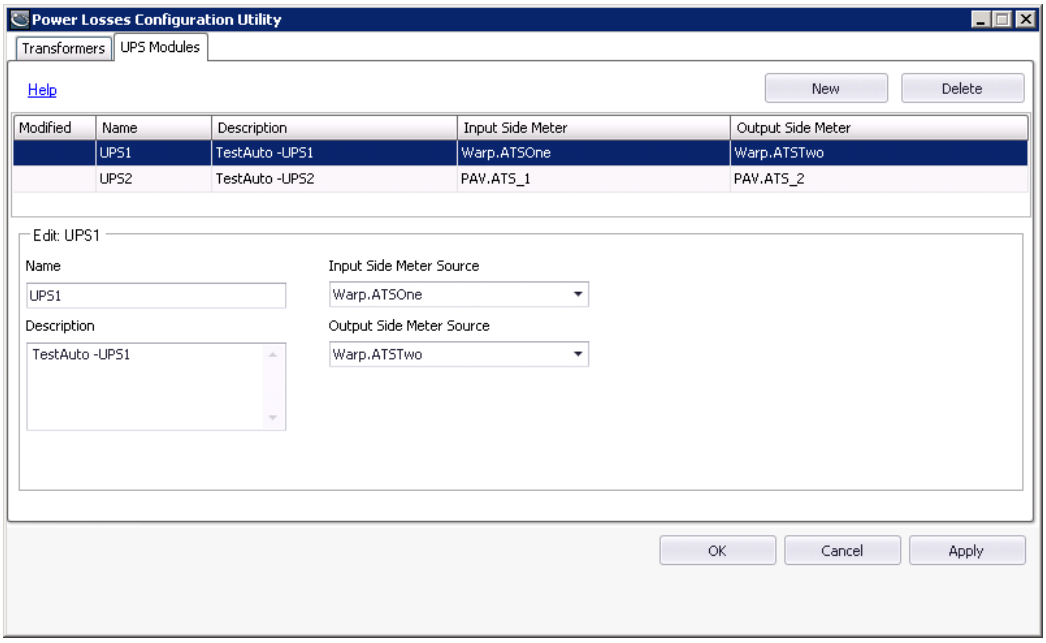


Related Topic: Defining UPS modules for Power Losses

Defining UPS modules for Power Losses

To define a UPS module used in your power losses system:

1. Click the **UPS Modules** tab.
2. Click **New**. The editable fields are enabled.
3. Define the UPS module:
   a. **Name:** Enter a unique name for the UPS module.
   b. **Description:** (Optional) Enter a description for the UPS module. For example: make, model.
   c. **Input Side Meter Source:** Select a source name from the drop-down list. The source represents the Power Monitoring Expert device that records the electrical data from the input side of the UPS module.
   d. **Output Side Meter Source:** Select a source name from the drop-down list. The source represents the Power Monitoring Expert device that records the electrical data from the output side of the UPS module.
4. Click **OK** to save the UPS module.



Related Topic: Defining transformers for Power Losses

PQDIF Exporter

PQDIF (Power Quality Data Interchange Format) is a non-proprietary means of exchanging power quality data between different metering devices and software.

Developed under the guidelines of IEEE P1159.3, PQDIF provides a common ground where different vendors can export to or import from, using a data format consistent with the defined PQDIF standard.

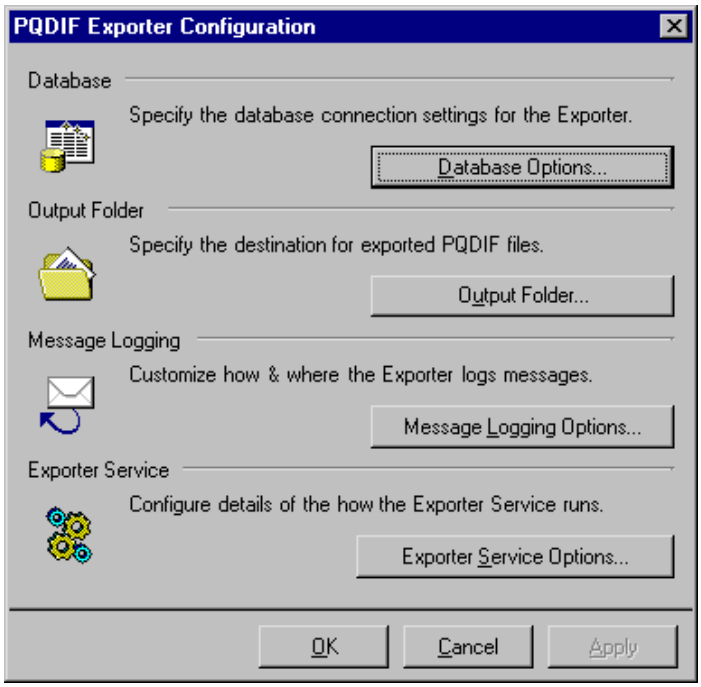
Power Monitoring Expert supports PQDIF through the “PQDIF Exporter” add-on. PQDIF Exporter takes data from the Power Monitoring Expert SQL Server database, converts it to PQDIF, and stores this formatted file for viewing with any of the various programs that can display PQDIF data. The PQDIF Exporter allows you to set regularly scheduled exports of ION data to PQDIF, as well as perform these exports manually.

This guide provides basic configuration and operation instructions for the PQDIF Exporter. It is assumed that the user already has knowledge of PQDIF. For details on viewing the PQDIF data, refer to the documentation that came with your PQDIF viewer. For detailed information on the PQDIF specification, visit the IEEE website.

Configuring the PQDIF Exporter

From Management Console, select **Tools > System > PQDIF Exporter**.

When you run PQDIF Exporter for the first time, the PQDIF Exporter Configuration dialog opens with the options to perform the initial configuration steps. To edit these settings at any time, select **Options > Configure PQDIF Exporter**. You can also edit the PT/CT Scaling used for the sources by the PQDIF Exporter; select **Options > PT/CT Scaling**.



Database options

The Database Options dialog allows you to make changes to the database connection settings (SQL Server Instance, User Name, and Password). Type your changes in the appropriate fields.

NOTE: Under most conditions, you do not need to change the factory settings.

Click **Test These Settings** to test your database connection. A prompt displays to indicate whether or not connection to the database was successful.

Output folder

Click **Output Folder** to change the folder where PQDIF Exporter stores its output files. Type the folder path or click **Browse** to navigate and select the folder (or to create a new folder).

Message logging options

Click **Message Logging Options** to change the settings for message logging and email notification. The options available to configure are Log File, System Log, and E-mail Notification.

Log File options

Click **Log File Options** to specify the location for the log file and the logging level option.

Location

To change the folder location for the log file, type the folder path in the Location field or click **Browse** to navigate and select the folder.

Logging Level

Logging Level lists the different options for logging depth. Select the level you want from the dropdown list:

- **Disabled**: No messages are stored in the log file.
- **Normal**: Warning and error messages are stored in the log file.
- **Detailed**: Warnings, errors, and information are stored in the log file.
- **Diagnostic**: Warnings, errors, information, and diagnostic messages are stored in the log file.

NOTE: The “Diagnostic” log file option uses a huge amount of system resources. Select this option only if absolutely necessary.

System Log options

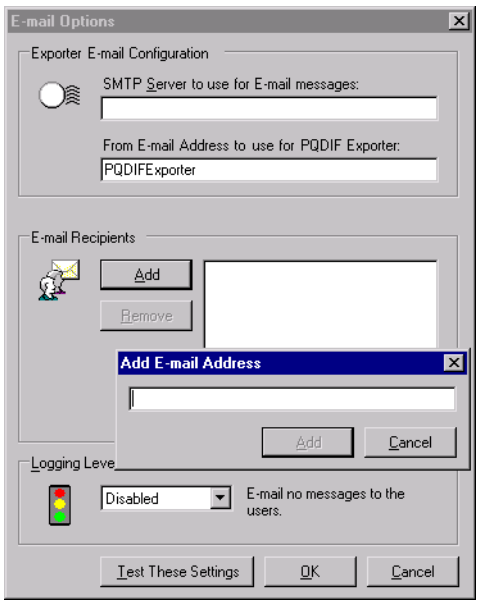
Click **System Log Options** to specify whether or not messages are stored in the Power Monitoring Expert system log.

Select from the following options:

- **Disabled**: No messages are stored in the system log.
- **Normal**: Warning and error messages are stored in the system log.

Email options

Click **E-mail Options** to set up email notification from PQDIF Exporter.



SMTP Server to set for E-mail messages

Type the name of the SMTP server PQDIF Exporter uses to send the email.

From E-mail Address to use for PQDIF Exporter

Type the address you want to appear in the “From” field in the email message.

E-mail Recipients

Click **Add** to enter email address recipients for the PQDIF Exporter messages. To delete an email address from the list, select it then click **Remove**.

Logging Level

The Logging Level box lists the different options for the amount of information sent in the email message. If you change this setting, it affects the setting for all email recipients.

- **Disabled**: No email sent.
- **Normal**: Email warning and error messages.

When you have finished setting up the email options, click **Test These Settings** to test the email connection.

If email settings are configured properly, a test message is sent to your inbox.

Exporter service options

Click **Exporter Service Options** to specify how often the PQDIF Exporter service restarts from an idle state to check the database for data to export.

Use the up and down arrows and dropdown list to set the frequency.

NOTE: Setting the Exporter Service Frequency Settings to seconds uses a huge amount of system resources. Select this option only if absolutely necessary.

PT/CT scaling

For a network where the PT/CT ratios on the meters are not set to the actual ratio values (for example, if the ratios are set to 1:1 for revenue metering purposes), the PQDIF Exporter service can scale the values to the correct primary measurements when it exports data.

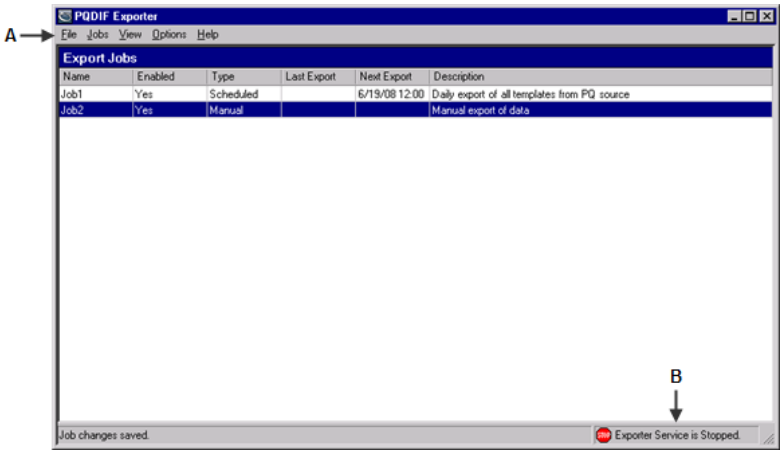
To set the PT/CT scaling for the PQDIF Exporter:

1. Click **Options > PT/CT Scaling** to open the PT/CT Scaling dialog displaying the current PT/CT scaling for the sources in your network.
2. Select a source(s) and click **Edit PT/CT Scaling for Selected Sources** to open the Edit PT/CT Ratios dialog.
3. Enter the multiplier required to convert secondary values to primary values (for example, enter 1000 for a 5000:5 CT). Click **OK**.
4. Click **Save** to save your changes.

PQDIF Exporter main window

This is the main user interface for setting up schedules for PQDIF Exporter jobs or for setting up and running the jobs manually.

From Management Console, click **Tools > System > PQDIF Exporter**.



A	Main menu items	B	Status of Exporter

Menu items

All the PQDIF Exporter commands are available from the main menu. Some of these commands are also available when you right-click on the interface background or on a job.

Starting/stopping the exporter service

To start the PQDIF Exporter service:

- Select **Options > Start Exporter Service**, or
- Right-click the status bar and select Start Service.

To stop the service:

- Select **Options > Stop Exporter Service**, or
- Right-click the status bar and select Stop Service.

PQDIF Exporter jobs

The **Jobs** menu contains commands which allow you to set up PQDIF Exporter jobs that run automatically, according to the schedule you specify. You can also set up manual jobs to collect data for a specific date range from the SQL Server database for conversion to PQDIF.

PQDIF data templates

PQDIF data templates are the mapping files that convert ION data to PQDIF. PQDIF Exporter extracts recorded data for the following default templates:

- **Flicker**: Short-term and long-term flicker disturbance data on the voltage inputs.
- **Sag/Swell**: Sag/swell disturbance data for the voltage inputs, including minimum, maximum and average values.
- **Sag/Swell Waveforms**: Waveform data for voltage sag/swell.
- **Steady-state**: Steady-state (RMS) data for trending.
- **Steady-state Waveforms**: Waveform data for steady-state data.

  NOTE: For the Steady-state Waveforms template, you must program the meter to use a Periodic Timer module to perform periodic waveform recording of the voltage and current channel inputs. The time interval you specify must be a multiple of 15 minutes.

- **Transient Waveforms**: Transient disturbance data for voltage inputs.

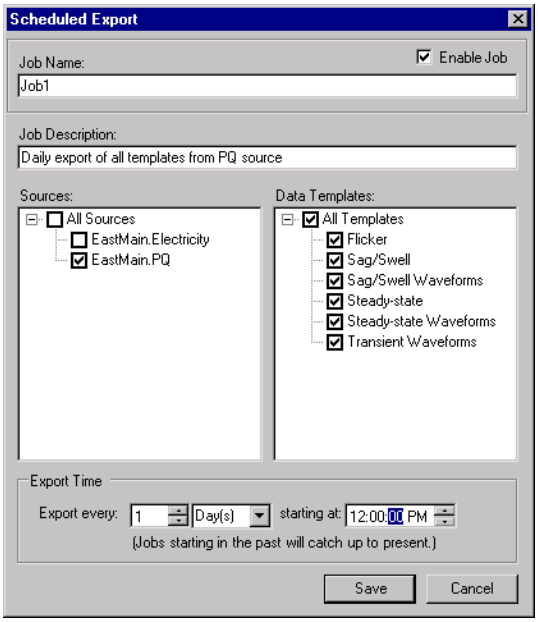
In addition to the default templates, custom templates can be also be developed — contact Technical Support if you require customized data templates for your application.

Scheduled export jobs

You can set up PQDIF Exporter to run at a specific time every day, or you can specify a different time interval (for example, every 12 hours or every 7 days). You can create and store multiple scheduled jobs for the PQDIF Exporter.

Creating a Scheduled Export Job

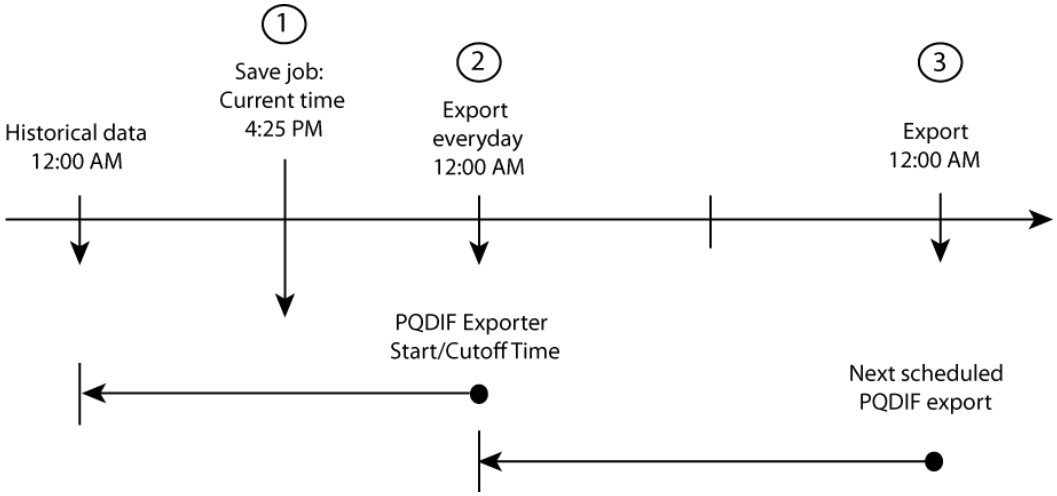
1. Click **Jobs > New Job > Scheduled Export** to open the **Scheduled Export** dialog.



2. Type a short but descriptive name in the **Job Name** field. Use the **Job Description** field to give more details about the job.
3. Select the sources for your scheduled data export. Click the box beside each source to select or deselect it.

   Click **All Sources** to select all available devices that log the type of data specified by the data templates. When this logged data is detected for a new device, that device is automatically added to all scheduled PQDIF Exporter jobs that have All Sources selected.
4. Select the Data Templates you want to use when the PQDIF Exporter runs. Click the box beside each template to select or deselect it.

   Click **All Templates** to select all available data templates for the selected devices. When a new data template is added, that template is automatically added to all scheduled PQDIF Exporter jobs that have All Templates selected.
5. Use the **Export Time** section to specify how frequently the PQDIF Exporter should run, as well as its start/cut-off time. When a scheduled PQDIF Exporter job runs for the first time (at the specified start time), it collects historical data to create PQDIF files so that the time period for that export is consistent (“caught up”) with the time periods of all subsequent scheduled PQDIF exports.
   - **Example 1**: If you saved the scheduled job (1) at 4:25 PM, with the Exporter scheduled to run daily at midnight, the first PQDIF file is generated at midnight (2) the same day, and includes data spanning from the previous midnight. PQDIF Exporter runs again next midnight (3), and includes data spanning the first scheduled export (2).



- **Example 2**: If you set a scheduled job to run PQDIF Exporter every 8 hours, starting at 3:00 AM, then the first PQDIF file is generated at 3:00 AM, and will include data spanning 8 hours previous to that time (that is, 7:00 PM). The next export starts 8 hours later, at 11:00 AM, then at 7:00 PM, then at 3:00 AM and so on.
- **Example 3**: To run PQDIF Exporter once a week at 6:00 AM, change Export Time to "Export every 7 Day(s) at 6:00 AM". In this example, the PQDIF file contains a full week's worth of PQDIF data

6. Click **Add Job**.

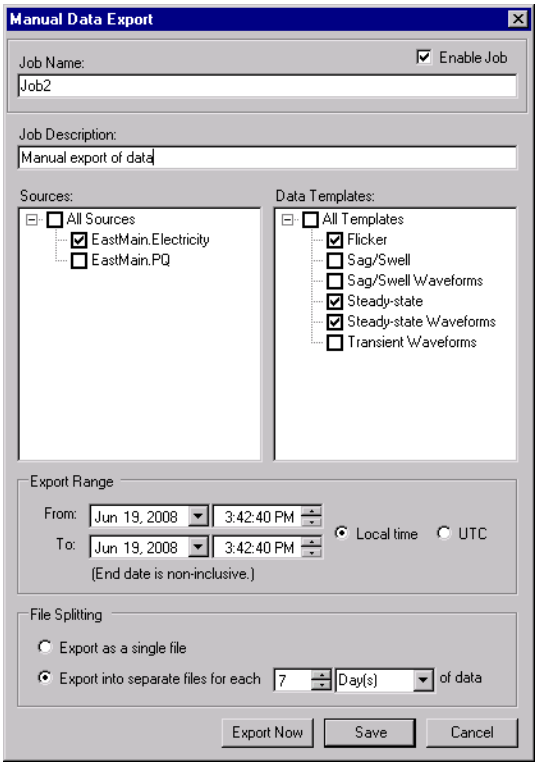
NOTE: Exporter Service must be started in order to run scheduled PQDIF Exporter jobs. See PQDIF Exporter main window.

Manual export jobs

A manual export job enables you to run the PQDIF Exporter immediately. You can create a different manual job for each source and/or template, or for specific groups of sources and/or templates.

Creating a manual export job

1. Click **Jobs > New Job > Manual Export** to open the **Manual Data Export** dialog.



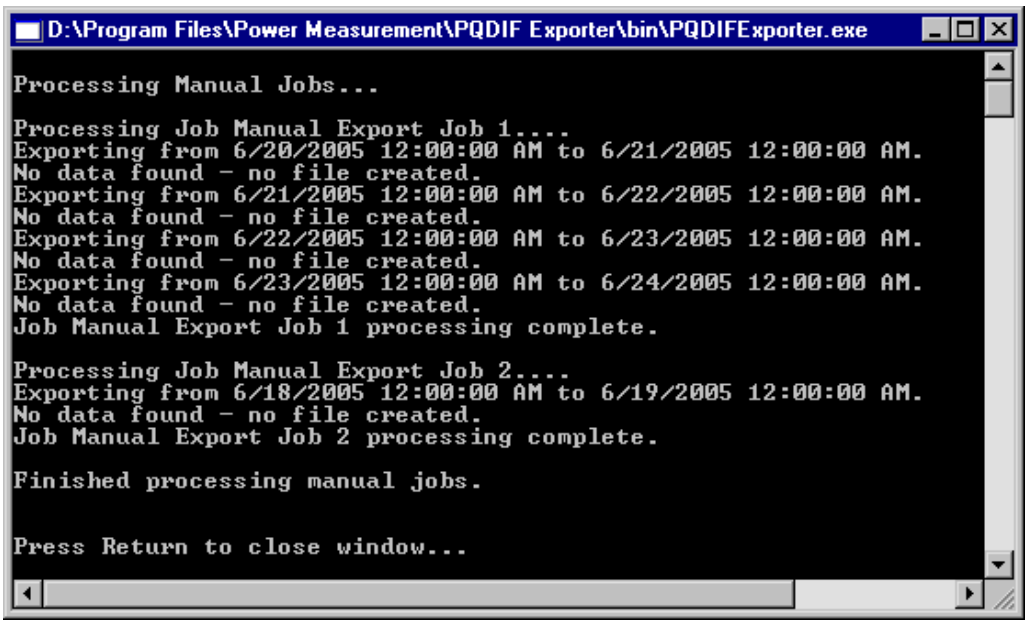
2. Type a short but descriptive name in the **Job Name** field. Use the **Job Description** field to give more details about the job.
3. Select the sources for your data export. Click the box beside each source to select or deselect it.
   - To select all available devices, select the **All Sources** box.
4. Select the Data Templates you want to use. Click the box beside each template to select or deselect it.
   - To select all available templates, select the **All Templates** box.
5. Use the Export Range **From** and **To** boxes to specify the date range of historical data that the PQDIF Exporter will use. The default time format is local time. If you want to use Coordinated Universal Time format, select **UTC**.
6. Use the File Splitting options to specify how PQDIF Exporter exports the data. The default method is to export the data to a single PQDIF file. You can change this so the data is split into different PQDIF files — for example, if you want to split the data so each PQDIF file contains 12 hours worth of data, set the File Splitting to “Export into separate files for each 12 Hour(s) of data”.
7. Click **Export Now** to run and save this manual PQDIF Exporter job, or click **Add Job** to save without running it.

Running manual jobs

After you enter the manual PQDIF Exporter jobs, you can select and run them:

1. On the PQDIF Exporter interface, select the manual job(s) you want to run.
2. Right-click and select **Export Selected Manual Job(s)**. A command window displays to indicate the progress of the export. Press the RETURN (ENTER) key when prompted to return to the PQDIF Exporter interface.

NOTE: To run all manual jobs, click **Jobs > Export All Manual Jobs**.



Editing the PQDIF Exporter jobs

To make changes to a scheduled or manual job:

1. To edit a job, open the **Export Configuration** dialog in one of the following ways:
   - Double-click the job.
   - Select the job, then click **Jobs > Edit Selected Job**, or
   - Right-click the job and select **Edit Selected Job**.
2. Make your changes and click **Save**.

Duplicating PQDIF Exporter jobs

If you are creating jobs that have very similar attributes (for example, jobs that use the same set of devices, templates and/or time schedules), you can set up the first job, duplicate it, then simply edit the copy.

1. Select the job(s) you want to duplicate, then click **Jobs > Duplicate Selected Jobs** (or right-click the job and select **Duplicate Selected Jobs**).
2. Double-click the copy of the job you want to edit, make your changes, then click **Save**.

Enabling/disabling the PQDIF Exporter jobs

To enable or disable the scheduled or manual jobs:

1. Select the job(s) you want to enable or disable.
2. To enable the jobs, click **Jobs > Enable Selected Jobs**. To disable them, click **Jobs > Disable Selected Jobs**. You can also right-click the jobs and select **Enable Selected Jobs** or **Disable Selected Jobs** to enable or disable the jobs.

Adjusting the column widths

To change the width of a column, hover the mouse over border of the column headings — the mouse pointer changes into a double-arrow pointer — click and drag to adjust the column width.

Sorting the PQDIF Exporter job list

Click the title of a column to sort the data according to that column heading. An arrow appears in the title of the column. Click the title again to toggle the sorting—ascending or descending order.

Deleting PQDIF Exporter jobs

To permanently remove PQDIF Exporter jobs from the list:

1. Select the jobs you want to delete, then:
   - Click **Jobs > Delete**,
   - Press the Delete key on your keyboard, or
   - Right-click and select **Delete Selected Jobs**.
2. Click **Yes** when prompted.

NOTE: You can also disable a job instead of deleting it (that is, Enable = “No”). This way, the job can be enabled at a later date if required.

Closing the PQDIF Exporter window

To close and exit the PQDIF Exporter window, click the “X” at the top right corner, or click **File > Exit**.

If the Exporter Service is stopped when you try to exit, PQDIF Exporter prompts you to start the service in order to process scheduled jobs. Click **Yes** to start the Exporter Service.

Rate Editor

Rate Editor is a Web-based application that lets you change cost values for items included in a billing report.

Open Rate Editor from Web Applications **Settings** > **System** > **Billing Rates**. You can also open Rate Editor from Management Console **Tools** > **Web Tools**.

The **Rate File** list on the left lists all of the rate files contained in the **ratelibrary** folder in the Power Monitoring Expert install location under `applications\config\reports\billing report`. When you add rate files to the folder, they are included in the **Rate File** list.

Rate Editor User Interface

The **Line Item Label** and **Unit Cost** areas on the right list a description of line items and the associated cost values defined in each rate file. Click a rate file to view its line items and cost values.

To modify the unit cost value for billing report purposes:

1. Click the unit cost value that you want to change to enable editing.
2. Type the new value and press **Enter** to complete the update.
3. To return to the previous value, click **Undo**.

The rate files included in the product are examples of various billing scenarios. The files are intended to be copied and modified to meet your specific requirements. For further information about creating or modifying rate files, see the documentation, tutorials, and examples included in the Billing Module Toolkit (available in the Power Monitoring Expert Exchange).

Remote Modem Setup

Use Remote Modem Setup to preconfigure dialup modems that will be connected to meters at remote locations. Hardware-based and software-based (WinModems) modems are supported.

Remote Modem Setup provides access to a database that contains configuration data for a variety of modems you can pick from. Remote Modem Setup also provides direct access to your modem so you can customize settings and troubleshoot its operation.

Preliminary Setup

Follow the instructions in your modem's documentation to set up and connect the modem to one of your computer's serial ports. Select a port that the Power Monitoring Expert Communications Server is not using.

Using Remote Modem Setup

1. Start Management Console.
2. Click **Tools > System > Remote Modem Setup** to open the **Remote Modem Setup** dialog.
3. Set the Port to the serial communications port that the computer uses to communicate with (and set up) the modem. Set the Baud Rate to match the modem's baud rate.

   NOTE: To reduce possible communication issues, set the computer, modems and meters to the same baud rate.

4. Set the following properties for the remote modem:
   - Select the type of modem from the **Type** box.
   - Set the Site Baud Rate.
   - To set the modem to answer after a specified number of rings, select **Auto Answer**, then type the appropriate number in the Number of Rings box.
   - To save the modem configuration data in the modem's onboard memory, select **Store Profile**. This feature allows the modem to revert to the saved settings after a power outage. Clear **Store Profile** to disable this feature.
   - To turn on the modem's internal speaker, select **Speaker On**, then select a setting from the Volume list. Clear **Speaker On** to disable this feature.
5. Click **Send** to save the settings to the modem.

   If there are DIP switch settings required for the modem that is being configured, a message displays with instructions on which switches to turn on or off. Set the DIP switches on the modem as instructed.

The modem is now ready to be used at the remote power monitoring site.

Software Logging

Use Software Logging to add or edit software-based data logging for Modbus device types. This is intended for device types that do not have onboard data logging capabilities. You can also add software logging to a device type with onboard data logging to log additional measurements that are not logged by the device.

RECOMMENDATION: Use onboard data logging when possible. The data log timestamps for onboard data logs are more accurate than the timestamps for software data logging. Onboard data logging is also more reliable than software data logging since it does not depend on a network connection to the device.

The **Software Logging** link in Management Console opens the same **Configure Logging and Calculation** dialog that is available through the Device Type Editor. For more information on adding software logging see Adding Software Logging to a Modbus Device Type.

System use notification

You can add a system use notification to your PME system that is displayed in Engineering applications and Web Applications clients every time before users can log into the system.

Use a system use notification to inform persons accessing the system of authorization requirements, to get user acceptance of terms and conditions before logging in, or to display any other information that you want to make your users aware of.

To enable a system use notification:

1. In Windows Explorer, locate the system use notification HTML files.
   a. For Web Application clients: `...Power Monitoring Expert\Applications\ApplicationFramework\Authentication\PreLoginDialog.html.sample`.
   b. For Engineering applications: `...Power Monitoring Expert\config\content\PreAuthDialog.html.sample`.
2. Remove the `.sample` extension from the filenames. The filenames should now be `PreLoginDialog.html` and `PreAuthDialog.html` respectively. This enables the system use notification.

   NOTE: You can enable the notification for Web Application clients only, or for Engineering applications only, or for both.
3. Open the system use notification files in a text editor, such as Notepad. Edit the default messages to meet your needs. You can use inline HTML styles to customize the appearance of the notifications.

Done

To disable the system use notification:

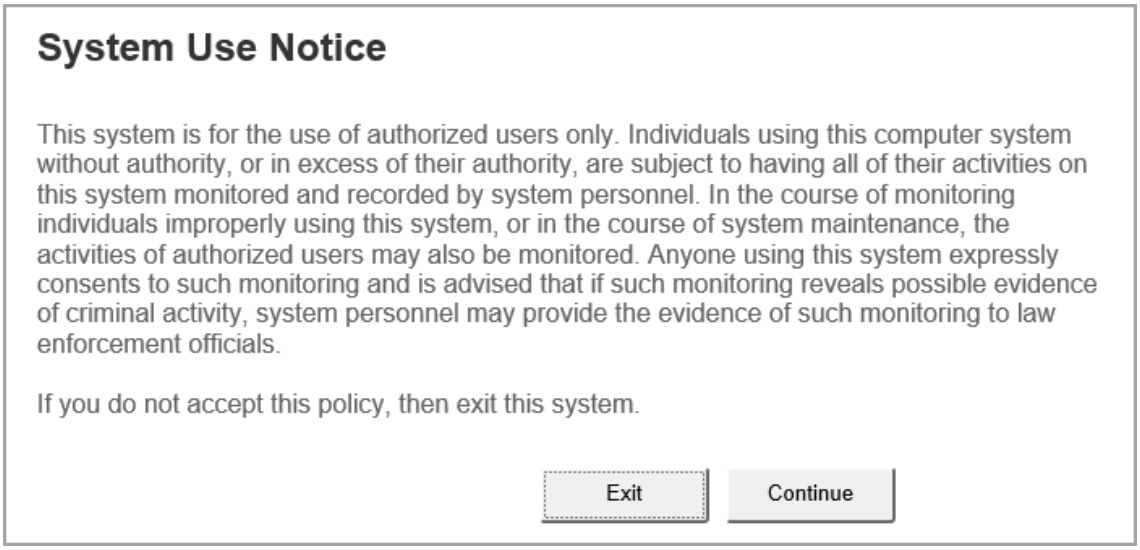
1. In Windows Explorer, locate the system use notification HTML files.
   a. For Web Application clients: `...Power Monitoring Expert\Applications\ApplicationFramework\Authentication\PreLoginDialog.html`.
   b. For Engineering applications: `...Power Monitoring Expert\config\content\PreAuthDialog.html`.
2. Add `.sample` to the end of the filenames. The filenames should now be `PreLoginDialog.html.sample` and `PreAuthDialog.html.sample` respectively. This disables the system use notification.

   NOTE: You can disable the notification for Web Application clients only, or for Engineering applications only, or for both.

Done

Default system use notification message:

NOTE: The default notice is meant as an example and placeholder for your own notice. It has not been reviewed for completeness or legal accuracy.



Time of Use Editor

Time of Use (TOU) schedules created with the Time of Use Editor are designed to be used with the Reports application. When you use a TOU schedule in a report, the report data is presented according to the time periods you defined in the schedule. See *Report definitions* in the online help for Reports in the Web Applications component for information on the Energy Cost Report.

A typical TOU has On Peak, Off Peak and Shoulder periods. Since rate schedules vary not only by day and week, but also by season, the TOU schedules can be set up to match your precise needs.

Opening the Time of Use Editor

To access the Time of Use Editor, select **Tools > System > Time of Use Editor** in Management Console.

Use the navigation pane on the left to navigate through the schedules. Right-click a schedule or sub-schedule to access menu items. Select an item to display associated tabs in the tab display pane on the right.

Overview: Creating a TOU schedule

To create a TOU schedule, you need to:

1. Add a schedule. See Adding or editing a schedule.
2. Add a sub-schedule, if you need more than one sub-schedule. See Adding or editing a sub-schedule.
3. Add a season, if you need more than one. See Configuring seasons.
4. Configure special days (such as holidays) to include in your TOU schedule. See Adding special days.
5. Add day groups, if you need groups other than the default day groups. See Configuring Day groups.
6. Add TOU names, if you need names other than the default names. See Defining TOU names.
7. Assign TOU periods to TOU names. See Defining TOU periods.

To view a sample schedule, right-click the navigation pane and select **Import Schedule**. Select SampleSchedule.tou from the ...\Power Monitoring Expert\system\etc folder and click **Open**.

Adding or editing a schedule

This section describes how to add a blank schedule, and import or copy an existing schedule.

Adding a blank schedule

1. Select **File > New Schedule** to open the **Add a Schedule** dialog.
2. Type a name and description for the schedule. Click the arrow beside the effective date to bring up a calendar where you can select the effective date of the schedule.
3. Click **OK**. That schedule name appears in the list in the navigation pane.

Copying an existing schedule

1. In the navigation pane, right-click the schedule that you want to copy.
2. Select **Save as New Schedule** to open the **Save as New Schedule** dialog.

3. Enter a name and description for the new schedule.
4. Click **OK**. The new schedule appears in the navigation pane with the attributes of the copied schedule.

Importing a schedule

1. Place the schedule that you want to import into a folder that can be accessed from the computer.
2. In the navigation pane, right-click an empty area of the navigation pane then select **Import Schedule** to open the **Open** dialog.
3. Navigate to the folder where you placed the schedule. Select the schedule and click **Open**.

   The schedule is imported with the extension "_imported". For example, a schedule named "ScheduleA" becomes "ScheduleA_imported".

Exporting a schedule

To export a schedule to use in another TOU installation:

1. Right-click the schedule you want to export in the navigation pane. Click **Export** to open the **Save As** dialog.
2. Select the folder where you want to save the schedule.
3. Enter a schedule name in the File name box.
4. Click **Save**.

   The schedule is saved with the extension ".tou". For example, "ScheduleB" becomes "ScheduleB.tou".

Editing an existing schedule

To edit a schedule name or description:

1. From the navigation pane, right-click a schedule name then click **Edit Schedule** to open the **Edit a Schedule** dialog.
2. Change the schedule name or description.

   To change the effective date, you must make the change to the sub-schedule(s). See Editing a sub-schedule effective date.
3. Click **OK**.

Deleting a schedule

To delete a schedule, right-click the schedule name in the navigation pane then select **Delete Schedule**. This deletes the entire schedule, including any sub-schedules.

Adding or editing a sub-schedule

When you add the basic schedule, it contains one sub-schedule, with the effective date (start date) you entered for the schedule. To add additional sub-schedules with alternate effective dates, follow the instructions in the following sections.

Expand a schedule to display its sub-schedule(s). Sub-schedules are listed in order of their effective dates.

TIP: If you want to have more than one sub-schedule with the same seasons, day groups, TOU periods, etc., configure the first sub-schedule then right-click it and select **Save as New SubSchedule**.

Adding a blank sub-schedule

1. Right-click the schedule name and select **New SubSchedule** to open the **New SubSchedule** dialog.
2. Click the arrow beside the effective date to open a calendar where you can choose an effective date for the new sub-schedule.
3. Click **OK**.

   The sub-schedule displays in the navigation pane. Continue configuring the sub-schedule by adding seasons and day groups.

To add a new sub-schedule that has the same settings as an existing sub-schedule, see Copying an existing sub-schedule, below.

Copying an existing sub-schedule

1. Right-click the sub-schedule that you want to copy and select **Save as New SubSchedule** to open the **New SubSchedule** dialog.
2. Click the arrow beside the effective date to open a calendar where you can choose an effective date for the new sub-schedule.
3. Click **OK**. The new sub-schedule displays in the navigation pane with the same attributes (other than effective date) of the sub-schedule you copied.

Editing a sub-schedule effective date

1. Right-click the sub-schedule for which you want to change the effective date, then select **Edit Effective Date** to open the **Edit SubSchedule Effective Date** dialog.
2. Click the arrow beside the effective date to open a calendar where you can choose an effective date for the new sub-schedule.
3. Click **OK**.

Deleting a sub-schedule

To delete a sub-schedule, right-click the sub-schedule name in the navigation pane and select **Delete**. This also deletes all seasons in that sub-schedule (and any day groups, special days, etc., that they contain).

Configuring seasons

Use seasons to create timeframes for presenting data in reports. A newly created schedule has a single season, called All Year. Expand a sub-schedule to view its seasons.

If you only need one season (All Year), you can skip the steps below and go to configuring special days.

Configuring seasons

Use the **Define a Season** tab to set up or edit the time spans for each season.

NOTE: A date can only belong to one season; you cannot overlap dates in one season with dates in another.

1. From the navigation pane, select the sub-schedule to which the season belongs.
2. In the tab display pane, select the **Define a Season** tab.

   After you add a sub-schedule, the tab displays only one season (All Year) that covers the entire year. The season is listed at the top of the tab, and the calendar that shows the days and months that belong to that season is full. To make room to add other seasons, you must edit the All Year season.
3. Select **All Year** from the **Define a Season** tab and click **Edit** to open the **Edit a Season** dialog.
4. In the **Season Name** field, type the name of one of the seasons you want to define (for example, Summer).
5. Set the Start Date and End Date for the season. You can specify fixed start and end dates (For example, 12/31) or relative start and end dates (for example, the last Saturday of October).

   Fixed Date: Click on the month or day portion of the date then either type the new date or use the up and down arrows beside the date to edit it.

   Relative Date: Select the day and month from the dropdown lists.

   For the end date, select the Time of Day the season ends (Start of Day or End of Day). If you select Start of Day, the season ends at 12:00:00 AM on the selected day; if you select End of Day, the season ends at 12:00:00 AM on the next day so there are no gaps in the schedule.

   NOTE: If you use relative dates, you can configure a schedule that may become invalid in future years. Be careful when you configure the schedule that there will be no missing or overlapping days in the schedule in future years. For example, rather than scheduling one season to end on the 1st Sunday in June and the next to start on the 1st Monday in June, it is better to schedule the first season to end at Start of Day on the 1st Sunday in June and the next season to start on the 1st Sunday in June.
6. If this is a split season (where there is a gap between two parts of the season), select the Split Season check box and add a second sets of dates. For example, winter is typically a split season because it occurs in the first and last months of the year.
7. Click **OK**.

   The calendar on the **Define a Season** tab now shows one season with the rest of the year unassigned.
8. Click **Add** to create additional seasons. Repeat steps 4 to 6 to name the season and define the start and end dates.

NOTE: Do not leave any dates unassigned: unassigned dates are not calculated in the reports.

Editing a season

1. On the **Define a Season** tab, select the season you want to edit then click **Edit** to open the **Edit a Season** dialog.
2. Make the changes you require then click **OK**.

Deleting a season

To delete a season, select the season in the **Define a Season** tab then click **Delete**. This also deletes the day groups and TOU periods configured for that season.

Adding special days

After you define a sub-schedule, you need to set up holidays and other special days. You can define holidays that occur on the same date every year or at some other regular interval (such as the third Thursday in November). You can also define special days, such as inventory days, that might occur regularly and require special treatment in reports.

Use the **Define Special Days** tab to set up holidays and other special days.

1. In the navigation pane, select the sub-schedule for which you want to define special days.
2. In the tab display pane, select the **Define Special Days** tab.
3. Click **Add** to open the **Add a Special Day** dialog.
4. Type a name for the special day in the Name field.
5. Select the frequency of the day:
   - **One time only**: Enter the date for a single day that does not repeat in future years; for example, a special day for your organization that does not repeat every year.
   - **Repeat yearly**: Enter the date; for example, a holiday that occurs on the same date every year.
   - **Repeat on**: Complete the fields in the Repeat On section to define how the day repeats and in which months it occurs. Select whether it occurs on a particular date of the selected month(s) (Day) or a relative day (i.e., Last Saturday) in the selected month(s).
6. Repeat steps 3 to 5 to add additional special days.
7. Click **OK** to save your changes and return to the **Define Special Days** tab.

See Configuring Day groups for instructions on how to apply special days to a sub-schedule.

Deleting a special day

To delete a special day, select the special day in the **Define a Special Day** tab then click **Delete**.

Configuring Day groups

Day groups define how days of the week are divided into groups.

Day groups can include:

- days of the week
- special days, such as holidays or other specially designated days (such as inventory days)

Default settings are weekdays (Monday to Friday) and weekends (Saturday and Sunday) but you can add additional groups. There can be a maximum of 47 day groups in any season.

Make sure that all days have been accounted for since unaccounted time is not included in any reports.

Adding a Day group

Before you add a day group, make sure that you have defined seasons and special days for the sub-schedule.

1. In the navigation pane, select the season for which you want to define day groups. The **Define DayGroups** tab appears in the tab display pane.
2. Click **Add** to open the **Add a DayGroup** dialog.

   If the Add button is unavailable, there are no free days to add to a day group. A day can only belong to one day group. To add another day group, you must first remove days from an existing day group.
3. Type a name for the day group.
4. Select one of the following options:
   - **Day of week**: Select the check box(es) for the day(s) you want to include. A day can belong to only one day group; if a day is unavailable, it already belongs to an existing group. If all days are unavailable, you can only include special days in this group unless you remove days from another day group.
   - **Special Day(s) Only**: Select the special day in the Include Special Days list then click to select or clear the day. Days with a check mark beside them are included in the day group. You can only include a special day in one day group.
5. Click **OK**. The name is added to the day group list.

Editing a Day group

1. On the **Define DayGroups** tab, select the day group you want to change, then click **Edit** to open the **Edit a DayGroup** dialog.
2. Make the changes you require then click **OK**.

Deleting a Day group

To delete a day group, select the day group in the **Define DayGroups** tab then click **Delete**. When you delete a day group, you also delete the TOU periods configured for that day group. If you add a day group again, you will need to reconfigure the TOU periods.

Configuring TOU names and TOU periods

When you run reports, the reports calculate and display data according to the information you enter in the **Define TOU Periods** and **Define TOU Names** tabs.

NOTE: You need to define TOU names and periods for each schedule that you create. Be sure to apply a TOU name to every square on the calendar. Unaccounted time causes your reports to display inaccurate information.

Defining TOU names

A TOU name is a designation that is used to differentiate billing rates. Three TOU Names are already defined: On Peak, Off Peak and Partial Peak. You can edit or delete these names, or add new names.

To define TOU names:

1. In the navigation pane, select the day group for which you want to define TOU names then select the **Define TOU Names** tab.
2. Click **Add** to open the **Add a TOU Name** dialog.
3. Type the TOU name you want to add then click **OK**. The TOU name is added to the list of TOU names.

Editing an existing TOU name

1. Select the TOU Name in the list on the **Define TOU Names** tab and click **Edit** to open the **Edit a TOU Name** dialog.
2. Type the new name in the TOU name field.
3. Click **OK**.

Deleting a TOU name

Select the TOU name in the list on the **Define TOU Names** tab and click **Delete**.

NOTE: If you delete a TOU name, the TOU periods assigned to the name are replaced with “Unaccounted”. Deleting a TOU name in a particular schedule affects all sub-schedules in that schedule.

Defining TOU periods

A TOU period is the time span within the 24-hour period to which you apply a TOU name (such as 8:00 a.m. to 5:00 p.m. for On Peak). You must have TOU names defined before you can associate TOU periods with those names.

Two TOU names are already defined: On Peak and Off Peak. You can edit or delete these names, or add new names.

Adding TOU periods

Select a day groups to set up the TOU time periods (on-peak, off-peak, etc.) for that group.

1. In the navigation pane, select the day group for which you want to define a TOU period then select the **Define TOU Periods** tab.
2. Click **Add** to open the **Add a Time Period** dialog.
3. In the Start Time field, type the time that the period begins, or select the hours and minutes and use the up and down arrows to set the start time.
4. In the Stop Time field, type the time that the period begins, or select the hours and minutes and use the up and down arrows to set the stop time.
5. From the Time of Use Name dropdown list, select the TOU name to associate with the time

period.

6. Click **OK**.

To add a split time period (i.e., a time period that spans from 19:00 to 6:00), you must add two separate time periods and associate them with the same time of use name.

If you want to expand a time period into time that already belongs to another period, you must first edit the other time period to clear the time.

Continue adding time periods until the 24 hour period is filled. Unaccounted time blocks cause your reports to display inaccurate information.

Editing TOU periods

1. Highlight the period you want to edit and click **Edit** to open the **Edit a Time Period** dialog.
2. Make the required changes then click **OK**.

Deleting TOU periods

To delete a period, highlight the period and click **Delete**.

Update EWS Server

Use this function to initialize or update the EcoStruxure Web Services (EWS) measurement mappings in the system. This function is part of the EWS server capabilities of PME.

Update OPC Server

Use this function to initialize or update the OPC measurement mappings in the system. This function is part of the OPC server capabilities of PME. For information on how to map ION registers to OPC, see OPC measurement support. For information on how to map Modbus registers to OPC, see Device Type Editor.

UPS Configuration Tool

TIP: You can open the UPS Configuration Tool from the **Power Monitoring Expert > Configuration Tools** folder on your desktop.

Use the UPS Configuration Tool to configure the Backup Power Module. With this tool you create UPS Devices and Groups for the UPS Auto Test Report, and you generate UPS Auto Test Vista diagrams.

See Backup Power Module configuration for details.

Prerequisites

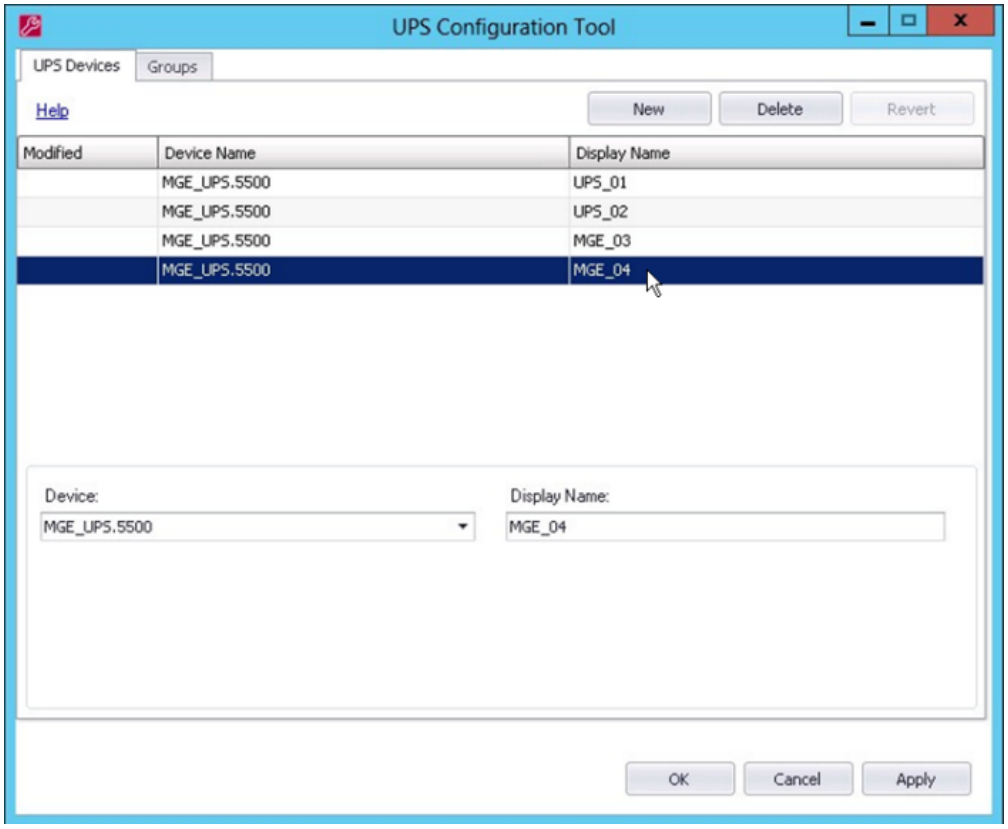
- The UPS devices must be configured in the PME Management Console and must be communicating before you can configure the components and properties in the configuration tool.

Configuring UPS groups

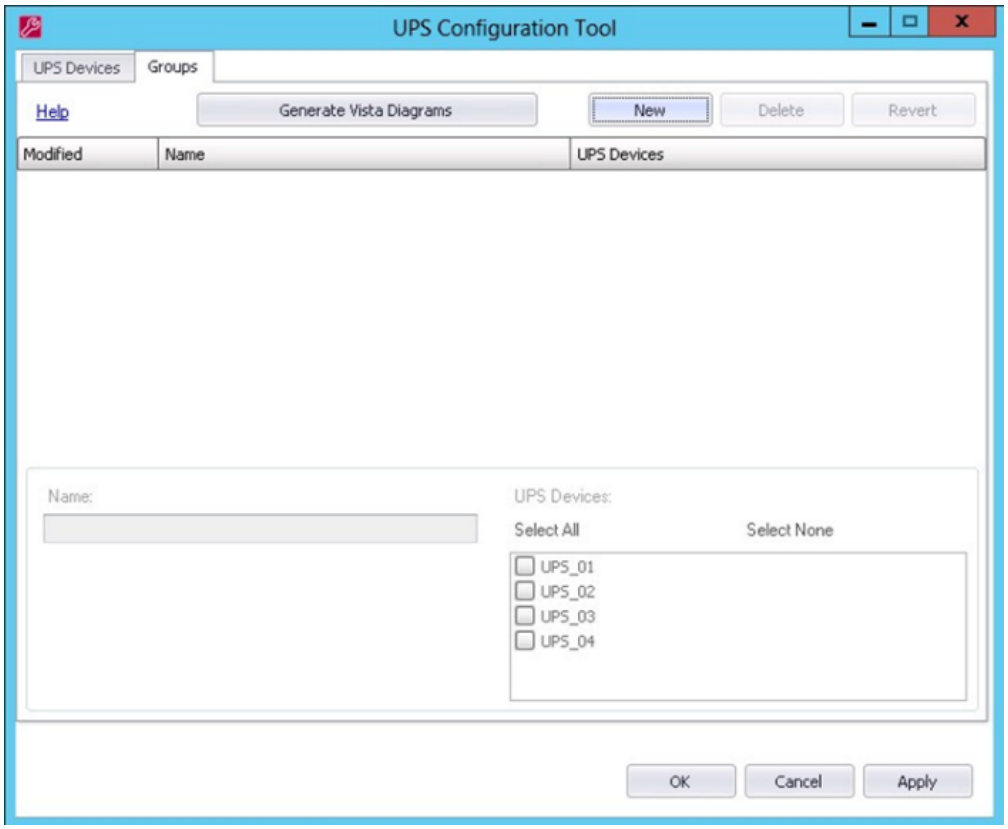
To configure UPS groups:

1. Open the UPS Configuration Tool.
2. In the UPS Configuration Tool, click **New** and add each new UPS that you added in the Management Console.
3. (Optional) Change the value for the **Display Name** that appears in the Vista diagram if you want.

   NOTE: This **Display Name** appears only in the Vista diagram and does not impact the name that you use in the Management Console.



4. After adding all new UPS devices, click the **Groups** tab.
5. Click **New** to create new groups for the UPS devices.

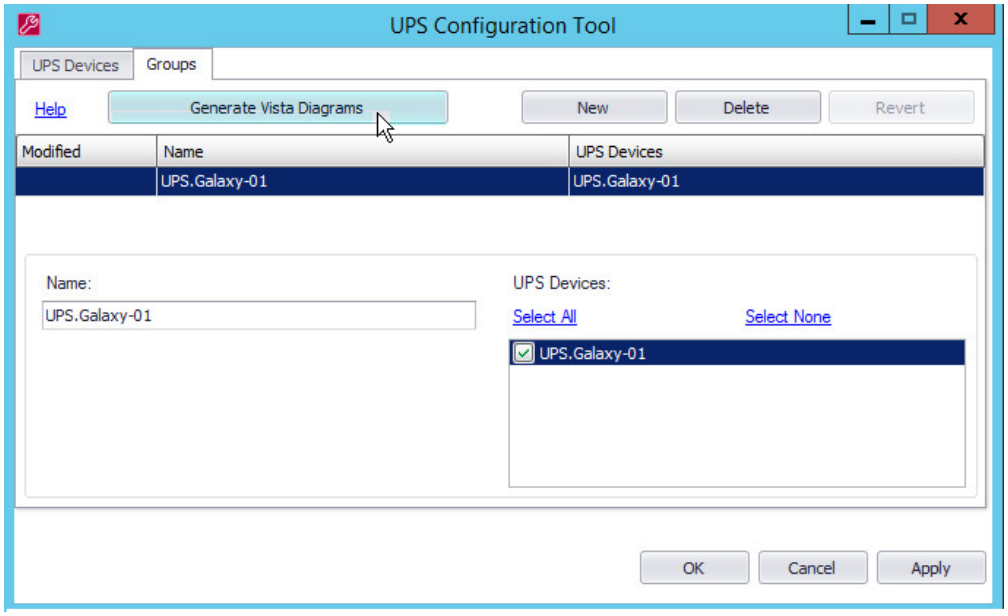


6. After you finish adding all UPS device and associated groups, click **Apply**.

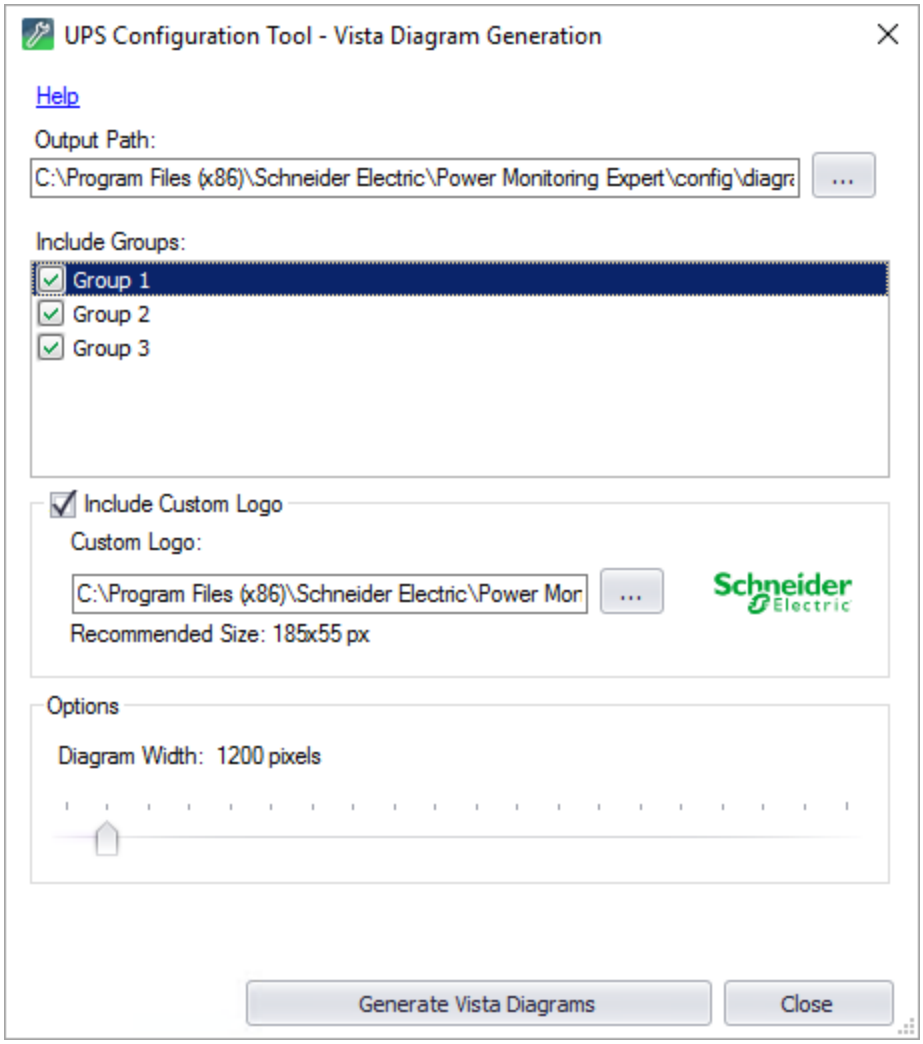
Generating a Vista diagram

To generate a Vista diagram:

1. In the UPS Configuration Tool, click **Generate Vista Diagrams**.



The **Vista Diagram Generation** dialog appears.



NOTE: The **Output Path** shows where the Vista diagram DGM file is saved after clicking **Generate Vista Diagrams**. The file name or location can be modified from the default value if desired.

2. Click **Include Custom Logo** and then navigate to and select the file to include a custom logo in your diagrams. Otherwise, a Schneider Electric logo appears.
3. Under **Options**, drag the indicator to define the width and dimensions of Vista diagrams you generate.
4. Click **Generate Vista Diagrams** to generate the DGM files, then click **Close**.

UPS Power Configuration Utility

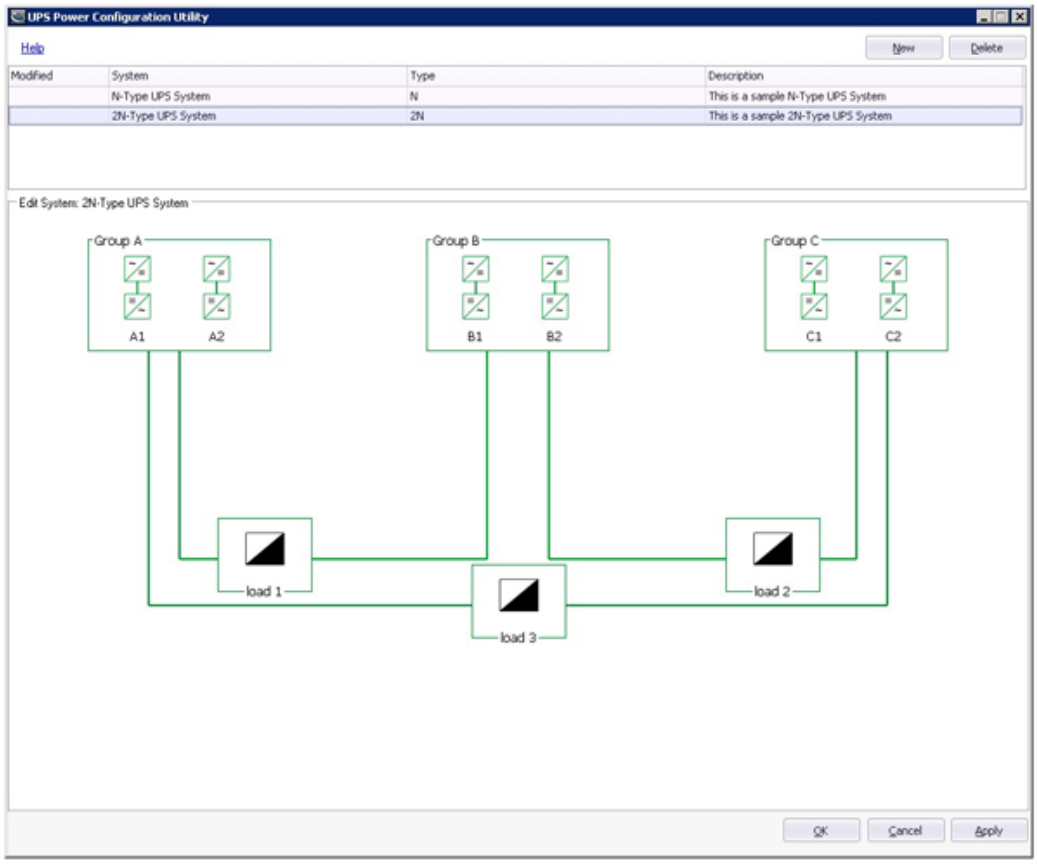
TIP: You can open the UPS Power Configuration Tool from the **Power Monitoring Expert > Configuration Tools** folder on your desktop.

Use the UPS Power Configuration Utility to configure the Capacity Management Module. With this tool you define UPS Systems for the UPS Power Report.

See Capacity Management Module configuration for details.

Prerequisites

- The monitoring devices that are recording the UPS data must be configured in the PME Management Console and must be communicating before you can configure the components and properties in the configuration tool.



User Interface

Control	Description
Help	Opens the help for the utility.
New	Creates a new entry in the grid.
Delete	Deletes the selected entry from the grid.
OK	Saves all changes and exits the utility.
Cancel	Exits the utility without saving changes.
Apply	Saves all changes and leaves the utility open.

Grid Area Columns	Description
Modified	Displays a status symbol for the record.
+ (plus)	A new entry.
* (asterisk)	An existing entry has been modified.
! (exclamation mark)	The entry is incorrect.
System	Displays the system name.
Type	Displays the UPS system type (N, 2N, N+2, etc.)
Description	Displays a description of the system

TIP: The tool indicates if there configuration errors. Point at the red exclamation icon to see configuration error details.

UPS Power configuration restrictions

The UPS Power Configuration Utility enforces certain rules when you create UPS systems, groups, and modules:

- **UPS System**
  - Name must be unique.
  - One or more systems are allowed.
- **UPS Groups**
  - Name must be unique.
  - At least one group must be present in each system.
  - A maximum of three groups are allowed in each system.
  - For N, N+1, and N+2 system types:
    - Each group in the system may have a different number of UPS modules.
    - Each UPS module in the group must have the same nameplate rating (kVA) value.
    - Each UPS module in the group must have the same derated nameplate rating (kW) value
    - Each group is connected to one load only. No other group can be connected to the same load.

    See the UPS Power Configuration Utility for more information.
  - For 2N, 2(N+1) and 2(N+2) system types:
    - All groups must have the same number of UPS modules.
    - All UPS modules in the groups must have the same nameplate rating (kVA) value.
    - All UPS modules in the groups must have the same derated nameplate rating (kW) value.

  - Depending on the number of groups present in the system, a load may be shared by two groups.

  See the UPS Power Configuration Utility for more information.

- **UPS Modules**
  - Name must be unique.
  - At least one module must be present in each group.
  - A maximum of 12 modules is allowed in each group.

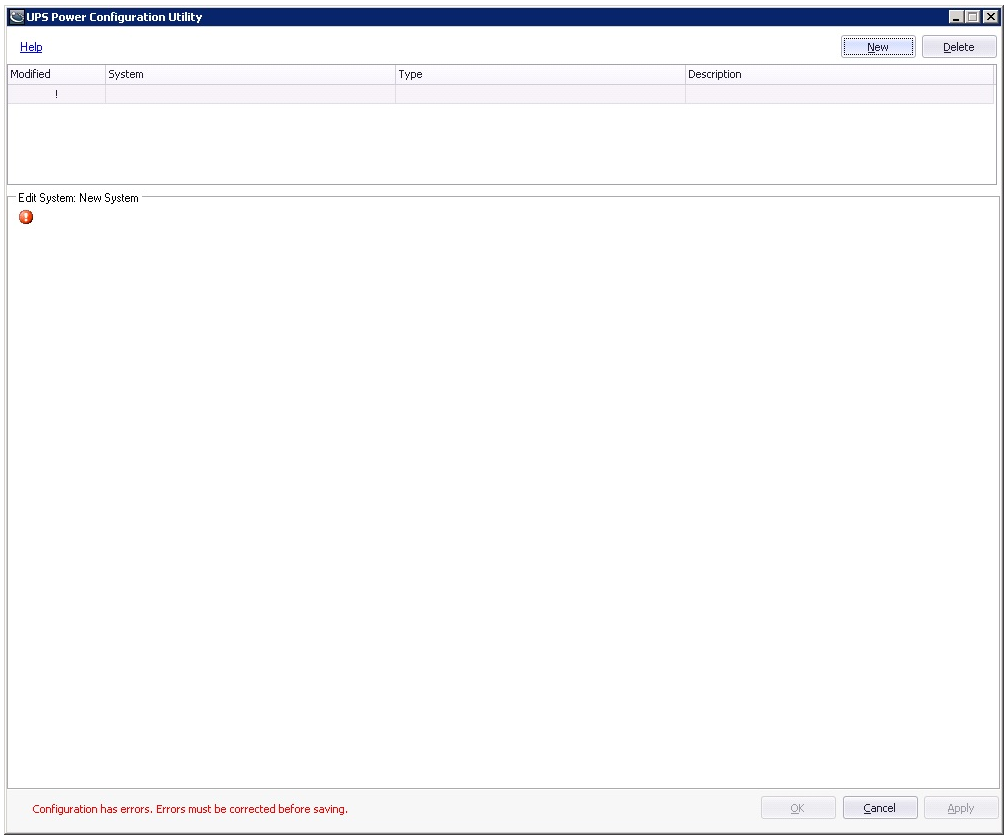
For information on UPS redundancy types, see UPS system redundancy types.

Defining UPS systems

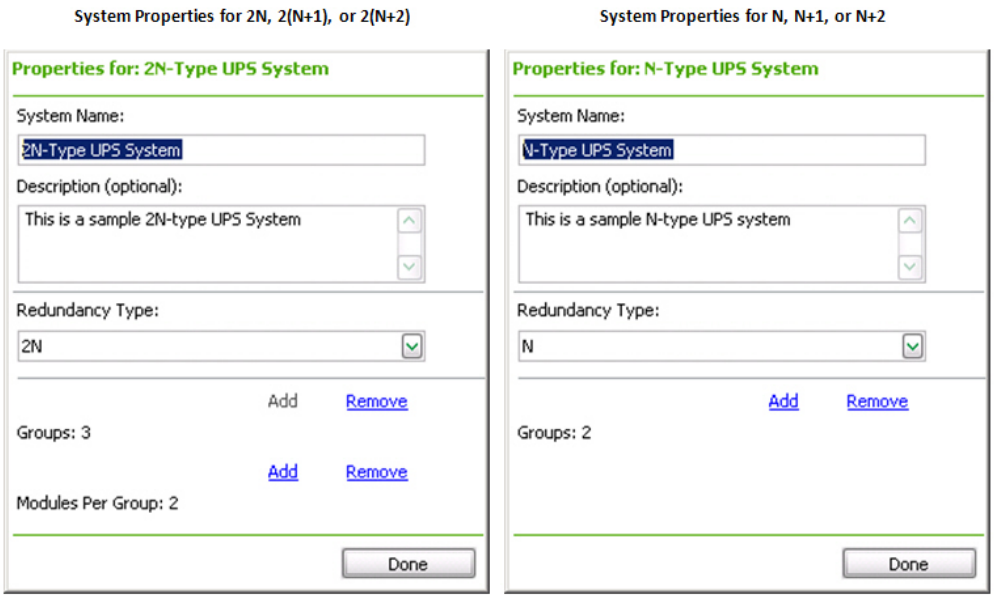
A UPS system is a logical system configuration that is used for reporting power capacity.

To define a UPS system:

1. Click **New**. The Edit System: New System area appears below the grid.



2. Click anywhere in the editor area. The Properties screen appears.



3. Complete the details for the UPS system:
   a. **System Name**: Enter a name for the UPS system. Each UPS system must have a unique name.
   b. **Description**: Enter a description for the UPS system. This field is optional.
   c. **Redundancy Type**: Select the redundancy type for the UPS system. The different redundancy types are explained in UPS system redundancy types.
   d. **Groups**: Shows the number of UPS groups contained in the UPS system. Click **Add** to add groups to the UPS system. Click **Remove** to delete groups.
   e. **Modules Per Group**: Shows the number of UPS modules in each group in the system. Click **Add** to add UPS modules to the group. Click **Remove** to delete modules.

      This property is only available when the system redundancy type is 2N, 2(N+1) or 2(N+2). To define the number of modules for a system with redundancy type N, N+1 or N+2, use the UPS group properties. See Defining UPS loads for more information.

4. Click **Done** to save the UPS system.

Related Topics:

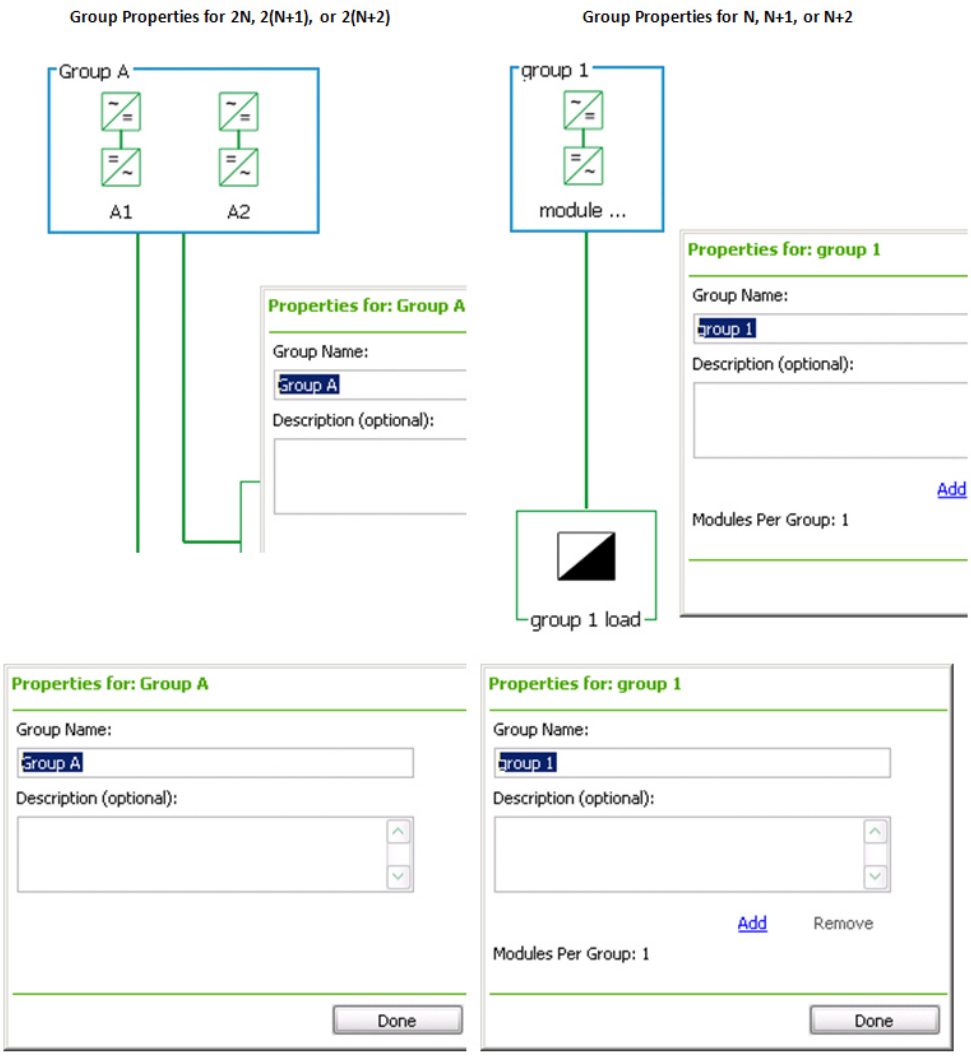
- Defining UPS groups
- Defining UPS modules
- Defining UPS loads

Defining UPS groups

A UPS group represents a logical grouping of UPS modules. The UPS system contains at least one UPS group and can contain multiple UPS groups. Depending on the UPS system type, the UPS group properties may be different, as shown below. See UPS Power configuration restrictions for more information.

To define a UPS group:

1. Click on the group object border. The Properties screen appears.



2. Complete the details for the UPS group:
   a. **Group Name:** Enter a name for the group. Each UPS group must have a unique name.
   b. **Description:** Enter a description for the group. This field is optional.
   c. **Modules Per Group:** Click **Add** to increase the number of UPS modules in the group. Click **Remove** to decrease the number. This property is available only for system redundancy types N, N+1 or N+2.
3. Click **Done** to save the UPS group.

Related Topics:

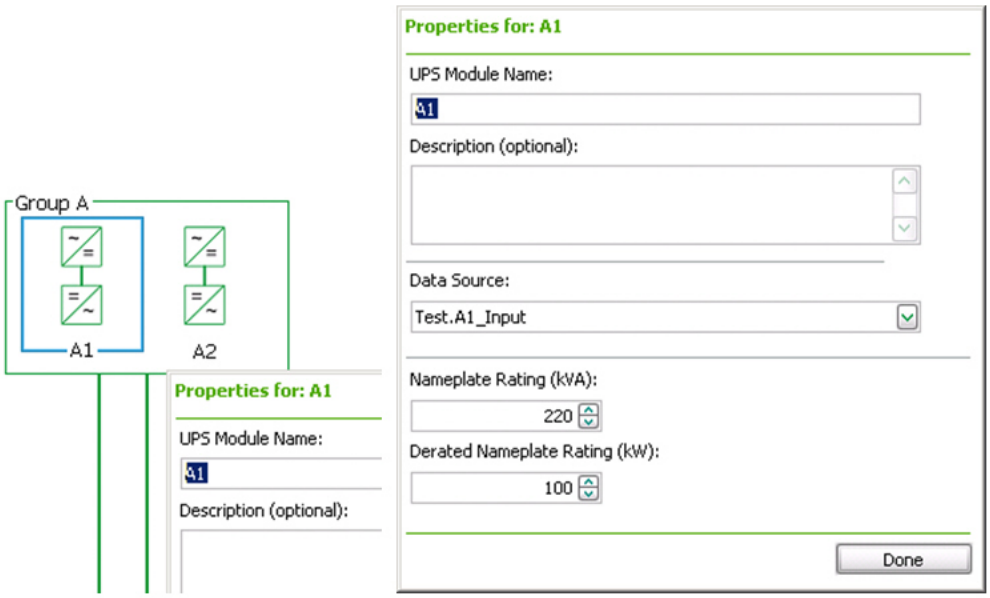
- Defining UPS systems
- Defining UPS modules
- Defining UPS loads

Defining UPS modules

A UPS module represents an actual UPS device in the data center. A UPS group contains at least one UPS module and can contain multiple UPS modules. For some UPS system types, each UPS group must contain the same number of UPS modules. See UPS Power configuration restrictions for more information.

To define a UPS module:

1. Click on the module object border. The selected module will be highlighted in blue and the Properties screen appears.



2. Complete the details for the UPS module:
   a. **UPS Module Name:** Enter the name for the module. This name must be unique for each UPS module in the system.
   b. **Description:** Enter a description for the module. This field is optional.
   c. **Data Source:** Select the meter source in Power Monitoring Expert where load data is logged for the UPS module. The source must be unique for each UPS module.
   d. **Nameplate Rating (kVA):** Enter the maximum output power (kVA) of the UPS module. This value must be greater than zero.
   e. **Derated Nameplate Rating (kW):** Enter the maximum power capacity (kW) that the UPS module is expected to support. This value must be equal or less than the nameplate rating value, and greater than zero.
3. Click **Done** to save the UPS module.

Related Topics:

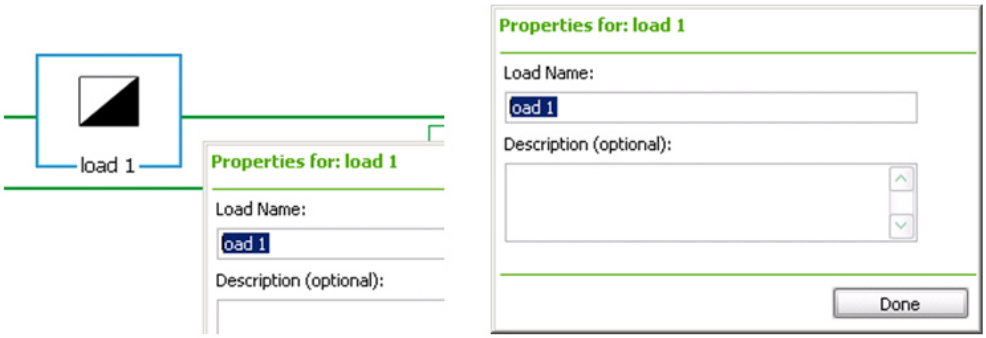
- Defining UPS systems
- Defining UPS groups
- Defining UPS loads

Defining UPS loads

A UPS load represents the logical load attached to a UPS group. This logical load has no functional purpose in the calculations for power redundancy. The UPS load is used only to provide a more complete diagram representation for the UPS system.

To define a UPS load:

1. Click the UPS load element in the system diagram. The Properties screen appears.



2. Complete the details for the UPS load:
   a. **Load Name:** Enter a name for the load.
   b. **Description:** Enter a description for the load. This field is optional.
3. Click **Done** to save the UPS load.

Related Topics:

- Defining UPS systems
- Defining UPS groups
- Defining UPS modules

UPS system redundancy types

You can create a UPS system to achieve power redundancy for IT equipment loads in different ways, depending on how the UPS units are grouped together and how they are connected to the equipment power supplies. This configuration tool supports several industry standard configurations.

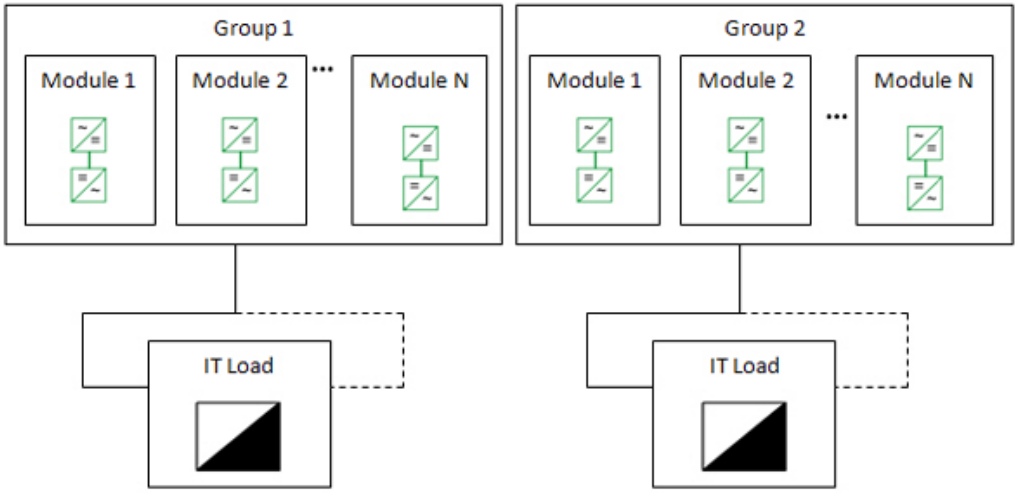
The UPS system supports the following redundancy design types:

- N Type
- N+1 Type
- N+2 Type
- 2N Type
- 2(N+1) Type
- 2(N+2) Type

N Type

The N system configuration is for one or more UPS modules which work together to supply power to the IT load. There is no redundancy, except optionally to the second power supply of each piece of equipment.

Each UPS system with an N configuration can have multiple UPS groups, where each group is connected to a different load. The number of modules within each UPS group can be different. Within each group, all UPS modules must have the same derated nameplate rating value (kW).

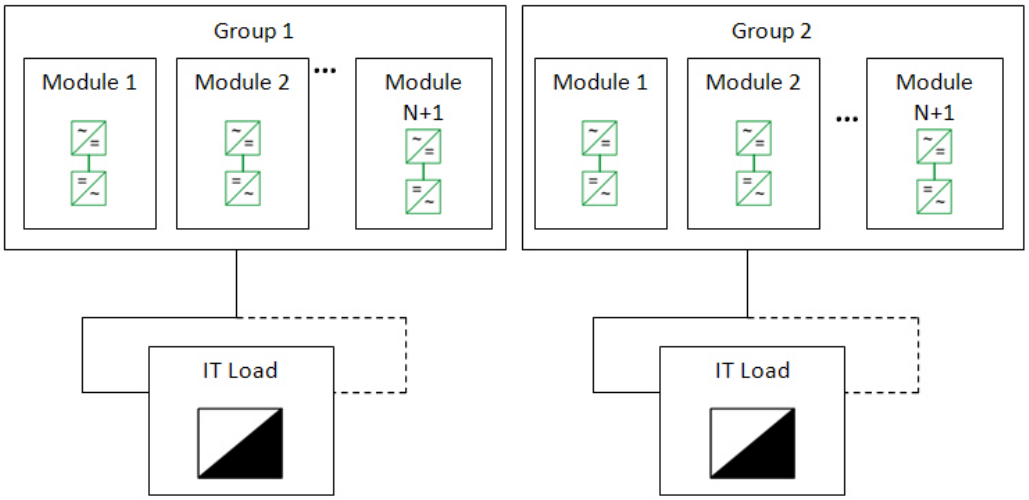


N+1 Type

The N+1 system configuration is for one or more UPS modules that work together to supply power to the IT load. There is simple module redundancy in that one of the modules can be rendered inoperative or be taken off-line. The load is spread among all remaining UPS modules, but the peak load is such that if one module stops working, the others will be able to assume its load. Another way to look at it is, N UPS modules will be able to support the peak IT load. If the peak IT load is more than N can support, then system design redundancy will be lost.

There is the option to connect the system of modules to the second power supply of each piece of equipment, but both power supplies are connected to the group of UPS modules.

Each UPS system with an N+1 configuration can have multiple UPS groups, where each group is connected to a different load. The number of modules within each UPS group can be different. The modules within a UPS group must have the same derated nameplate rating value (kW).

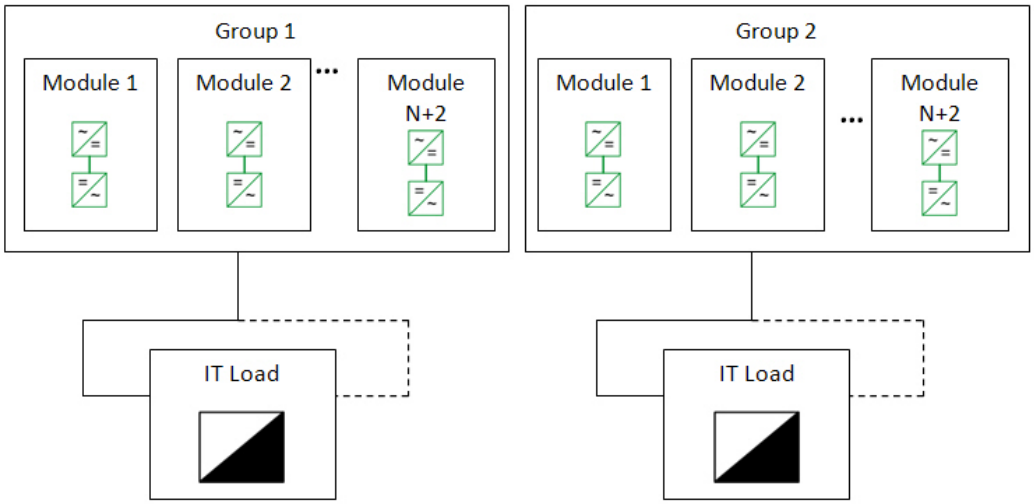


N+2 Type

The N+2 system configuration is for a group of UPS modules that work together to supply power to the IT load. There is simple module redundancy in that any two of the modules can be rendered inoperative or be taken off-line. The load is spread among all remaining UPS modules, but the peak load is such that if two modules stop working, the others will be able to assume their load. Another way to look at it is, N UPS modules will be able to support the peak IT load. If the peak IT load is more than N can support, then system design redundancy will be lost. An example of an N+2 system is five UPS modules connected to the IT load, but the peak IT load never exceeds the capacity of three of the UPS modules.

There is the option to connect the system of modules to the second power supply of each piece of equipment, but both power supplies are connected to the group of UPS modules.

Each UPS system with an N+2 configuration can have multiple UPS groups, where each group is connected to a different load. The number of modules within each UPS group can be different. The modules within a UPS group must have the same derated nameplate rating value (kW).

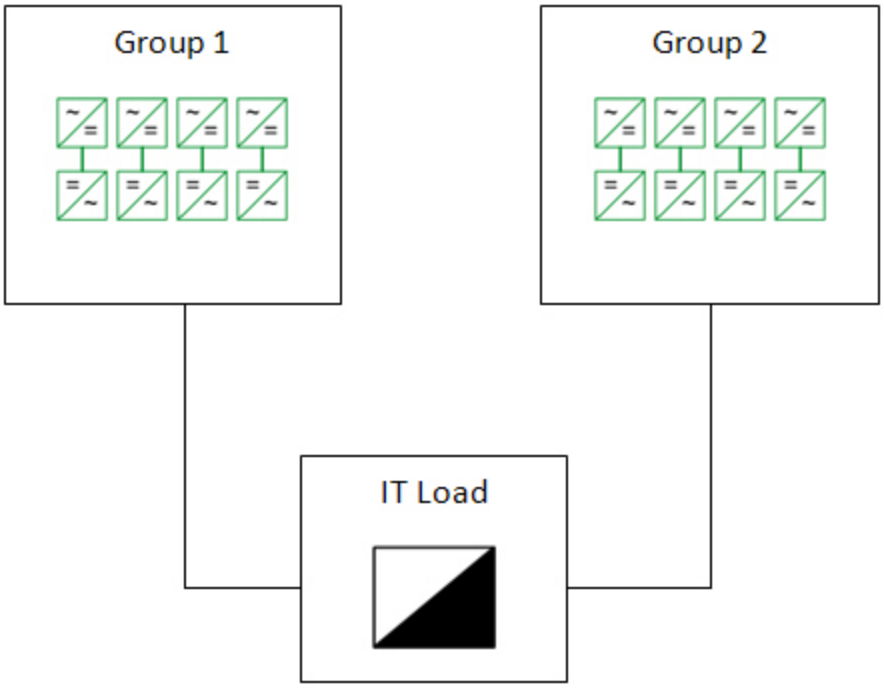


2N Type

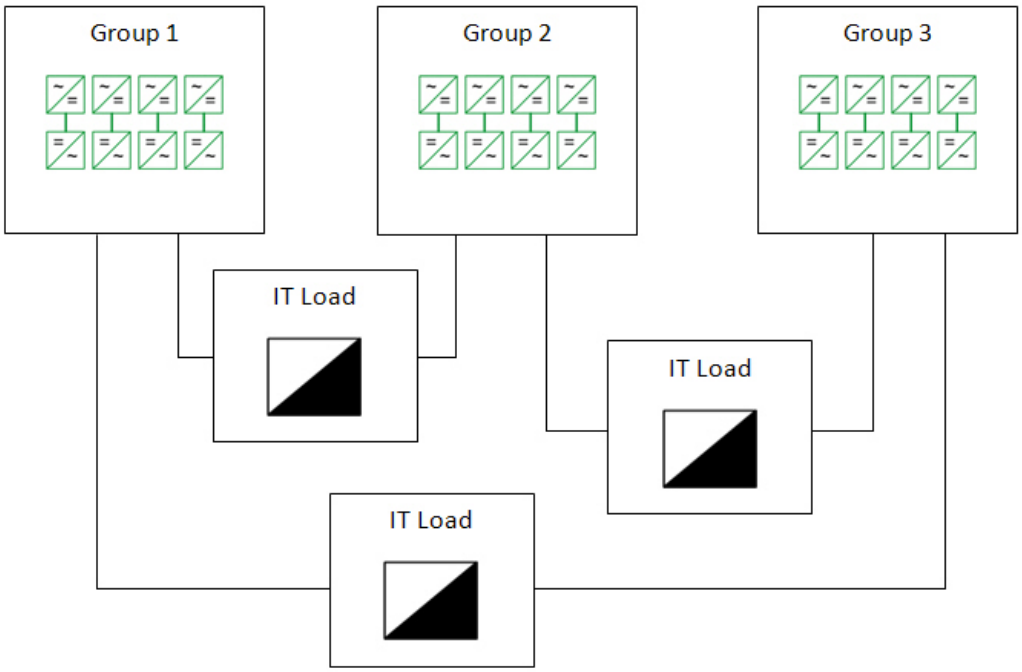
The 2N system configuration is for two or three groups of UPS modules that supply power to two different power supplies in each IT load. For redundancy, an entire UPS group can stop working or be taken off-line, and the IT equipment will still be supplied with power. It also means that either one of the two power supplies in an IT load can be rendered inoperative. The load is spread among all UPS modules, but the peak load is such that if an entire group's worth of modules is not working, the remaining modules will be able to assume their load. Another way to look at it is, N UPS modules will be able to support the peak IT load. If the peak IT load is more than N can support, then system design redundancy will be lost.

Each UPS system with a 2N configuration can have two or three UPS groups. If there are two groups, both must be connected to the same load. If there are three groups, then there are three separate loads and each group is connected to two of the loads. The number of modules within each UPS group in a UPS system must be the same in a 2N configuration. Additionally, all UPS modules within a UPS group must have the same derated nameplate rating value (kW).

In the first example, there are two groups with four UPS modules each. In a 2N configuration, one group can stop working and the system will still have the designed redundancy. Therefore, the value for N is four. So, the total IT load cannot exceed the derated nameplate rating of four of the UPS modules.



In the second example, there are three groups with four UPS modules each. In a 2N configuration, one group's worth of UPS modules can be rendered inoperative and the system will still have the designed redundancy. Therefore, the value for N is eight. So, the total IT load (for all three IT load groups shown below) cannot exceed the derated nameplate rating of eight of the UPS modules.

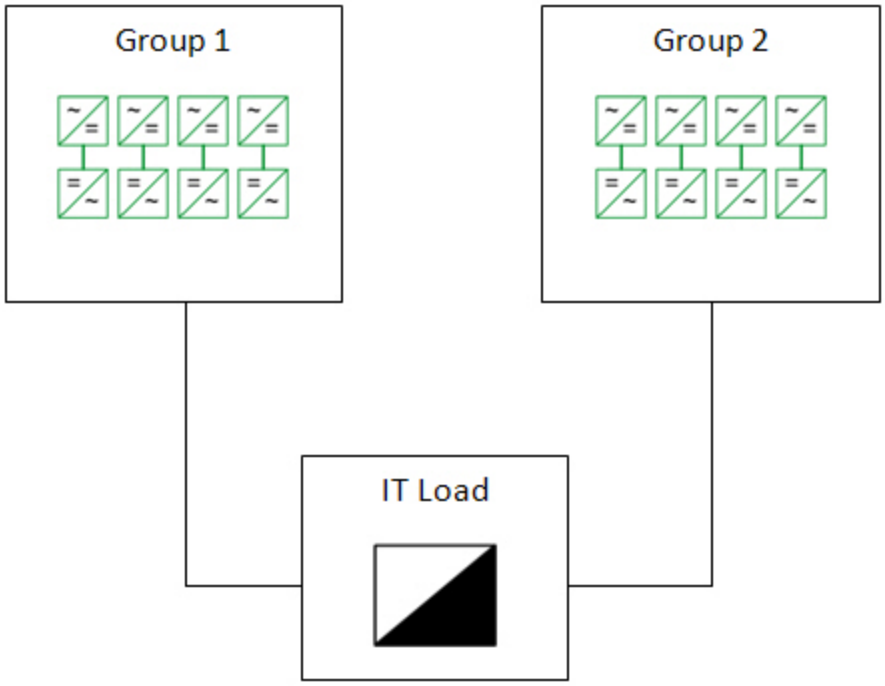


2(N+1) Type

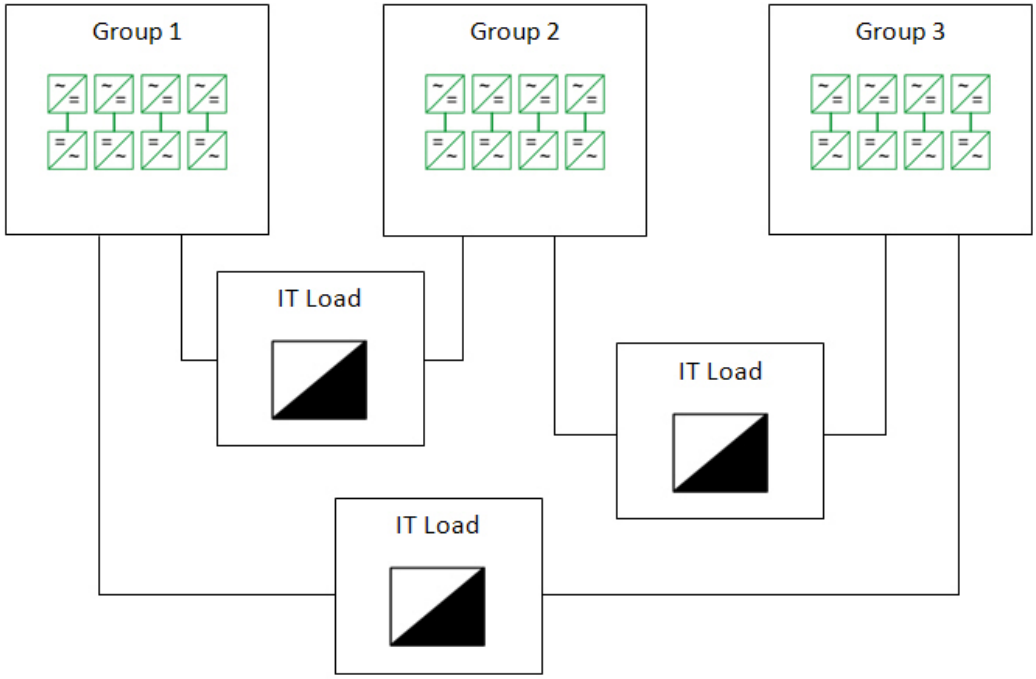
The 2(N+1) system configuration is for two or three groups of UPS modules that supply power to two different power supplies in each IT load. The redundancy provided means that an entire group of UPS modules, plus one more module from the remaining groups, can stop working or be taken off-line, and the IT equipment will still be supplied with power. It also means that either one of the two power supplies in an IT load can be rendered inoperative. The load is spread among all UPS modules, but the peak load is such that if an entire group's worth of modules be rendered inoperative, plus one more from each other group, the remaining modules will be able to assume their load. Another way to look at it is, N UPS modules will be able to support the peak IT load. If the peak IT load is more than N can support, then system design redundancy will be lost.

Each UPS system with a 2(N+1) configuration can have two or three UPS groups. If there are two groups, both must be connected to the same load. If there are three groups, then there are three separate loads and each group is connected to two of the loads. The number of modules within each UPS group in a UPS system must be the same in a 2(N+1) configuration. Additionally, all UPS modules within a UPS group must have the same derated nameplate rating value (kW).

In the first example, there are two groups with four UPS modules in each group. One group plus one UPS module from the other group can be rendered inoperative, and the system will still have the designed redundancy. Therefore, the value for N is three. So, the total IT load cannot exceed the derated nameplate rating of three of the UPS modules.



In the second example, there are three groups with four UPS modules in each group. One group plus one module from each of the other two groups can stop working and the system will still have the designed redundancy. Therefore, the value for N is six. So, the total IT load (for all three IT load groups shown below) cannot exceed the derated nameplate rating of six of the UPS modules.



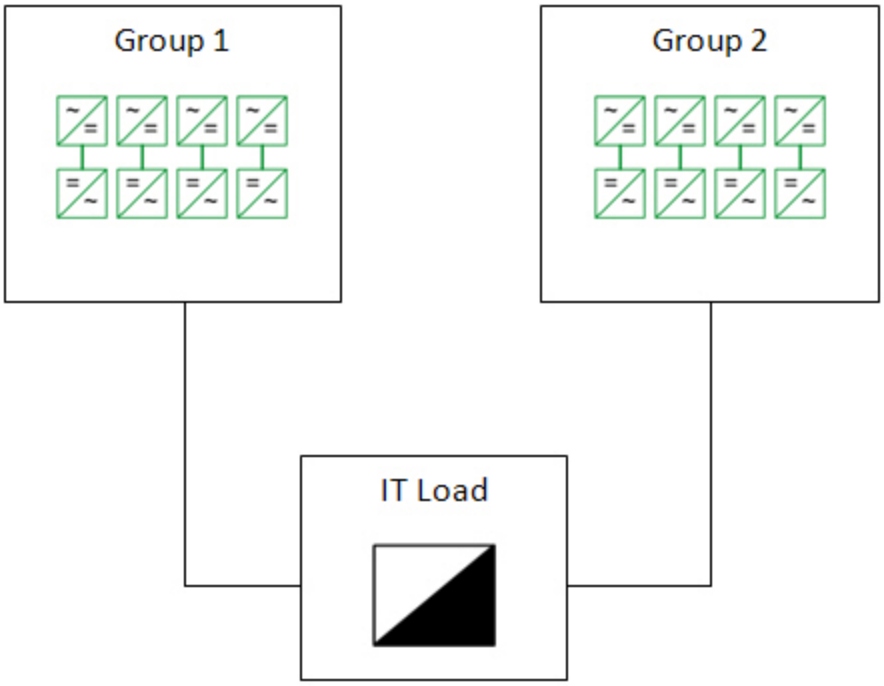
2(N+2) Type

The 2(N+2) system configuration is for two or three groups of UPS modules that supply power to two different power supplies in each IT load. The redundancy provided means that an entire group of UPS modules, plus two more modules from the remaining groups, can stop working or be taken off-line and the IT equipment will still be supplied with power. It also means that either one of the two

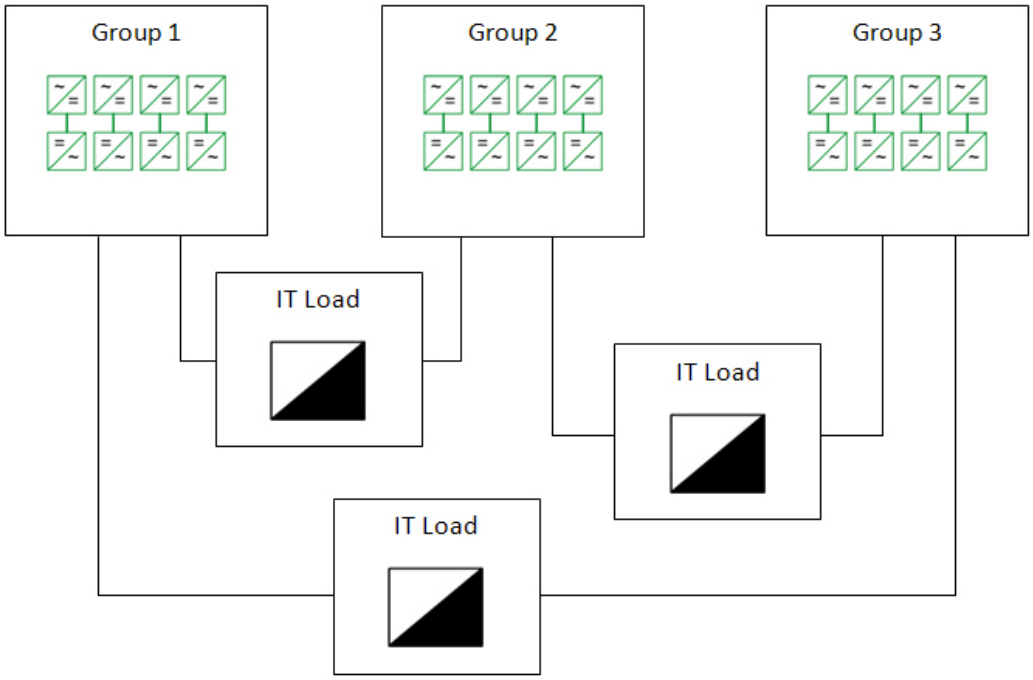
power supplies in an IT load can stop working. The load is spread among all UPS modules, but the peak load is such that, if an entire group stops working, plus two more from the other group, the remaining modules will be able to assume their load. Another way to look at it is, N UPS modules will be able to support the peak IT load. If the peak IT load is more than N can support, then system design redundancy will be lost.

Each UPS system with a 2(N+2) configuration can have two or three UPS groups. If there are two groups, both must be connected to the same IT load. If there are three groups, then there are three separate loads and each group is connected to two of the loads. The number of modules within each UPS group must be the same. All UPS modules within a group must have the same derated nameplate rating value (kW).

In the first example, there are two groups with four UPS modules each. One group can be rendered inoperative, plus two more UPS modules from the other group and the system will still have the designed redundancy. Therefore, the value for N is two. The total IT load cannot exceed the derated nameplate rating of two of the UPS modules.



In the second example, there are three groups with four UPS modules each. One group plus two modules from each of the other two groups can stop working, and the system will still have the designed redundancy. Therefore, the value for N is four. So, the total IT load cannot exceed the derated nameplate rating of four of the UPS modules.



User Manager

TIP: You can open User Manager from **SETTINGS** > **Users** > **User Manager** in the Web Applications banner. You can also open User Manager from **Management Console** > **Tools** > **Web Tools** > **User Manager**.

NOTE: You must have supervisor-level access to use User Manager, otherwise the link on the **SETTINGS** page is not available.

Use User Manager to:

- Configure users and user groups.
- Customize user access level privileges.
- View web application user licensing information.

PME does not provide any pre-configured user accounts or user groups. One supervisor account is created with a user defined password during the installation of the software. Create user accounts and groups to meet your needs.

⚠ WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

Use cybersecurity best practices when configuring user access.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

Cybersecurity policies that govern user accounts and access – such as least privilege and separation of duties – vary from site to site. Work with the facility IT System Administrator to ensure that user access adheres to the site-specific cyber security policies.

RECOMMENDATION: Use Windows users instead of standard users in your PME system to improve cybersecurity. Windows offers advanced user management functions, such as enforcing password strength and limiting the number of invalid login attempts. These functions are required for IEC 62443 compliance, the global standard for industrial automation control system security.

NOTE: To only use Windows users, replace any existing standard users in the system with Windows users. Disallow logins for standard users in Web Applications, this disables the **supervisor** user. See Login Options for more information.

To configure users and user groups, see:

Users

- Users
- Adding a standard user

- Adding a Windows user
- Adding a Windows group
- Changing a username
- Changing a user password
- Changing a user access level
- Changing user details
- Deleting a user

User groups

- User Groups
- Adding a user group
- Adding a user to a user group
- Adding sources to a user group
- Changing a user group name
- Removing a user from a user group
- Removing sources from a user group
- Changing application access for a user group
- Moving a user between user groups
- Deleting a user group

For information on the Web Application user licenses, see:

- Viewing Web Applications user license information

For information on related Web Application settings, see:

- Login Options

To customize user access level privileges, see:

- Customizing Access Level Privileges

For reference information see:

- User Manager user interface
- Default User Access Level Privileges

Users

A user is an account in Power Monitoring Expert (PME) that provides access to the system. A user has a username, which must be unique, and a password. You use the username and password to log into PME.

PME supports 3 different types of users - standard users, Windows users, and Windows groups.

The following table shows the characteristics of each user type:

User Type	Characteristics
Standard user	This is a PME native user account. The username, password, and details are defined in the PME User Manager. Note: The email addresses defined for a user can be used for report subscriptions.
Windows user	This is an account from an external Windows system. The username, password, and details are defined through the Windows Active Directory or local Windows operating system.
Windows group	This is a group of accounts from an external Windows system. The username, password, and details are defined through the Windows Active Directory or local Windows operating system.

Each user has an access level, which is set in User Manager. The access level determines which actions the user is allowed to take in PME.

There are 5 different access levels. The highest level is **Supervisor**, the lowest level is **Observer**. All Windows users that are a member of a Windows group in PME have the same access level as the one set for the Windows group. For details on the permissions granted by the different access levels see Default User Access Level Privileges.

Each user is a member of at least one user group. The user group determines which sources and applications the user can access. By default, users are assigned to the Global user group which has access to all sources and applications in the system. See user groups for details on how to configure groups and assign users to groups.

Rules

The following rule applies to users in PME:

- A Windows user that is a member of multiple Windows groups with different access levels in PME, gets the highest access level of any of the groups.

Example:

Windows user BillG is a member of Windows group A with observer access level in PME.
Windows user BillG is also a member of Windows group B with operator access level in PME.
As a result, BillG has operator access level in PME.

Limitations

The following limitations exist for standard PME users:

- Usernames must be unique in PME.
- Usernames cannot contain any of the following characters: whitespace character, < > : " / \ | ? * , ; @ # % ' ^ & ( ) ! = + - ~ . $
- Usernames and passwords must be between 1-50 characters long.
- Email addresses are not checked for the correct format. Any leading or trailing whitespace characters are removed.
- Multiple email addresses must be separated by a **;** (semicolon).
- First name, last name, and organization must be between 0-50 characters long. Any leading or trailing whitespace characters are removed.

The following limitations exist for all PME users:

- A user cannot change its own access level.
- A user cannot delete its own account.

Related topics:

Users

- Users
- Adding a standard user
- Adding a Windows user
- Adding a Windows group
- Changing a username
- Changing a user password
- Changing a user access level
- Changing user details
- Deleting a user

User groups

- User Groups
- Adding a user group
- Adding a user to a user group
- Adding sources to a user group
- Changing a user group name
- Removing a user from a user group
- Removing sources from a user group
- Changing application access for a user group

- Moving a user between user groups
- Deleting a user group

For information on the Web Application user licenses, see:

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For information on related Web Application settings, see:

- Login Options

To customize user access level privileges, see:

- Customizing Access Level Privileges

For reference information see:

- User Manager
- User Manager user interface
- Default User Access Level Privileges

Adding a standard user

Add a standard user to create an account for accessing PME. Set the access level for the user to control what they are allowed to do.

⚠ WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

Use cybersecurity best practices when configuring user access.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

Cybersecurity policies that govern user accounts and access – such as least privilege and separation of duties – vary from site to site. Work with the facility IT System Administrator to ensure that user access adheres to the site-specific cyber security policies.

RECOMMENDATION: Use Windows users instead of standard users in your PME system to improve cybersecurity. Windows offers advanced user management functions, such as enforcing password strength and limiting the number of invalid login attempts. These functions are required for IEC 62443 compliance, the global standard for industrial automation control system security.

To add a standard user:

1. In User Manager, select the **Users** tab, and then click **Add Standard User**.
2. In Add Standard User, enter a username and password, and assign an access level.
3. (Optional) Enter **Details** information.
4. Click **Add**.

Related topics:

Users

- Users
- Adding a standard user
- Adding a Windows user
- Adding a Windows group
- Changing a username
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For reference information see:

- User Manager
- User Manager user interface
- Default User Access Level Privileges

Adding a Windows user

Add a Windows user to give this user access to PME. Set the access level for the Windows user to control what they are allowed to do.

⚠ WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

Use cybersecurity best practices when configuring user access.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

Cybersecurity policies that govern user accounts and access – such as least privilege and separation of duties – vary from site to site. Work with the facility IT System Administrator to ensure that user access adheres to the site-specific cyber security policies.

To add a Windows user:

1. In User Manager, select the **Users** tab, and then click **Add Windows User**
2. In Add Windows User - Selection:
   a. Select a domain name.

      Use a Windows domain name to add a user from an Active Directory. Use the local computer name or use **localhost** to add a user from the local list of Windows users.

   b. To find the Windows user you want, (optional) enter a keyword into the **Available Windows Users** search box, and then click **Find**.

      The search result includes all usernames that match all or part of the keyword string.

   c. In the search result table, select the Windows user you want to add, and then click **Next**.
3. In Add Windows User - Details, assign an access level, and then click **Finish**.

Related topics:

Users

- Users
- Adding a standard user
- Adding a Windows user
- Adding a Windows group
- Changing a username
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- Deleting a user

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For reference information see:

- User Manager
- User Manager user interface
- Default User Access Level Privileges

Adding a Windows group

Add a Windows group to give all Windows users in this group access to PME. Set the access level for the Windows group to control what they are allowed to do.

⚠ WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

Use cybersecurity best practices when configuring user access.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

Cybersecurity policies that govern user accounts and access – such as least privilege and separation of duties – vary from site to site. Work with the facility IT System Administrator to ensure that user access adheres to the site-specific cyber security policies.

To add a Windows group:

1. In User Manager, select the **Users** tab, and then click **Add Windows Group**
2. In Add Windows Group - Selection:
   a. Select a domain name.

      Use a Windows domain name to add a group from an Active Directory. Use the local computer name or use **localhost** to add a group from the local list of Windows groups.

   b. To find the Windows group you want, (optional) enter a keyword into the **Available Windows Groups** search box, and then click **Find**.

      The search result includes all groups that match all or part of the keyword string.

   c. In the search result table, select the Window group you want to add, and then click **Next**.
3. In Add Windows Group - Details, assign an access level.

   (Optional) Click on **View Windows Users in this Windows Group** to see the Windows users that are members of the group.
4. Click **Finish**.

Related topics:

Users

- Users
- Adding a standard user
- Adding a Windows user
- Adding a Windows group
- Changing a username
- Changing a user password

- Changing a user access level
- Changing user details
- Deleting a user

User groups

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For reference information see:

- User Manager
- User Manager user interface
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Changing a username

Change a username to give the user a better or more meaningful name.

NOTE: You can only change the name of a standard user in User Manager. You cannot change the name of a Windows user or group.

To change a username:

1. In User Manager, select the **Users** tab.
2. In the users table, select the row of the user for which you want to change the name, and then click **Edit** in this row.
3. In Edit Standard User, change the name under **Username** to the new name, and then click **Save**.

Related topics:

Users

- Users
- Adding a standard user
- Adding a Windows user
- Adding a Windows group
- Changing a username
- Changing a user password
- Changing a user access level
- Changing user details
- Deleting a user

User groups

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For reference information see:

- User Manager
- User Manager user interface
- Default User Access Level Privileges

Changing a user password

Change a user password to update the password as part of a security best practice, or because the existing password is lost.

NOTE: You can only change the password for a standard user in User Manager. You cannot change the password for a Windows user.

⚠ WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

Use cybersecurity best practices for password creation and management.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

Cybersecurity policies that govern user accounts and access - such as least privilege, separation of duties - vary from site to site. Work with the facility IT System Administrator to ensure that user access adheres to the site-specific cybersecurity policies.

To change a user password:

1. In User Manager, select the **Users** tab.
2. In the users table, select the row of the user for which you want to change the password, and then click **Edit** ⚙ in this row.
3. In Edit Standard User, enter the new password under **Password** and under **Confirm Password**, and then click **Save**.

Related topics:

Users

- Users
- Adding a standard user
- Adding a Windows user
- Adding a Windows group
- Changing a username
- Changing a user password
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For reference information see:

- User Manager
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Changing a user access level

Change a user access level to give this user higher or lower access permissions in PME.

⚠ WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

Use cybersecurity best practices when configuring user access.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

Cybersecurity policies that govern user accounts and access – such as least privilege and separation of duties – vary from site to site. Work with the facility IT System Administrator to ensure that user access adheres to the site-specific cyber security policies.

NOTE: When a user access level is changed, this change will be applied automatically by the system to logged in users, after a short period of time.

To change a user access level:

1. In User Manager, select the **Users** tab.
2. In the users table, select the row of the user for which you want to change the access level, and then click **Edit** in this row.
3. In the Edit window, choose the new access level under **Access Level**, and then click **Save**.

Related topics:

Users

- Users
- Adding a standard user
- Adding a Windows user
- Adding a Windows group
- Changing a username
- Changing a user password
- Changing a user access level
- Changing user details
- Deleting a user

User groups

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For reference information see:

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Changing user details

Change user details to add additional information or update outdated information.

NOTE: You can only change the details of a standard user in User Manager. You cannot change the details of a Windows user or group.

To change user details:

1. In User Manager, select the **Users** tab.
2. In the users table, select the row of the user for which you want to change the details, and then click **Edit** in this row.
3. In Edit Standard User, change the details information under **Details**, and then click **Save**.

Related topics:

Users

- Users
- Adding a standard user
- Adding a Windows user
- Adding a Windows group
- Changing a username
- Changing a user password
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- Deleting a user

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Deleting a user

Delete a user if this user is no longer needed, for example if someone no longer needs access to PME.

NOTE: Windows users or groups are only removed from PME. The group or user is not deleted from Windows.

NOTE: When a user is deleted, this user will be logged out automatically by the system after a short period of time, if they are logged in.

To delete a user:

1. In User Manager, select the **Users** tab.
2. In the users table, select the row of the user you want to delete, and then click **Delete** in this row.
3. In the confirmation dialog box, click **Delete** for a standard user, or **Remove** for a Windows user or group.

Related topics:

Users

- Users
- Adding a standard user
- Adding a Windows user
- Adding a Windows group
- Changing a username
- Changing a user password
- Changing a user access level
- Changing user details
- Deleting a user

User groups

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- Moving a user between user groups
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User Groups

User groups determine which sources and applications users can access in Power Monitoring Expert (PME). Each user is a member of at least one user group.

PME has two built-in groups, the Global group and the Unassigned group. Members of the Global group can access all sources and applications in the system. Members of the Unassigned group can access none of the sources and applications in the system. Members of the Unassigned group are also not allowed to log into PME Web Applications.

In addition to the built-in groups, you can create any number of custom user groups in PME. Use User Manager to create a custom group and define which sources and applications its members can access.

NOTE: User group membership determines which sources and applications are visible to a user. User groups do not set the user access level for the group members. Access levels are set for each user individually as part of the user account settings.

The user group feature only applies to the Dashboards, Diagrams, Trends, Alarms, and Reports applications in PME. For all other applications users have full access to all sources regardless of their group membership.

Rules

The following rules apply to group membership in PME:

- A user is a member of at least one group.
- A user can be a member of multiple groups.
- When a new user is created, it is automatically added to the Global group.
- If a member of the Global group is added to another group, it is automatically removed from the Global group.
- If a user is removed from the Global group without being added to a custom group, it is automatically added to the Unassigned group.
- If a user is removed from its last custom group, or this group is deleted, the user is automatically added to the Unassigned group.
- If a member of a custom group is added to the Global group, it is automatically removed from all custom groups.
- A supervisor-level user can only be a member of the Global group.
- If a non-supervisor level user that is a member of a custom group is promoted to supervisor, it is automatically removed from all custom groups and added to the Global group.
- If the last custom group is deleted, all of its members are moved to the Global group.

The following rules apply to resource access by groups in PME:

- A user that is a member of multiple groups can access the sources of each group.
- If a member of a custom group is deleted or removed from the group, then this user's public content, such as dashboards or reports, remains available to the group.

- If a member of a custom group is deleted or removed from the group, then this user's private content, such as dashboards or reports, is only available to users in that group who have Edit permissions on this item type.
- If a member of a custom group is removed from the group, then this user has no longer access to any of its content, such as dashboards or reports, that was created during its group membership.

Limitations

The following limitations exist for user groups in PME:

- The Global and Unassigned user groups cannot be renamed or deleted.
- The default settings for which sources and applications can be accessed in the Global and Unassigned user groups cannot be changed.
- User group names must be between 1-255 characters long. Any leading or trailing whitespace characters are removed.
- If a user group name contains a **]** (left angle bracket), the bracket must be followed by a space or be at the end of the name.
- If a user group name contains a **&** (ampersand), the ampersand must not be followed by a **#** (hash).

Related topics:

Users

- Users
- Adding a standard user
- Adding a Windows user
- Adding a Windows group
- Changing a username
- Changing a user password
- Changing a user access level
- Changing user details
- Deleting a user

User groups

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- Deleting a user group

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For reference information see:

- User Manager
- User Manager user interface
- Default User Access Level Privileges

Adding a user group

Add a user group to control which sources and applications the group members can access in PME.

To add a user group:

1. In User Manager, select the **User Groups** tab, and then click **Add User Group**.
2. In Add User Group - User Group Name, enter a group name, and then click **Next**.
3. In Add User Group - Users, select the users you want to be in the new group form the list of available users, and then click **Next**.

   NOTE: Supervisor-level users are not included in the available users list. A supervisor-level user can only be a member of the Global group, not a custom group.

4. In Add User Group - Sources, in the **Available Sources** tree, select the sources you want the users in this group to be able to access, and then click **Next**.
5. In Add User Group - Applications, select the applications you want the users in this group to be able to access.
6. Click **Finish**.

Related topics:

Users

- Users
- Adding a standard user
- Adding a Windows user
- Adding a Windows group
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- Changing a user password
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- Deleting a user

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- User Manager
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Adding a user to a user group

Add a user to a user group to give this user access to the sources and applications assigned to this group in PME.

To add a user to a user group:

1. In User Manager, select the **User Groups** tab.
2. In the user groups table, select the row of the user group to which you want to add users, and then click **Edit** in this row.
3. In Edit User Group, select the **Users** tab, and then, in the user table, select the user you want to add.

   NOTE: Supervisor-level users are not included in the available users list. A supervisor-level user can only be a member of the Global group, not a custom group.

4. Click **Save**.

Related topics:

Users

- Users
- Adding a standard user
- Adding a Windows user
- Adding a Windows group
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Adding sources to a user group

Add sources to a user group to give the users in this group access to these sources in PME.

To add sources to a user group:

1. In User Manager, select the **User Groups** tab.
2. In the user groups table, select the row of the user group to which you want to add sources, and then click **Edit** in this row.
3. In Edit User Group, select the **Sources** tab, and then, in the **Available Sources** tree, select the sources you want to add.
4. Click **Save**.

Related topics:

Users

- Users
- Adding a standard user
- Adding a Windows user
- Adding a Windows group
- Changing a username
- Changing a user password
- Changing a user access level
- Changing user details
- Deleting a user

User groups

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For reference information see:

- User Manager
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- Default User Access Level Privileges

Changing a user group name

Change a user group name to give this group a better or more meaningful name.

To change a user group name:

1. In User Manager, select the **User Groups** tab.
2. In the user groups table, select the row of the user group for which you want to change the name, and then click **Edit** in this row.
3. In Edit User Group, select the **User Group Name** tab, and then change the name under **Name** to the new group name.
4. Click **Save**.

Related topics:

Users

- Users
- Adding a standard user
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User groups

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Removing a user from a user group

Remove a user from a user group to no longer give this user access to the sources and applications assigned to this group in PME.

To remove a user from a user group:

1. In User Manager, select the **User Groups** tab.
2. In the user groups table, select the row of the user group from which you want to remove a user, and then click **Edit** in this row.
3. In Edit User Group, select the **Users** tab, and then, in the user table, clear the check box for the user you want to remove.
4. Click **Save**.

Related topics:

Users

- Users
- Adding a standard user
- Adding a Windows user
- Adding a Windows group
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- Changing a user password
- Changing a user access level
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Removing sources from a user group

Remove sources from a user group to no longer give the users in this group access to these sources in PME.

To remove sources from a user group:

1. In User Manager, select the **User Groups** tab.
2. In the user groups table, select the row of the user group from which you want to remove sources, and then click **Edit** in this row.
3. In Edit User Group, select the **Sources** tab.
4. In the **Selected Sources** list, select the source you want to remove, and then click **Remove** for this source.
5. Repeat step 4 for all the sources you want to remove from the user group.

   (Optional) Click **Remove All** to remove all sources from the group.
6. Click **Save**.

Related topics:

Users

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Changing application access for a user group

Change application access for a user group to add or remove access to certain applications for the members of this group in PME.

To change application access for a user group:

1. In User Manager, select the **User Groups** tab.
2. In the user groups table, select the row of the user group for which you want to change application access, and then click **Edit** in this row.
3. In Edit User Group, select the **Applications** tab, and then select the check boxes for the applications you want to add, or clear the check boxes for the applications you want to remove.
4. Click **Save**.

Related topics:

Users

- Users
- Adding a standard user
- Adding a Windows user
- Adding a Windows group
- Changing a username
- Changing a user password
- Changing a user access level
- Changing user details
- Deleting a user

User groups

- User Groups
- Adding a user group
- Adding a user to a user group
- Adding sources to a user group
- Changing a user group name
- Removing a user from a user group
- Removing sources from a user group
- Changing application access for a user group
- Moving a user between user groups
- Deleting a user group

For information on the Web Application user licenses, see:

- Viewing Web Applications user license information

For information on related Web Application settings, see:

- Login Options

To customize user access level privileges, see:

- Customizing Access Level Privileges

For reference information see:

- User Manager
- User Manager user interface
- Default User Access Level Privileges

Moving a user between user groups

Move a user to a different user group to change which sources and applications this user can access in PME.

To move a user between two user groups, remove the user from the one group and add it to the other group. The order in which these two tasks are performed is not important.

Related topics:

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Deleting a user group

Delete a user group if this group is no longer needed, for example after all users have been removed from the group.

To delete a user group:

1. In User Manager, select the **User Groups** tab.
2. In the user groups table, select the row of the user group you want to delete, and then click **Delete** in this row.
3. In Delete User Group, click **Delete**.

Related topics:

Users

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- Adding a standard user
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Viewing Web Applications user license information

View license information to determine the number of available, free licenses left in the system. You can also see which users have licenses issued to them, and when they were issued.

NOTE: The license information shown in the User Manager is read-only. Use the Floating License Manager to make changes to the Web Application user licenses in the system.

To view license information:

1. In User Manager, select the **Licenses** tab.
2. View license summary information in the top left area of the page. View detailed license information in the user license table of the page.

Related topics:

Users

- Users
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Customizing Access Level Privileges

Each user in PME has an access level. This access level determines the actions the user is allowed to take in the software. There are 5 different access levels. The highest level is supervisor, the lowest level is observer. Each access level has a default set of privileges. You can customize many of these privileges, as shown below.

NOTE: When access level privileges are changed for a logged in user, the user must log out and then log in again for the changes to take effect. If the logged in user's privileges are reduced, some functionality might no longer be available to them even before they log out and back in.

To customize access level privileges:

1. In User Manager, select the **Privileges** tab.
2. Find the privileges and access levels you want to customize and set the desired options.

   TIP: Use Search to find the privilege you are looking for based on key words.

   NOTE: Only correctly licensed features and functions are displayed in the Privileges tab.
3. Click **Save Privileges** to apply the changed settings.

Related topics:

Users

- Users
- Adding a standard user
- Adding a Windows user
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Virtual Processor service (VIP)

The Virtual Processor is a service that operates on the Power Monitoring Expert server, providing coordinated data collection, data processing, and control functions for groups of meters. This makes distributed operations possible, providing customized solutions to a variety of industrial, commercial, and power utility needs.

⚠ WARNING

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Do not use control objects for time-critical functions because delays can occur between the time a control action is initiated and when that action is applied.
- Do not create a custom control object in Virtual Processor for remote equipment operation without configuring it with the appropriate access level, and without configuring a status object to indicate the status of the control operation.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The Virtual Processor lets you gather the information available from your network of power monitoring devices, and enables you to categorize, manipulate, and/or customize the data before distributing the information to the different departments in your company. You could think of the Virtual Processor as a virtual device, capable of collecting and processing data from several power monitoring devices, analyzing the information and performing control functions as required. The Virtual Processor's name implies its characteristics:

- **Virtual** - The Virtual Processor runs in the memory of your PC, not as a remote device.
- **Processor** - The Virtual Processor contains a wide selection of ION modules, which it uses to process information.

Using the Virtual Processor

A **VIP.DEFAULT** Virtual Processor service is created by default. However, this Virtual Processor is not configured at the factory. To perform data collection, data analysis, Modbus communications, or distributed control, you must first create ION module frameworks, using Designer. Refer to the *ION Reference* for information on ION modules.

Configuring the Virtual Processor with Designer

Use Designer to perform all Virtual Processor configuration, including adding new modules, configuring module setup registers, and linking module inputs and output registers to other modules.

Creating a second Virtual Processor

Create a second ION Virtual Processor Service and start it using the following steps:

1. Open a command prompt window.
2. Register the Virtual Processor as a service from the ...\Power Monitoring Expert\system\bin folder by typing: **vip.exe -Service -N<custom Virtual Processor name>**
3. Open **Control Panel > Administrative Tools > Services** and start the new registered Virtual Processor.

Viewing Virtual Processor data with Vista

After you have used Designer to add and link modules in the Virtual Processor, you can create a user diagram in Vista and link it to the modules in the Virtual Processor. You can then use your user diagram to display system data, monitor alarms, and control basic functions in your Virtual Processor framework.

Configuring the Virtual Processor to interact with the desktop

1. Open **Control Panel > Administrative Tools > Services**.
2. Right-click the ION Virtual Processor Service and select **Properties**.
3. Select the **Log On** tab.
4. Select the “Allow service to interact with desktop” check box and click **OK**.
5. Stop and restart the ION Virtual Processor Service.

Distributed control

Virtual Processor Distributed Control modules are a means of transferring information between the different devices in your network. These modules can be used to build frameworks for control processes such as alarm annunciation, plant-wide demand control, power factor control, load shedding, paging, and generator switching.

Before you decide to use a Virtual Processor to implement a control system, it is important to understand the various factors that influence the speed with which the Virtual Processor is able to generate a control action. Some of these factors include network traffic, the number of polled devices in your network, the reliability of your communications network, and the Virtual Processor workstation's CPU usage.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Do not use control objects for time-critical functions because delays can occur between the time a control action is initiated and when that action is applied.
- Do not create a custom control object in Virtual Processor for remote equipment operation without configuring it with the appropriate access level, and without configuring a status object to indicate the status of the control operation.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The information presented in this section assumes that you are familiar with the various ION modules and their functions. Refer to the *ION Reference* for details on Distributed Control and other modules.

Distributed control modules

The Virtual Processor uses four modules to implement Distributed Control frameworks. Three types of Distributed Control modules (Distributed Boolean, Numeric, and Pulse modules) receive data from devices or other Virtual Processors within your network and transfer this data to the node address specified in the module's setup registers. The Data Monitoring module is used as a means of disabling a control module, if the data at the source input (which is used to make the control decision) becomes “stale”.

Distributed control module setup registers

All Distributed Control modules (Distributed Boolean, Distributed Numeric, and Distributed Pulse modules) have a Source input and an Activate input. The Activate input must be linked to another module, and it must be on for a Distributed Control module to function. These modules also contain a *Destination* setup register that specifies the node receiving the data.

Distributed Boolean module

All Distributed Boolean modules have one input that must linked to an External Boolean output register. Whenever this register’s Boolean value changes state, the new value is sent to the node defined in the *Destination* setup register.

Distributed numeric module

A Distributed Numeric module's input must be linked to an External Numeric module. This input’s value is sent to the node specified in the Destination setup register. This module has two additional setup registers that are used to determine when and how often new data is sent to the *Destination* node.

Distributed pulse module

All Distributed Pulse modules have one input that must link to an External Pulse module. This module’s pulse is sent to the node defined in the *Destination* setup register.

Data monitoring module

The Data Monitor module provides a means of alerting you to communication problems that may occur between the Virtual Processor and any ION node referenced by the Data Monitor's *Source* inputs.

NOTE: ION meters with Advanced Security enabled do not accept control operations from the Virtual Processor. In order to enable these control operations, you need to provide a device password in Management Console for these applications to use. See Accessing meters with advanced security for information on configuring Advanced Security.

Distributed control network performance

It is important to maximize the speed at which the Virtual Processor receives the data used to make control decisions. The performance of a Virtual Processor using Distributed Control is sensitive to factors such as network traffic, the Virtual Processor's global parameters, and the workstation's CPU usage.

The following sections provide some guidelines for improving a distributed control network's performance.

System configuration

- Minimize the number of devices per site for sites including devices used for distributed control.
- Minimize the number of applications (such as Vista diagrams) that are requesting data from the control site.
- Decrease the Virtual Processor's Client Polling Period.
- Maximize the site's baud rate.

CPU performance

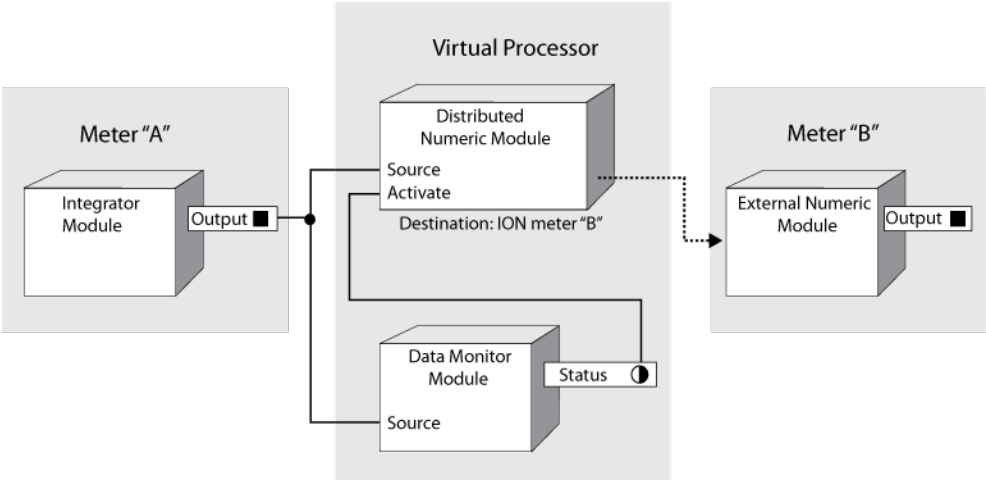
- Dedicate a single Virtual Processor for control purposes; an additional Virtual Processor can be run for less critical functions.
- Do not run CPU intensive functions on the same workstation as your distributed control Virtual Processor.

Distributed control applications

The Virtual Processor's Distributed Control frameworks can perform various control processes; two examples are presented below. Ensure that you are familiar with the sections above before using any of these module frameworks in a control system.

Example: Passing a value between devices

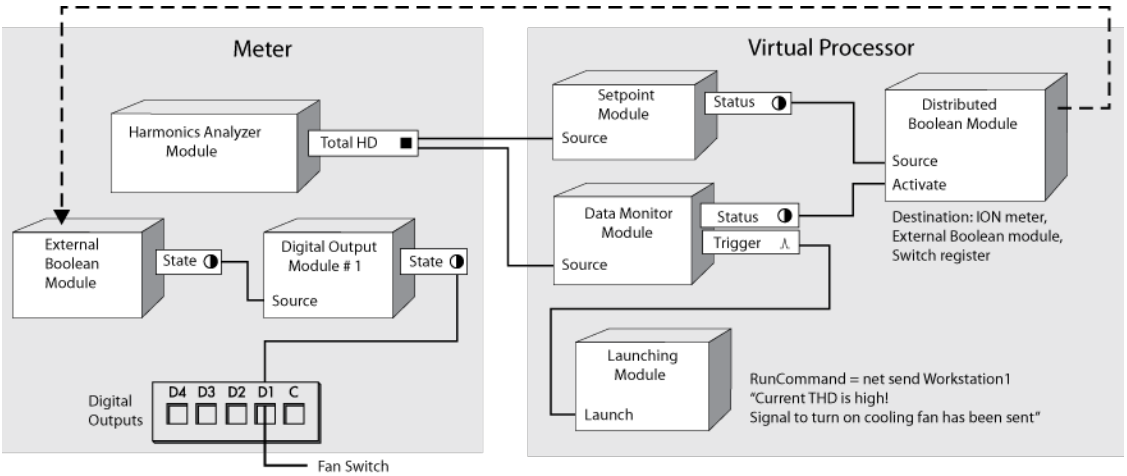
The following example shows how the numeric output of the Integrator modules in meter “A” is sent to an External Numeric module in meter “B”.



Note that the Distributed Numeric module is disabled if the Data Monitor module detects a communication problem between the meter “A” and the Virtual Processor (for example, timeouts or slow network connections). As a result, control actions are only performed based on up-to-date data.

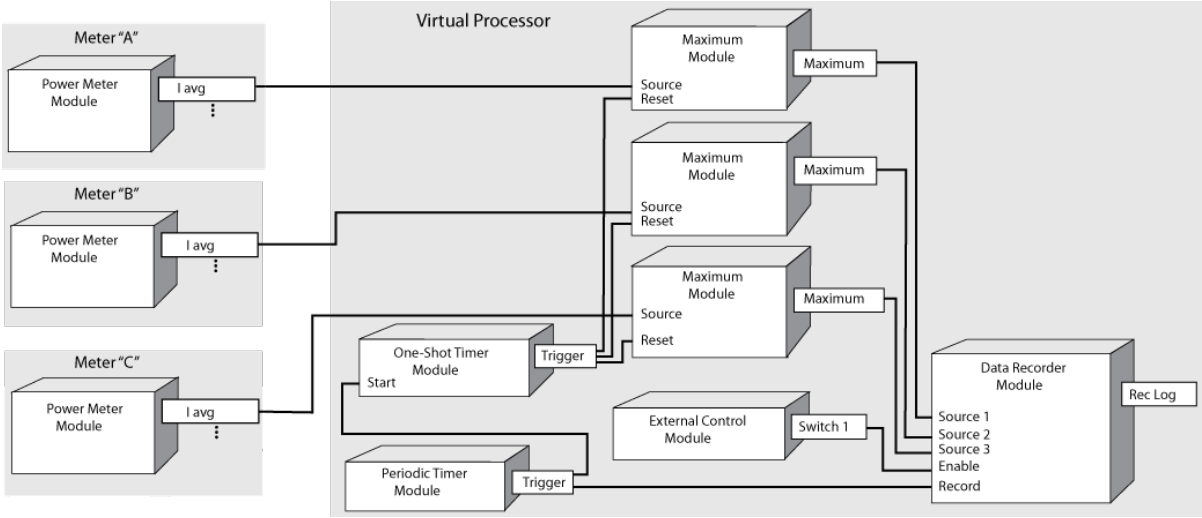
Example: Device control

This example framework monitors total harmonic distortion (THD), which could cause a piece of equipment (like a power transformer) to overheat. When a setpoint is reached, the system sends a network message to a workstation and turns on a fan.



Example: Data aggregation

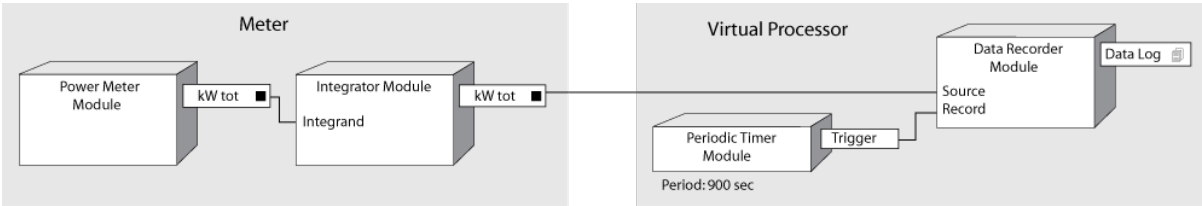
In the following example, meters monitor average current values (I avg). Every day at a specified time (determined by the Periodic Timer module), the Data Recorder Module stores the maximum average current value for each meter.



Example: Logging data from meters

The Virtual Processor can be used to log data from meters that do not have Data Recorders. In the following example, the total kWh from a meter's Integrator module is recorded every 15 minutes by a Virtual Processor's Data Recorder module.

Note that the Virtual Processor holds only 100 records at a time, that is, it holds about one day of 15 minute data. If the Virtual Processor stops operating, data logging also stops.



Setting global parameters

The Virtual Processor global operating parameters and Modbus network setup are configured using Virtual Processor Setup.

The global parameters do not need to be changed for normal operation. The Virtual Processor operates properly in most applications with the default settings. See Modifying the Global Parameters for details.

To set up the Virtual Processor's Modbus network, see Virtual Processor setup.

NOTE: The ION Virtual Processor Service must be restarted for any changes to take effect, as the Virtual Processor only reads the vipsys.dat file once on startup. The ION Virtual Processor Service can be restarted, like any other service, using the Services window found via the Control Panel service applet.

Virtual Processor setup

TIP: You can open Virtual Processor Setup in Management Console from the **Tools > System > ION Virtual Processor Setup** link.

The Virtual Processor (VIP) is the Power Monitoring Expert service (ION Virtual Processor Service) that provides coordinated data collection and aggregation, control, and mathematical analysis of power monitoring system data from groups of metering or similar intelligent devices. Use Virtual Processor Setup to configure a Modbus Slave port when using the VIP as a Modbus Slave device for exporting data to an external, 3rd-party Modbus Master. . Virtual Processor Setup can also be used to improve the performance of the ION Virtual Processor Service by modifying its global operating parameters.

See Virtual Processor service (VIP) for application examples using the Virtual Processor.

Configuring the Modbus Slave port

NOTE: The VIP Modbus Slave functionality requires a Data Exchange Module license.

You can configure the VIP to act as a Modbus Slave device to an external Modbus Master. The Modbus Master can read data from the VIP through the VIP Modbus Slave modules. See the *ION Reference* for information on how to configure Modbus Slave modules.

For the Modbus Master to be able to access the VIP, you need to configure a Modbus Slave Port. A Modbus Slave Port can be a serial port, for example COM1, COM2, and so on, or a Modbus TCP port.

To add a Modbus Slave Port:

1. Open Management Console and log on with a supervisor level user account.
2. Select **Tools** > **System** > **ION Virtual Processor Setup**. This opens the ION Virtual Processor Setup dialog box.
3. In ION Virtual Processor Setup, find the VIP for which you want to add a slave port. Double-click **Modbus Network** for this VIP. This opens the Network view.
4. Double-click **Slave Ports**. This shows any configured slave ports for this VIP. If no slave ports are configured, the list will be empty.
5. Click **Add Port**. This opens the VIP Setup Modbus Port/Site dialog box.
6. In VIP Setup Modbus Port/Site, select the Port you want to use. Click **OK**.
7. Double-click the newly added slave port and then double-click **Settings**. This opens the port settings.
8. Edit the port settings if required. For more information on port settings, see VIP Modbus Slave port settings
9. Click **Save**, then click **Exit**.

   NOTE: You must restart the VIP for the changes to take effect.

Done

Modifying the Global Parameters

Typically, you do not need to change the default Virtual Processor's **Global Parameters**. However, the settings in the following table can be modified to improve system performance. To view and select the settings, expand Global Parameters.

Global Parameter	Value Range	Description	Notes
Module Update Period	50 to 1000 ms	The interval at which ION modules inside the Virtual Processor are updated.	Frequent module updates contribute to the workstation's processor load. By increasing the Module Update Period, you reduce the number of times a module executes in a given time period.
Configuration Saver Period	10 to 600 seconds	The interval at which the Virtual Processor writes its configuration data to the workstation's hard disk.	Increasing the Configuration Saver Period significantly reduces the processor load if you have a large Virtual Processor configuration file.
Client Polling Period	500 to 300000 ms	The interval at which the Virtual Processor gets information from other nodes in the network (for example, another Virtual Processor or a device).	You can increase the period for less time sensitive Virtual Processor applications and reduce the period for more time sensitive applications.
Server Polling Period	200 to 1440000 ms	The interval at which the Virtual Processor responds to requests for information from client nodes such as Vista or the Log Inserter.	Reducing this value increases the rate at which these responses are sent; however, this can also increase network traffic.

Web Applications settings

TIP: You can open the Settings page from the **SETTINGS** link in the Web Applications banner.

Use the Settings page to access web application settings and configuration tools.

NOTE: Access to this application or function is controlled by user privileges. See Default User Access Level Privileges and Customizing Access Level Privileges for details.

TIP: Use Search, in the Settings Library, to find the settings and tools you are looking for based on keywords.

The Settings page consists of a Settings Library and a configuration area. The Settings Library provides access to the following settings and tools:

Category	Settings/Tools
Alarms	Alarm Views Notifications Software Alarms (tool)
Integrations (Note: This setting is hidden when EWS is disabled.)	EWS Login
Personalization	Personal Preferences Report Theme System Language System Theme
Registration & Analytics	Diagnostics and Usage Registration
Security	Authorized Hosts Diagrams Control Options Login Options Session Timeout
System	Billing Rates (tool) Device Manager (tool) Hierarchies (tool) Modeling (tool) System Log (tool)
Users	User Manager (tool)

NOTE: The availability of the Billing Rates (Rate Editor) and Modeling are subject to licensing. EcoStruxure Web Services (EWS) appears in the **Settings** pane only if it is enabled in the system.

NOTE: You can customize the web application navigation links (Dashboards, Diagrams, Trends, and so on) in the banner. For example, you can add custom links, hide/unhide/delete links, and re-order links. For details see Customizing the Web Applications links

Alarm Views

Use the alarm view settings to:

- Change the number of items that are displayed in the alarms display.
- Change the priority classifications for alarms and incidents.
- Customize the behavior of the alarm annunciator with these settings.
- Customize the display of Load Impact events in Alarm and Incident views.

To change how many Incidents, Alarms, and Events are shown in the Alarm Viewer:

1. Under **Display Settings**, enter the maximum number you want to be displayed for Incidents, Alarms, and Events in the boxes.
2. Click **Save** to apply the changed settings.

To change the Alarm Viewer update interval:

1. Under **Display Settings**, select the **Update Interval**.
2. Click **Save** to apply the changed settings.

To turn the Alarm Annunciator on or off:

1. Under **Annunciator**, turn **Enable** on or off.

   When the Annunciator is turned off, it is not visible in the Web Applications banner.
2. Click **Save** to apply the changed settings.

To change what type of state counts are shown in the Alarm Annunciator:

1. Under **Annunciator**, select the state type for **Show counts for**.
2. Click **Save** to apply the changed settings.

To change the Alarm priorities that are shown in the Alarm Annunciator:

1. Under **Priority Classification**, select or clear the **Visible in Annunciator** check boxes for the Alarm priorities you want to include or exclude from the Annunciator.
2. Click **Save** to apply the changed settings.

To change for which Alarm priorities an Alarm notification sound is played:

1. Under **Priority Classification**, select or clear the **Audible in Annunciator** check boxes for the Alarm priorities you want a notification sound to be played for or not.
2. Click **Save** to apply the changed settings.

To change the sound that is played for Alarm notification:

1. Under **Annunciator**, click **Select Sound File**.
2. In Select Audio File, select the sound you want, or if the sound is not in the Media Library,
   a. Click **Upload Audio File** and either choose a sound file available on your system by clicking **Choose Files** or drag a sound file into the application area.
   b. Click **Finish** to add it to the Media Library.
3. Click **OK** to complete your sound selection.
4. Click **Save** to apply the changed settings.

To change the Alarm Annunciator update interval:

1. Under **Annunciator**, select the **Update Interval**.
2. Click **Save** to apply the changed settings.

To change the display color and Alarm priority ranges for the Alarm Viewer:

1. Under **Priority Classification**, set the **Color** and **Start** values for the different alarm priorities. The **End** values are adjusted automatically.
2. Click **Save** to apply the changed settings.

To change the display of Load Impact events in Alarm and Incident views:

1. Under **Load Impact Display**, select or clear the check boxes for the options you want or not.
2. Click **Save** to apply the changed settings.

EWS Login

EcoStruxure Web Services (EWS) requires a unique set of credentials to connect to the data exchange service.

To configure the credentials:

1. Click **Change Credentials**, or **Set Credentials**, if you are configuring this setting for the first time, to enable the input fields.
2. Add a user name.
3. Type the password for the user in the **Password** and **Confirm Password** entry fields.
4. Click **Save** to apply your changes or **Discard** to retain the existing credentials.

NOTE: The **EWS Login** settings are only visible if EWS is enabled. When EWS is disabled, the **Integrations** and **EWS Login** settings are hidden.

Personal Preferences

Use the personal preferences settings to update or edit your user profile details, change your account password, set your personal localization preferences, and choose your personal theme color.

NOTE: Your personal localization settings overrule the system localization settings for your user account. By default, your personal localization settings are the same as the system localization settings. See System and personal localization settings for details on the behavior of these settings.

NOTE: Your personal localization settings also apply to the Vista and Designer applications.

NOTE: The profile details settings and change password option are only available for standard accounts. For Windows accounts, this information is managed through Windows.

NOTE: The profile details and account password are the same as the ones configured for your account with User Manager.

To change any of the personal preferences:

1. Edit the fields or select the options you want from the drop-down lists.
2. Click **Save** to apply the changed settings.

Report Theme

Change the Report theme to customize the Reports colors and the Reports logo.

To change the Reports colors:

1. Under **Report Colors**, select **Use Theme Colors** or **Override Theme Colors**.

   TIP: The system theme colors are defined by the System Theme settings for the Web Applications. See System Theme for more information.

2. If you choose Override Theme Colors, then set the colors for the Report Title, Section Header, Table Header, Summary, Row Shading, and Section Title, using the drop-down selectors.
3. Click **Save** to apply the changed settings.

To change the Reports Logo:

1. In SETTINGS, open the Settings Library and click **Report Theme**.
2. Under **Report Logo**, click **Select** to open the Select Report Logo Image dialog.
3. Select an image currently available in the repository, or
   a. Click **Upload Image** to choose an image file available on your system or drag an image file into the application area.
   b. Click **Finish** to add it to the image repository.
4. Click **OK** to complete your selection.
5. Click **Save** to apply the changed settings.

NOTE: You can use GIF, JPG, JPEG, or PNG image formats. The recommended file size is 250 x 100 pixels. Images are automatically re-sized to fit the logo area in Reports.

System Language

Use these system localization settings to select the language, region, and currency symbol. The setting for **Region** determines date, time, number, and currency formats.

NOTE: Your personal localization settings overrule the system localization settings for your user account. By default, your personal localization settings are the same as the system localization settings. See System and personal localization settings for details on the behavior of these settings.

NOTE: The system localization settings also apply to the diagrams displayed in the Vista application.

To change any of the system localization settings:

1. Select the options you want from the drop-down lists.
2. Click **Save** to apply the changed settings.

System Theme

Use the system theme settings to:

- Choose the Default theme or a User Defined theme
- Specify if you want to display the vendor logo in the top right corner of the Web applications window.
- Change the image and text that is displayed in the top left corner of the Web Applications window.
- Choose a theme color for the borders and other elements of the user interface. You can enable high contrast mode which uses a dark background color for the application.
- Choose the location of the library panel to be on the right or left side of the user interface.
- Specify if you want to use compact mode navigation.

  NOTE: Compact navigation replaces the main navigation bar at the top of the Web Applications user interface with an options button . The options button is displayed at the top left corner of the banner. When you click the button, the navigation links to the different Web applications are shown. Compact mode is used for small displays, such as on mobile devices. The Web Applications user interfaces switches to compact mode automatically when the browser size is reduced below a certain size. Turning on the **Always use compact mode for Navigation** setting forces this mode regardless of browser size.

- Set the colors for the waveform and bust data plots.
- Reset the theme to system defaults.

To select the theme to be default or user defined:

1. Under **General Theme**, click **Default Theme** or click **User Defined**.

   NOTE: With the Default Theme all color, image, and logo options are set to the factory defaults. You can change the location of the navigation panel, choose to always use compact mode, and you can customize the colors for the waveform and burst data plots.

2. Click **Save** to apply the changed settings.

To specify the display of the vendor logo:

1. Under **General Theme**, click **User Defined**.
2. Turn on **Show Vendor logo** to display the logo or turn off **Show Vendor logo** to hide the logo, in the top right corner of the Web Applications window.
3. Click **Save** to apply the changed settings.

To change the top left logo and text:

1. Under **General Theme**, click **User Defined**.
2. Under **Image**, click **Select**.
3. In Select Image, select the image you want, or if the image is not in the Image Library,
   - Click **Upload Image** and either choose an image file available on your system by clicking **Choose Files** or drag an image file into the application area.
   - Click **Finish** to add it to the Image Library.
4. Click **OK** to complete your image selection.

   The image file name is shown under **Image**. The image is updated on the banner when you save your settings. You can use GIF, JPG, JPEG, or PNG image formats. The maximum file size is 2MB. Images are automatically resized to fit the logo area on the banner.

5. Use the **Text** field to change the text beside the logo in the banner. The text is updated when you save your settings.
6. Click **Save** to apply the changed settings.

To change the theme color:

1. Under **General Theme**, click **User Defined**.
2. Under **Theme Color**, select from several preset color themes or create your own using the color selector that opens when you click the color theme icon on the right. When you click a preset color, it is temporarily applied to the interface to show you the effect of the change.

   TIP: Enable high contrast mode to create a dark mode type theme with dark backgrounds.

3. Click **Save** to apply the changed settings.

To choose the location of the library panel:

1. Under **Navigation**, select **Left** or **Right**.
2. Click **Save** to apply the changed settings.

To specify the use of compact mode navigation:

1. Under **Navigation**, turn on **Always use compact mode for Navigation**.
2. Click **Save** to apply the changed settings.

To change the color settings for Waveform and Burst Data:

1. Under **Waveform and Burst Data**, set the color that is used to display the different measurement types.

   NOTE: Click **Reset to Default** to set the colors to the system default.

2. Click **Save** to apply the changed settings.

To reset the theme to the system defaults:

1. Click **Default Theme**.
2. Click **Save** to apply the changed settings.

Diagnostics and Usage

Diagnostics and Usage

Diagnostics and Usage anonymously sends data to a secure server. Schneider Electric uses this data to help improve our software by understanding how you use it.

The diagnostics and usage service collects and sends data to Schneider Electric weekly on Monday at 2:00 a.m. (server time), over HTTPS at port 443. Each time the service runs, it creates a log file in the `system\bin` folder in the Power Monitoring Expert install location.

This operation is enabled by default.

NOTE: All diagnostics and usage data are sent to Schneider Electric anonymously. None of the collected information identifies you or your company. For more information on the Schneider Electric Privacy Policy, see the Schneider Data Privacy and Cookie Policy. See Resources for link information.

The following diagnostic and usage data is collected when it is enabled:

Diagnostic Data	Usage Data
• Power Monitoring Expert version • Operating system version and type (32- or 64-bit) • Number of CPU cores • System memory (RAM) • .NET Framework version • SQL Server version • Distributed or local database • City or region • Number of monitors in use • Client screen resolution • Screen DPI	• Total number of devices • Device type count • Number of users

To disable the sending of data:

1. Open Web Applications and click **Settings > Registration & Analytics > Diagnostics and Services**.
2. Select **Disable** in the dropdown list and click **Save** to apply the change.

Registration

Connected Services

Connected Services lets you share the operational data that is collected by Power Monitoring Expert with Schneider Electric. The collected energy and power data can then be used by connected services – such as EcoStruxure™ Power Advisor and EcoStruxure™ Asset Advisor – to help identify gaps or issues in your power management system. It can also help identify power quality issues within your electrical distribution system.

The collected data depends on the specific services that the customer receives from Schneider Electric. For more information on Connected Services, see the Power Advisor User Guide. See Resources for link information.

To disable the collecting of operational data, select **Disable** in the drop-down list and click **Save** to apply the change.

Software registration

Registration information is used by Schneider Electric to help provide support and to enhance the service we provide to you. Schneider Electric will never sell or share this information.

By registering you acknowledge that your registration information will be shared with Schneider Electric and you consent to receiving occasional communications about your product. Product communication includes new features, service pack releases, and recommended cybersecurity updates.

You can edit the registration information at any time through the web application settings.

Authorized Hosts

Use the authorized hosts settings to define third-party web resources that are allowed to either embed (frame) the PME web applications, or to which the PME web applications can redirect requests.

To define a third-party web resource as a **Hosts That Can Frame**, add the Uniform Resource Locator (URL) of that resource to the list, for example `https://localhost:446`.

NOTE: Add all the names (URLs) that might be used for a host, for example the server name, "localhost", the IP address, and so on.

To define a third-party web resource as **Hosts That Can Be Redirected To**, add the hostname (no protocol, no port number) of that resource to the list, for example `localhost`.

NOTE: Reset Internet Information Services (IIS) on the PME server after updating the Authorized Hosts settings.

An example for an application that requires an entry in the **Hosts That Can Frame** list is the integration of PME with EcoStruxure Building Operation. As part of that integration, PME Web Applications are embedded in Building Operation. For this to work, the Building Operation server URL must be added to the list of hosts that can frame.

Login Options

Use the login options settings to define how Windows users can log into the software. You can also disallow login for standard users and only allow login for Windows users.

You can choose the following login options for Windows users:

- **Manual Login Only**

  Windows users can log into the system by manually entering credentials on the login page.

- **One-Click Login Only**

  Windows users can log into the system by clicking a hyperlink on the login page.

- **Manual Login and One-Click Login**

  Windows users can log into the system by manually entering credentials, or by clicking a hyperlink on the login page.

NOTE: Standard users, if allowed to log in, always have to enter their credentials manually.

If you only want to allow Windows user accounts to log into the software, you can disable standard user login. For these options to be available, your system must have at least one Windows user with supervisor-level access.

Session Timeout

Use the session timeout settings to define the timeout behavior of the software web applications and Windows applications clients.

You have to following options:

- You can enable and set a timeout for the web applications.
- You can enable and set a timeout for the Windows applications.

NOTE: You can enter a timeout value from 1 minute to 1440 minutes (1 day)

When a session timeout is configured, web application clients are logged out and Windows application clients (Vista, Designer, Management Console) are locked after a period of inactivity. The default timeout for both client types is 20 minutes. To restart or unlock the session you must enter the login credentials.

A session is considered inactive when none of the following actions are detected for the duration of the timeout period:

- Mouse movement
- Mouse clicks
- Keyboard activity
- Touch screen activity

Administering

This chapter provides information on tasks and tools for ongoing system maintenance in Power Monitoring Expert (PME).

Use the links in the following table to find the content you are looking for.

Function/Tool	Task
Basic administration tasks	Run Updates, check database maintenance tasks.
Cybersecurity	Provides recommended actions to help secure your system.
Configuration Manager	Use Configuration Manager to back up the configuration on your system. (Note: This is an add-on tool. See Resources for information on where to get it.)
Database Manager	Archive and trim the ION databases, upgrade a database, create a new database, or export the database registry settings.
Deactivating alarms	Deactivate alarms that are incorrectly stuck in a permanently active state.
Diagnostics Viewer	Monitor system and network performance.
PME Installer	Reconfigure, reset accounts, export System Key, import System Key, uninstall.
User Manager	Add or remove PME users. Change user access level, passwords, and account information. Change User Group access to devices and Web Applications.
Windows Updates	Routinely apply Microsoft Windows Updates.

Basic administration tasks

Install Windows updates

Apply critical and routine Windows and SQL Server updates to the PME servers and clients; no prior approval by Schneider Electric is required.

Check the scheduled database maintenance tasks

NOTICE

LOSS OF DATA

- Back up the database at regular intervals.
- Back up the database before upgrading or migrating the system.
- Back up the database before trimming it.
- Back up the database before making manual database edits.
- Verify correct database behavior after making database or system changes.

Failure to follow these instructions can result in permanent loss of data.

In Standalone PME systems, the database maintenance tasks for backup, archive, maintenance, and trim are pre-configured and scheduled to run automatically by default. For Distributed Database PME systems, we recommend that these scheduled tasks are set up manually.

Check the task outputs regularly and confirm that backups are created as expected. Review and adjust the schedules to meet your application needs, if required. See Database maintenance for more information on the scheduled database maintenance tasks.

NOTE: You can perform additional, manual backups using standard SQL Server backup procedures.

Monitor the database size for systems with SQL Server Express databases

NOTICE

LOSS OF DATA

- Back up or archive the database before trimming it.
- Trim the SQL Server Express database before it reaches the size limit.

Failure to follow these instructions can result in permanent loss of data.

SQL Server Express has a maximum database size limit of 10 GB. The database stops logging data when this size limit is reached. The scheduled default database maintenance tasks include a database size notification task. When the size threshold is reached, the task logs a system log event message and triggers a Critical alarm in PME every time the task runs.

Check the PME system log and Alarms on a regular basis for database size notification messages. Check the database size on a regular basis and take action before reaching the database size limit.

Cybersecurity

This section provides information on how to help secure your system during the Administering phase.

Renew security certificate

Renew the security certificate before it expires.

Securely store the system key

See Protect the System Key for details.

Apply PME updates

Install software updates that apply to your system when they become available. Check the PME Exchange Community (requires login) or the Schneider Electric Exchange - EcoStruxure Power Monitoring Expert (Portal) for available updates, or contact your service provider.

Verify update file integrity and authenticity

See Verify install file integrity and authenticity for details.

Apply OS and SQL Server updates

⚠ WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

Apply the latest updates and hotfixes to your Operating System and software.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

Critical and routine Windows and SQL Server updates can be applied to the operating systems hosting the PME server and clients without prior approval by Schneider Electric.

Consider implementing best practices, such as:

- Establish a reliable process for finding and applying the latest security updates.
- Use systematic procedures governed by corporate policy.
- Use automated scanners for detecting missing patches, misconfigurations, use of default accounts, and so on.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Before installing the update, verify that the system is not performing critical control actions that may affect human or equipment safety.
- Verify correct system operation after the update.

Failure to follow these instructions can result in death or serious injury.

⚠ WARNING

INACCURATE DATA RESULTS

- Before installing the update, verify that the system data results are not used for critical decision making that may affect human or equipment safety.
- Verify correct system data results after the update.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

Review user accounts on a regular basis

Review PME user accounts on a regular basis. Update passwords and user permissions, and remove unused accounts as required.

RECOMMENDATION: Use Windows users instead of standard users in your PME system to improve cybersecurity. Windows offers advanced user management functions, such as enforcing password strength and limiting the number of invalid login attempts. These functions are required for IEC 62443 compliance, the global standard for industrial automation control system security.

NOTE: To only use Windows users, replace any existing standard users in the system with Windows users. Disallow logins for standard users in Web Applications, this disables the **supervisor** user. See Login Options for more information.

Keep network security up-to-date

Keep security related networking tools and equipment up-to-date and working as expected.

NOTE: Network security equipment, such as firewalls, are complex devices and must be maintained by trained individuals.

Keep computer hardware secure

See Plan your site security for more information.

Perform security audits

Perform comprehensive system security audits on a regular basis. Regularly scan and verify security.

Consider implementing best practices, such as:

- Check the OS and PME system logs.
- Check performance monitor profiles

Database Manager

Use Database Manager to manually perform operations on the Power Monitoring Expert databases.

NOTICE

LOSS OF DATA

- Back up the database at regular intervals.
- Back up the database before upgrading or migrating the system.
- Back up the database before trimming it.
- Back up the database before making manual database edits.
- Verify correct database behavior after making database or system changes.

Failure to follow these instructions can result in permanent loss of data.

NOTE: Database Manager does not include manual database operations on the Application Modules database (ApplicationModules). In a disaster recovery situation or when directed by Technical Support, the Application Modules database can be restored by using the Restore database function in the SQL Server Management Studio. See Restoring a database for further information about this operation. ION databases can be restored using the same process.

For information on database maintenance tasks in PME, see Database maintenance.

Prerequisites

The following user prerequisites need to be met to work with Database Manager and database functions through SQL Server Management Studio:

- For Database Manager: Since Windows authentication is used to access the SQL Server databases, the user needs to be a member of the sysadmin SQL Server role, which is set in SQL Server Management Studio.
- For most database functions available in SQL Server Management Studio: The user needs to be a member of the sysadmin SQL Server role.

NOTE: If the Windows user that you used to log into the system is not a member of the sysadmin role, and you want to run Database Manager, you can do so without logging out by completing the following steps:

1. Navigate to the system\bin folder in the product's install location.
2. Locate DatabaseManager.exe.
3. Click the EXE file name to highlight it, then press **Shift+Right-click** to open the menu.
4. Click **Run as different user** to open the Windows Security dialog.
5. In the **User name** field, type a user name that has the sysadmin role, then type the password for that user.
6. Click **OK** to open Database Manager.

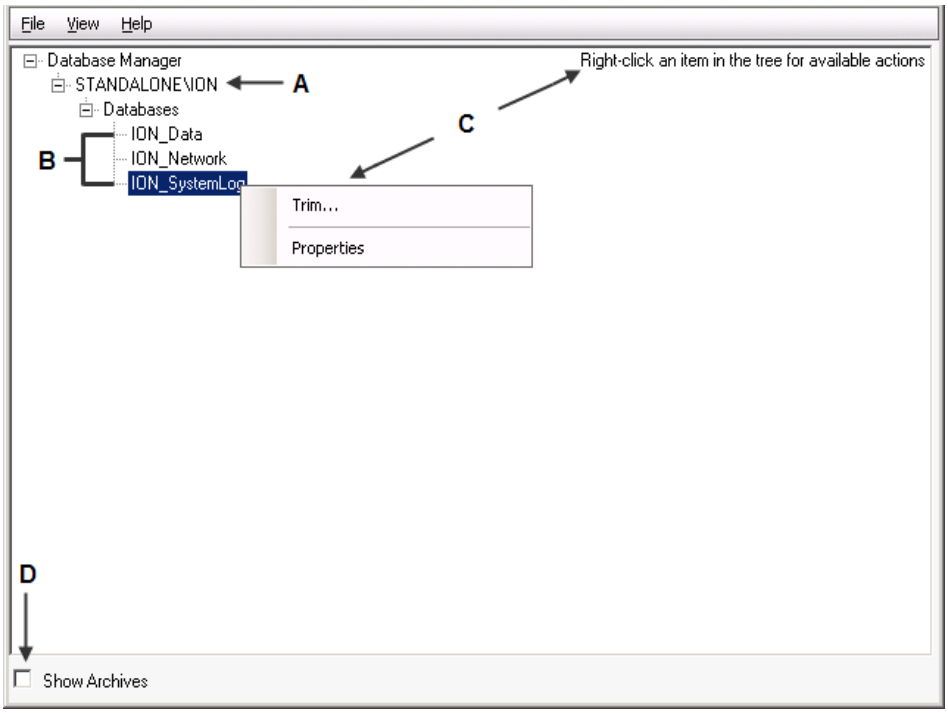
Database Manager interface

To access Database Manager, start Management Console then click **Tools > Database Manager**.

Note that the Windows user running Database Manager needs to be a member of the sysadmin SQL Server role.

Expand the items in the navigation tree to display the **Databases** for each instance.

Note that scheduled jobs are available only in Windows Task Scheduler. For further information, see Database maintenance.



A	SQL Server Instance	B	Databases	C	Options menu	D	Show Archives

SQL Server instance

The default SQL Server instance that the product uses for its databases is *COMPUTERNAME**INSTANCE*, where *COMPUTERNAME* is the name of the server, and *INSTANCE* is the SQL Server instance used with the product.

Databases

The **Databases** section lets you view information about the databases or perform manual actions on the databases.

For information on the manual actions you can perform, see Manual actions.

Viewing Database Properties

To view the properties of a particular database, right-click that database and select **Properties**. The properties are:

- **Size**: The current size of the database.
- **Primary File Location**: The file path for the primary database (.mdf) file.

- **Transaction Log Location**: The file path for the transaction log (.ldf) file.
- **Creation Date**: The date and time when the database was created.
- **Last Backup Date**: The date when the last backup was performed.
- **Disk Space Available**: The amount of free space available on the disk where the database resides.
- **Server Version**: The type and version of the SQL Server instance that is hosting the database.

Show archives

Select this check box (lower left-hand corner) if you want the list under **Databases** to include all archived databases along with the live databases. After **Show Archives** is selected, you can upgrade archived databases or view the properties of the archived databases.

Clear the **Show Archives** check box to hide the archived databases from view. This also prevents the database actions from being performed on database archives.

Manual actions

The following sections provide information on the manual actions that you can use to manage your databases.

To perform an action manually, do one of the following:

- Right-click **Databases** and select the action from the menu, or
- Right-click the specific database and select the action you want to perform from the pop-up menu.

When you right-click **Databases** and select an action, a dialog specific to that action opens. The databases listed in the dialog are those to which the action applies.

When you right-click a specific database, only the actions that apply to that database appear in the menu and the database is selected by default in the dialog for the action.

Archive

The Archive action creates an archive of the selected database.

Before proceeding, ensure that you have write access to the archive directory location.

1. Right-click **Databases** or **ION_Data** and select **Archive** to open the **Database Archive** dialog. If necessary, select the database that you want to archive.
2. Select the directory where the archive will be saved.

   For **standalone** environments:

   a. In **Save archive to**, click the browse button ... to select the directory where the archive will be saved.

      `...\Power Monitoring Expert\Database\Archives\Data` is the default directory for the saved archive, but you can specify another local directory.

b. (Optional) Specify a different local directory.

> **NOTE**: You can only save an archive to a directory on the local machine, not to a location on the network.

c. (Optional) Edit the default archive filename to follow your naming conventions.

> **NOTE**: The database name is restricted to characters A-Z, a-z, 0-9, and _ (underscore).

For **distributed** environments:

a. In **Save archive to**, enter an existing directory path on the server and a valid filename for the archive.

For example: `C:\Archives\ION_Data_January.mdf`. The path – in the example `C:\Archives` – must exist on the Database Server.

> **NOTE**: The database name is restricted to characters A-Z, a-z, 0-9, and _ (underscore).

3. Select the data types that you want to archive.
4. Specify the date range of the data that you want to archive. For **Start**, select **The beginning of the database** or select **Date** and enter a date and time. Enter a date and time for **End Date**.
5. Under **Trim after archive** select whether or not you want to remove archived data from the database.

   You need to select **The beginning of the database** for the start date range for trimming the live database, otherwise the **Trim after archive** option is disabled.
6. Click **OK**.

The **Progress** field displays the current progress of the archive process. If a manual archive does not succeed, a message appears and the **Database Archive** dialog remains open with the **OK** button grayed out — examine the **Progress** field to discover where the process did not succeed. If the archive is successful, the dialog closes automatically.

Export Registry Setting

The Export Registry Setting action exports settings to a registry (.reg) file. This is useful if you need to set up client computers in a system where the primary server's database settings (server instance name and database name) are customized. After you export the settings to the registry (.reg) file, you can import that registry file on the client computer.

1. Right-click **Databases** and select **Export Registry Setting** to open the **Database Registry Key Export** dialog.
2. Type the path and filename for the file or click the browse button ... to specify the location for the saved the database registry key.

   The directory ...\Power Monitoring Expert\config\cfg\ is the default save location for the exported database registry key.
3. Click **OK**.

New ION_Data Database

The New ION_Data Database action creates a new, blank version of the ION_Data database.

1. Right-click **Databases** and select **New ION_Data Database** to open the **New Historical Database** dialog.
2. Type a name for your new database.

   NOTE: Do not name it “ION_Data” as this is the default name for the existing ION database. Database names are restricted to characters A-Z, a-z, 0-9, and _ (underscore).

3. Click the browse button ... to specify a location for the database.
4. Click **OK**.

Trim

The Trim action removes data from a database.

NOTICE
LOSS OF DATA • Back up the database at regular intervals. • Back up the database before upgrading or migrating the system. • Back up the database before trimming it. • Back up the database before making manual database edits. • Verify correct database behavior after making database or system changes. **Failure to follow these instructions can result in permanent loss of data.**

1. Right-click **Databases**, **ION_Data** or **ION_SystemLog** and select **Trim** to open the **Trim Database** dialog.
2. Select the database you want to trim from the **Database to trim** list.
3. Under **Trim Range**, specify the date range of data you want to trim (for the ION_Data database) or set the maximum data age in days (for the ION_SystemLog database).
4. For the ION_Data database, select the data types you want to trim (**Data Records**, **Waveforms**, **Events**) in the **Data Types** section. You can select any combination of data types to trim.
5. Click **OK**. A message appears to notify you that the selected data will be removed. Click **Yes** to continue or **No** to cancel.

Upgrade Database

The Upgrade Databases action upgrades the selected database to the latest database schema.

1. Right-click **Databases** and select **Upgrade Databases** to open the **ION Database Upgrade** dialog.

The Power Monitoring Expert installer automatically upgrades your databases with the new database schemas when you install Power Monitoring Expert on an existing server. If you install the latest version of the product on a different server so that you can manually copy older database files to the new computer, you can run this action on the older databases (that is, on the ION_Data, ION_SystemLog, and ION_Network databases, and archives) to upgrade them with the new schema.

2. Select the database in the list that you want to upgrade and click **OK**.

Restoring a database

You can restore a database from a backup by logging in to SQL Server Management Studio as a user with syadmin access authority for the **Restore Database** function. (Database backups are specified as a scheduled job in Windows Task Scheduler. See Database maintenance for more information.)

Restoring the latest database

Complete the following to restore a database from the latest backup:

1. Stop all ION services.
2. Open **SQL Server Management Studio**, enter your password if required and click **Connect** to access your SQL Server.
3. In the **Object Explorer** pane on the left, expand **Databases**, right-click the database you want to restore and click **Tasks > Restore > Database** to open the **Restore Database** dialog.
4. Under **Source**, select **Database** and click the database you want to restore in the dropdown list if it is not already selected.
5. Under **Backup sets to restore**, select the checkbox in the **Restore** column for the database you want to restore.
6. Click **Options** in the **Select a page** pane on the left.
7. On the **Options** page:
   - Under **Restore options**, select **Overwrite the existing database (WITH REPLACE)**.
   - For **Recovery state**, select **RESTORE WITH RECOVERY** from the dropdown list.

     RESTORE WITH RECOVERY is described as **Leave the database ready to use by rolling back uncommitted transactions. Additional Transaction logs cannot be restored**.
8. Click **OK** to begin the restore operation.

   A message indicates that the database has been restored successfully. If the restore operation is not successful, the database reverts to its original state.

   NOTE: After you restore the database, you need to assign its ownership to the ION user as follows:

   a. In SQL Server Management Studio, right-click the restored database and click **Properties** in the menu to open the Database Properties dialog.

b. Click **Files** under **Select a page**.

c. Click the button on the right of the **Owner** field to open the Select Database Owner dialog.

d. Type ION in the field labeled **Enter the object names to select** and click **Check Names** to adjust the format of your entry to [ION].

e. Click **OK** to update the owner of the database.

f. Click **OK** to close the Database Properties dialog.

9. Restart all ION services.

Restoring a specific database

Complete the following to restore a specific database:

1. Repeat steps 1 through 3 from Restoring the latest database above.
2. Under **Source**, select **Device** and click **Browse** to open the **Select backup devices** dialog.
3. Select **File** in **Backup media type** list if it is not already specified and then click **Add** to open the **Locate Backup File** dialog.
4. Navigate to and select the backup file you want to restore and click **OK**.
5. Verify that the file referenced in the **Specify Backup** dialog is the one you selected and click **OK** to return to the **Restore Database** dialog.
6. Under **Select the backup sets to restore**, select the checkbox in the **Restore** column for the database you are restoring.
7. Click **Options** in the **Select a page** pane on the left.
8. On the **Options** page:
   - Under **Restore options**, select **Overwrite the existing database (WITH REPLACE)**.
   - Under **Recovery state**, select **RESTORE WITH RECOVERY** from the dropdown list.

     RESTORE WITH RECOVERY is described as **Leave the database ready to use by rolling back uncommitted transactions. Additional Transaction logs cannot be restored**.
9. Click **OK** to begin the restore operation.

   A message indicates that the database has been restored successfully. If the restore operation is not successful, the database reverts to its original state.

   NOTE: After you restore the database, you need to assign its ownership to the ION user as follows:

   a. In SQL Server Management Studio, right-click the restored database and click **Properties** in the menu to open the Database Properties dialog.

   b. Click **Files** under **Select a page**.

   c. Click the button on the right of the **Owner** field to open the Select Database Owner dialog.

   d. Type ION in the field labeled **Enter the object names to select** and click **Check Names**.

The format of your entry changes to [ION].

e. Click **OK** to update the owner of the database.

f. Click **OK** to close the Database Properties dialog.

10. Restart all ION services.

Operating

This chapter describes the different applications for accessing power monitoring information in Power Monitoring Expert (PME). You use these applications on a regular basis to view real-time data, historical data, and alarm data. The chapter is organized by applications and software modules. See Introduction to Power Monitoring Expert (PME) for a general overview.

Use the information in the following tables to find the content you are looking for.

By application or function:

Application/Function	Function
Alarms	View incidents, alarms, and events. Acknowledge alarms
Dashboards	View high level ,historical and real-time data in gadgets.
Diagrams	View low level, historical and real-time data in one-line and graphics diagrams.
Reports	Run reports manually, or schedule automatic report generation.
System integration	Use PME integrated with other EcoStruxure™ systems.
Trends	View trends for real-time and historical data.
Vista	Perform control actions in your power monitoring system, for example reset counters or activate device digital outputs. View low level, historical and real-time data in one-line and graphics diagrams.
Web Applications	Access the Dashboards, Diagrams, Trends, Alarms, and Reports applications. Access Settings and configurations tools. View the alarm annunciator.

By software module:

Module	Application
Backup Power Module operation	Generator and Uninterruptible Power Supply (UPS) performance monitoring and reporting, including battery health.
Breaker Performance Module operation	Circuit breaker aging and breaker settings monitoring.
Capacity Management Module operation	Generator and Uninterruptible Power Supply (UPS) capacity monitoring and reporting. Includes transformer and UPS loss monitoring.
Energy Analysis Dashboard Module operation	Gadgets for identifying consumption patterns and anomalies and for comparing different consumers over time.
Energy Analysis Reports Module operation	Reports for energy consumption monitoring and modeling, including energy usage by process area or by product output.
Energy Billing Module operation	Energy-based billing and reporting, including consumption monitoring and reporting at the branch circuit level.

Module	Application
Event Notification Module operation	Notifications of power system events via email or SMS.
Insulation Monitoring Module operation	Monitoring for isolated power systems, such as the ones found in hospital operating rooms.
Power Quality Performance Module operation	Analysis of power quality events and disturbances and their impact on the monitored system.

References:

Topic	Description
Operation references	Links to reference information related to the content of the Operating chapter.

Introduction to Power Monitoring Expert (PME)

PME software is a power management solution for energy suppliers and consumers. It allows you to manage energy information from metering and control devices installed in your facility or other remote locations. The product offers control capabilities and comprehensive power quality and reliability analysis to help you reduce energy-related costs.

The product supports multiple communications standards and protocols available on various intelligent metering devices. You can also connect to existing power monitoring systems through industry standard protocols such as Modbus and OPC.

Supported operating systems and SQL Server versions

See Operating Environment for information on supported Windows operating systems and SQL Server versions and editions.

PME software components

This section outlines the PME software components.

Web Applications

Web applications are the end user facing components of the software. You use web applications in your daily work with PME. Web Applications has 3 main parts: Apps, Settings, and Configuration Tools.

Apps

Use Web apps to access power monitoring information. The following apps are included in the Web Applications:

- Dashboards
- Diagrams
- Trends
- Alarms
- Reports

See Web Applications for details.

Settings

Use Settings to tailor the behavior and appearance of the software. The following Web Application Settings are available:

- Alarm Views
- Authorized Hosts
- Diagnostics and Services
- Diagrams Control Options
- EWS Login
- Login Options
- Personal Preferences

- Registration
- Report Theme
- Security Options
- Session Timeout
- System Language
- System Theme

The Settings page also provides links to the following configuration tools:

- Software Alarms
- Device Manager
- Hierarchy Manager
- Log Viewer
- Modeling Configuration
- Notifications
- Rate Editor
- User Manager

See Web Applications settings for details.

Engineering applications

Engineering applications are the backend components that are used to configure and maintain the monitoring devices, networks, databases and other elements of the power monitoring system. It also includes the Vista application which is used to for real-time control and to build diagrams. The following applications are included:

Management Console

Use Management Console to add and configure network components such as servers, sites (communication links) and devices. Management Console also provides access to the following system and database applications, and utilities (listed in menu sequence):

Through **Management Console > Tools**

- Database Manager
- Event Watcher Manager
- Reports Configuration
- Logical Device editors
- Deactivating alarms
- Configure managed circuits

Through **Management Console > Tools > System**

- Diagnostics Viewer
- Device Type Editor
- Manual Data Editor

- Remote Modem Setup
- Virtual Processor setup
- Update OPC Server
- Update EWS Server
- PQDIF Exporter
- Time of Use Editor

Through **Management Console > Tools > Web Tools**

Management Console provides shortcuts to Web Applications configuration tools. See Web Applications for details.

Vista

Use Vista to reset counters and perform other control actions on monitoring devices. Vista also displays real-time and historical information using graphical displays. You use Vista to create the diagrams for the Diagrams Web app.

Designer

Use Designer to perform a wide range of functions, from configuring setup registers of ION devices on your network to creating complex frameworks using a combination of ION modules from hardware or software nodes.

OPC Server Assistant

The OPC Server Assistant is a utility that you use to expose ION measurements as OPC tags. You open the utility from Designer. See OPC Server Support for further information.

The OPC Server Assistant is available during the 90-day trial period. After the trial period, you need to purchase a Data Exchange Module license and activate it through the Floating License Manager to enable OPC server functionality.

Large system setup using Management Console

Use the Duplicate and Configure function to set up large systems efficiently. See Setting up large systems for more information.

(PME) Windows Services

For a list of PME Windows Services see PME Windows services

Power Monitoring Expert databases

For information on the PME databases, see PME DatabasesPME Databases.

Getting started

This section describes how to start, log on to, and exit most of the components of the Power Monitoring Expert product.

Starting a component of Power Monitoring Expert

Use one of the following methods to start the main components Management Console, Vista, or Web Applications of your product installation:

- Open the Power Monitoring Expert folder on your desktop and double-click the icon of the program you want to start.
- Click **Start > All Programs > Schneider Electric > Power Monitoring Expert** and select the program you want to start.

Logging into a component

Most Power Monitoring Expert programs require you to log in before you can access them.

At the logon prompt, type your user name and password in the appropriate box, then click **OK**. Some actions are restricted to certain users or groups, depending on how their login permissions were set up. For information on creating users and user groups, and on setting user access levels, see the User Manager section in Web Applications Help.

After you log on, the program interface appears.

Ending a session

There are two ways to end a session in a component:

- **Log off** if you want to end the current user session but keep the program running, or
- **Exit** if you want to close the program completely.

Some components offer both options; some only offer the Exit option.

Logging off

1. Select **File > Logoff**.

   A message appears, prompting you to confirm your intention to log off.

2. Click **Yes** to log off or **No** to return to the program.

   If you attempt to log off without saving your work, you are prompted to save your changes. Click **Yes** to save your changes, **No** to discard them, or **Cancel** to return to the program.

After you log off, the component's **Logon** screen appears.

Exiting

1. Select **File > Exit**.

   A message appears, prompting you to confirm your intention to exit the application.

2. Click **Yes** to exit or **No** to return to the program.

   If you attempt to exit without saving your work, the program prompts you to save your changes. Click **Yes** to save your changes, **No** to discard them, or **Cancel** to return to the program.

Customizing and navigating interface displays

The following sections describe ways to customize and navigate display windows, dialogs, and tables in components of Power Monitoring Expert.

Navigating tree structures

Information is often displayed in a tree structure. Click “+” to expand items in the tree or “-” to collapse them.

Selecting multiple items in tables, tree structures, diagrams and folder structures

To select adjacent items, select the first item, hold down the SHIFT key then click the last item.

To select non-adjacent items, hold down the CTRL key then click to select the items.

To select adjacent items in Vista or Designer diagrams, drag a selection box around the items. All items in the box are selected.

Adjusting the display of a window or dialog

The following sections describe how to resize and hide or reveal panes.

Resizing panes

To resize panes in a window, point the mouse at the border where the two sections meet. When the resize handle appears, drag to move the border.

Dock (Pin) or hide (Unpin) pane

Some component interfaces have panes that can be hidden (visible temporarily) or docked (visible all the time).

To hide or dock a pane, click the Pin/Unpin button on the pane. When a pane is hidden, it is minimized to a button at the edge of the workspace.

To temporarily show a hidden pane, hover the mouse over the button for that pane. Move the mouse away to hide the pane again.

Grid table controls

Certain windows and utilities display information in “grid” tables. These tables have unique table and information display commands.

Select columns/column selector

Some tables allow you to select which columns to include in the table.

1. In Management Console, hover over the column selector tab on the right side of the display window. In other interfaces, click the “Select Columns” link.
2. Select the boxes for the columns you want to include in the table. Clear the boxes for the columns you do not want to include in the table.

Adjust column width

To change the width of a column, point the mouse to the right edge of the column header. When the resize handle (double-arrow pointer) appears, click and drag to adjust the width. To adjust the width for best fit, point to the right edge of the column header, then double-click when the resize handle appears.

Best Fit

To adjust a column width to the best fit with the least amount of white space:

- For one column, right-click a column header and select **Best Fit**.
- For all columns, right-click the column title area and select **Best Fit (all columns)**.

Arrange columns

To change the order of the columns, drag a column header to the left or right of its original position.

Group by column

To group data according to the contents of a particular column, drag the column header to the area above it (marked “Drag a column header here to group by that column”). To expand or collapse the groups, click the “+” or “-” button. To expand or collapse all groups, right-click the column header in the Group By Box area and select **Full Expand** or **Full Collapse**, respectively.

You can also group by multiple columns in a specific order, with sorting and filtering applied. To do this drag each column to the **Group By Box** area in the order that you want to group them.

To ungroup, drag the column header back to its original position (or right-click the column header and select **Ungroup**).

To show or hide the **Group By Box** area, right-click the column header and select or clear **Group By Box**.

Sorting data in a column

Click a column header to sort table rows according to data in that column. You can sort in ascending or descending order (indicated by an up or down arrow, respectively). To cancel sorting and return the column to its default state, right-click the column and select **Clear Sorting**.

Filtering data in a column

The following sections describe the available filtering options.

Using the Simple Column Filter

When the mouse is positioned over a column header, the Filter icon appears in the top right corner of the header. Click it to select one of the listed filter conditions and apply it to the data in that column. Select **(Custom)** to apply one or two logic conditions to filter the data. To cancel filtering and return the column to its default state, right-click the column and select **Clear Filter**.

Using the Dynamic Column Filter

Some tables have a row between the column header and the table data. This is the dynamic filter area.

To use the dynamic filter area, start typing the entry you want to filter on in the space above the applicable column. You can use an asterisk (*) at the beginning of the filter as a wildcard. Once you achieve the filter results you want, you can stop typing. For example, to filter out “DST” from “disturbance” in System Log Events, you only need to type “di”.

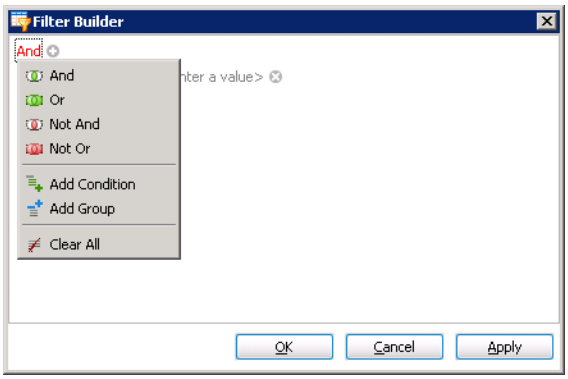
Using the Filter Builder

The Filter Builder is an advanced data filtering tool. Use it to create filters with multiple conditions across multiple columns. To use the Filter Builder:

1. Right-click a column header and select **Filter Editor** to open the **Filter Builder** dialog.
2. Specify the filter conditions.

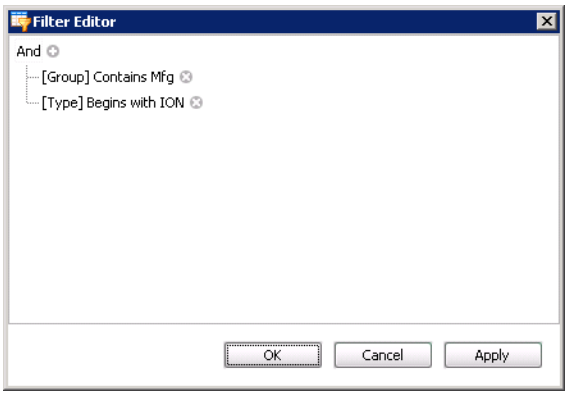
   The elements of the filter builder are: <Column Header> <Condition> <Value>

   Click an element to display the options available, then select the option you want to use.

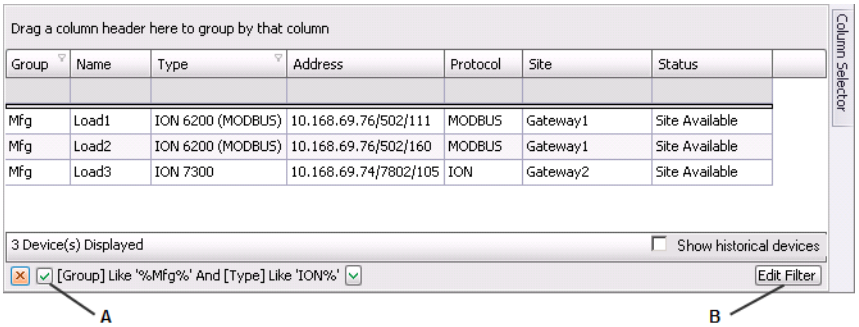


3. Select the <Column Header> and the <Condition> you want to apply. Type the <Value> to test for.
4. To add another filter, click the "+" button on the top.
5. Select a logic to apply to this new filter (in relationship to the current filter).
6. Repeat step 3.
7. To remove a filter, click the delete ("**x**") button beside it.

In the following example, the filter finds all devices in group name containing "Mfg" **and** whose types begin with "ION".



The rows returned are as follows:



A	Select the checkbox to turn the filter on; clear it to turn the filter off. Click the "X" to cancel and exit the filter mode.
B	Click **Edit Filter** to configure the filter conditions

Alarms

⚠ WARNING

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Do not use the software to control time-critical functions.
- Do not use the software to control remote equipment without proper access control and status feedback.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Overview

The alarm viewer is the user interface (UI) for the Alarms application. Use the alarm viewer to see software generated and device-based alarms in PME.

The alarm viewer UI has two main areas, the view library and the alarms display. To see alarm information in the alarms display, you select a view in the view library. The library has predefined system views and you can create additional custom views. For more information, see: Alarm Viewer UI

TIP: You can open the alarm viewer from the **ALARMS** link in the Web Applications banner.

View types

There are two types of views, status views and history views.

Status views

Use status views to see existing alarm definitions in the system, their present state, how often they occurred, their priority, and other relevant information. The following predefined status views are available in PME:

View Name	Description
Active Alarms	This view shows alarms that are in the active state. It includes low, medium and high priority alarms from all sources and all categories. This view does not include General Event and Unassociated Dropout type alarms.
All Alarms	This view shows all low, medium and high priority alarms in the system regardless of state, category, and source.
Unacknowledged Alarms	This view shows unacknowledged alarms. It includes low, medium and high priority alarms from all sources and all categories that are in the active or inactive state.

History views

Use history views to see a record of Incidents, alarm instances, and events that happened in the past. The following predefined history views are available in PME:

View Name	Description
Asset Monitoring Incidents	This view shows Incidents that are categorized as Asset Monitoring and are in the active or unacknowledged state. It includes low, medium and high priority Incidents from all sources.
Clutter	This view shows Incidents that are categorized as General Clutter and are in the active or unacknowledged state. It includes low, medium and high priority Incidents from all sources.
Load Loss Incidents	This view shows incidents that are categorized as Power Quality (Over Voltage, Swell, Under Voltage, Interruption, Sag, Transient, or Unclassified Disturbance) and that recorded a sustained load loss after a voltage sag. It includes low, medium and high priority Incidents that are active or unacknowledged, from all sources.
Power Quality Incidents	This view shows Incidents that are categorized as Power Quality and are in the active or unacknowledged state. It includes low, medium and high priority Incidents from all sources.
Recent Alarms	This view shows alarm instances that are in the active or unacknowledged state. It includes low, medium and high priority alarms from all sources and all categories. This view does not include Unassociated Dropout and Clock/Time type alarms.
Recent Events	This view shows events of all priorities from all sources.
Recent Incidents	This view shows Incidents that are in the active or unacknowledged state. It includes low, medium and high priority Incidents from all sources and all categories. This view does not include General Alarms for type Clutter.
System Health	This view shows Diagnostics type alarm instances that are in the active or unacknowledged state. It includes low, medium and high priority alarms from all sources. This view does not include Diagnostics Alarms of type Clock/Time and Device Settings.

Incidents, Alarms, and Events

Incidents

Incidents provide a high-level view. They represent real world power events, such as disturbances or faults. An incident combines alarms, waveforms, and burst data from many sources in the system into a single representation of the power event. You can look at an incident and see how the different pieces of information are linked together, instead of having to analyze each data point individually. Use incidents as a starting point for your alarm analysis.

For more information, see:

- Incidents
- Viewing incidents
- Incident history UI

Alarms

Alarms provide information on the state and history of alarm conditions that are defined for specific sources and measurements in the system. Use alarms to monitor the state of your power system and to investigate specific details as part of an Incident analysis.

For more information, see:

- Alarms
- Viewing alarms
- Alarm status UI
- Alarm history UI

Events

Events are records of activities in the system. Activities are performed by users, the system software, or the connected devices. Events are logged and displayed as they happen in the system without any processing or aggregation. PME uses event records to determine alarm types and states. Use events for low level investigations and detailed root cause analysis.

For more information, see:

- Events
- Viewing events
- Event history UI

Alarm Acknowledgment

You can acknowledge alarms in status views and history views. If you acknowledge alarms through an incident history view, all alarms that are part of this incident will be acknowledged. Whenever you acknowledge an alarm, from any of these locations, you are acknowledging the alarm definition itself, not an instance of it. That means acknowledging an alarm marks it as Acknowledged and resets its Unacknowledged occurrence counter. For more information, see Acknowledging alarms.

Analysis tools

The alarm viewer includes tools for analyzing the causes and impacts of alarm events. Some of these tools are for very specific alarm types, others can be used for a broad range of alarms.

For details on the different tools, see:

Disturbance Direction

- Disturbance Direction
- Viewing Disturbance Direction

Load Impact

- Load Impact
- Viewing Load Impact

Timeline analysis

- Timeline analysis
- Viewing a timeline analysis
- Timeline analysis UI

Voltage Tolerance

- Voltage Tolerance
- Viewing Voltage Tolerance

Waveforms

- Waveforms
- Viewing waveforms
- Waveforms UI

Time display

See Time Display in Web Applications for information on how time is displayed in a system where the monitoring devices, the PME/Web server, and the Web client (browser) are in different time zones.

Terminology

See Alarms terminology for definitions of the terms used in the Alarms application.

For information on how to configure Alarms, see Alarms configuration.

Viewing incidents

View incidents to investigate system issues, to analyze what happened during a power disturbance or to identify root causes.

To view incidents:

1. In the alarm viewer, open an existing incident view from the view library or add a new View.
2. View the incident information displayed in the alarms display pane.

   (Optional) In the view library, right-click the view name or click **Options** ⋮, and select **Edit** to open the view settings. You can also open the view settings by double-clicking the view name. Adjust the settings for View Type, Priority, State, Sources, and Categories to customize the view if necessary. **Save** the modified view settings or click **Cancel** to discard the changes.

Related topics:

- Viewing incidents
- Viewing alarms
- Viewing events
- Viewing Disturbance Direction
- Viewing Load Impact
- Viewing a timeline analysis
- Viewing Voltage Tolerance
- Viewing waveforms
- Acknowledging alarms

For reference information see:

- Alarms
- Incidents
- Alarms
- Events
- Disturbance Direction
- Load Impact
- Timeline analysis
- Voltage Tolerance
- Waveforms
- Alarms terminology
- Alarms UI
- Timeline analysis UI
- Waveforms UI

For information on how to configure Alarms, see Alarms configuration.

Viewing alarms

View Alarm Status to assess the state of the monitored power system and to respond to important events and issues. View Alarm History for root cause analysis and to understand the sequence of events.

To view Alarm Status or Alarm History:

1. In the alarm viewer, open an existing alarm status or alarm history view from the view library or add a new View.
2. View the alarm information displayed in the alarms display pane.

   (Optional) In the view library, right-click the view name or click **Options** ⋮, and select **Edit** to open the view settings. You can also open the view settings by double-clicking the view name. Adjust the settings for View Type, Priority, State, Sources, and Categories to customize the view if necessary. **Save** the modified view settings or click **Cancel** to discard the changes.

Related topics:

- Viewing incidents
- Viewing alarms
- Viewing events
- Viewing Disturbance Direction
- Viewing Load Impact
- Viewing a timeline analysis
- Viewing Voltage Tolerance
- Viewing waveforms
- Acknowledging alarms

For reference information see:

- Alarms
- Incidents
- Alarms
- Events
- Disturbance Direction
- Load Impact
- Timeline analysis
- Voltage Tolerance
- Waveforms
- Alarms terminology
- Alarms UI

- Timeline analysis UI
- Waveforms UI

For information on how to configure Alarms, see Alarms configuration.

Viewing events

View events to investigate system activities in PME or to troubleshoot unexpected system behavior.

To view events:

1. In the alarm viewer, open an existing event view from the view library or add a new View.
2. View the event Information displayed in the alarms display pane.

   (Optional) In the view Library, right-click the view name or click **Options** for this view and select **Edit** to open the view settings. You can also open the view settings by double-clicking the view name. Adjust the settings for View Type, Priority and Sources to customize the view if necessary. **Save** the modified view settings or click **Cancel** to discard the changes.

TIP: Double-clicking an event in the events display table opens the associated alarm.

Related topics:

- Viewing incidents
- Viewing alarms
- Viewing events
- Viewing Disturbance Direction
- Viewing Load Impact
- Viewing a timeline analysis
- Viewing Voltage Tolerance
- Viewing waveforms
- Acknowledging alarms

For reference information see:

- Alarms
- Incidents
- Alarms
- Events
- Disturbance Direction
- Load Impact
- Timeline analysis
- Voltage Tolerance
- Waveforms
- Alarms terminology
- Alarms UI

- Timeline analysis UI
- Waveforms UI

For information on how to configure Alarms, see Alarms configuration.

Viewing Disturbance Direction

View Disturbance Direction to analyze the likely origin of voltage disturbance events in your power system.

NOTE: Disturbance Direction analysis is only available for alarm instances and incidents, not for alarm status. Also, the data associated with the alarm or incident must include disturbance direction information.

To view Disturbance Direction:

1. In the alarm viewer, open an existing alarm history or incident history view from the view library or add a new View.

   TIP: Add a Disturbance Direction filter to your view to identify disturbance direction relevant alarms and incidents. You can add this filter in **View Settings** > **Categories** > **Power Quality**.

   NOTE: The Disturbance Direction filter settings only apply to the following Power Quality alarm or incident types: Interruption, Under Voltage, Over Voltage, Sag, Swell, Unclassified Disturbance, Transient.

2. Find the alarm instance or Incident for which you want to view Disturbance Direction and click **Open Details** to open the details window.

   TIP: Alarms or incidents with Disturbance Direction information are tagged with an Upsteam or Downstream indicator.

3. In the details window, view the Disturbance Direction information of the representative disturbance for this alarm or incident.

Related topics:

- Viewing incidents
- Viewing alarms
- Viewing events
- Viewing Disturbance Direction
- Viewing Load Impact
- Viewing a timeline analysis
- Viewing Voltage Tolerance
- Viewing waveforms
- Acknowledging alarms

For reference information see:

- Alarms
- Incidents

- Alarms
- Events
- Disturbance Direction
- Load Impact
- Timeline analysis
- Voltage Tolerance
- Waveforms
- Alarms terminology
- Alarms UI
- Timeline analysis UI
- Waveforms UI

For information on how to configure Alarms, see Alarms configuration.

Viewing Load Impact

View Load Impact to identify changes in steady state electrical loads in your power system triggered by a voltage disturbance.

NOTE: Load Impact analysis is only available for alarm instances and incidents, not for alarm status. Also, the data associated with the alarm or incident must meet the prerequisites. See Load Impact for more information.

To view Load Impact:

1. In the alarm viewer, open an existing alarm history or incident history view from the view library or add a new View.

   TIP: Add a Load Impact filter to your view to identify load impact relevant alarms and incidents. You can add this filter in **View Settings** > **Categories** > **Power Quality**.

   NOTE: The Load Impact filter settings only apply to the following Power Quality alarm or incident types: Interruption, Under Voltage, Over Voltage, Sag, Swell, Unclassified Disturbance, Transient.

2. Find the alarm instance or Incident for which you want to view Load Impact and click **Open Details** to open the details window.

   TIP: Alarms or incidents with Load Impact calculations are tagged with a Load Loss Load Loss x % or Load Gain Load Gain x % label. You can enable or disable the display of the label in **Web Applications** > **Settings** > **Alarms** > **Alarm Views**.

3. In the details window, view the Load Impact information related to this alarm or incident.

   TIP: See Load Impact calculations for more details.

Related topics:

- Viewing incidents
- Viewing alarms
- Viewing events
- Viewing Disturbance Direction
- Viewing Load Impact
- Viewing a timeline analysis
- Viewing Voltage Tolerance
- Viewing waveforms
- Acknowledging alarms

For reference information see:

- Alarms
- Incidents
- Alarms
- Events
- Disturbance Direction
- Load Impact
- Timeline analysis
- Voltage Tolerance
- Waveforms
- Alarms terminology
- Alarms UI
- Timeline analysis UI
- Waveforms UI

For information on how to configure Alarms, see Alarms configuration.

Viewing a timeline analysis

View a timeline analysis to investigate the sequence of events that occurred during a single incident, multiple incidents, or alarms.

To view a timeline analysis for an incident:

1. In the alarm viewer, open an existing incident view from the view library or add a new View.
2. Find the incident for which you want to view the analysis, and click **Open Timeline Analysis** to open the timeline window.

   (Optional) Edit the view settings for the timeline analysis and save the view for future reference.

To view a timeline analysis for multiple incidents:

1. In the alarm viewer, open an existing Incident view from the view library or add a new View.
2. Find and select the incidents for which you want to view the analysis.

   TIP: Use `Ctrl+Click` to select individual alarms, use `Shift+click` to select a block of alarms.

3. From the in the **Options** menu at the top of the alarms display pane, select **Open Timeline Analysis on selection**.

To view a timeline analysis for an alarm:

1. In the alarm viewer, open an existing alarm history view from the view library or add a new View.
2. Find the alarm for which you want to view the analysis and click **Open Details**.
3. In the alarm details window, click **Timeline Analysis**.

Related topics:

- Viewing incidents
- Viewing alarms
- Viewing events
- Viewing Disturbance Direction
- Viewing Load Impact
- Viewing a timeline analysis
- Viewing Voltage Tolerance
- Viewing waveforms
- Acknowledging alarms

For reference information see:

- Alarms
- Incidents

- Alarms
- Events
- Disturbance Direction
- Load Impact
- Timeline analysis
- Voltage Tolerance
- Waveforms
- Alarms terminology
- Alarms UI
- Timeline analysis UI
- Waveforms UI

For information on how to configure Alarms, see Alarms configuration.

Viewing Voltage Tolerance

View Voltage Tolerance to investigate the potential impact of a voltage disturbance on equipment.

NOTE: Voltage Tolerance analysis is only available for alarm instances and incidents, not for alarm status. Also, the data associated with the alarm or incident must include voltage disturbance measurements.

To view Voltage Tolerance:

1. In the alarm viewer, open an existing alarm history or incident history view from the view library or add a new View.

   TIP: Add a Voltage Tolerance filter to your view to identify alarms and incidents that fall into a certain area of the ITIC/CBEMA curve. You can add this filter in **View Settings** > **Categories** > **Power Quality**. See Voltage Tolerance for more information.

   NOTE: The Voltage Tolerance filter settings only apply to the following Power Quality alarm or incident types: Interruption, Under Voltage, Over Voltage, Sag, Swell, Unclassified Disturbance, Transient.

2. Find the alarm instance or Incident for which you want to view Voltage Tolerance, and click **Open Details** to open the details window.

3. In the details window, select **Tolerance Chart** in the display selector on left side of the window.

For an alarm instance, a single voltage disturbance is displayed in the chart. For incidents, all available voltage disturbances for the alarms that are part of the Incident are displayed.

Related topics:

- Viewing incidents
- Viewing alarms
- Viewing events
- Viewing Disturbance Direction
- Viewing Load Impact
- Viewing a timeline analysis
- Viewing Voltage Tolerance
- Viewing waveforms
- Acknowledging alarms

For reference information see:

- Alarms
- Incidents
- Alarms
- Events

- Disturbance Direction
- Load Impact
- Timeline analysis
- Voltage Tolerance
- Waveforms
- Alarms terminology
- Alarms UI
- Timeline analysis UI
- Waveforms UI

For information on how to configure Alarms, see Alarms configuration.

Viewing waveforms

View waveforms to investigate power quality events and identify root causes of disturbances.

To view waveforms:

1. In the alarm viewer, open an existing Incident history view or alarm history view from the view library or add a new View.
2. Find the incident or alarm for which you want to view waveforms and click **Details** . You can also open Details by double-clicking the incident or alarm instance.
3. In Details, click **Waveforms**.

   TIP: Click **Open Representative Waveform** to see the representative waveform for this Incident or alarm instance.

4. View the waveforms associated with the incident or alarm instance.

   (Optional) Click **Inspect** a waveform to see more details and to analyze the waveform.

Related topics:

- Viewing incidents
- Viewing alarms
- Viewing events
- Viewing Disturbance Direction
- Viewing Load Impact
- Viewing a timeline analysis
- Viewing Voltage Tolerance
- Viewing waveforms
- Acknowledging alarms

For reference information see:

- Alarms
- Incidents
- Alarms
- Events
- Disturbance Direction
- Load Impact
- Timeline analysis
- Voltage Tolerance
- Waveforms
- Alarms terminology
- Alarms UI

- Timeline analysis UI
- Waveforms UI

For information on how to configure Alarms, see Alarms configuration.

Acknowledging alarms

Acknowledge alarms to show that these alarms are managed. Record relevant information related to the alarms, as part of the acknowledgment, for future reference. There are many ways to acknowledge alarms.

NOTE: You can acknowledge alarms in status views and history views. If you acknowledge alarms through an incident history view, all alarms that are part of this incident will be acknowledged. Whenever you acknowledge an alarm from any of these locations, you are acknowledging the alarm definition itself, not an instance of it. That means acknowledging an alarm marks it as Acknowledged and resets its Unacknowledged occurrence counter.

Acknowledging through an alarm status view

To acknowledge a single alarm:

1. In the alarm viewer, open an existing alarm status view from the view library or add a new View.
2. In the alarms display pane, find the alarm definition you want to acknowledge.

   (Optional) In the view library, right-click the view name or click **Options** ⋮, and select **Edit** to open the view settings. You can also open the view settings by double-clicking the view name. Adjust the settings for View Type, Priority, State, Sources, and Categories to customize the view if necessary. **Save** the modified view settings or click **Cancel** to discard the changes.
3. In the **Acknowledgment** column for this alarm definition, click **Acknowledge**. This opens the Acknowledge Alarms window. You can also open the details for this alarm definition and click **Acknowledge** in the details window to open Acknowledge Alarms.
4. In Acknowledge Alarms, click **Acknowledge**.
   (Optional) In the **Comment** box, enter notes related to the alarm definition.

   TIP: To later view the acknowledgment notes, open the alarm details and click **History** on the top right. The acknowledgment with the note is shown in the alarm instance history display.

To acknowledge multiple alarms:

1. In the alarm viewer, open an existing alarm status view from the view library or add a new View.
2. In the alarms display pane, find and select the alarm definitions you want to acknowledge in the alarms table.

   TIP: Use `Ctrl+Click` to select individual alarms, use `Shift+click` to select a block of alarms.

   (Optional) In the view library, right-click the view name or click **Options** ⋮, and select **Edit** to open the view settings. You can also open the view settings by double-clicking the view name. Adjust the settings for View Type, Priority, State, Sources, and Categories to

customize the view if necessary. **Save** the modified view settings or click **Cancel** to discard the changes.

3. Click **Options** in the top right corner of the alarms pane, and then click **Acknowledge Selected** in the options menu. This opens the Acknowledge Alarms window.
4. In Acknowledge Alarms, click **Acknowledge**.
   (Optional) In the **Comment** box, enter notes related to the alarm definitions.

   TIP: To later view the acknowledgment notes, open the alarm details, for any of the alarms, and click **History** on the top right. The acknowledgment with the note is shown in the alarm instance history display.

To acknowledge all alarms in a view:

1. In the alarm viewer, open an existing alarm status view from the view library or add a new View.
2. Click **Options** in the top right corner of the alarms pane, and then click **Acknowledge All** in the options menu. This opens the Acknowledge Alarms window.
3. In Acknowledge Alarms, click **Acknowledge**.
   (Optional) In the **Comment** box, enter notes related to the alarm definitions.

   TIP: To later view the acknowledgment notes, open the alarm details, for any of the alarms, and click **History** on the top right. The acknowledgment with the note is shown in the alarm instance history display.

Acknowledging through an alarm history view

To acknowledge an alarm:

1. In the alarm viewer, open an existing alarm history view from the view library or add a new View.
2. In the alarms display pane, find the alarm you want to acknowledge.

   (Optional) In the view library, right-click the view name or click **Options**, and select **Edit** to open the view settings. You can also open the view settings by double-clicking the view name. Adjust the settings for View Type, Priority, State, Sources, and Categories to customize the view if necessary. **Save** the modified view settings or click **Cancel** to discard the changes.
3. Open the details for this alarm by clicking on Open Details or double-clicking the alarm.
4. In Alarm Details, click **Acknowledge**. This opens the Acknowledge Alarms window.
5. In Acknowledge Alarms, click **Acknowledge**.
   (Optional) In the **Comment** box, enter notes related to the alarm.

   TIP: To later view the acknowledgment notes, open the alarm details and click **History** on the top right. The acknowledgment with the note is shown in the alarm instance history display.

Acknowledging through an incident history view

To acknowledge all alarms in an incident:

1. In the alarm viewer, open an existing incident history view from the view library or add a new View.
2. In the alarms display pane, find the incident you want to acknowledge.

   (Optional) In the view library, right-click the view name or click **Options** ⋮, and select **Edit** to open the view settings. You can also open the view settings by double-clicking the view name. Adjust the settings for View Type, Priority, State, Sources, and Categories to customize the view if necessary. **Save** the modified view settings or click **Cancel** to discard the changes.
3. Open the details for this incident by clicking on Open Details or double-clicking the incident.
4. In Incident Details, click **Acknowledge**. This opens the Acknowledge Alarms window.
5. In Acknowledge Alarms, click **Acknowledge**.
   (Optional) In the **Comment** box, enter notes related to the alarms.

   TIP: To later view the acknowledgment notes, open the alarm details, for any of the alarms, and click **History** on the top right. The acknowledgment with the note is shown in the alarm instance history display.

Related topics:

- Viewing incidents
- Viewing alarms
- Viewing events
- Viewing Disturbance Direction
- Viewing Load Impact
- Viewing a timeline analysis
- Viewing Voltage Tolerance
- Viewing waveforms
- Acknowledging alarms

For reference information see:

- Alarms
- Incidents
- Alarms
- Events
- Disturbance Direction
- Load Impact
- Timeline analysis
- Voltage Tolerance

- Waveforms
- Alarms terminology
- Alarms UI
- Timeline analysis UI
- Waveforms UI

For information on how to configure Alarms, see Alarms configuration.

Incidents

Incidents in PME represent real world power events, such as disturbances or faults. An incident combines alarms, waveforms, and burst data from many sources in the system into a single representation of the power event. Instead of having to analyze each data point individually, you can look at an incident and see how the different pieces of information are linked together.

PME uses alarm types and alarm start times as criteria to determine which alarms to group into a specific incident. The start of an alarm marks the beginning of an incident. Any alarm of a similar type, that starts within a certain time interval is considered part this same incident. The grouping time interval is always based on the most recent alarm in the incident, which means that the counter is restarted every time a new alarm is added to the incident. If there is no more alarm that falls inside the interval, the incident is complete. The maximum duration for an incident is 24 hours and the maximum number of alarms in an incident is 500. A new incident is started the next time an alarm is recorded. See Alarm to incident mapping for more information.

The incident grouping time interval is different for different alarm types. For example, Over Voltage alarms have a time interval of 5 minutes. If a new Over Voltage alarm occurs within 5 minutes, for any source, it is grouped into the same incident. To make it easier to analyze incidents, PME categorizes them into types. The incident types are based on the alarm types.

The following table shows the Incident types and the grouping time intervals for each type:

Category	Type	Grouping Time Interval
Power Quality	Flicker	5 minutes
	Frequency Variation	5 minutes
	Harmonics	5 minutes
	Interruption	5 minutes *
	Over Voltage	5 minutes *
	Sag	20 seconds *
	Swell	20 seconds *
	Transient	20 seconds *
	Unbalance	5 minutes
	Unclassified Disturbance	20 seconds *
	Under Voltage	5 minutes *
Asset Monitoring	Arc Flash	60 seconds
	Backup Power	80 minutes
	Current Monitor	5 minutes
	Protection	5 minutes
	Thermal Monitor	30 minutes
Energy Management	Air	5 minutes
	Demand	5 minutes
	Electricity	5 minutes
	Gas	5 minutes
	Power Factor	5 minutes
	Steam	5 minutes
	Water	5 minutes

Category	Type	Grouping Time Interval
General	Clutter	1 day
	General Setpoints	5 minutes
Diagnostics	Communication Status	10 minutes
	Device Status	5 minutes
	System Status	0 seconds (one incident per alarm)

* These grouping intervals time settings are default settings. The defaults are extended automatically to include power quality alarms that are outside the interval but close enough that they could be related to the incident.

Related topics:

- Viewing incidents
- Viewing alarms
- Viewing events
- Viewing Disturbance Direction
- Viewing Load Impact
- Viewing a timeline analysis
- Viewing Voltage Tolerance
- Viewing waveforms
- Acknowledging alarms

For reference information see:

- Alarms
- Incidents
- Alarms
- Events
- Disturbance Direction
- Load Impact
- Timeline analysis
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- Waveforms
- Alarms terminology
- Alarms UI
- Timeline analysis UI
- Waveforms UI

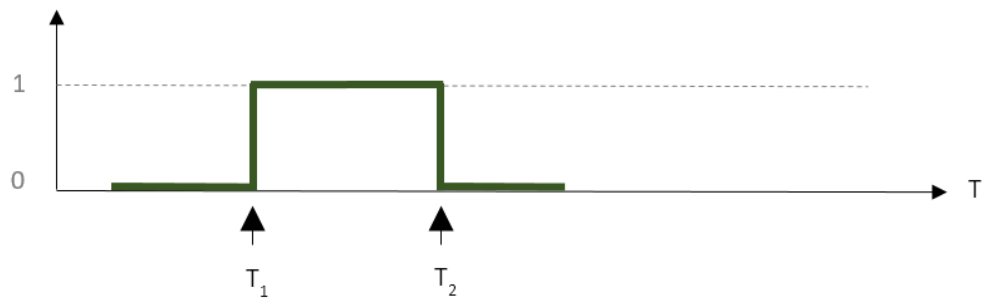
For information on how to configure Alarms, see Alarms configuration.

Alarms

An alarm is a defined condition for a source in PME. The software or the device monitors this condition and records when the condition is met and when not. For example, you can define an Over Voltage alarm for a certain monitoring device in the system. When the voltage threshold is exceeded on this device, the alarm goes active. When the voltage drops below the threshold, the alarm goes inactive. The next time the voltage on this device goes above the threshold again, the same alarm goes active again. An alarm is always associated with a single source and a single measurement.

Some alarms are based on instantaneous events such as a voltage transient, others are based on a condition that lasts a certain period of time such as an over voltage condition. For lasting conditions, the alarm goes from an inactive state to an active state while the condition lasts and then back to an inactive state when the condition is over. Instantaneous alarms are always shown in an inactive state.

The following diagram shows an alarm that is based on a lasting condition. The alarm goes active at the time T_1 and inactive at T_2. The time interval between T_1 and T_2 can be short or long.

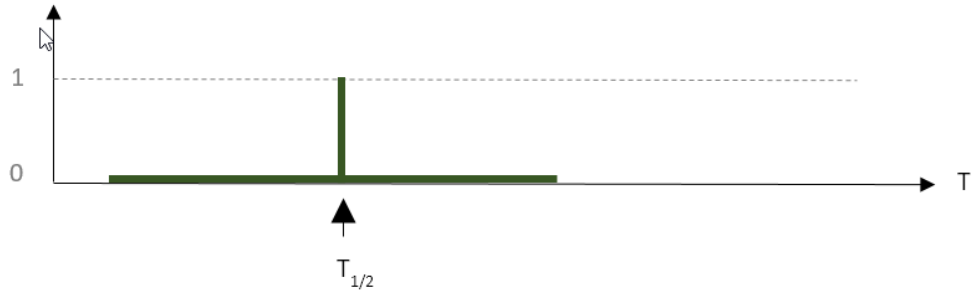


0 = inactive alarm state; 1 = active alarm state; T = time

T_1 = Alarm goes active

T_2 = Alarm goes inactive

The following diagram shows an instantaneous alarm. For this alarm, the start time T_1 and end time T_2 are identical.



0 = inactive alarm state, 1 = active alarm state; T = time

$T_{1/2}$ = Alarm goes active and immediately inactive again

After an alarm has gone active, it can be acknowledged in the alarm viewer. When you acknowledge an alarm, the date and time of the acknowledgment is recorded together with an optional note that you can enter in the acknowledge window.

An alarm stays unacknowledged until you acknowledge it. After you have acknowledged an alarm, it stays acknowledged until the next time it goes active. At that point it is reset to unacknowledged and is waiting for you to acknowledge it again.

PME counts the number of times an alarm goes through an inactive to active state transition. The number of these transitions is displayed as Occurrences in the alarm viewer in the alarm status view. There are two counters for each alarm. One counter for the total number of occurrences, and one for occurrences since the alarm was last acknowledged.

The time period during which an alarm is active, starting when it goes active, ending when it goes inactive, is called an alarm instance.

Alarm conditions are defined either as software alarms in the Software Alarms tool, or as device-based alarms in the monitoring devices, using the appropriate device configuration tool.

To make it easier to analyze alarms, PME categorizes them into types and combines alarms of similar types into incidents, based on the alarm start times.

The following table shows the different alarm categories and types in PME:

Category	Type
Power Quality	Flicker Frequency Variation Harmonics Harmonics (Current) Harmonics (Power) Harmonics (Voltage) Interruption Over Voltage Sag (Voltage) Swell (Voltage) Transient Unbalance Unbalance (Current) Unbalance (Voltage) Unclassified Disturbance Under Voltage
Asset Monitoring	Arc Flash Backup Power Over Current Protection Sag (Current) Swell (Current) Thermal Monitor Under Current

Category	Type
Energy Management	Air Demand Electricity Gas Power Factor Steam Water
General	General Event General Setpoint Unassociated Dropout
Diagnostics	Clock / Time Communication Status Device Settings Device Status System Status

Related topics:

- Viewing incidents
- Viewing alarms
- Viewing events
- Viewing Disturbance Direction
- Viewing Load Impact
- Viewing a timeline analysis
- Viewing Voltage Tolerance
- Viewing waveforms
- Acknowledging alarms

For reference information see:

- Alarms
- Incidents
- Alarms
- Events
- Disturbance Direction
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- Alarms terminology
- Alarms UI

- Timeline analysis UI
- Waveforms UI

For information on how to configure Alarms, see Alarms configuration.

Events

An event is a record of an activity or a condition that is logged in PME. Events are generated by users, the system software, or the connected devices. Examples of events include resetting a measurement, logging into PME, making a configuration change in a device, or a setpoint going active on a device. Some of these events are logged automatically, for others logging must be setup manually. Each event record that is logged has a timestamp and several fields that describe the activity. Each event record describes one single activity or condition, for example, a setpoint going active in a monitoring device.

Events are logged and displayed as they happen in the system without any processing or aggregation. For example, an Over Voltage setpoint going active and then inactive in a device will cause 3 events to be logged, one for the pickup, one for the dropout, and one for the extreme voltage value measured during the time the setpoint was active.

Here is an example of the event records for an over voltage setpoint:

Source	Timestamp	Event	Condition	Measurement	Value	Type
My.Device	8/10/2017 1:44:53.000 PM	Over Voltage	ON	Voltage Phase A	145.740	Pick up
My.Device	8/10/2017 1:44:53.000 PM	Over Voltage	Extreme	Voltage Phase A	145.740	Instantaneous
My.Device	8/10/2017 1:45:39.000 PM	Over Voltage	OFF	Voltage Phase A	125.230	Drop out

PME uses event records to determine alarm types and states.

Related topics:

- Viewing incidents
- Viewing alarms
- Viewing events
- Viewing Disturbance Direction
- Viewing Load Impact
- Viewing a timeline analysis
- Viewing Voltage Tolerance
- Viewing waveforms
- Acknowledging alarms

For reference information see:

- Alarms
- Incidents
- Alarms
- Events
- Disturbance Direction

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For information on how to configure Alarms, see Alarms configuration.

Disturbance Direction

Disturbance Direction identifies the origin of a voltage disturbance (sag/swell/transient).

Disturbance direction calculations are done by the monitoring devices. A device determines the direction of the origin of a disturbance as either Upstream or Downstream from the device location. It is possible to identify the likely origin of a disturbance within a power system by combining the direction information from multiple devices in the network. For alarms, the disturbance direction shown in the software is the direction determined by the device that is associated with the alarm. For incidents, it is the direction determined by the representative device for the incident.

Use Disturbance Direction to analyze the likely origin of voltage disturbance events in your power system.

Prerequisites

The monitoring devices must be capable of detecting and logging the disturbance direction.

Related topics:

- Viewing incidents
- Viewing alarms
- Viewing events
- Viewing Disturbance Direction
- Viewing Load Impact
- Viewing a timeline analysis
- Viewing Voltage Tolerance
- Viewing waveforms
- Acknowledging alarms

For reference information see:

- Alarms
- Incidents
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- Disturbance Direction
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For information on how to configure Alarms, see Alarms configuration.

Load Impact

Load Impact identifies changes in the steady state electrical loads of a power system triggered by a voltage disturbance, such as a voltage sag or interruption.

Loads can be affected by voltage disturbances in different ways. Some loads might shut down and not automatically restart after the disturbance. Other loads might experience changes in their operational state and draw more or less power. It is even possible that the power flow reverses, for example if backup power generation is triggered by the disturbance.

Use Load Impact analysis to identify changes in steady state electrical loads in your power system triggered by a voltage disturbance.

NOTE: Load Impact identifies changes in loads that persist after the disturbance. It does not identify changes in loads during the disturbance event.

See Load Impact calculations for more details.

Prerequisites

Load Impact calculations are only available for data captured by the following monitoring device types:

- ION 9000 (all firmware versions)
- ION 8800 (all firmware versions)
- ION 8650 (all firmware versions)
- ION 7650 (all firmware versions)
- ION 7550 (all firmware versions)
- ION 7400 (all firmware versions)
- PM8000 (all firmware versions)
- ACCESS 9510 (all firmware versions)
- ACCESS 9610 (all firmware versions)
- 9410 (all firmware versions)
- 9810 (all firmware versions)

The monitoring devices must be configured to record the following data:

- Sag/swell and transient event data
- Current and voltage waveforms, for each phase, for the voltage disturbance events.

NOTE: Load Impact calculations are done automatically by the software for any applicable alarm or incident. No special configuration is required.

Related topics:

- Viewing incidents
- Viewing alarms
- Viewing events

- Viewing Disturbance Direction
- Viewing Load Impact
- Viewing a timeline analysis
- Viewing Voltage Tolerance
- Viewing waveforms
- Acknowledging alarms

For reference information see:

- Alarms
- Incidents
- Alarms
- Events
- Disturbance Direction
- Load Impact
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- Waveforms UI

For information on how to configure Alarms, see Alarms configuration.

Timeline analysis

Timeline analysis is a sequence of event analysis for items that are associated with one or more incidents or alarms. The items are shown on a timeline, in chronological order. Items include alarms, waveforms and burst data recordings. The tools available in timeline analysis allow you to add or remove items from the timeline, add notes, zoom in or out, and include alarms previously not associated with this incident. You can save a timeline analysis as new view in the view library for future reference.

Use timeline analysis to investigate the sequence of events during an alarm or incident. See Timeline analysis UI for more information.

Prerequisites

None. Any incident can be displayed using timeline analysis.

NOTE: Alarms and data measurements during an incident occur in very short time intervals. To show the correct sequence of events in the timeline analysis, the timestamps must be accurate. Consider using monitoring devices with Precision Time Protocol (PTP) or GPS time synchronization for accurate time stamping.

Related topics:

- Viewing incidents
- Viewing alarms
- Viewing events
- Viewing Disturbance Direction
- Viewing Load Impact
- Viewing a timeline analysis
- Viewing Voltage Tolerance
- Viewing waveforms
- Acknowledging alarms

For reference information see:

- Alarms
- Incidents
- Alarms
- Events
- Disturbance Direction
- Load Impact
- Timeline Analysis
- Voltage Tolerance
- Waveforms
- Alarms terminology

- Alarms UI
- Timeline analysis UI
- Waveforms UI

For information on how to configure Alarms, see Alarms configuration.

Voltage Tolerance

Voltage Tolerance is available in PME as an analysis tool and as a filter for alarm history and Incident history views.

Analysis tool

Voltage Tolerance uses a graphical display of the magnitude and duration of a voltage disturbance to analyze potential impacts of the event on equipment. The voltage magnitude during the disturbance and the duration of the event are plotted in a Cartesian coordinate system. A voltage susceptibility curve is overlaid to show how the disturbance compares to established equipment tolerances. You can plot multiple disturbances in the same chart. The tool provides two susceptibility curves, ITIC/CBEMA (for information technology equipment) and SEMI F47-0706 (for semiconductor processing equipment).

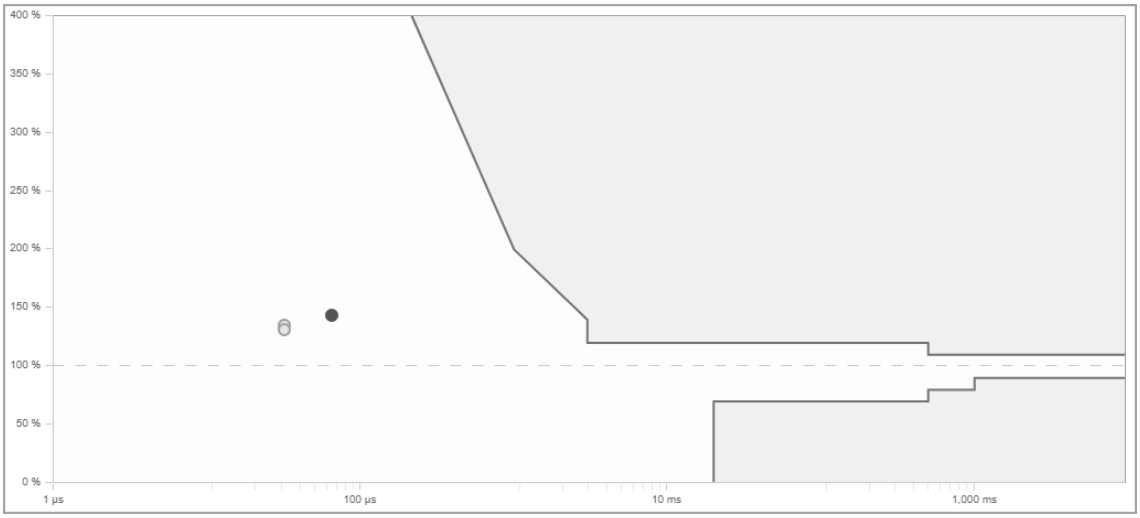
Use Voltage Tolerance analysis to investigate potential impacts of a voltage disturbance on the equipment in your facility.

Prerequisites

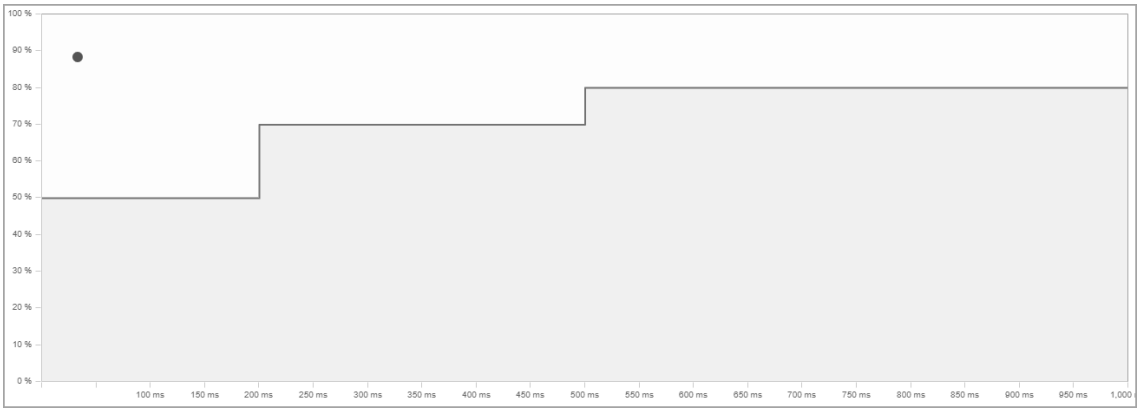
The monitoring device data associated with the alarm or incident must include sag, swell, or transient voltage disturbance measurements.

Examples:

ITIC/CBEMA



SEMI F47-0706



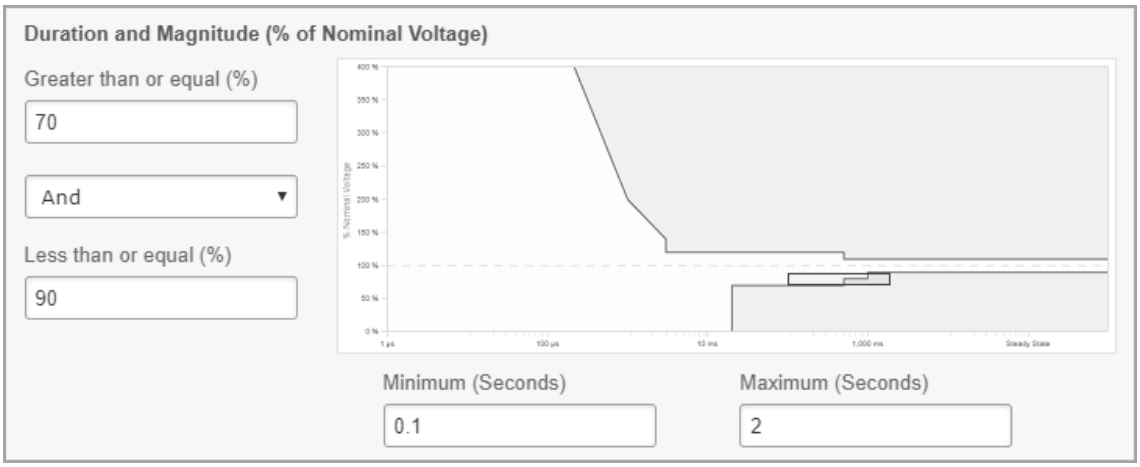
View filter

Use the Voltage Tolerance filter to create alarm history or incident history views that select alarms and incidents based on specific voltage disturbance characteristics. For example, you could define a view that only includes alarms or incidents with voltage sags of a magnitude between 70 - 90% of nominal voltage, and a duration of 0.1 - 2 seconds.

NOTE: You can add this filter in **View Settings** > **Categories** > **Power Quality**.

NOTE: The Voltage Tolerance filter settings only apply to the following Power Quality Incident types: Interruption, Under Voltage, Over Voltage, Sag, Swell, Unclassified Disturbance, Transient.

Example:



NOTE: The Voltage Tolerance view filter only supports the ITIC/CBEMA voltage susceptibility curve.

Related topics:

- Viewing incidents
- Viewing alarms
- Viewing events
- Viewing Disturbance Direction
- Viewing Load Impact
- Viewing a timeline analysis
- Viewing Voltage Tolerance
- Viewing waveforms
- Acknowledging alarms

For reference information see:

- Alarms
- Incidents
- Alarms

- Events
- Disturbance Direction
- Load Impact
- Timeline analysis
- Voltage Tolerance
- Waveforms
- Alarms terminology
- Alarms UI
- Timeline analysis UI
- Waveforms UI

For information on how to configure Alarms, see Alarms configuration.

Waveforms

Waveforms are graphical representations of voltage and current that show their variations over time. The waveform displays in PME are based on logged, historical measurements that were recorded by a monitoring device. The measurements recorded by a device for a waveform capture are called samples and the speed with which these samples are taken is called sampling rate. The higher the sampling rate, the more accurately the waveform capture represents the actual voltage or current waveform. Captures taken by different device types can have different sampling rates, depending on the capabilities and settings of the device.

Use Waveforms to analyze power quality events by viewing the individual wave shapes, the magnitudes, the phase angles between voltage and current, and the timing of wave shape variations. Waveform data is also used to show voltage and current phasors and the individual harmonic components.

Prerequisites

The monitoring device data associated with the alarm or incident must include waveform captures.

Related topics:

- Viewing incidents
- Viewing alarms
- Viewing events
- Viewing Disturbance Direction
- Viewing Load Impact
- Viewing a timeline analysis
- Viewing Voltage Tolerance
- Viewing waveforms
- Acknowledging alarms

For reference information see:

- Alarms
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- Timeline analysis UI
- Waveforms UI

For information on how to configure Alarms, see Alarms configuration.

Dashboards

⚠ WARNING

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

Use the Dashboards application to view high level historical and real-time data, for example Key Performance Indicators (KPIs). The information in the Dashboards application is accessed through dashboards with gadgets. Dashboards are saved in the Dashboard Library. In addition to viewing individual dashboards, you can create slideshows to automatically display a sequence of dashboards.

TIP: You can open the Dashboards application from the **Dashboards** link in the Web Applications banner.

Time display

See Time Display in Web Applications for information on how time is displayed in a system where the monitoring devices, the PME/Web server, and the Web client (browser) are in different time zones.

For information on how use the Dashboards application, see:

- Viewing Dashboards
- Dashboard Slideshows
- Playing a Slideshow
- Gadgets

For reference information see:

- Dashboards user interface (UI)

For information on how to configure Dashboards, see Dashboards configuration.

Viewing Dashboards

View Dashboards to monitor key performance indicators, historical trends, and other high-level information for the monitored power system. Dashboards are one of the main applications for viewing power system information.

To view a Dashboard:

1. In Dashboards, open an existing Dashboard from the Dashboard Library or add a new Dashboard.
2. View the Dashboard Gadgets displayed in the Dashboards display pane.

Related topics:

- Viewing Dashboards
- Dashboard Slideshows
- Playing a Slideshow
- Gadgets

For reference information see:

- Dashboards user interface (UI)

For information on how to configure Dashboards, see Dashboards configuration.

Dashboard Slideshows

Use slideshows to create collections of dashboards that are displayed in sequence without user interaction. A slideshow displays each of its dashboards for a short period of time and then displays the next dashboard. When it reaches the end, it starts over again with the first dashboard. It continuously cycles through all its dashboards in this way. Slideshows are a good option for unattended, kiosk type displays. See Configuring a slideshow for more details.

Related topics:

- Viewing Dashboards
- Dashboard Slideshows
- Playing a Slideshow
- Gadgets

For reference information see:

- Dashboards user interface (UI)

For information on how to configure Dashboards, see Dashboards configuration.

Playing a Slideshow

Slideshows are a good option for unattended, kiosk type displays.

NOTE: Anyone with access to the PME web server can view a slideshow using the slideshow URL. No user authentication is required. Restrict network access and access to the URL to authorized users for slideshows containing confidential information.

To play a Slideshow:

1. In Dashboards, open the Dashboards Library, and click **Slideshow Manager** in the **Options** menu at the top of the Dashboard Library. This opens the Slideshow Manager window.
2. In Slideshow Manager, select the slideshow you want to view, and click **Play**. This opens a new browser window, playing the slideshow.
3. Return to the original browser window and click **Close** in the Slideshow Manager to close it. The slideshow continues to play in the new browser window until you close that window.

Related topics:

- Viewing Dashboards
- Dashboard Slideshows
- Playing a Slideshow
- Gadgets

For reference information see:

- Dashboards user interface (UI)

For information on how to configure Dashboards, see Dashboards configuration.

Gadgets

Gadgets are graphical display objects used in the dashboard display pane for charting trends over time, or in comparison with correlated measurements or similar functionality. The gadgets available for a dashboard are listed in the Gadget Setup dialog, which opens when you click **Add Gadget** in the **Dashboard Controls** area.

TIP: When the gadget is displayed in the dashboard, you can click an item in the gadget legend to toggle the graphical display of data for that item on and off. When you place the pointer on an item in the gadget, a tooltip provides information related to that item. You can also click the maximize gadget icon to fill the browser page with the gadget. Click the **Restore** icon to return the gadget to its original size on the dashboard.

Use the following links to jump to the descriptions of the different gadget types:

Related topics:

- Viewing Dashboards
- Dashboard Slideshows
- Playing a Slideshow
- Gadgets

For reference information see:

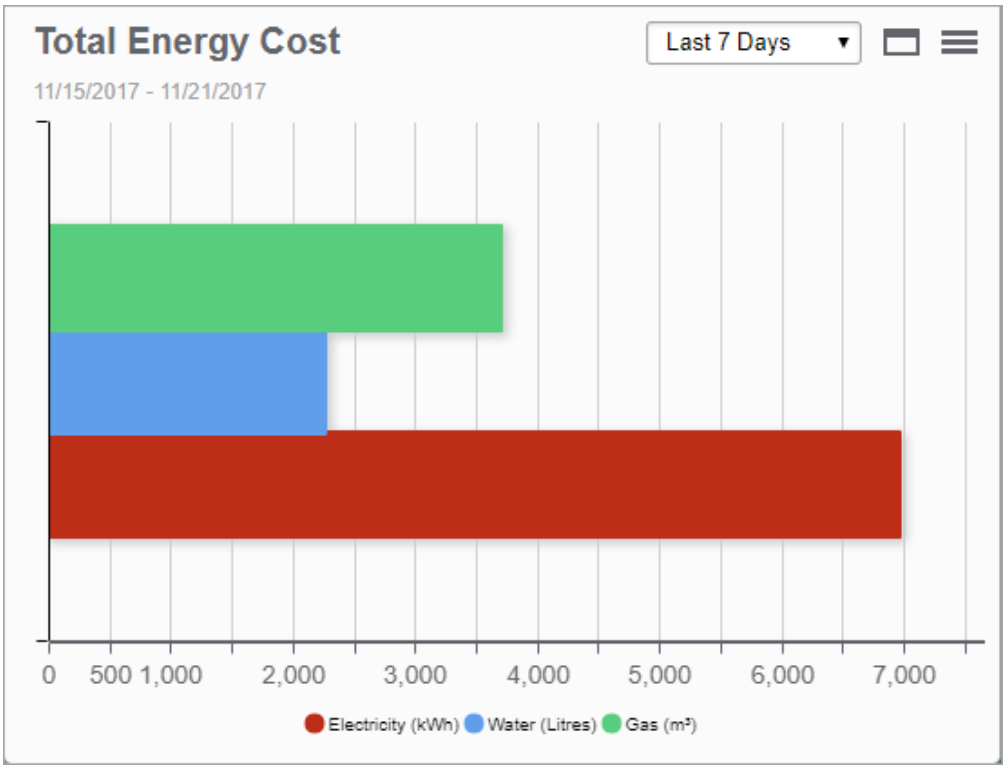
- Dashboards user interface (UI)

For information on how to configure Dashboards, see Dashboards configuration.

Bar Chart gadget

This gadget shows a comparison of several data series, over a selected time period. The information is shown as horizontal bars.

Example:



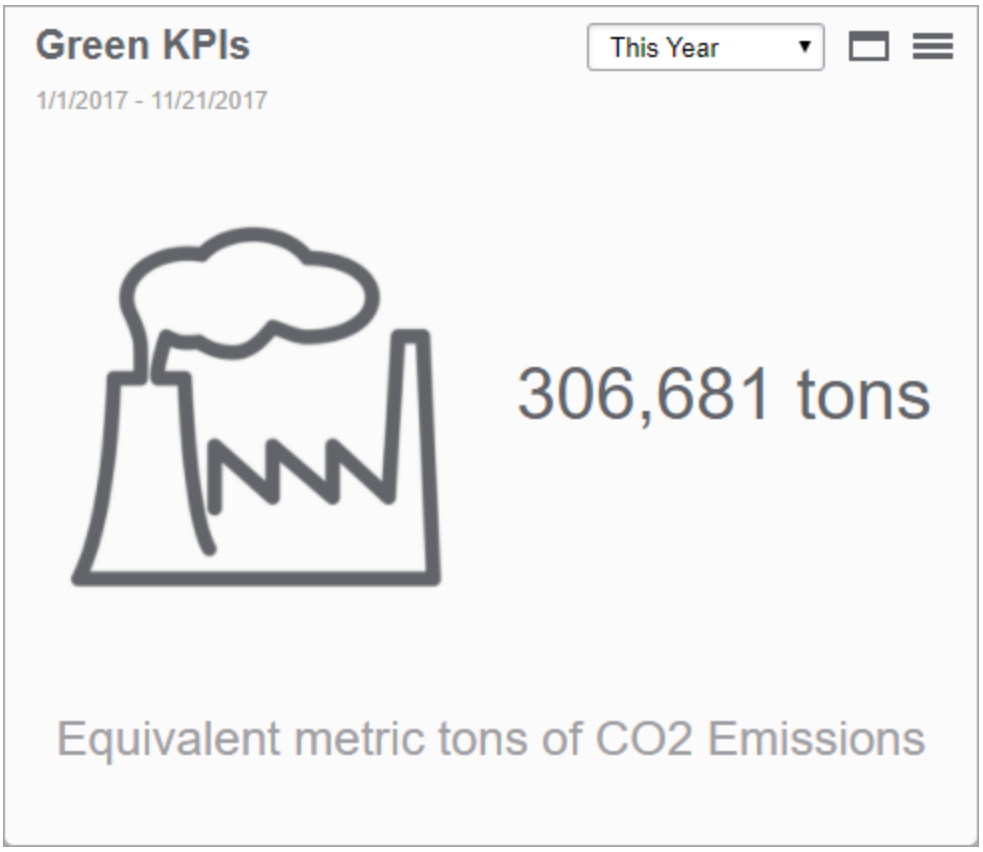
TIP: Place your pointer on a bar in the chart to open a tooltip showing the measurement value. Click a series in the legend to hide or show this series in the chart.

For information about configuring the gadget, see Configuring Gadgets.

Energy Equivalency gadget

This gadget shows a single value that is equivalent to the aggregated consumption input data, over a selected time period. The value can be scaled to represent a consumption equivalent measurement, such as CO2 emissions or primary energy units. The information is shown as a numeric value with unit, a custom text, and a custom graphic.

Example:



For information about configuring the gadget, see Configuring Gadgets.

Table gadget

This gadget shows real-time data from devices in the system. The information is shown in table format.

Example:

Campus Real-Time

Last Update: 11/21/2017 12:58:02 PM Update in 0:03

Sources	Real Power (kW)	Current A (A)	Voltage L-N Avg (V)	Frequency (Hz)
Campus.Academic_Hall	43	49	277	60.0
Campus.Dining_Hall	72	188	120	60.0
Campus.Library	147	165	277	60.0
Campus.Residence_Hall	63	165	120	60.0

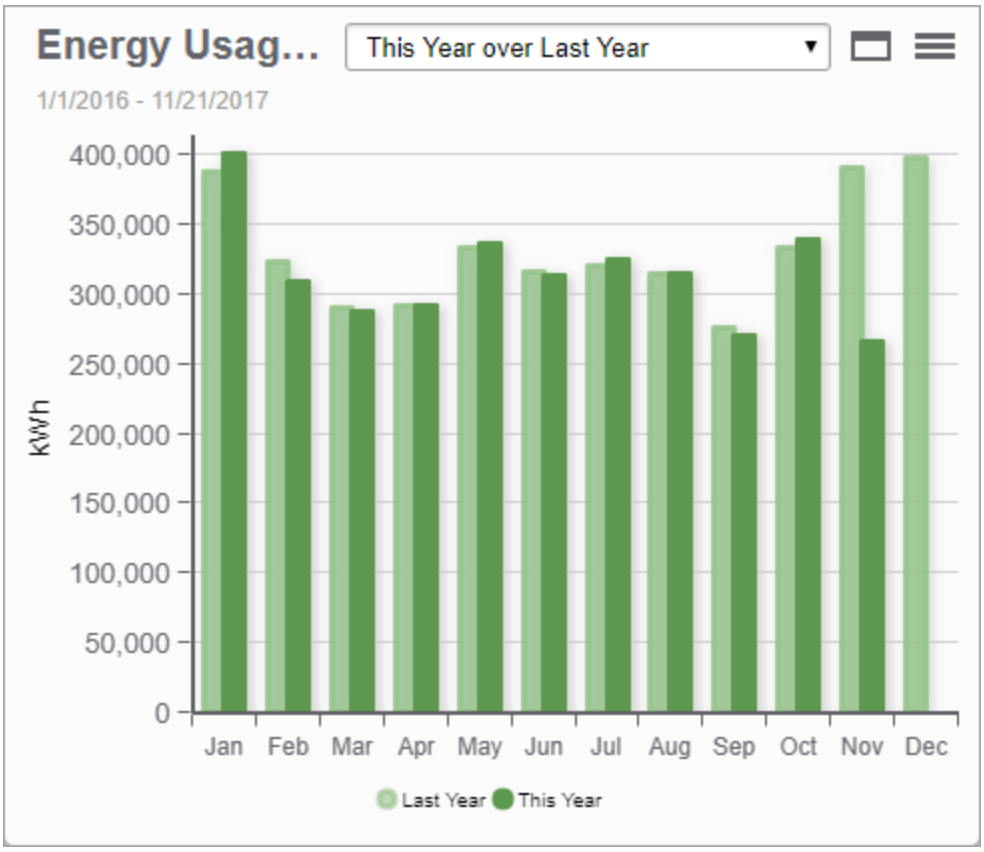
TIP: The measurements can be arranged in rows or in columns.

For information about configuring the gadget, see Configuring Gadgets.

Period Over Period gadget

This gadget shows consumption data for the same measurement for two different viewing periods side-by-side. The information is shown in a column chart.

Example:



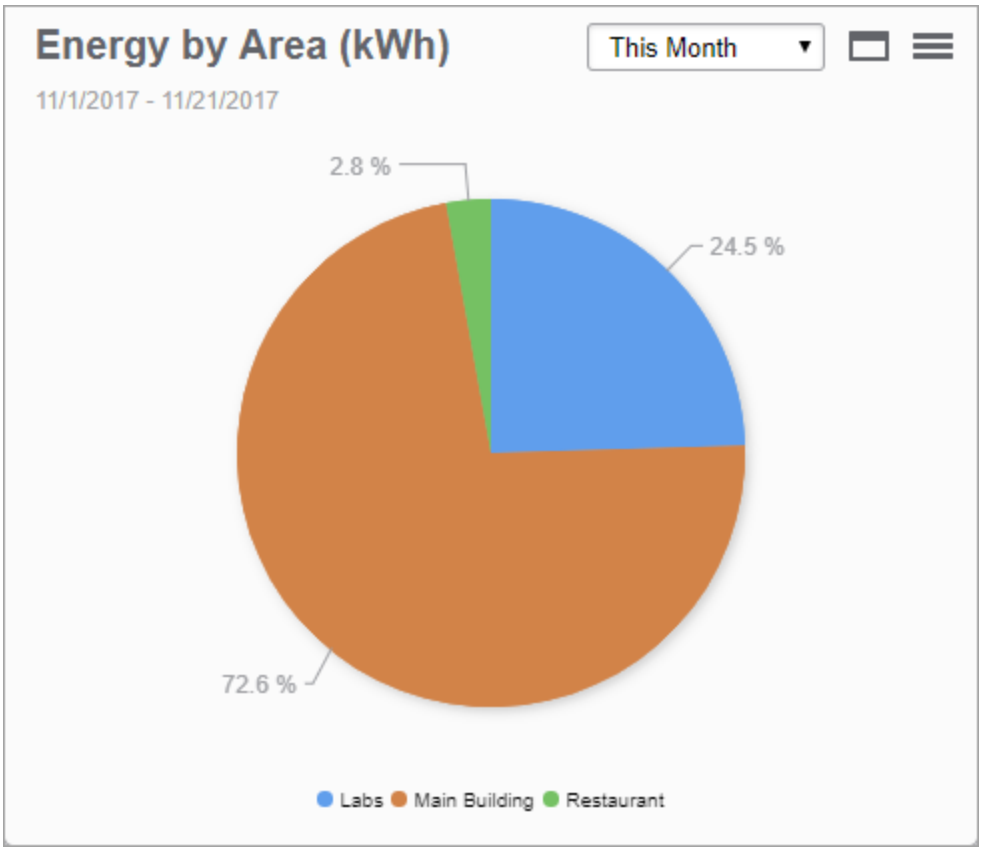
TIP: Place your pointer on a column in the chart to open a tooltip showing the measurement value. Click a series in the legend to hide or show this series in the chart.

For information about configuring the gadget, see Configuring Gadgets.

Pie Chart gadget

This gadget shows a comparison of several data series in a single chart, over a selected time period. The information is shown in a pie chart, as a percentage distribution of the different data series.

Example:



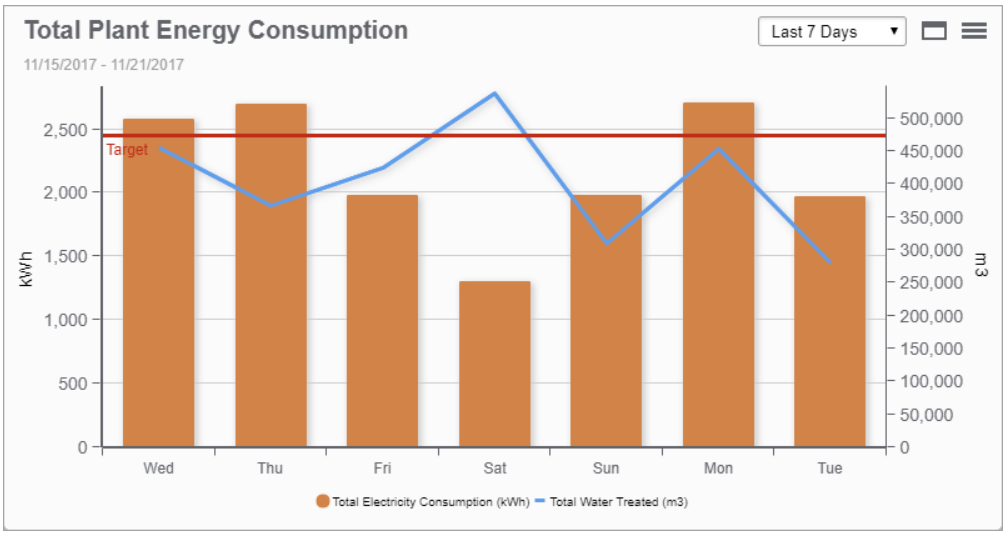
TIP: Place your pointer on a section in the chart to open a tooltip showing the measurement value. Click a section in the pie to separate it from the pie. Click a series in the legend to hide or show this series in the chart.

For information about configuring Power Quality gadgets, see Configuring Gadgets.

Trend Chart gadget

This gadget shows consumption data, over a selected time period. The information is shown in a combined column and line chart. You can include one or more data series in a single chart. You can select how to display the data for both the primary and secondary axes.

Example:



TIP: Place your pointer on a column in the chart to open a tooltip showing the measurement value. Click a series in the legend to hide or show this series in the chart.

For information about configuring the gadget, see Configuring Gadgets.

Web Viewer gadget

This gadget shows a web page inside the gadget frame in the dashboard.

⚠ WARNING

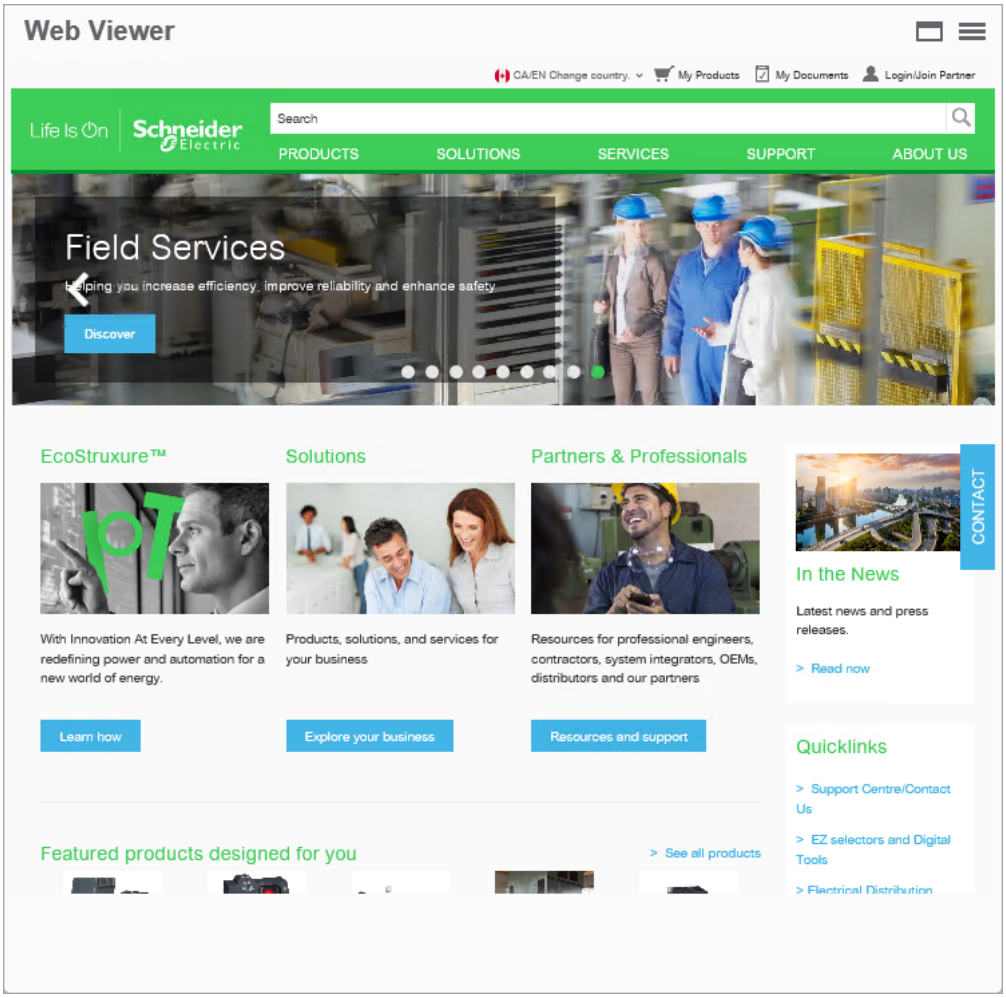
POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

Use cybersecurity best practices to help prevent unauthorized access to the software.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

NOTE: When you configure the Web Viewer gadget to access a website, you should be careful that the website does not include hidden malware, viruses, or content that could compromise your web client computers. It is recommended that the target site specified in the gadget be secured with the SSL or TLS protocol (accessed via HTTPS).

Example:



For information about configuring the gadget, see Configuring Gadgets.

Power Quality gadgets

NOTE: These gadgets are part of the Power Quality Performance Module. This Module requires a separate license.

See Power Quality Performance events and disturbances, in the Reference section of this document, for a definition of power quality events.

Use the following links to jump to the descriptions of the different Power Quality gadget types:

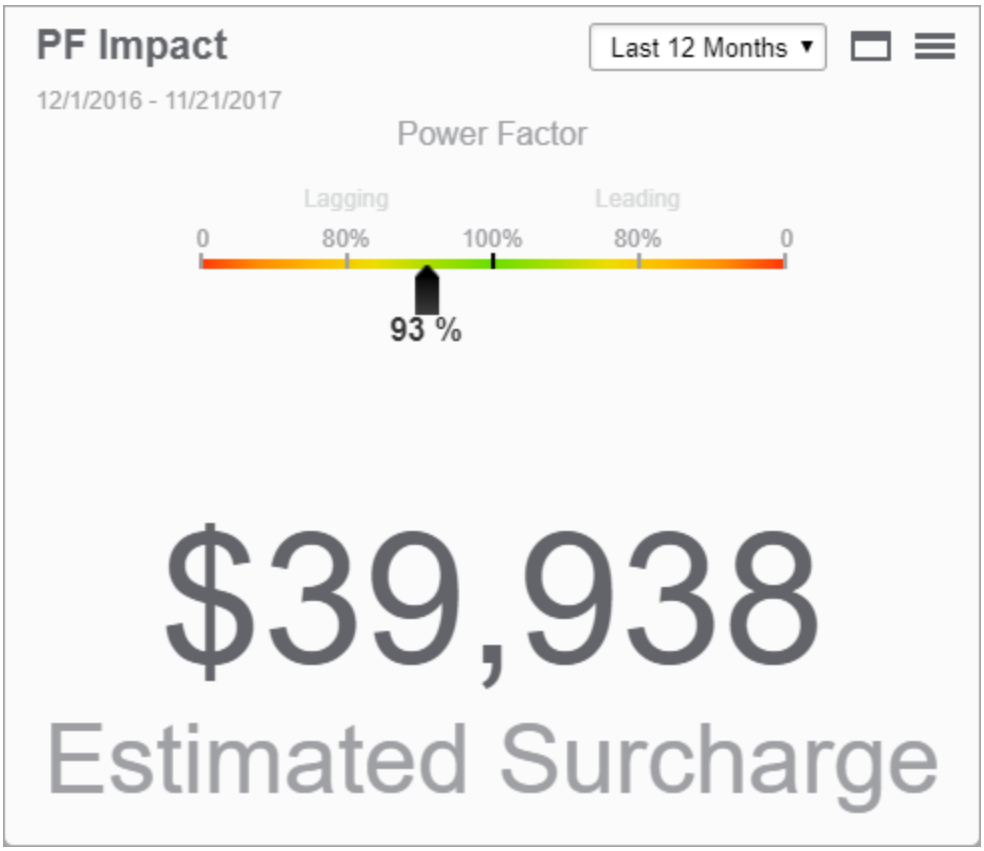
Power Factor Impact
Power Factor Impact Trend
Power Quality Incident Breakdown
Power Quality Incident Impact
Power Quality Incident Location
Power Quality Impact
Power Quality Impact Trend
Power Quality Rating
Power Quality Rating Trend

Power Factor Impact gadget

NOTE: This gadget is part of the Power Quality Performance Module. This Module requires a separate license.

This gadget shows the power factor and the estimated power factor surcharge, based on the billing rate, over a selected time period. The information is shown as a graphic display of the power factor and the estimated surcharge.

Example:



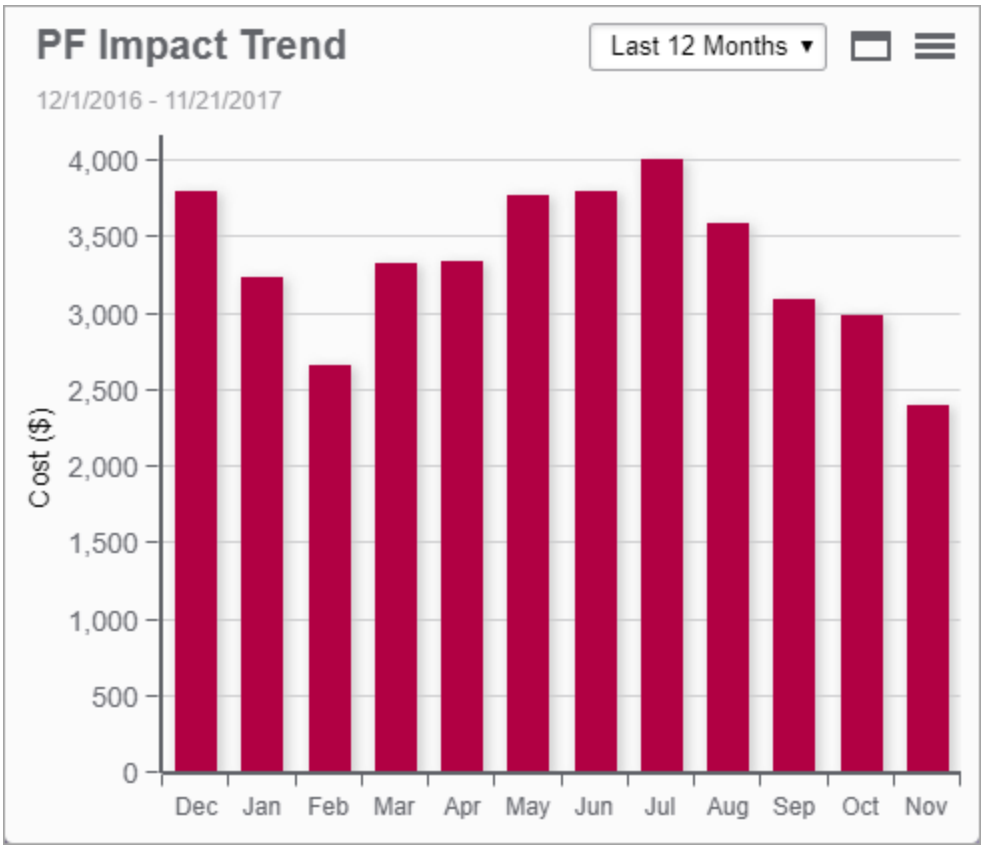
For information about configuring Power Quality gadgets, see Configuring Gadgets.

Power Factor Impact Trend gadget

NOTE: This gadget is part of the Power Quality Performance Module. This Module requires a separate license.

This gadget shows the estimated power factor surcharge, based on the billing rate, over a selected time period. The information is shown in a column chart, grouped by aggregation period.

Example:



TIP: Place your pointer on a column in the chart to open a tooltip showing the estimated surcharge.

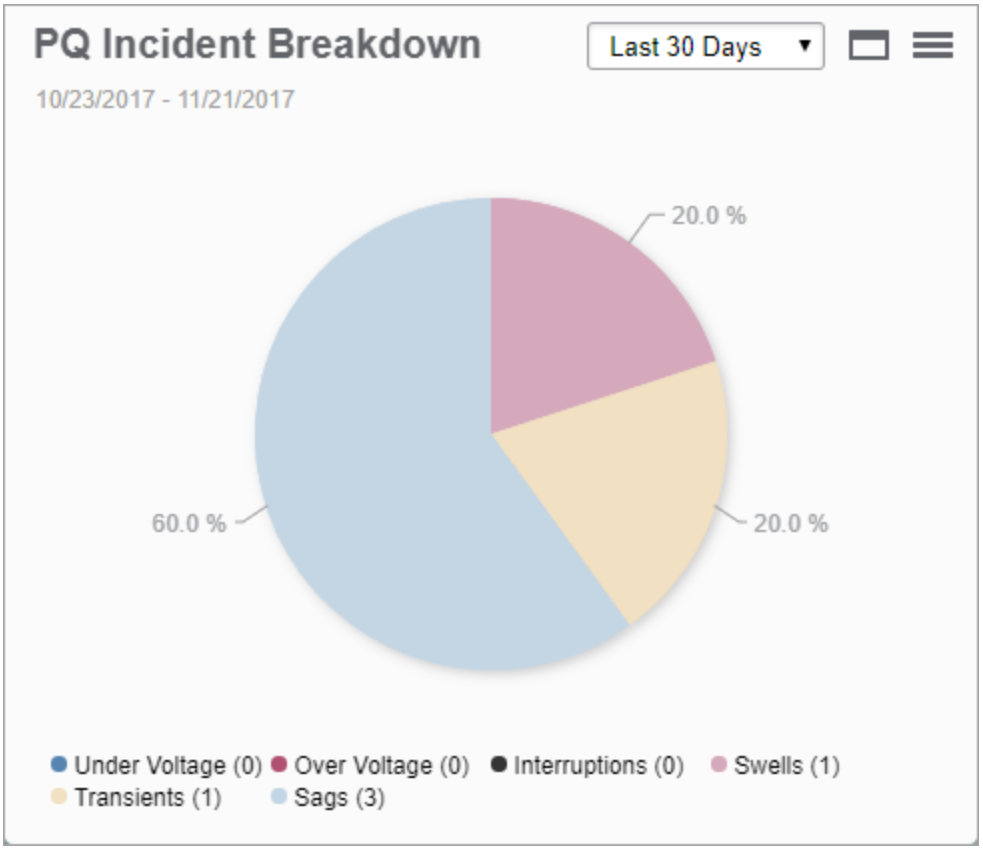
For information about configuring Power Quality gadgets, see Configuring Gadgets.

Power Quality Incident Breakdown gadget

NOTE: This gadget is part of the Power Quality Performance Module. This Module requires a separate license.

This gadget shows a breakdown of the power quality events, by type, over a selected time period. The information is shown in a pie chart, as a percentage distribution of the events.

Example:



NOTE: The colors in the chart are shown dimmed if the events had no expected impact. The colors in the chart are shown solid if one or more events had an expected impact.

TIP: Place your pointer on a section in the chart to open a tooltip showing the number of events in each category. Click a section to separate it from the pie.

For information about configuring Power Quality gadgets, see Configuring Gadgets.

Power Quality Incident Impact gadget

NOTE: This gadget is part of the Power Quality Performance Module. This Module requires a separate license.

This gadget shows the number of power quality events, over a period of time, that might have had a process impact, compared to those that most likely did not have an impact. It is a simplified representation of the CBEMA/ITIC curve in a pie chart format. Events that are inside the curve are shown as “no impact events” and those outside the curve are shown as “likely impact events”.

Example:

NOTE: The colors in the chart are shown dimmed if the events had no expected impact. The colors in the chart are shown solid if one or more events had an expected impact.

TIP: Place your pointer on a section in the chart to open a tooltip showing the number of events in each category. Click a section to separate it from the pie.

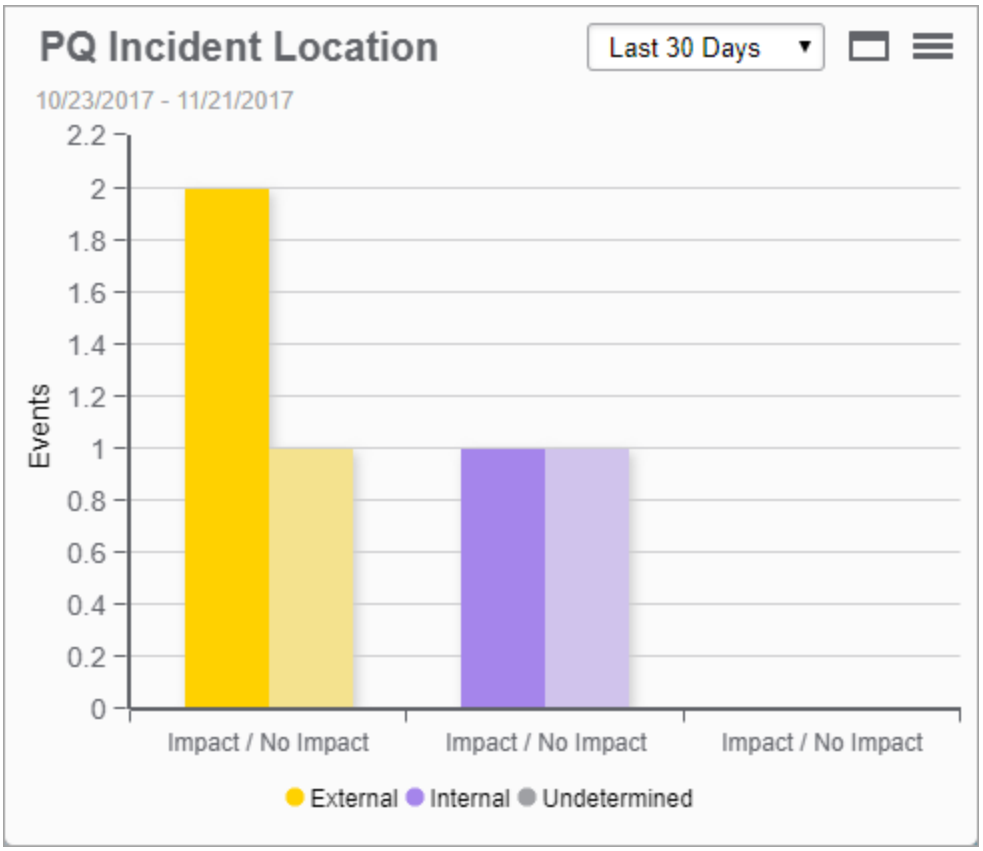
For information about configuring Power Quality gadgets, see Configuring Gadgets.

Power Quality Incident Location gadget

NOTE: This gadget is part of the Power Quality Performance Module. This Module requires a separate license.

This gadget shows the number of power quality events, over a selected time period, grouped by location of origin (external, internal, undetermined). In addition, it indicates whether the events had a likely process impact or not. The information is shown in a column chart, grouped by impact assessment.

Example:



TIP: Place your pointer on a column in the chart to open a tooltip showing the number of events and their likely process impact.

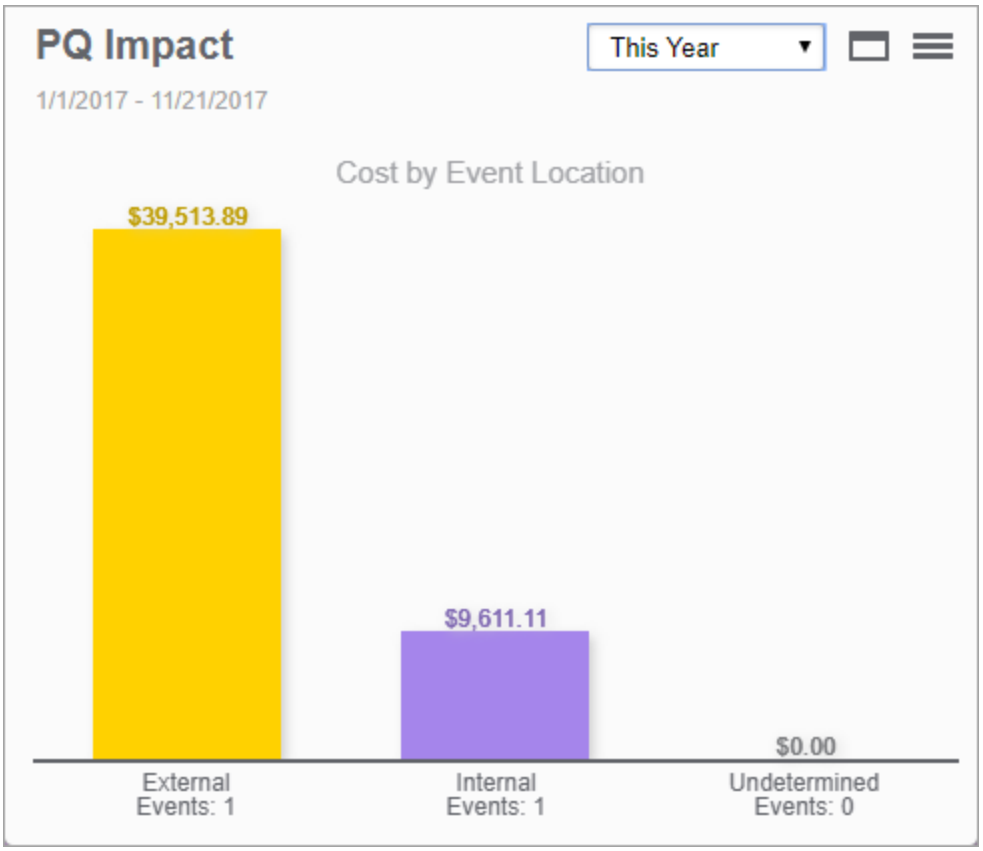
For information about configuring Power Quality gadgets, see Configuring Gadgets.

Power Quality Impact gadget

NOTE: This gadget is part of the Power Quality Performance Module. This Module requires a separate license.

This gadget shows the cost of power quality events with a process impact, over a selected time period. The information is shown in a column chart, grouped by location of power quality event origin (external, internal, undetermined).

Example:



TIP: Place your pointer on a column in the chart to open a tooltip showing the event duration.

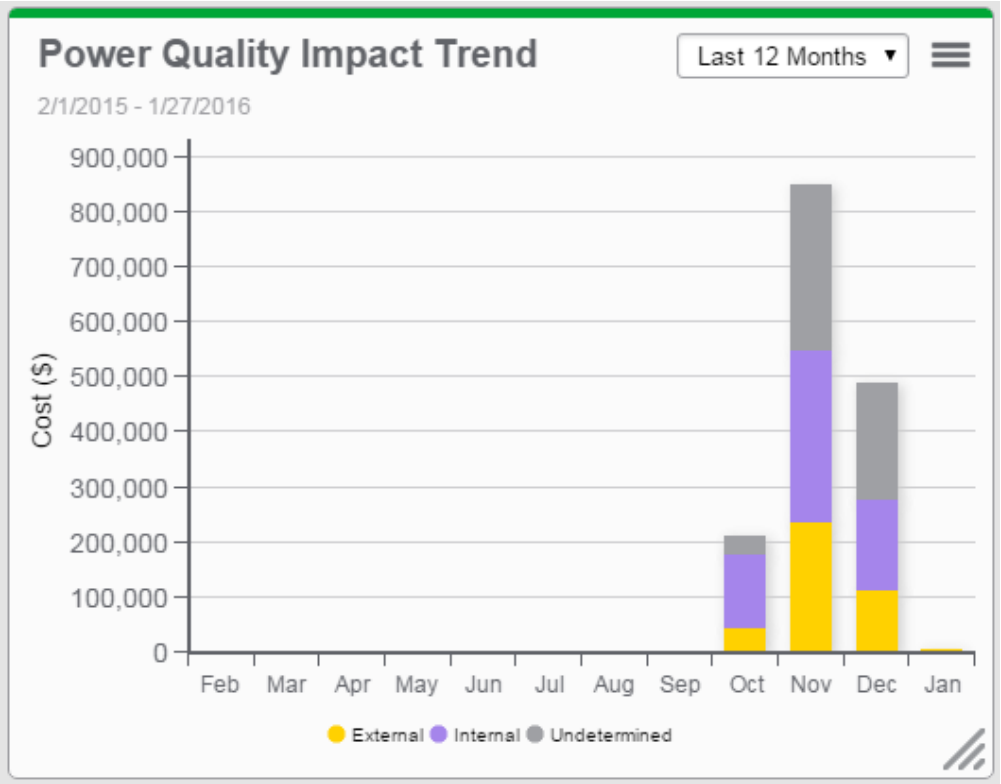
For information about configuring Power Quality gadgets, see Configuring Gadgets.

Power Quality Impact Trend gadget

NOTE: This gadget is part of the Power Quality Performance Module. This Module requires a separate license.

This gadget shows the aggregated cost of power quality events with a process impact, over a selected time period. The information is shown in a stacked column chart, grouped by aggregation period. The location of power quality event origin (external, internal, undetermined) is shown by the color of the columns.

Example:



TIP: Place your pointer on a column in the chart to open a tooltip showing the event origin, cost, and duration. Click a series in the legend to hide or show this series in the chart.

For information about configuring Power Quality gadgets, see Configuring Gadgets.

Power Quality Rating gadget

NOTE: This gadget is part of the Power Quality Performance Module. This Module requires a separate license.

This gadget shows a power quality rating in the form of a letter grade (A to F). The rating is a summary of multiple types of power quality disturbances. The information is shown as a graphic display of the letter grade, with a % power quality rating and a list of the main contributing disturbances.

The following formula is used to calculate the power quality rating:

$$PQ.Rating = \frac{\sum PQ.Indicators.Value \times Weight\ Factor}{\sum PQ.Indicators.MaxValue \times Weight\ Factor} \times 100\%$$

Where:

- PQ.Indicators.Value is a number indicating each power quality indicator status (green = 2, yellow= 1, red = 0).
- PQ.Indicators.MaxValue = 2 for each individual indicator.
- Weight Factor is an adjustable value (default=1) for assigning different weight to each individual indicator as per user's needs.

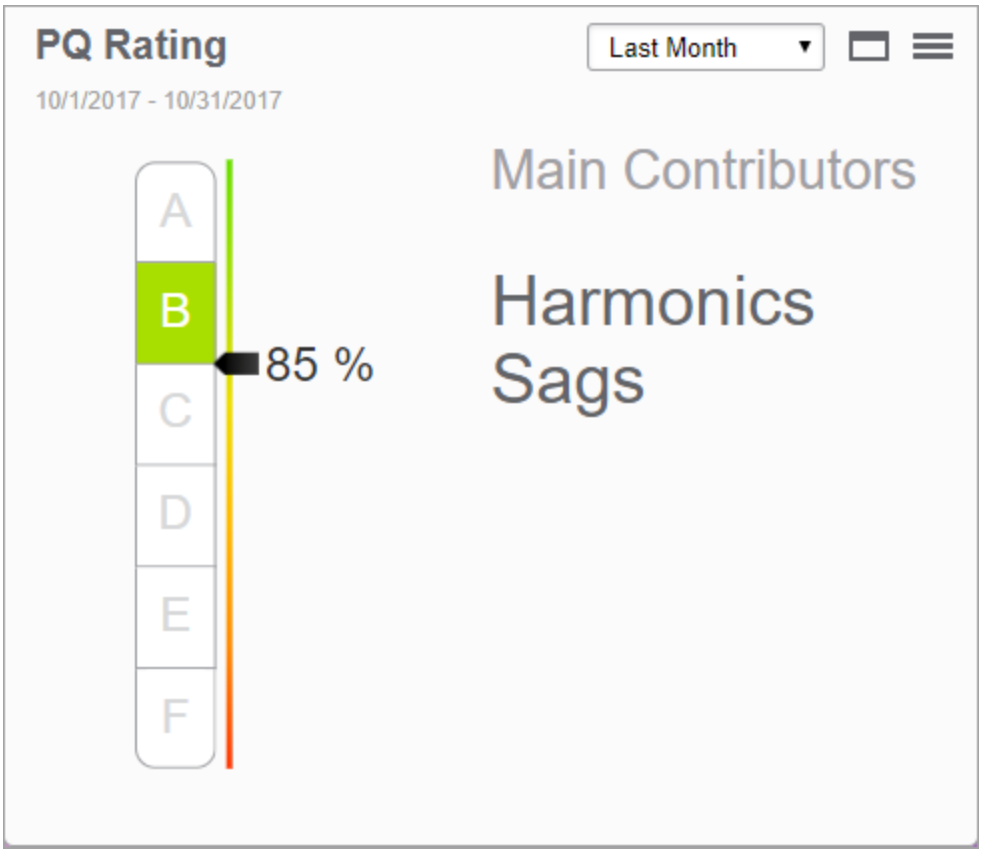
The power quality rating is mapped to the letter grades in the following way:

- PQ.Rating >= 95% → "A"
- PQ.Rating >= 85% → "B"
- PQ.Rating >= 75% → "C"
- PQ.Rating >= 65% → "D"
- PQ.Rating >= 55% → "E"
- PQ.Rating >= 0% → "F"

With 0% = worst power quality and 100% = optimal power quality.

NOTE: The ratings are based on established thresholds and limits defined in IEEE519, IEC 61000-4-30, EN50160, and IEEE1159 standards.

Example:



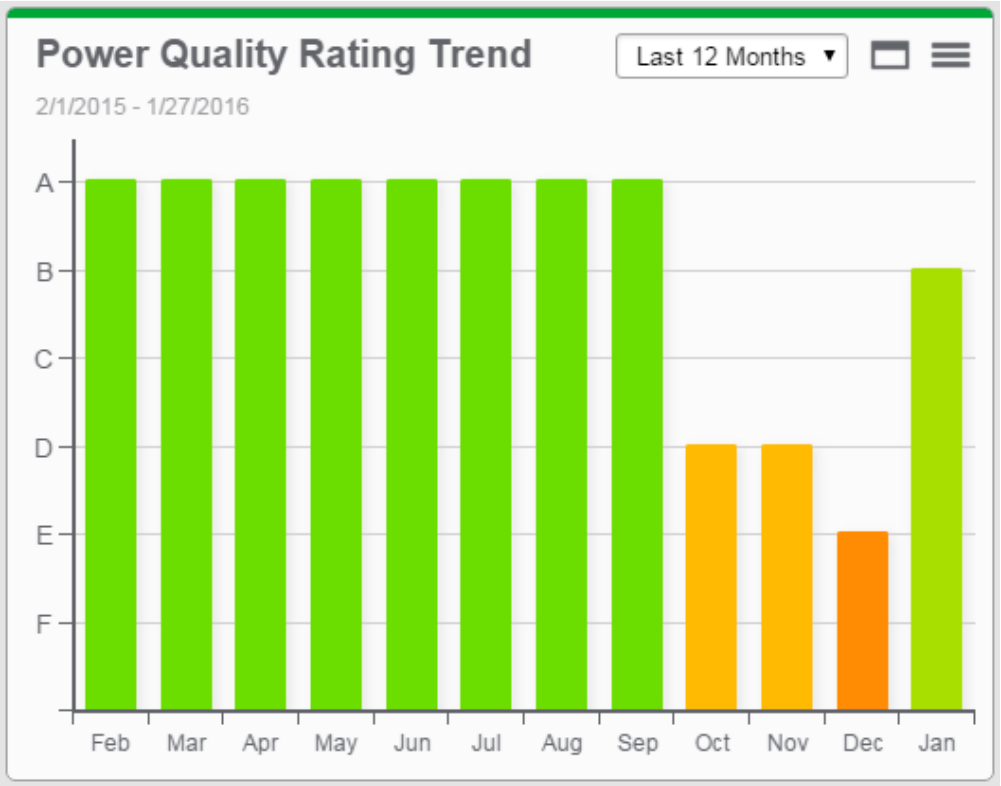
For information about configuring Power Quality gadgets, see Configuring Gadgets.

Power Quality Rating Trend gadget

NOTE: This gadget is part of the Power Quality Performance Module. This Module requires a separate license.

This gadget shows the power quality rating, over a selected time period. The information is shown in a column chart, grouped by aggregation period.

Example:



TIP: Place your pointer on a column in the chart to open a tooltip showing the date and the power quality rating.

For information about configuring Power Quality gadgets, see Configuring Gadgets.

Sankey gadget

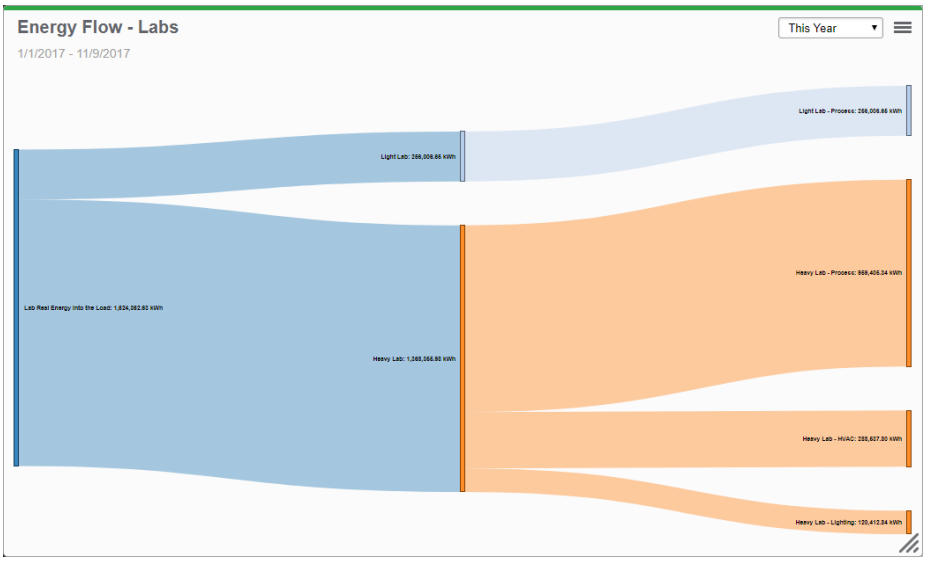
NOTE: This gadget is part of the Energy Analysis Dashboards Module. This Module requires a separate license.

This gadget shows a flow diagram, in which the width of the arrows is proportional to the data values. The diagram starts as a combined flow for all the selected consumers, and then breaks out into individual flows for each consumer.

Use this gadget to show WAGES consumption broken down by load type, or to visualize consumption costs by consumer. You can also use it to show power losses.

NOTE: The Sankey gadget must be used with hierarchy data. The Sankey gadget automatically removes nodes with missing data from the display. A message is displayed in the chart if a node is removed.

Example:



TIP: Drag individual nodes horizontally or vertically in the chart for a better view.

For information about configuring the gadget, see Configuring Gadgets.

Pareto Chart gadget

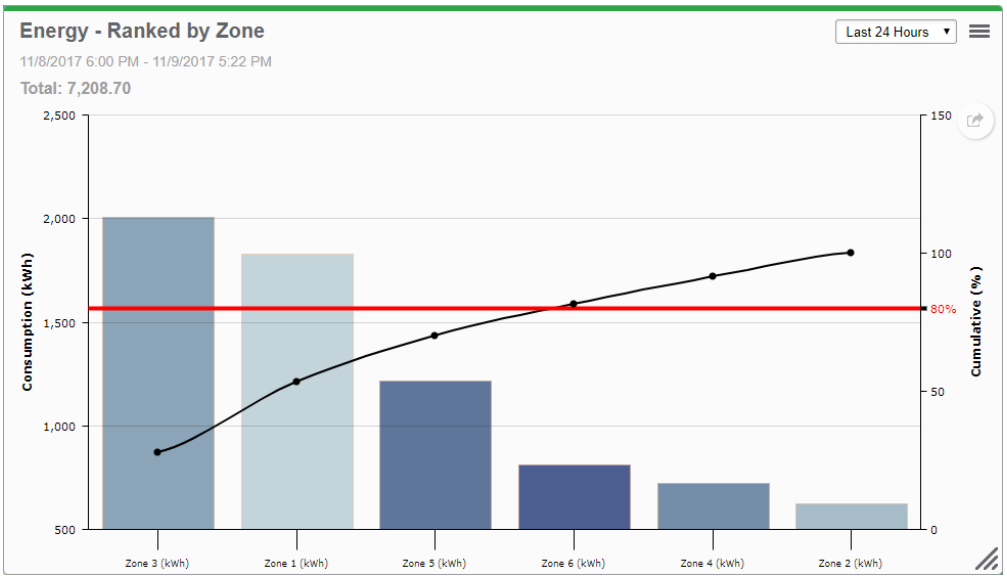
NOTE: This gadget is part of the Energy Analysis Dashboards Module. This Module requires a separate license.

This gadget shows consumption data, by consumer, for multiple consumers, over a selected time period. The information is shown in a combined column and line chart. The columns are arranged from highest consumption to lowest consumption. The chart includes a cumulative curve based on the aggregation period consumption values. The chart also contains a configurable marker line which is used as a target or threshold indicator.

Use this gadget to perform an 80/20 analysis, identifying those consumers that together make up the largest portion, or 80% of the overall consumption.

TIP: This gadget supports exporting its complete data set in CSV format or Microsoft Excel format (XLSX) directly from the Web browser. To export the data, hover the mouse pointer over the download icon in the gadget and select the desired format from the pop-up menu or select **Export to CSV** from top right Options menu.

Example:



For information about configuring the gadget, see Configuring Gadgets.

Aggregated Pareto Chart gadget

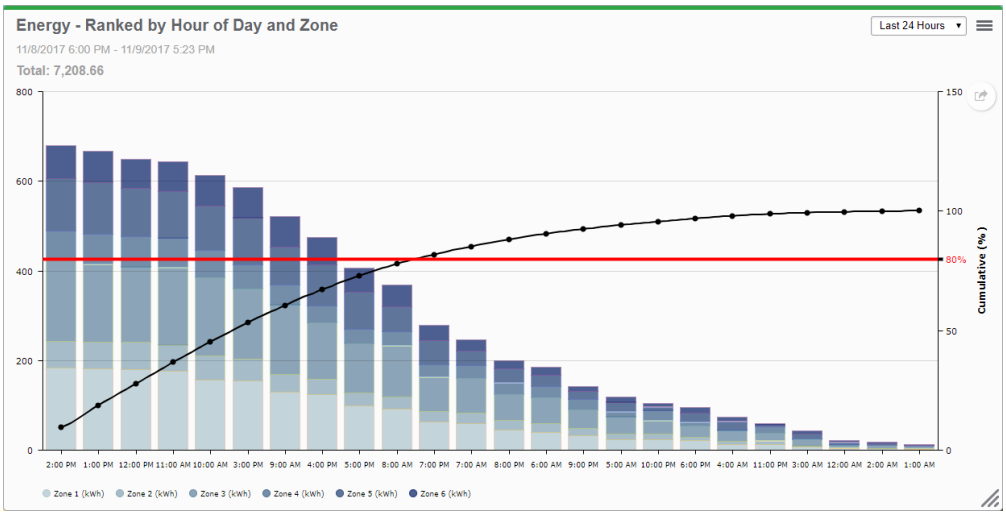
NOTE: This gadget is part of the Energy Analysis Dashboards Module. This Module requires a separate license.

This gadget shows consumption data for multiple consumers, over a selected time period. The information is shown in a combined column and line chart, grouped by aggregation period. The columns are arranged from highest consumption to lowest consumption. The chart includes a cumulative curve based on the aggregation period consumption values. The chart also contains a configurable marker line which is used as a target or threshold indicator.

Use this gadget to perform an 80/20 analysis, identifying those aggregation intervals and consumers that together make up the largest portion, or 80% of the overall consumption.

TIP: This gadget supports exporting its complete data set in CSV format or Microsoft Excel format (XLSX) directly from the Web browser. To export the data, hover the mouse pointer over the download icon in the gadget and select the desired format from the pop-up menu or select **Export to CSV** from top right Options menu.

Example:



For information about configuring the gadget, see Configuring Gadgets.

Heat Map gadget

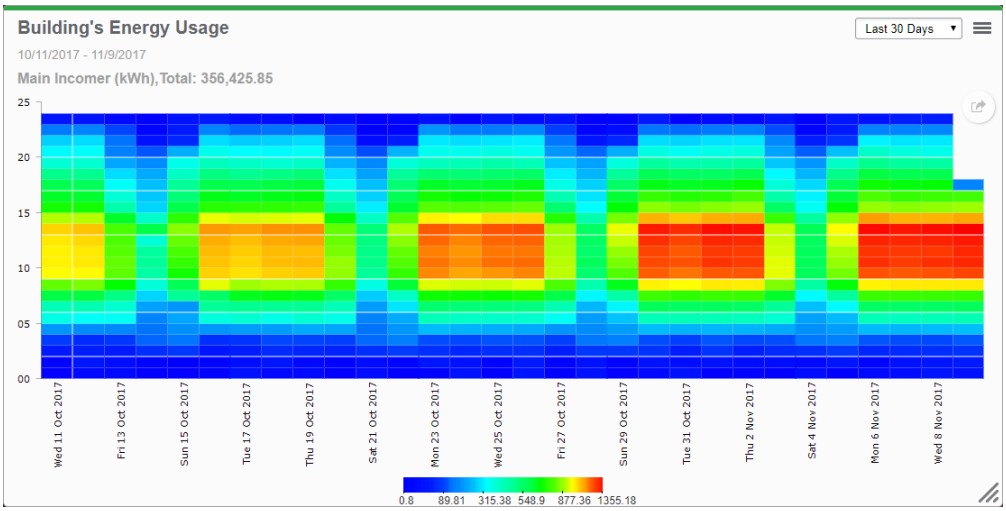
NOTE: This gadget is part of the Energy Analysis Dashboards Module. This Module requires a separate license.

This gadget creates a graphical representation of your data where the individual values are represented as colors in a matrix format. The graphical display makes it easy to identify patterns in complex data sets.

Use this gadget with consumption data to identify usage patterns and anomalies.

TIP: This gadget supports exporting its complete data set in CSV format or Microsoft Excel format (XLSX) directly from the Web browser. To export the data, hover the mouse pointer over the download icon in the gadget and select the desired format from the pop-up menu or select **Export to CSV** from top right Options menu.

Example:



For information about configuring the gadget, see Configuring Gadgets.

Consumption Ranking gadget

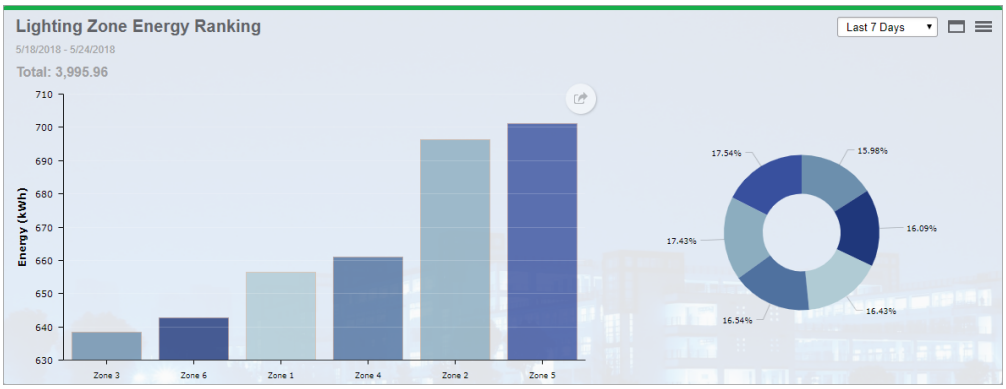
NOTE: This gadget is part of the Energy Analysis Dashboards Module. This Module requires a separate license.

This gadget shows consumption data, by consumer, for multiple consumers, over a selected time period. The information is shown side-by-side in a column or bar chart and a doughnut chart. The columns or bars are arranged in order of consumption. The chart includes the aggregated total consumption.

Use this gadget to compare the consumption of different consumers over a period of time.

TIP: This gadget supports exporting its complete data set in CSV format or Microsoft Excel format (XLSX) directly from the Web browser. To export the data, hover the mouse pointer over the download icon in the gadget and select the desired format from the pop-up menu or select **Export to CSV** from top right Options menu.

Example:



For information about configuring the gadget, see Configuring Gadgets.

Aggregated Consumption Ranking gadget

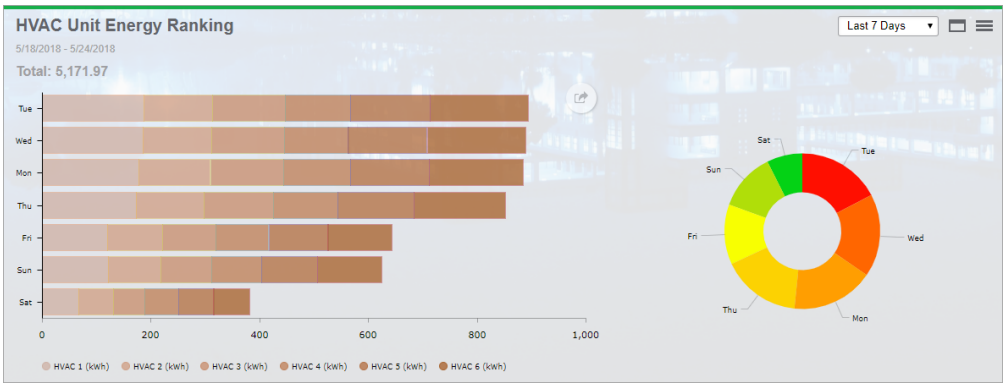
NOTE: This gadget is part of the Energy Analysis Dashboards Module. This Module requires a separate license.

This gadget shows consumption data for multiple consumers, by aggregation period, over a selected time period. The information is shown side-by-side in a column or bar chart and a doughnut chart. The columns or bars are arranged in order of the aggregated consumption. The chart includes the aggregated total consumption.

Use this gadget to compare the consumption of consumers during specific time intervals, for example by hour, by day of week, or by day.

TIP: This gadget supports exporting its complete data set in CSV format or Microsoft Excel format (XLSX) directly from the Web browser. To export the data, hover the mouse pointer over the download icon in the gadget and select the desired format from the pop-up menu or select **Export to CSV** from top right Options menu.

Example:



For information about configuring the gadget, see Configuring Gadgets.

Diagrams

⚠ WARNING

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Do not use the software to control time-critical functions.
- Do not use the software to control remote equipment without proper access control and status feedback.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

TIP: You can open the Diagrams application from the **DIAGRAMS** link in the Web Applications banner.

Use the Diagrams application to view Vista diagrams in the Web Applications interface. You can view the network diagram and any custom diagrams created in Vista. In addition, the Diagrams application provides a Devices diagrams view with device type specific diagrams for each device that is configured in the system. Objects that can be displayed in the browser include real-time numeric data, full or partial gauges, background graphics or diagrams, and basic views of event, data and waveform logs.

You can also perform manual control actions such as resetting values on devices or changing device configuration settings.

NOTE: See Time Display in Web Applications for information on how time is displayed in a system where the monitoring devices, the PME/Web server, and the Web client (browser) are in different time zones.

For information on how use the Diagrams application, see:

- The Diagrams user interface
- User authentication

- Viewing historical (trend) data
- Viewing meter events
- Performing manual control actions
- Stale data and error indicators
- Power Quality Performance diagrams
- Insulation Monitoring diagrams
- UPS Auto Test diagrams
- EPSS diagrams
- Breaker Aging diagrams

For information on how to configure Diagrams, see Diagrams configuration.

The Diagrams user interface

The Diagrams user interface consists of a diagram display pane and a Diagram Library pane.

Diagrams display pane

The diagram display pane shows the diagram selected in the **Diagram Library**. The system administrator can set a system default diagram that users see when they first log in.

Diagram Library

The Diagram Library contains all the diagrams that are configured in the system. Diagrams can be listed individually, or they can be organized within folders. The **Devices** diagram folder is a system folder that is automatically generated. It cannot be edited or deleted. You use the Diagram Library to select the diagram you want to view.

TIP: To hide the library, click the Hide Library icon (or) in the top right corner of the library. To show the library, click the Show Library icon (or) at the top of the library ribbon, or click anywhere in the minimized library ribbon.

Related topics:

- The Diagrams user interface
- User authentication
- Viewing historical (trend) data
- Viewing meter events
- Performing manual control actions
- Stale data and error indicators
- Power Quality Performance diagrams
- Insulation Monitoring diagrams
- UPS Auto Test diagrams
- EPSS diagrams
- Breaker Aging diagrams

For information on how to configure Diagrams, see Diagrams configuration.

User authentication

If you access Diagrams through the Web Applications framework, you are automatically authenticated, using the Web Applications login.

If you access Diagrams from outside the Web Applications framework, through a browser using the URL `http://server_name/ion` (where *server_name* is the fully-qualified name of the server or its IP address), you are prompted to log in using your Power Monitoring Expert user name and password.

Related topics:

- The Diagrams user interface
- User authentication
- Viewing historical (trend) data
- Viewing meter events
- Performing manual control actions
- Stale data and error indicators
- Power Quality Performance diagrams
- Insulation Monitoring diagrams
- UPS Auto Test diagrams
- EPSS diagrams
- Breaker Aging diagrams

For information on how to configure Diagrams, see Diagrams configuration.

Viewing historical (trend) data

The Diagrams application provides a Web-based graphing utility for viewing historical data in the diagrams. This utility allows you to select the date range and the data that you want to view.

1. Click the meter icon to open its diagram, then click the link or tab that contains the button for the trending information you want to view.
2. Click the Data Log Viewer button that corresponds to the data log you want to view.

   The data log table displays today's data by default.

   When the data log table opens, 30 rows of data are displayed initially. As you scroll or page down, 30 additional rows of data at a time are added to the table.
3. Click **Change Date Range** to change the timeframe for the data and select one of the available options for the data that you want to view. To specify a custom date range, select **Between these dates** then click the calendar icons to set start and end dates.

   The new date range is applied when you view the graph. Click **Show Table** to return to the data log table. (When you return to the data log table, your previous table header selections are cleared.)

   If you select a custom date range, a maximum of 6000 rows of data are displayed initially. If the custom date range includes more than 6000 rows of data, you can display the additional records in increments of 30 rows at a time by scrolling down or pressing **End**.
4. Select the check boxes for the items in the table header for the parameters that you want to graph.
5. Click **Show Graph**.
6. Manipulate and control the displayed graph by doing the following:
   a. To zoom in on the graph, left click and drag the mouse pointer around the portion you want to zoom in on.
   b. To restore the graph to its original display size, double-click anywhere in the graph.
7. Click:
   a. **Device Diagram** to return to that page.
   b. **Change Date Range** to select a different date range for the data log table. The new date range is applied when you view the graph.
   c. **Show Table** to return to the data log table. (When you return to the data log table, your previous table header selections are cleared.)

RMS waveform plotting

The Diagrams application plots the calculated root mean square (RMS) values for waveforms.

Related topics:

- The Diagrams user interface
- User authentication

- Viewing historical (trend) data
- Viewing meter events
- Performing manual control actions
- Stale data and error indicators
- Power Quality Performance diagrams
- Insulation Monitoring diagrams
- UPS Auto Test diagrams
- EPSS diagrams
- Breaker Aging diagrams

For information on how to configure Diagrams, see Diagrams configuration.

Viewing meter events

You can view meter events in the diagrams, in a table format, using the Diagrams application.

NOTE: You cannot acknowledge alarms on the screens generated by the Diagrams application since control functions are not supported. To acknowledge alarms, click the **ALARMS** icon in the Web Applications component to open the Alarm Viewer.

Viewing the meter events

1. Click the meter icon to open its diagram, then click the link or tab that contains the Meter events button.
2. Click the Meter events button to open a table showing the meter events.

   The meter events table displays today's data by default.

   When the meter events table opens, 30 rows of data are displayed initially. As you scroll or page down, 30 additional rows of data at a time are added to the table.
3. Click **Change Date Range** to change the timeframe for the data and select one of the available options for the data that you want to view. To specify a custom date range, select **Between these dates** then click the calendar icons to set a start and end date.

   If you select a custom date range, a maximum of 6000 rows of data are displayed. If the custom date range includes more than 6000 rows of data, you can display the additional records in increments of 30 rows at a time by scrolling down or pressing **End**.

Related topics:

- The Diagrams user interface
- User authentication
- Viewing historical (trend) data
- Viewing meter events
- Performing manual control actions
- Stale data and error indicators
- Power Quality Performance diagrams
- Insulation Monitoring diagrams
- UPS Auto Test diagrams
- EPSS diagrams
- Breaker Aging diagrams

For information on how to configure Diagrams, see Diagrams configuration.

Performing manual control actions

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Do not use the software to control time-critical functions.
- Do not use the software to control remote equipment without proper access control and status feedback.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

You can use Diagrams to perform manual control actions on devices. Manual control actions include actions such as resetting values on devices or changing device configuration settings.

For you to be able to perform control actions, the following must be true:

- Control in Diagrams must be enabled. See Set Diagrams control options for information on how to enable control.
- Your Web Applications client (= web browser) must use an HTTPS connection to the PME server.
- Your user access level must be at the level required by the control object, or higher. See Controlling system functions in Vista for information on control object configuration.
- The device you are trying to control does not use Advanced meter security. Control in Diagrams does not support Advanced security on devices.

To perform a control action:

1. Open the diagram for the device you want to control in Diagrams.
2. Click on the control object you want to trigger or change. This opens a confirmation dialog.
3. Provide any information requested by the confirmation dialog.
4. Click **OK** in the confirmation dialog.

NOTE: There can be a time delay until Diagrams displays a new control value or state after it has been written to the device.

TIP: Control actions in Diagrams are recorded in the PME system log. Use Log Viewer to see system log entries.

Related topics:

- The Diagrams user interface
- User authentication
- Viewing historical (trend) data
- Viewing meter events
- Performing manual control actions

- Stale data and error indicators
- Power Quality Performance diagrams
- Insulation Monitoring diagrams
- UPS Auto Test diagrams
- EPSS diagrams
- Breaker Aging diagrams

For information on how to configure Diagrams, see Diagrams configuration.

Stale data and error indicators

The Diagrams application uses the Vista stale data settings for its diagrams. Stale data and errors are displayed in the browser as follows:

- A **yellow** border surrounding an object indicates stale data.
- An **orange** border surrounding an object indicates an error in communications, security access, configuration, or other system error.

NOTE: See the "Identifying Stale Data" topic in the Vista section of the online *Power Monitoring Expert Help* for information on stale data. Although you can change the stale data and error flag colors in Vista , the color indicators for these flags do not change in the Diagrams application.

Related topics:

- The Diagrams user interface
- User authentication
- Viewing historical (trend) data
- Viewing meter events
- Performing manual control actions
- Stale data and error indicators
- Power Quality Performance diagrams
- Insulation Monitoring diagrams
- UPS Auto Test diagrams
- EPSS diagrams
- Breaker Aging diagrams

For information on how to configure Diagrams, see Diagrams configuration.

Power Quality Performance diagrams

NOTE: These diagrams are part of the Power Quality Performance Module. This Module requires a separate license. The module must be configured before the diagrams can be used.

Power Quality Performance diagrams provide an overview of the power quality of your system. Two sets of Vista diagrams are available; indicator diagrams and equipment diagrams:

- Indicator diagrams present an aggregated and simplified view of historical power quality data.
- Equipment diagrams provide a real-time summary of the operational status of the corrective equipment installed in support of your system.

⚠ CAUTION

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.

Failure to follow these instructions can result in injury or equipment damage.

NOTE: See Power Quality Performance events and disturbances, in the Reference section of this document, for a definition of power quality events.

For details on the diagrams, see:

- Power Quality Performance Indicator diagrams
- Power Quality Performance Equipment diagrams

Related topics:

- The Diagrams user interface
- User authentication
- Viewing historical (trend) data
- Viewing meter events
- Performing manual control actions
- Stale data and error indicators
- Power Quality Performance diagrams
- Insulation Monitoring diagrams
- UPS Auto Test diagrams
- EPSS diagrams
- Breaker Aging diagrams

For information on how to configure Diagrams, see Diagrams configuration.

Power Quality Performance Indicator diagrams

Overview

The Power Quality Indicator diagrams show several power quality indicators. Each indicator represents a different type of power quality event or disturbance. The indicators are color coded and provide more detailed information when clicked.

Diagrams

Power Quality Performance Indicator diagram is organized into 3 levels and a setup page:

1. Landing page
2. Details pages
3. Information pages
4. Setup page

1. Landing page

This page shows a high-level power quality summary. The landing page first opens to the LAST 7 DAYS viewing period. The other time periods are LAST 24 HOURS, LAST 30 DAYS, and LAST 12 MONTHS.

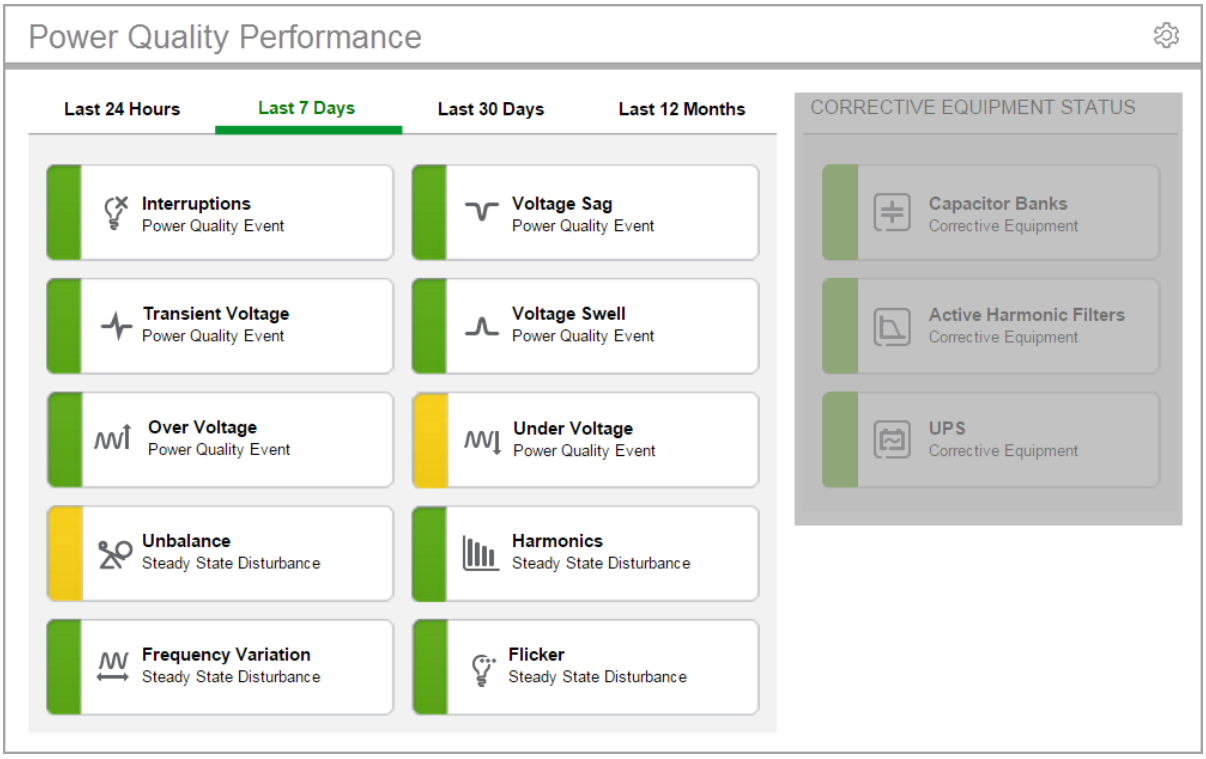
The indicators on the page are color-coded based on the state of the specific power quality item. The color classifications are defined by configurable limits, set for each item. The color coding indicates how well your system performed, with regards to power quality, over a certain period of time:

- Green means there are no power quality issues.
- Yellow means there are a few power quality issues, which might be investigated.
- Red means there are frequent power quality issues, which should be investigated.

To open the landing page:

In diagrams, click the grouping object that links to the page , or click the Power Quality Performance tab in the Web Applications banner. Which of these two options have been implemented depends on how your system has been configured.

Example landing page:



2. Details page

This page shows a breakdown of the specific event or disturbance, by time period. It provides the following details:

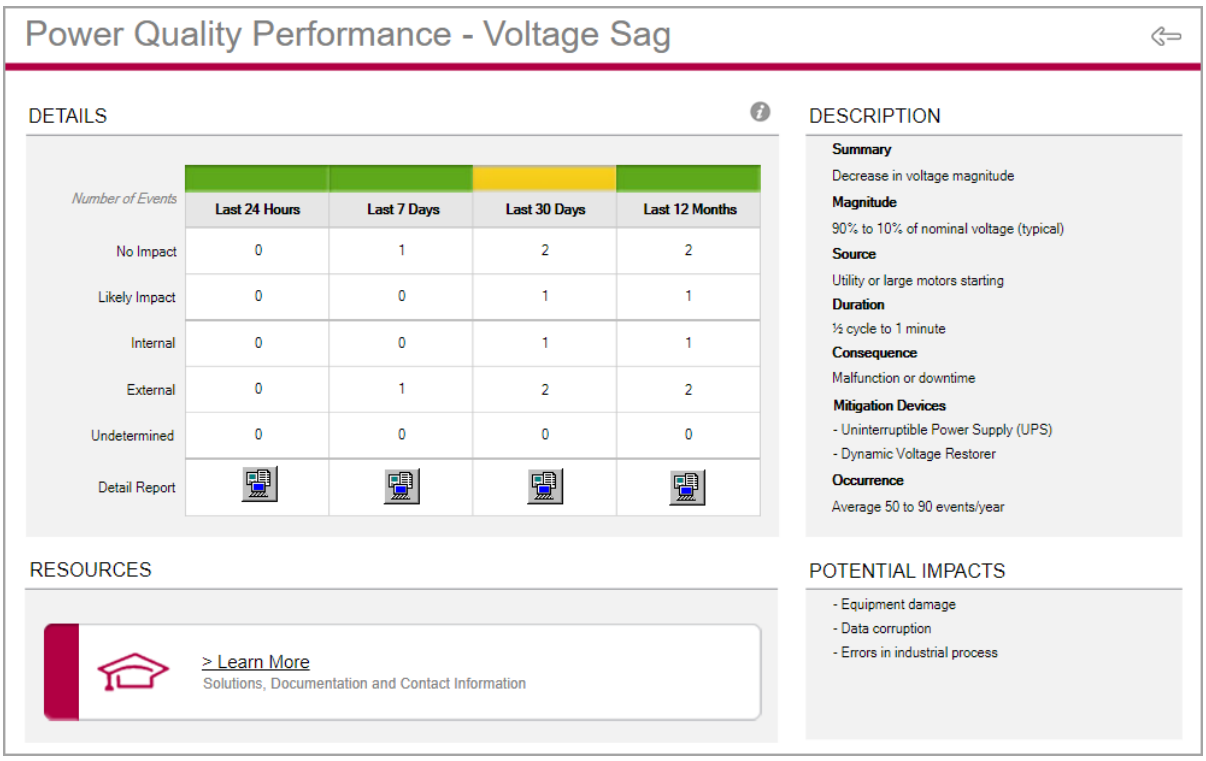
- Counts for events with **No Impact** and **Likely Impact**.
- Counts for events with **Internal**, **External**, and **Undetermined** origin.
- A log with event details.

The details page also includes a description of the event or disturbance type and potential impacts. There is a **Learn More** link to access additional, related information.

To open a details page:

On the landing page, click an event or disturbance to open the details page for that item.

Example details page:



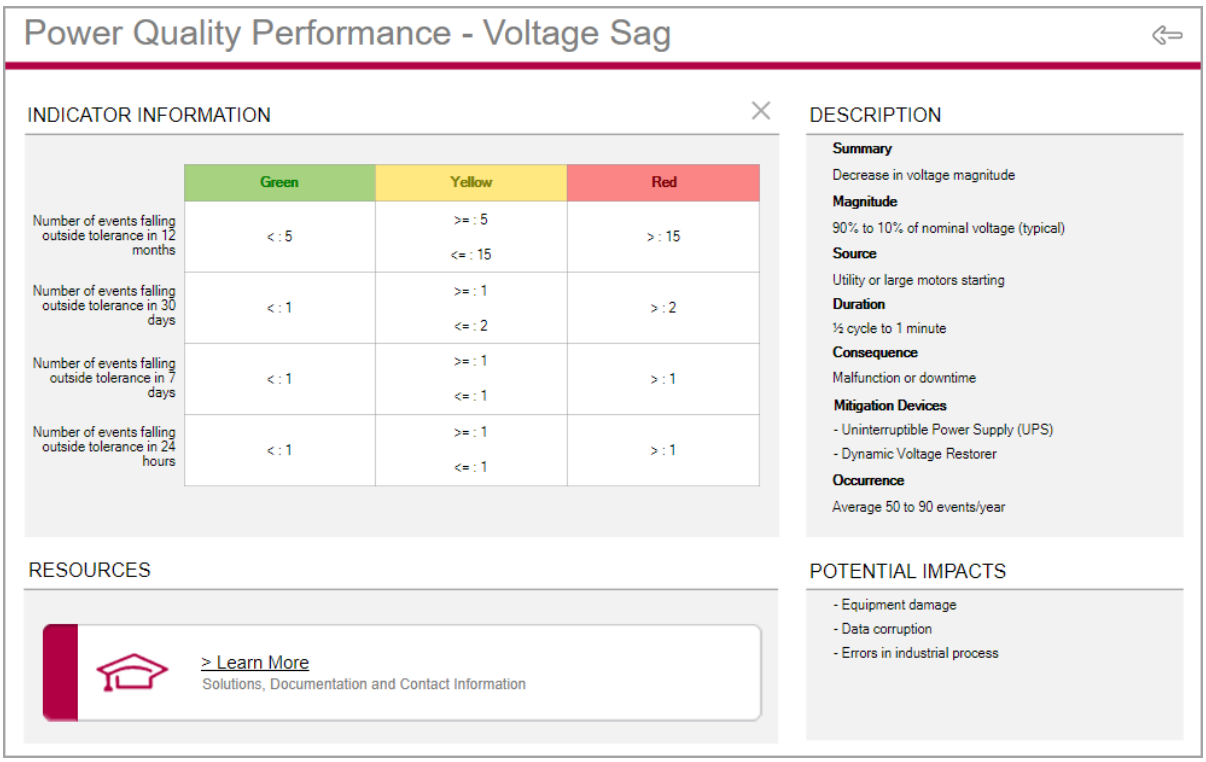
3. Information page

This page shows the color classification limits used to determine whether the event or disturbance is flagged with a green, yellow, or red color.

To open an information page:

On a details page, click the information icon . Click X to return to the details page.

Example information page:



4. Setup page

This page has controls to trigger an update of the power quality indicators and the indicator limits.

Use the **Initialize/Update Indicators** control to manually update all indicators in the Power Quality Performance diagrams. This triggers an immediate update instead of waiting for automatic updates (15 minutes to 1 hour).

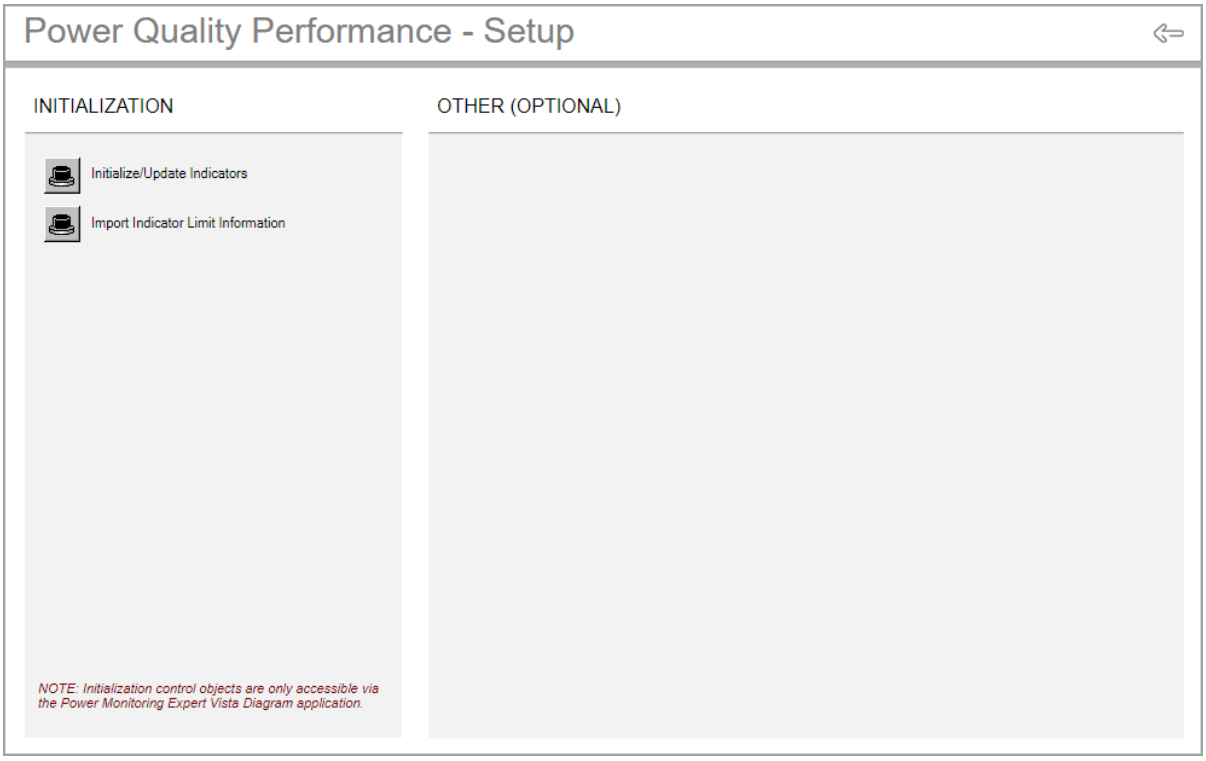
Use the **Import Indicator Limit Information** control to update the Power Quality Performance indicator limits after the limit table in the database has been updated.

The OTHER (OPTIONAL) area is intended for custom controls. This area is empty by default.

To open the setup page:

On the landing page, click the Setup icon . Click the Back icon to return to the landing page.

Example setup page:



For details on the diagrams, see:

- Power Quality Performance Indicator diagrams
- Power Quality Performance Equipment diagrams

Related topics:

- The Diagrams user interface
- User authentication
- Viewing historical (trend) data
- Viewing meter events
- Stale data and error indicators

- Power Quality Performance diagrams
- Insulation Monitoring diagrams
- UPS Auto Test diagrams
- EPSS diagrams
- Breaker Aging diagrams

For information on how to configure Diagrams, see Diagrams configuration.

Power Quality Performance Equipment diagrams

Overview

The Power Quality Equipment diagrams show status and operational details about the power quality equipment in your facility. The status indicators are color coded and provide more detailed information when clicked.

Diagrams

Power Quality Equipment diagram is organized into 3 levels:

1. Landing page
2. Group page
3. Details pages

1. Landing page

This page shows the status for each equipment type and a count for the number of devices of that type.

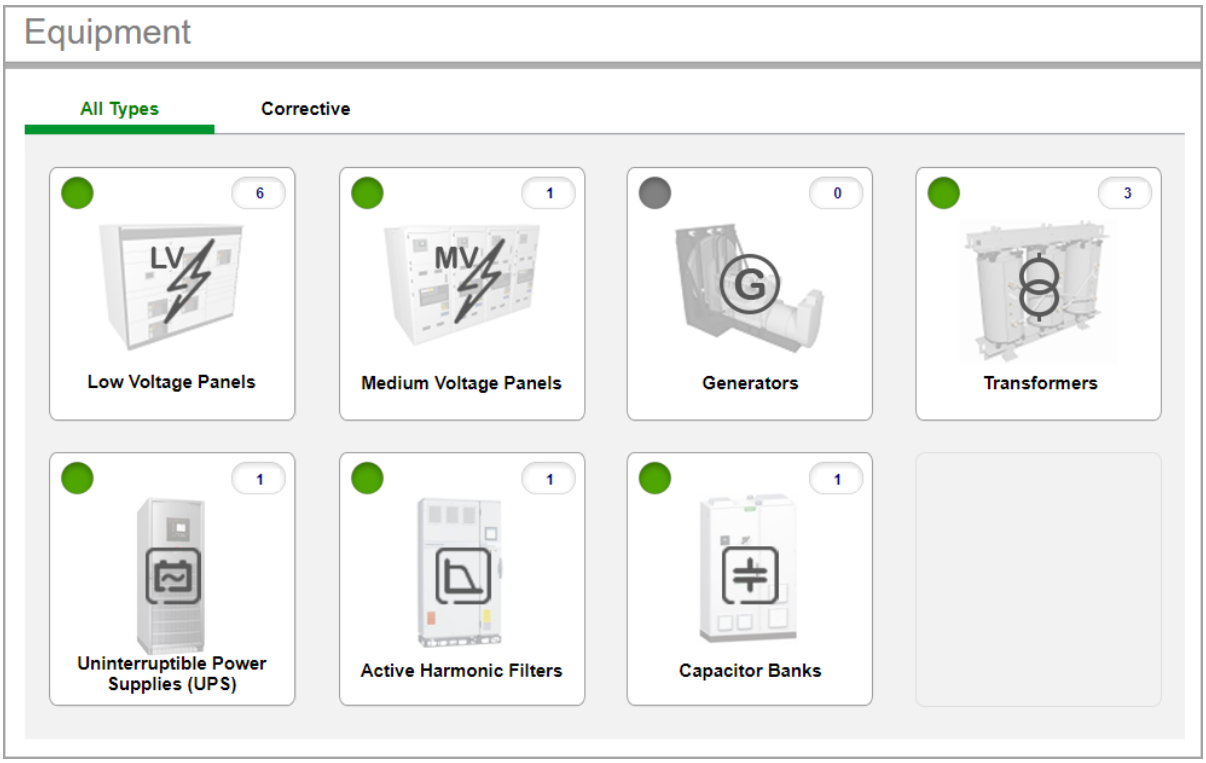
(Optional) Click **Corrective** in the top navigation area of the page to view only the corrective equipment types, click **All Types** to see all equipment.

To open the landing page:

On the Power Quality Performance Indicator diagrams landing page, click **Equipment** in the left navigation pane.

You can also click one of the buttons under **CORRECTIVE EQUIPMENT STATUS** on that page, to open the equipment group page for the devices grouped under the equipment type. The default types are Capacitor Banks, Active Harmonic Filters, and UPS.

Example landing page:



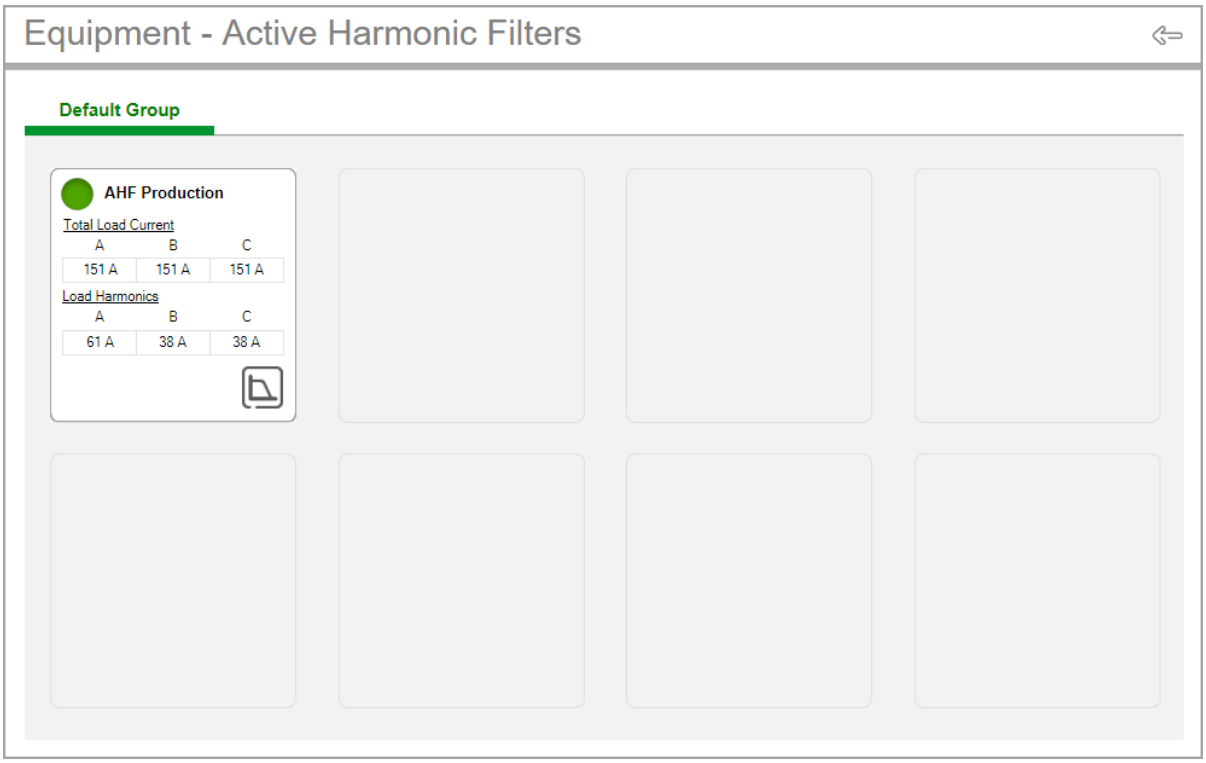
2. Group page

This page shows operational summary information for the equipment, such as load current and harmonics. Each piece of equipment is shown with its own display area.

To open a group page:

On the landing page, click one of the equipment types. Click the Back icon to return to the landing page.

Example group page:



3. Details page

This page shows detailed operational information for the equipment, including device status, and maintenance indicators.

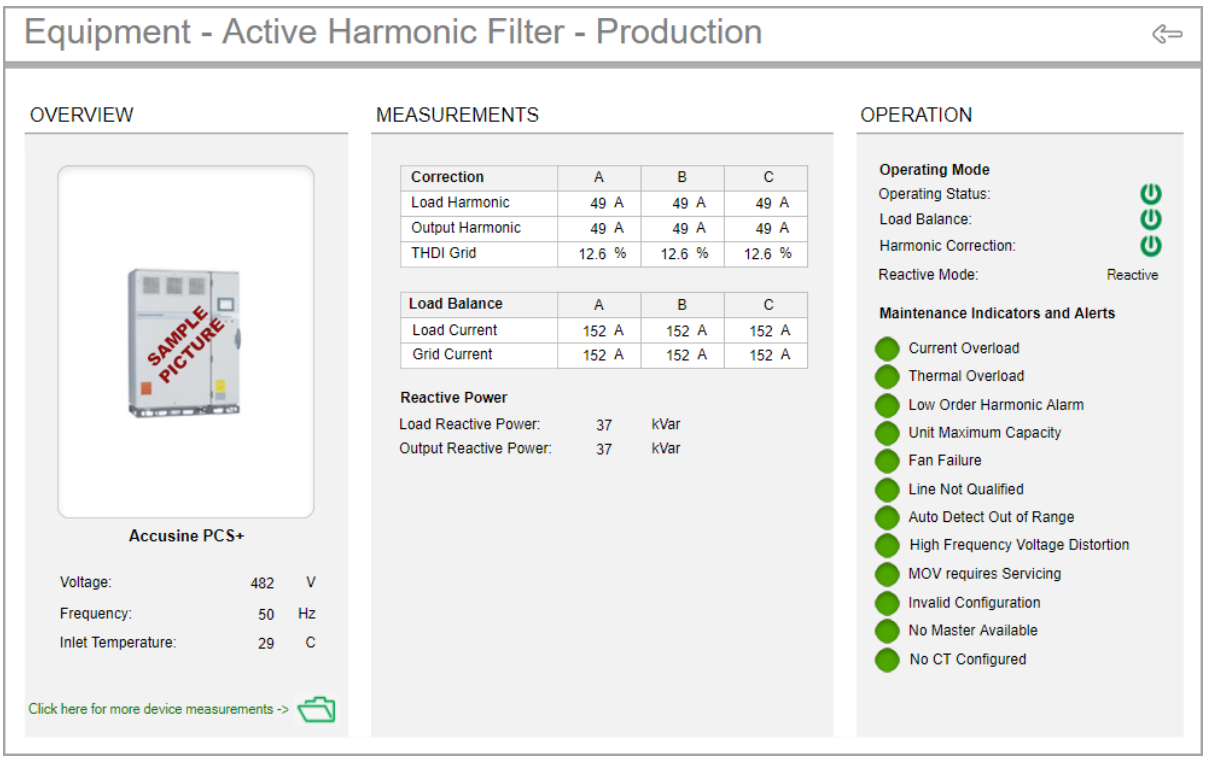
To open a details page:

On a group page, click inside a specific equipment area to open the details page for that item.

To view additional measurements for the device, click the folder icon in the OVERVIEW area on the details page to open a device diagram for this equipment.

Click the Back icon to return to the landing page.

Example details page:



For details on the diagrams, see:

- Power Quality Performance Indicator diagrams
- Power Quality Performance Equipment diagrams

Related topics:

- The Diagrams user interface
- User authentication
- Viewing historical (trend) data
- Viewing meter events
- Stale data and error indicators
- Power Quality Performance diagrams
- Insulation Monitoring diagrams
- UPS Auto Test diagrams
- EPSS diagrams
- Breaker Aging diagrams

For information on how to configure Diagrams, see Diagrams configuration.

Insulation Monitoring diagrams

NOTE: These diagrams are part of the Insulation Monitoring Module. This Module requires a separate license. The module must be configured before the diagrams can be used.

The Insulation Monitoring diagrams show insulation status and other insulation related measurements. Use these diagrams to monitor and analyze the insulation status of your ungrounded IT power system.

Different diagrams are provided for ANSI and IEC applications:

- Insulation Monitoring diagrams for ANSI
- Insulation Monitoring diagrams for IEC

Related topics:

- The Diagrams user interface
- User authentication
- Viewing historical (trend) data
- Viewing meter events
- Performing manual control actions
- Stale data and error indicators
- Power Quality Performance diagrams
- Insulation Monitoring diagrams
- UPS Auto Test diagrams
- EPSS diagrams
- Breaker Aging diagrams

For information on how to configure Diagrams, see Diagrams configuration.

Insulation Monitoring diagrams for ANSI

The Insulation Monitoring module includes several diagrams that show the electrical status of the areas and circuits that are being monitored.

This section describes each type of diagram.

See the following topics:

- Using the diagrams
- Data logs

Different diagrams are provided for ANSI and IEC regulated applications:

- Insulation Monitoring diagrams for ANSI
- Insulation Monitoring diagrams for IEC

Related topics:

- The Diagrams user interface
- User authentication
- Viewing historical (trend) data
- Viewing meter events
- Stale data and error indicators
- Power Quality Performance diagrams
- Insulation Monitoring diagrams
- UPS Auto Test diagrams
- EPSS diagrams
- Breaker Aging diagrams

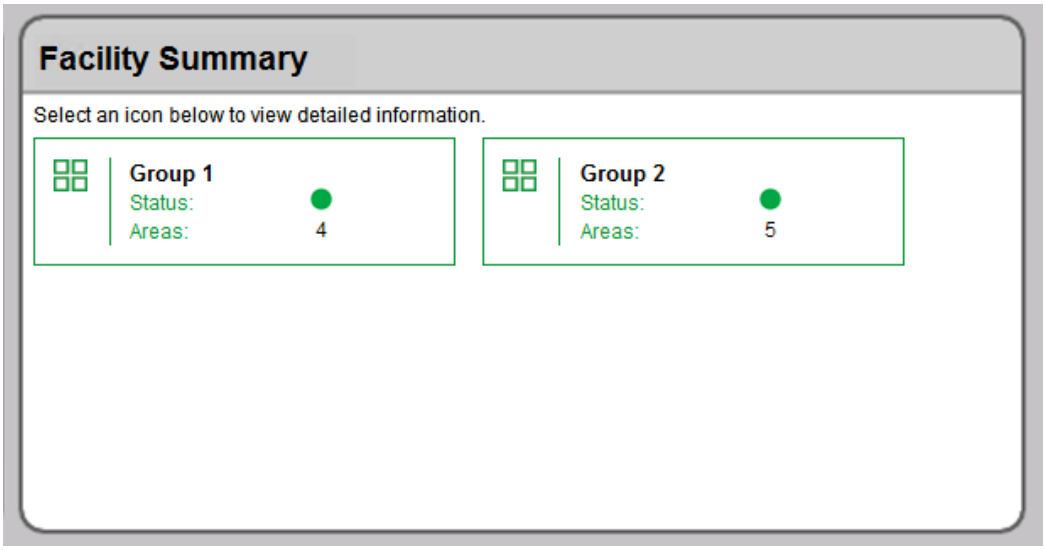
For information on how to configure Diagrams, see Diagrams configuration.

Using the diagrams

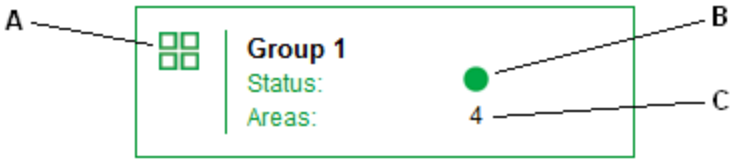
The insulation monitoring diagrams display overview or detail information as well as status.

Facility Summary diagram

The Facility Summary diagram shows each group that contains a number of areas.



The Facilities Summary diagram shows all the groups of areas that were configured for the facility. Each box in the main area represents a group of areas. This diagram provides a status overview and links to areas in the facility, as shown next:



A	**Group Icon** – Click the group icon to see the area diagram.
B	**Status Indicator** – This indicator is green or red to show the general status of the isolated power system: • **Green** – Normal condition. The Total Hazard Current measurements for all areas in this group are below the limit. • **Red** – Alarm condition. The Total Hazard Current measurement in one or more areas in this group exceeds the limit, or a LIM-IG6 is in test mode. **NOTE**: A LIM-IG6 test lasts 5 to 30 seconds. When the test is complete, the status indicator changes back to green. If an insulation fault has occurred, the indicator remains red until the fault is corrected. Example of an alarm indication: 
C	**Areas** Total number of monitored areas in this facility.

Recommended Actions for Alarm Condition Indication

1. Click the Group icon to open the Areas diagram. One or more area boxes will show an alarm condition.
2. Click the specific area icons to open the Area Details diagrams. One or more panel boxes will show an alarm condition. If the optional circuit fault locator devices are installed, the panel box also indicates each circuit that has a resistance fault.

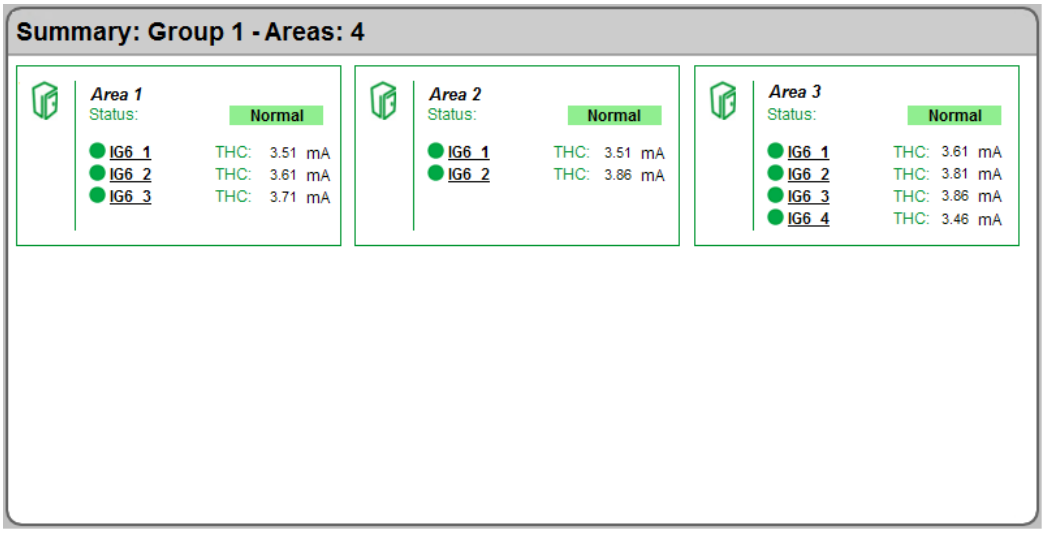
   NOTE: Some types of electrical faults can occur and not be indicated by the individual circuit fault locators. Only the area status indicator turns red. See Indicators for capacitive faults for details.

3. Notify the responsible person that can address the condition for the area and specific circuits.

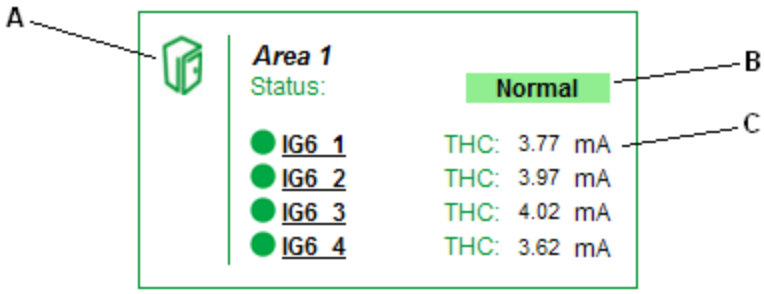
Summary of Areas diagram

The Summary of Areas diagram shows an overview of each area in the facility. Each box represents a single area.

Example:

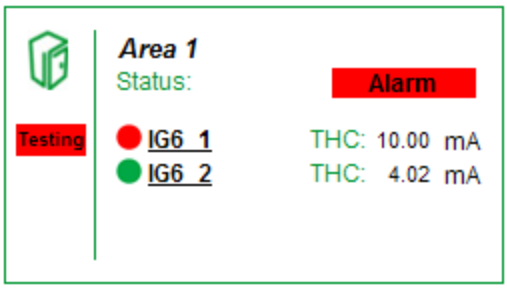


Each box represents a single area and contains the following information:

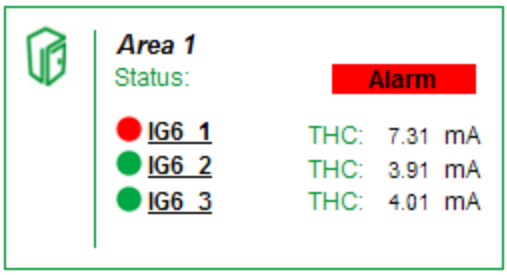


A	**Area Icon** – Click the area icon to see LIM-IG6 and circuit details for the area.
B	**Area Status Indicator** – Indicates the general conditions of the area. This indicator is either green "Normal" or red "Alarm". If the indicator is red, one or more IG6 monitors are in test mode or the Total Hazard Current measurement exceeds the limit.
C	**LIM-IG6 Status and Current Indicators** – Displays the insulation status and real-time Total Hazard Current, in mA, for each LIM-IG6 in the area. Up to six LIM-IG6 monitors can be installed in an area. The indicator changes to red if the LIM-IG6 is in test mode or if a THC measurement exceeds the limit. When in test mode, the THC measurement changes to 10.0 mA and the red "Testing" label appears next to the LIM-IG6 name. The test lasts 5 to 30 seconds. When the test is complete, the color changes to green. If a LIM-IG6 detects an insulation alarm, the THC measurement shows the real-time THC value.

LIM-IG6 in test mode:



LIM-IG6 in alarm condition:

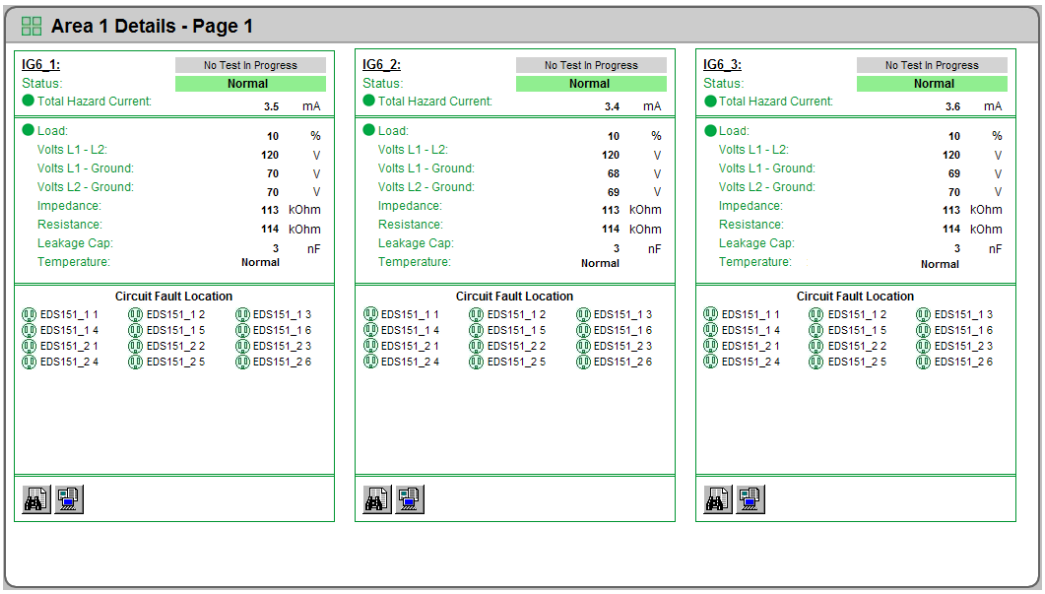


Area Details diagram

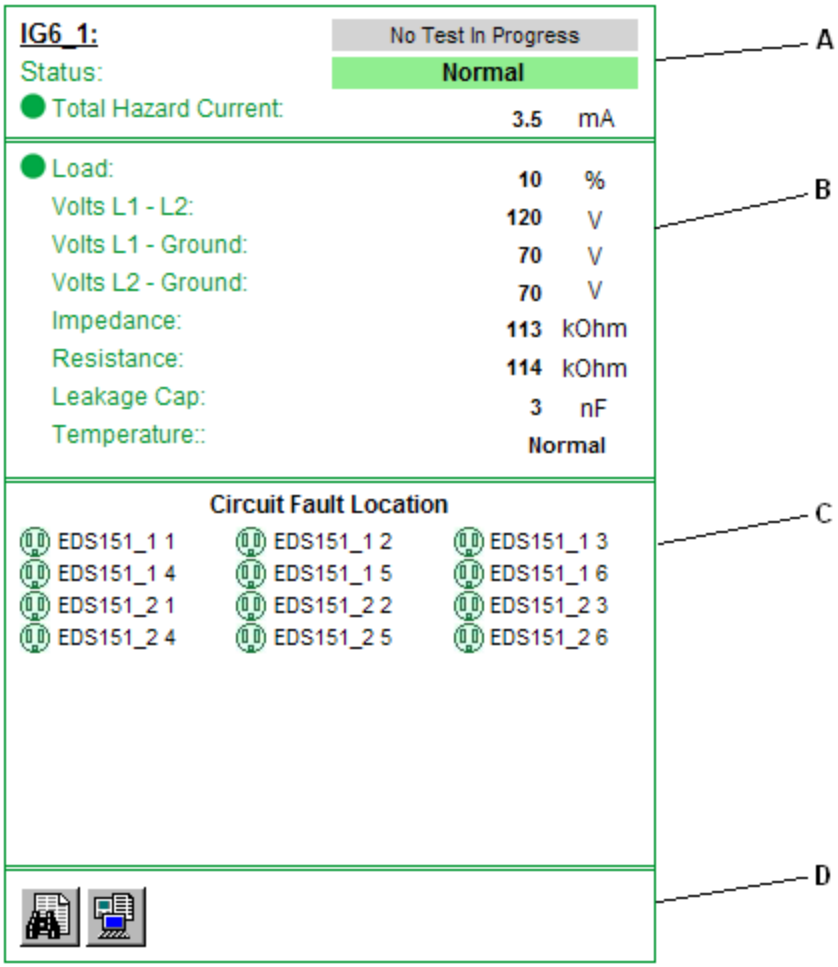
The Area Details diagram shows the details for each LIM-IG6 and connected devices in an area. The Area Details diagram can show up to 3 LIM-IG6 monitors. If more than 3 monitors are in the diagram, click the arrow in the upper right corner to see other monitors.

NOTE: For 208/240V systems, one LIM-IG6 can be shared between 2 areas. In this case, the monitor appears on both area diagrams.

For example, the following image shows a diagram of the area and LIM-IG6 details:



Each LIM-IG6 area contains these sections to provide specific information about the circuit conditions:

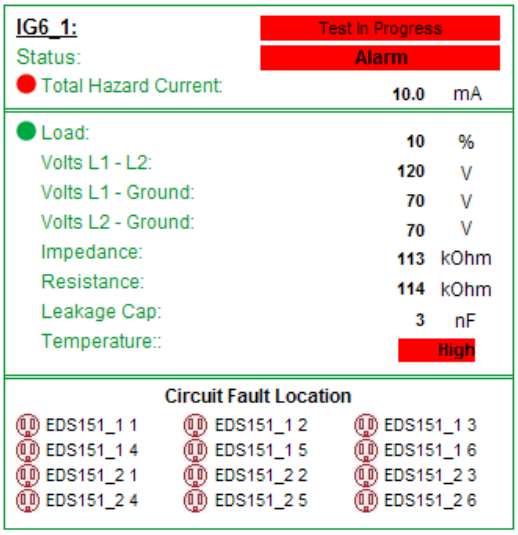


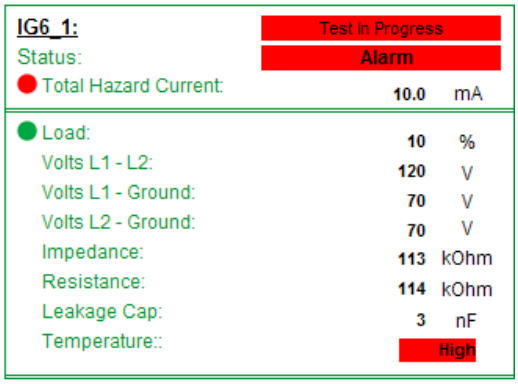
A	**LIM-IG6 Status** – Displays the name and status of the monitor, real-time THC measurement, and test status. The THC measurement is taken directly from the LIM-IG6. This indicator is either green "Normal" or red "Alarm". If the indicator is red, one or more panels are in test mode or circuits in the area have THC measurements above the limit. The red "Test In Progress" label appears when someone starts a LIM-IG6 test. A test is started by pressing the test button on the LIM-IG6 or by pressing the test button on the remote test device. This label remains visible during the test. See Indicators for Test Mode and Alarm condition for details.

B	**Measurements** – Displays the real-time measurements for the components connected to the LIM-IG6. • **Load** – Optional. Displays the transformer load if the circuit transformer is connected to the LIM-IG6. The status indicator turns red if the overload percentage exceeds the threshold defined for the transformer. • **Volts L1 - L2** – Voltage between L1 and L2, in V. • **Volts L1 - Ground** – Voltage between L1 and Ground, in V. • **Volts L2 - Ground** – Voltage between L2 and Ground, in V. • **Impedance** – Impedance Zf in kΩ. • **Resistance** – Resistance Rf in kΩ. • **Leakage** – Leakage capacitance in nF. • **Temperature** – Optional. The status of the transformer temperature, according to the over-temperature sensor. This appears only if the temperature sensor is installed with the transformer. The value changes to red "High" if the temperature exceeds the threshold.
C	**Circuit Status** – Appears only if the optional circuit fault locator is connected to the LIM-IG6. This area shows the status for each circuit being monitored. If the LIM-IG6 detects a resistance fault, the circuit monitor identifies the specific circuit and the circuit indicator turns red. When any indicator turns red, the alarm status propagates up to the top-level Facility Summary diagram. If the LIM-IG6 is in test mode, all circuit indicators turn red. See examples below for indicators in test or alarm condition.
D	**Event Log and Data Log** – Contains links to the historical data log and event log for the panel measurements. See Data logs for more information.

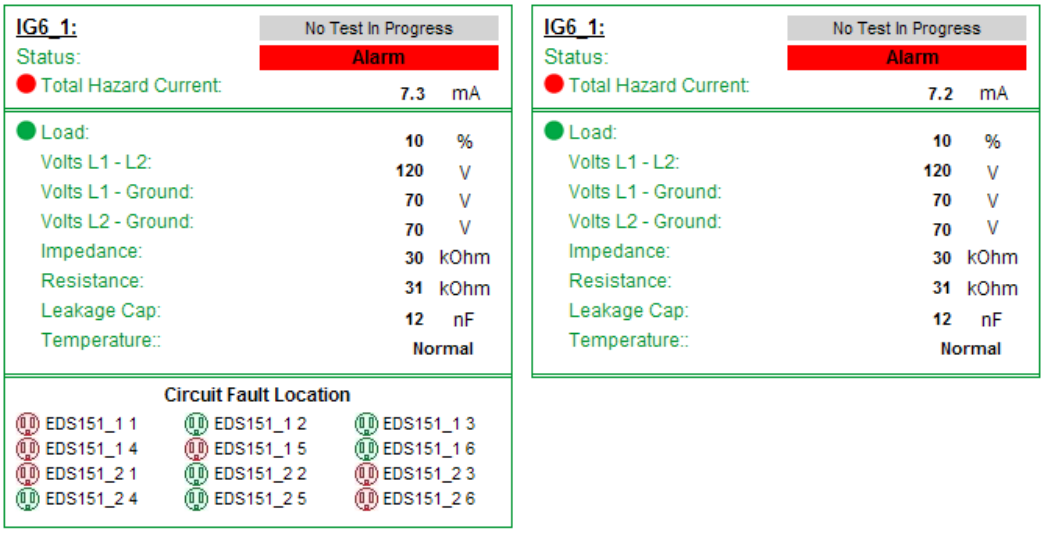
Indicators for Test Mode and Alarm condition

LIM-IG6 in test mode, with circuit fault locators (left) and without circuit fault locators (right):





LIM-IG6 in alarm condition, with circuit fault locators (left) and without circuit fault locators (right):



Indicators for capacitive faults

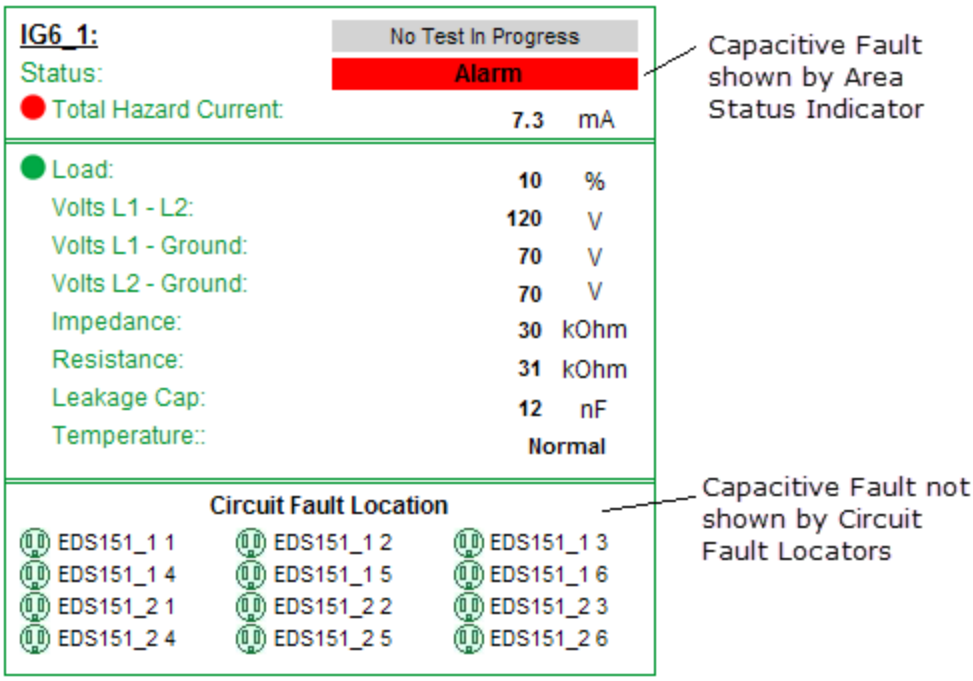
⚠ ⚠ DANGER

EQUIPMENT ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Do not ignore the main device hazard indicator when all circuit fault locator icons show green status.
- Determine and correct the cause of the fault if the main device hazard indicator shows a hazard.

Failure to follow these instructions will result in death or serious injury.

In some cases, such as when too many equipment items are connected to circuits, the LIM-IG6 detects a capacitance fault that exceeds the total hazard current (THC). For this situation, the room **Status** area shows the hazard, as shown next. However, if the optional circuit fault locators are installed, the circuit indicators do not indicate the capacitive fault, because they show only resistance faults, as shown next:



If all the circuit fault indicators are green, as above, and the room **Status** area shows a hazard, appropriate personnel must determine and correct the cause of the fault.

See the following topics:

- Using the diagrams
- Data logs

Different diagrams are provided for ANSI and IEC regulated applications:

- Insulation Monitoring diagrams for ANSI
- Insulation Monitoring diagrams for IEC

Related topics:

- The Diagrams user interface
- User authentication
- Viewing historical (trend) data
- Viewing meter events
- Stale data and error indicators
- Power Quality Performance diagrams
- Insulation Monitoring diagrams
- UPS Auto Test diagrams
- EPSS diagrams
- Breaker Aging diagrams

For information on how to configure Diagrams, see Diagrams configuration.

Data logs

When you need details about circuit measurements and details, the Area Details diagram provides links to the historical data log and the event log. These logs provide measurement data for the 5-minute polling interval of the LIM-IG6. You can filter the data in the logs by date range.

When using the event log, you can also generate a graph that shows THC measurements plotted across time. If any THC measurement exceeds the hazard threshold, the graph includes a callout at the specific event point.

Historical data log and graph

The following figure shows the historical log table.

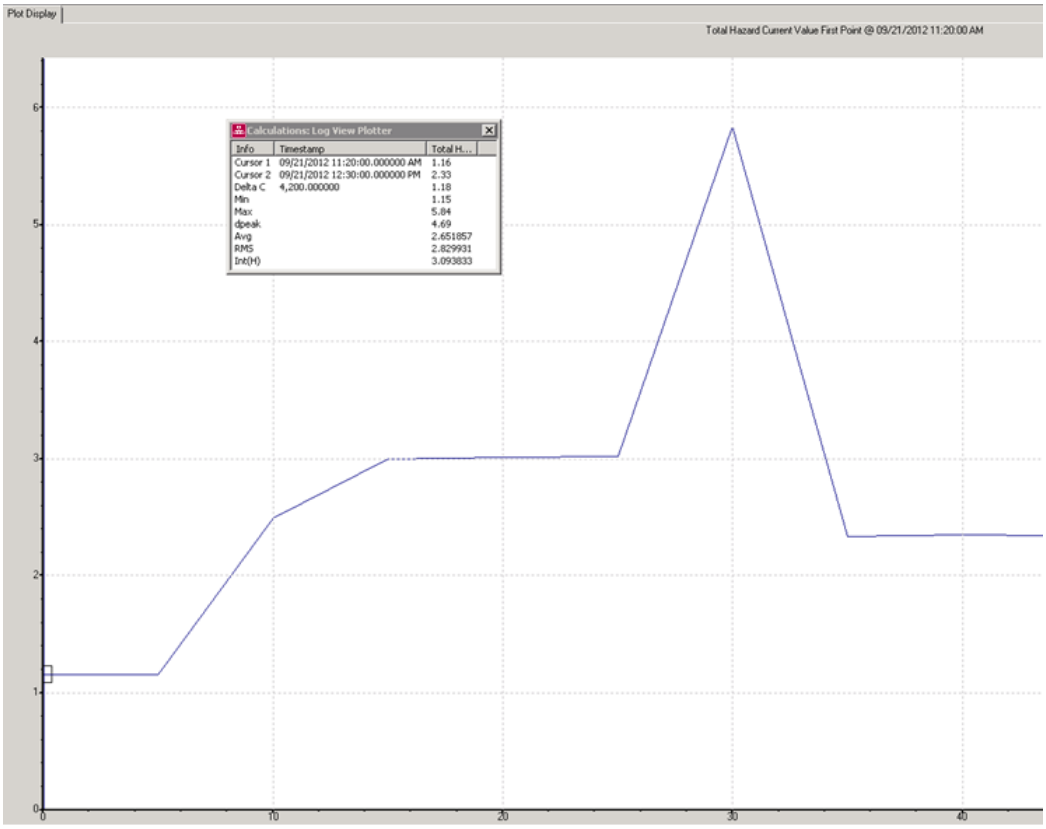
Device Diagram | Change Date Range | Show Graph

Node	Timestamp	Total Hazard Current Value	Load Percentage Value	Voltage L1-L2 Value	Voltage L1-Gnd Value	Voltage L2-Gnd Value	Impedance Value	Resistance Value	Capacitance Value
Hospital.IG6_1	1/29/2013 10:55:00.000 AM	3.800	10.000	127.000	10.000	122.000	113.000	114.000	3.000
Hospital.IG6_1	1/29/2013 10:50:00.000 AM	3.800	10.000	127.000	10.000	122.000	113.000	114.000	3.000
Hospital.IG6_1	1/29/2013 10:45:00.000 AM	3.800	10.000	127.000	10.000	122.000	113.000	114.000	3.000
Hospital.IG6_1	1/29/2013 10:40:00.000 AM	3.800	10.000	127.000	10.000	122.000	113.000	114.000	3.000
Hospital.IG6_1	1/29/2013 10:35:00.000 AM	3.800	10.000	127.000	10.000	122.000	113.000	114.000	3.000
Hospital.IG6_1	1/29/2013 10:30:00.000 AM	3.800	10.000	127.000	10.000	122.000	113.000	114.000	3.000
Hospital.IG6_1	1/29/2013 10:25:00.000 AM	3.800	10.000	127.000	10.000	122.000	113.000	114.000	3.000
Hospital.IG6_1	1/29/2013 10:20:00.000 AM	3.800	10.000	127.000	10.000	122.000	113.000	114.000	3.000
Hospital.IG6_1	1/29/2013 10:15:00.000 AM	3.800	10.000	127.000	10.000	122.000	113.000	114.000	3.000
Hospital.IG6_1	1/29/2013 10:10:00.000 AM	3.800	10.000	127.000	10.000	122.000	113.000	114.000	3.000
Hospital.IG6_1	1/29/2013 10:05:00.000 AM	3.800	10.000	127.000	10.000	122.000	113.000	114.000	3.000
Hospital.IG6_1	1/29/2013 10:00:00.000 AM	3.800	10.000	127.000	10.000	122.000	113.000	114.000	3.000
Hospital.IG6_1	1/29/2013 9:55:00.000 AM	3.800	10.000	127.000	10.000	122.000	113.000	114.000	3.000
Hospital.IG6_1	1/29/2013 9:50:00.000 AM	3.800	10.000	127.000	10.000	122.000	113.000	114.000	3.000
Hospital.IG6_1	1/29/2013 9:45:00.000 AM	3.800	10.000	127.000	10.000	122.000	113.000	114.000	3.000
Hospital.IG6_1	1/29/2013 9:40:00.000 AM	3.800	10.000	127.000	10.000	122.000	113.000	114.000	3.000
Hospital.IG6_1	1/29/2013 9:35:00.000 AM	3.800	10.000	127.000	10.000	122.000	113.000	114.000	3.000
Hospital.IG6_1	1/29/2013 9:30:00.000 AM	3.800	10.000	127.000	10.000	122.000	113.000	114.000	3.000
Hospital.IG6_1	1/29/2013 9:25:00.000 AM	3.800	10.000	127.000	10.000	122.000	113.000	114.000	3.000
Hospital.IG6_1	1/29/2013 9:20:00.000 AM	3.800	10.000	127.000	10.000	122.000	113.000	114.000	3.000
Hospital.IG6_1	1/29/2013 9:15:00.000 AM	3.800	10.000	127.000	10.000	122.000	113.000	114.000	3.000
Hospital.IG6_1	1/29/2013 9:10:00.000 AM	3.800	10.000	127.000	10.000	122.000	113.000	114.000	3.000
Hospital.IG6_1	1/29/2013 9:05:00.000 AM	3.800	10.000	127.000	10.000	122.000	113.000	114.000	3.000
Hospital.IG6_1	1/29/2013 9:00:00.000 AM	3.800	10.000	127.000	10.000	122.000	113.000	114.000	3.000
Hospital.IG6_1	1/29/2013 8:55:00.000 AM	3.800	10.000	127.000	10.000	122.000	113.000	114.000	3.000

The buttons located at the top of the table are:

- **Device Diagram** – Click this to return to the diagram.
- **Change Date Range** – Click this to view data for different dates. See "Select Date Range" below for more information.
- **Show Graph** – Select one or more column headers in the table and click this to see a graph of the data. The graph shows the data at 5-minute intervals. For example, you can check the **Total Hazard Current** option in the table and see the values. Click a point on the data line to see details for that value, as shown next.

The following figure shows the historical log table from the Vista client view:



Event Log

The following figure shows the event log table:

Device Diagram | Change Date Range

Node	Log	Timestamp	Cause	Cause Value	Effect	Effect Value	Priority	Ack Time	User Name
Hospital.IG6_1	EventLogCtl 1	12/6/2012 10:38:06.000 AM	Current I2 Alarm	No CT connected	-		100	1/28/2013 11:35:29 AM	supervisor
Hospital.IG6_1	EventLogCtl 1	12/6/2012 10:38:05.000 AM	Current I3 Alarm	InActive	-		100	-	-
Hospital.IG6_1	EventLogCtl 1	12/6/2012 10:38:05.000 AM	Current I2 Alarm	InActive	-		100	-	-
Hospital.IG6_1	EventLogCtl 1	12/6/2012 9:38:06.000 AM	Current I3 Alarm	No CT connected	-		100	1/28/2013 11:35:29 AM	supervisor
Hospital.IG6_1	EventLogCtl 1	12/5/2012 3:49:53.000 PM	Total Hazard Current Alarm	InActive	-		100	-	-
Hospital.IG6_1	EventLogCtl 1	12/5/2012 3:49:06.000 PM	Total Hazard Current Alarm	Active	-		100	1/28/2013 11:35:29 AM	supervisor
Hospital.IG6_1	EventLogCtl 1	12/1/2012 1:12:46.000 PM	Current I3 Alarm	InActive	-		100	-	-
Hospital.IG6_1	EventLogCtl 1	12/1/2012 1:12:46.000 PM	Current I2 Alarm	InActive	-		100	-	-
Hospital.IG6_1	EventLogCtl 1	12/1/2012 1:12:07.000 PM	Current I3 Alarm	No CT connected	-		100	1/28/2013 11:35:29 AM	supervisor
Hospital.IG6_1	EventLogCtl 1	12/1/2012 1:12:07.000 PM	Current I2 Alarm	No CT connected	-		100	1/28/2013 11:35:29 AM	supervisor
Hospital.IG6_1	EventLogCtl 1	12/1/2012 12:17:30.000 PM	Current I3 Alarm	InActive	-		100	-	-
Hospital.IG6_1	EventLogCtl 1	12/1/2012 12:17:30.000 PM	Current I2 Alarm	InActive	-		100	-	-
Hospital.IG6_1	EventLogCtl 1	12/1/2012 12:17:06.000 PM	Current I3 Alarm	No CT connected	-		100	1/28/2013 11:35:29 AM	supervisor
Hospital.IG6_1	EventLogCtl 1	12/1/2012 12:17:06.000 PM	Current I2 Alarm	No CT connected	-		100	1/28/2013 11:35:29 AM	supervisor
Hospital.IG6_1	EventLogCtl 1	12/1/2012 12:15:45.000 PM	Total Hazard Current Alarm	InActive	-		100	-	-
Hospital.IG6_1	EventLogCtl 1	12/1/2012 12:15:39.000 PM	Total Hazard Current Alarm	Active	-		100	1/28/2013 11:35:29 AM	supervisor
Hospital.IG6_1	EventLogCtl 1	12/1/2012 12:13:34.000 PM	Total Hazard Current Alarm	InActive	-		100	-	-
Hospital.IG6_1	EventLogCtl 1	12/1/2012 12:13:25.000 PM	Total Hazard Current Alarm	Active	-		100	1/28/2013 11:35:29 AM	supervisor
Hospital.IG6_1	EventLogCtl 1	12/1/2012 12:12:41.000 PM	Total Hazard Current Alarm	InActive	-		100	-	-
Hospital.IG6_1	EventLogCtl 1	12/1/2012 12:12:13.000 PM	Total Hazard Current Alarm	Active	-		100	1/28/2013 11:35:29 AM	supervisor
Hospital.IG6_1	EventLogCtl 1	12/1/2012 12:11:33.000 PM	Total Hazard Current Alarm	InActive	-		100	-	-
Hospital.IG6_1	EventLogCtl 1	12/1/2012 12:11:28.000 PM	Total Hazard Current Alarm	Active	-		100	1/28/2013 11:35:29 AM	supervisor
Hospital.IG6_1	EventLogCtl 1	12/1/2012 11:13:14.000 AM	Current I3 Alarm	InActive	-		100	-	-
Hospital.IG6_1	EventLogCtl 1	12/1/2012 11:13:14.000 AM	Current I2 Alarm	InActive	-		100	-	-

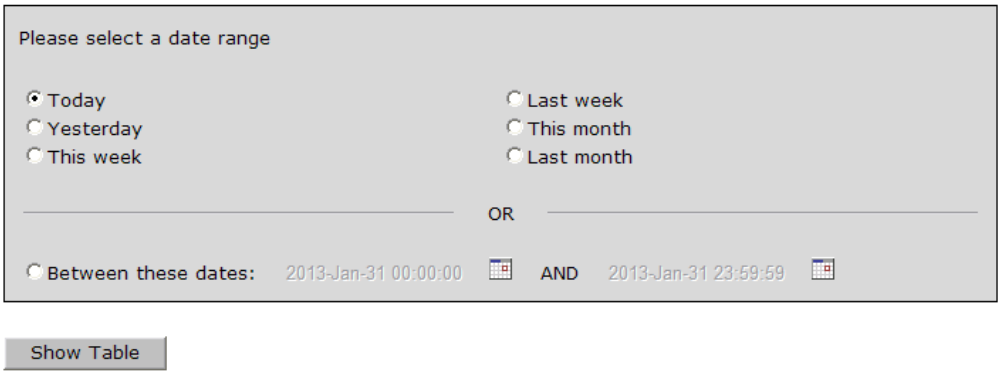
The buttons located at the top of the table are:

- **Device Diagram** – Click this to return to the diagram.
- **Change Date Range** – Click this to view data for different dates. See "Select Date Range" below for more information.

Select date range:

For either type of log table, you can select the date range for data you want to see. The default date range is "Today".

1. Click **Select Date Range**.



2. Select an available range or click **Between these dates** and select specific dates in the calendar.
3. Click **Show Table** to see the data.

If you select a date range of more than one week, a message appears to inform you that the table will be very long.

The new table appears.

See the following topics:

- Using the diagrams
- Data logs

Different diagrams are provided for ANSI and IEC regulated applications:

- Insulation Monitoring diagrams for ANSI
- Insulation Monitoring diagrams for IEC

Related topics:

- The Diagrams user interface
- User authentication
- Viewing historical (trend) data
- Viewing meter events
- Stale data and error indicators
- Power Quality Performance diagrams
- Insulation Monitoring diagrams
- UPS Auto Test diagrams
- EPSS diagrams
- Breaker Aging diagrams

For information on how to configure Diagrams, see Diagrams configuration.

Insulation Monitoring diagrams for IEC

The Insulation Monitoring module includes several diagrams that show the electrical status of the areas and circuits that are being monitored.

This section describes each type of diagram.

See the following topics:

- Using the diagrams
- Data logs

Different diagrams are provided for ANSI and IEC regulated applications:

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Related topics:

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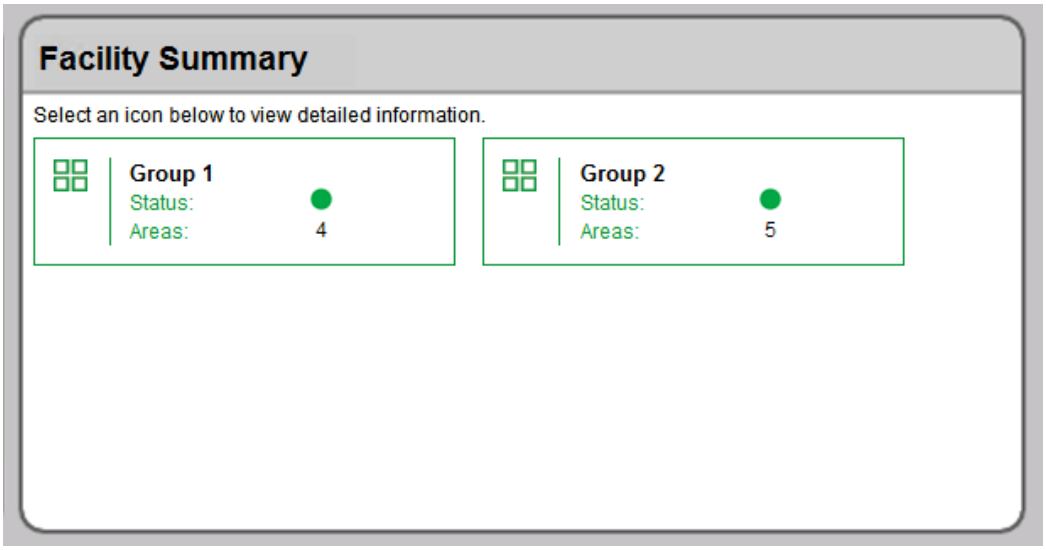
Using the diagrams

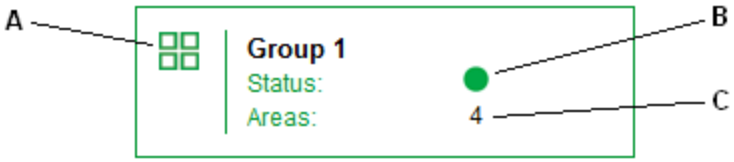
The insulation monitoring diagrams display overview or detail information as well as status.

Facility Summary diagram

The Facility Summary diagram shows each group that contains a number of areas.



The Facilities Summary diagram shows all the groups of areas that were configured for the facility. Each box in the main area represents a group of areas. This diagram provides a status overview and links to areas in the facility, as shown next:



A	**Group Icon** – Click the group icon to see the area diagram.
B	**Status Indicator** – This indicator is green or red to show the general status of the isolated power system: • **Green** – Normal condition. The insulation resistance measurements for all areas in this group is above the limit. • **Red** – Alarm condition. The insulation resistance measurements for one or more areas in this group are below the limit. Example of an alarm indication: 
C	**Areas** – Total number of monitored areas in this facility.

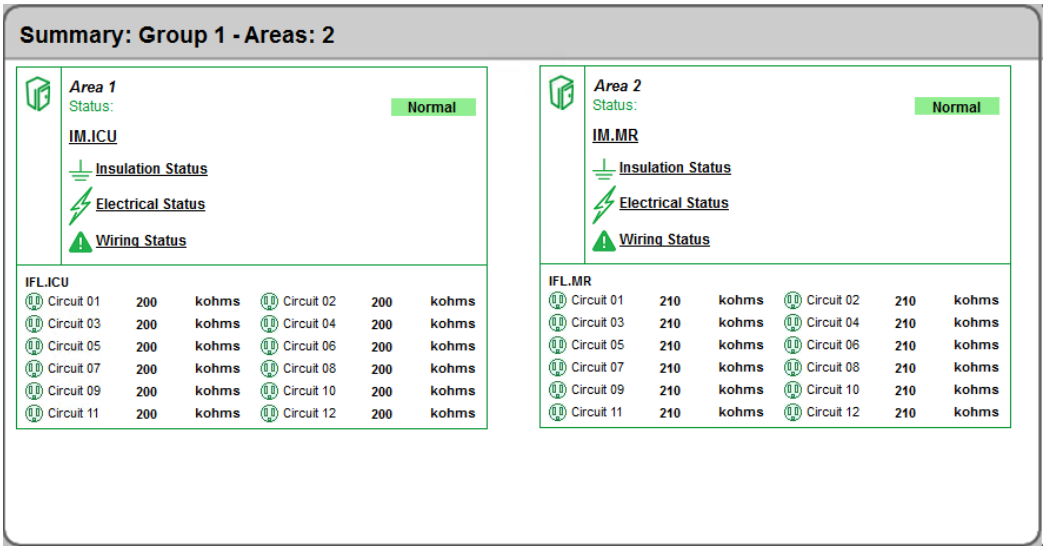
Recommended Actions for Alarm Condition Indication

1. Click the Group icon to open the Areas diagram. One or more area boxes will show an alarm condition. .
2. Click the specific area icons to open the Area Details diagrams. One or more panel boxes will show an alarm condition. If the optional circuit fault locator devices are installed, the panel box also indicates each circuit that has a resistance fault.
3. Notify the responsible person that can address the condition for the area and specific circuits.

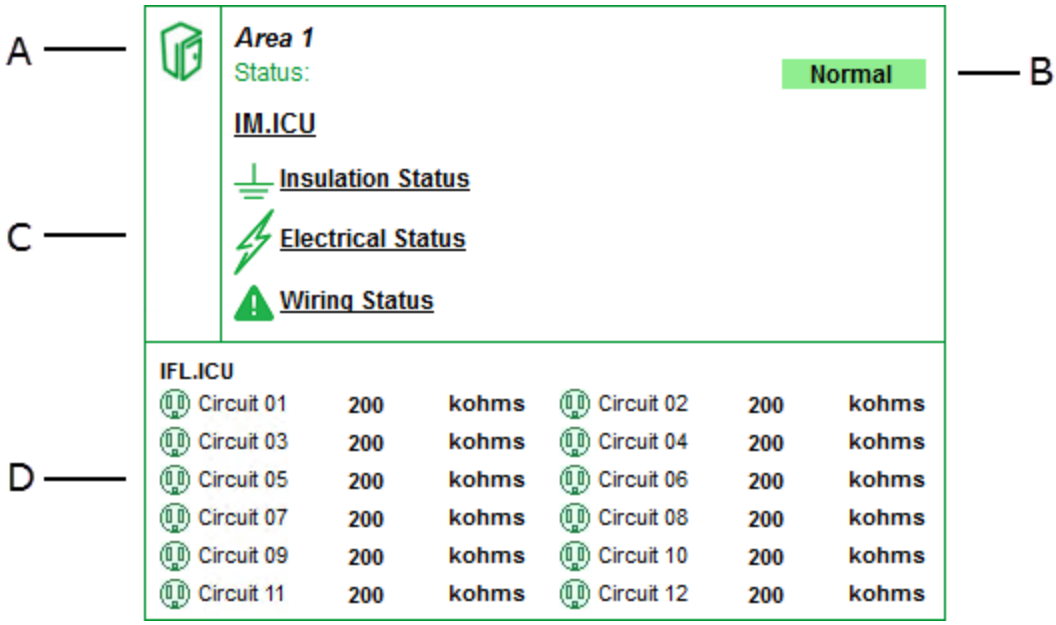
Summary of Areas diagram

The Summary of Areas diagram shows an overview of each area in the facility. Each box represents a single area.

Example:



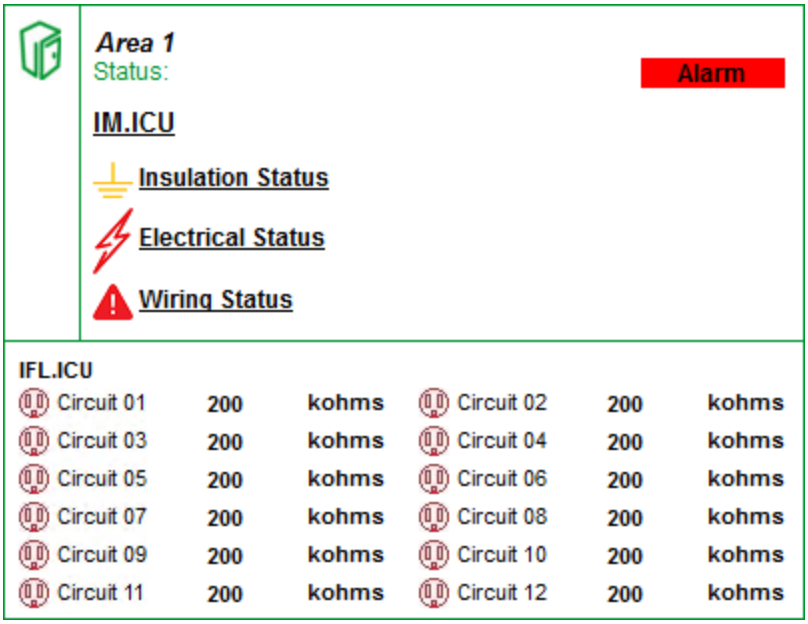
Each box represents a single area and contains the following information:



A	**Area Icon** – Click the area icon to see the details for the insulation monitoring device measurements for this area.
B	**Area Status Indicator** – Indicates the general conditions of the area. This indicator is either green "Normal" or red "Alarm". If the indicator is red, the insulation resistance measurement from the insulation monitoring device is below the limit.

C	**Area Information and Status Indicators** – Displays the area name, the insulation monitoring device, and the status indicators. If an alarm occurs in the room, these indicators show the specific type of alarm. • **Insulation Status** – Normal condition is green. If the impedance is lower than the threshold, the indicator turns orange. The impedance threshold is set on the insulation monitoring device. • **Electrical Status** – Normal condition is green. If the current transformer load or temperature exceed the threshold set on the insulation monitoring device, this indicator turns red. • **Wiring Status** – Normal condition is green. This indicator turns red if the device cannot monitor the isolation transformer.
D	**Circuit Status** – Appears only if the optional Insulation Fault Locator (IFL) device is installed. This area shows the status for each circuit being monitored. If the IFL detects a resistance fault, the circuit monitor identifies the specific circuit and the circuit indicator turns red. When any indicator turns red, the alarm status propagates up to the top-level Facility Summary diagram.

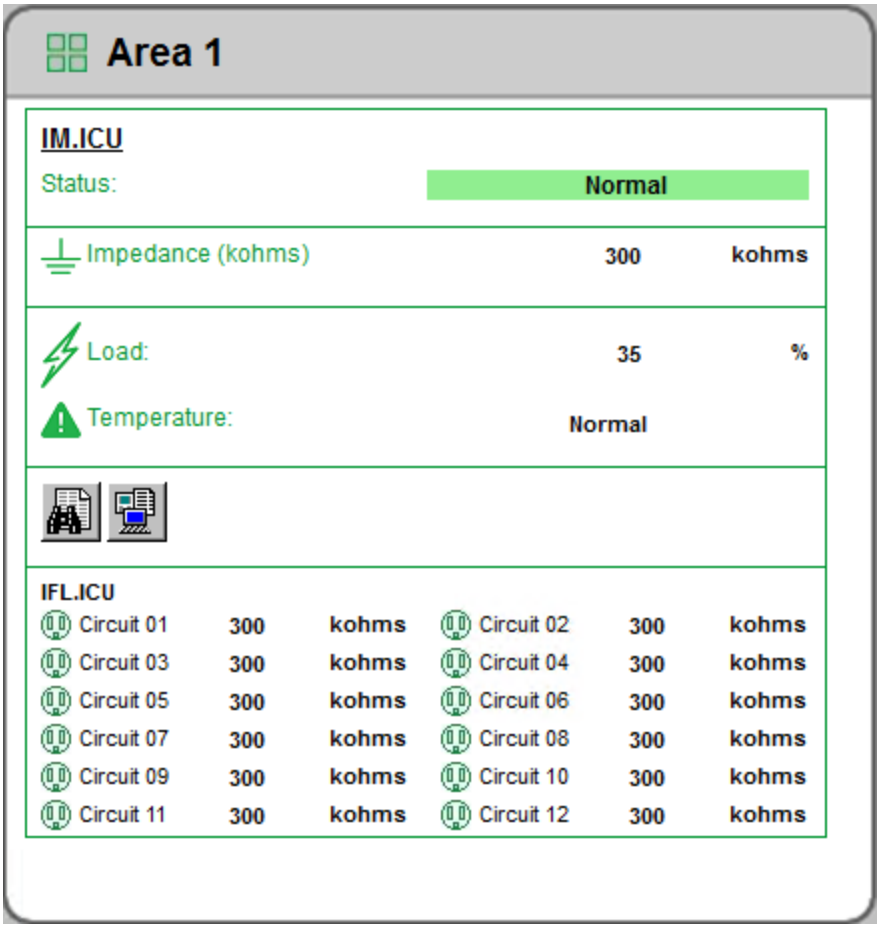
Status indicators in an alarm condition:



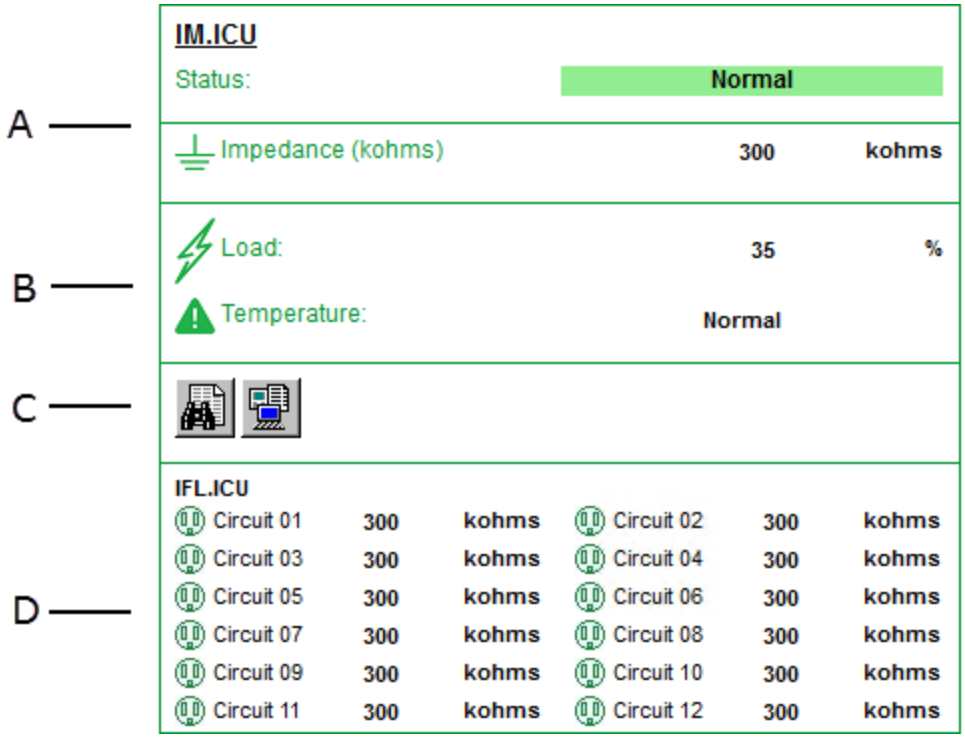
Area Details diagram

The Area Details diagram shows the details for the insulation monitoring and fault locator devices.

Example:

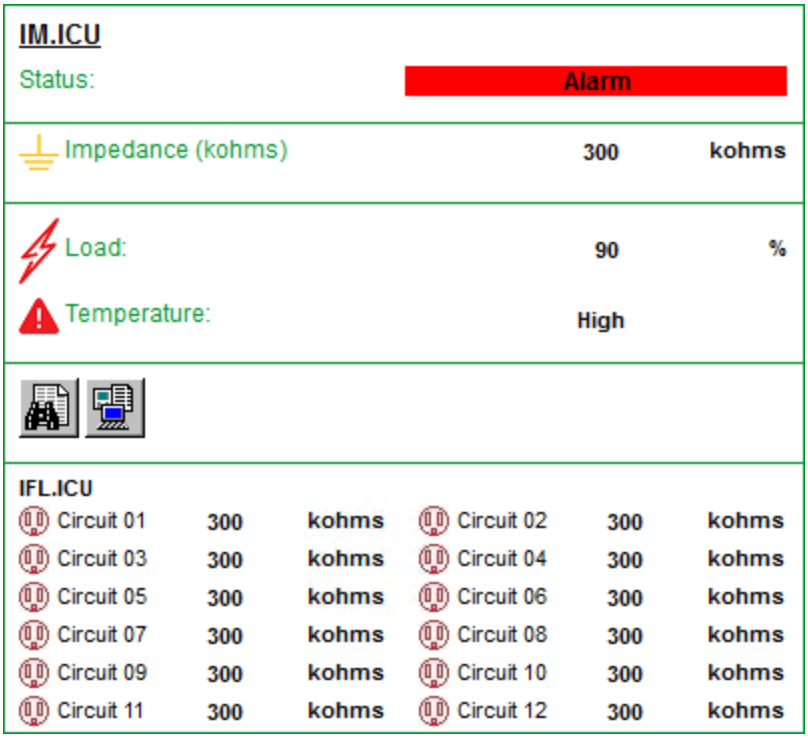


The diagram shows the following details:



A	**Device Name** – The group and name of the device in the area. **Insulation Monitoring Device Status** – Green = Normal, Red = Alarm. **Impedance** – The real-time measurement of the impedance to ground, in kiloohms. If the impedance is lower than the threshold, the indicator turns orange. The impedance limit is set on the insulation monitoring device.
B	**Transformer Indicators** – The load and temperature status for the current transfer • **Load** – If the current transformer load exceeds the threshold, this indicator turns red and displays the real-time load percentage value. • **Temperature** – If the current transformer temperature rises above the threshold, this indicator turns red and the status changes to "High."
C	**Event Log and Data Log** – Contains links to the historical data log and event log for the panel measurements. See Data logs for more information.
D	**Circuit Status** – Appears only if the optional Insulation Fault Locator (IFL) device is installed. This shows the status for each circuit being monitored. If the IFL detects a resistance fault, the circuit monitor identifies the specific circuit and the circuit indicator turns red. When any indicator turns red, the alarm status propagates up to the top-level Facility Summary diagram.

Example of status indicators in an alarm condition:



See the following topics:

- Using the diagrams
- Data logs

Different diagrams are provided for ANSI and IEC applications:

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Related topics:

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- User authentication
- Viewing historical (trend) data
- Viewing meter events
- Stale data and error indicators
- Power Quality Performance diagrams
- Insulation Monitoring diagrams
- UPS Auto Test diagrams
- EPSS diagrams
- Breaker Aging diagrams

For information on how to configure Diagrams, see Diagrams configuration.

Data logs

When you need details about circuit measurements and details, the Area Details diagram provides links to the historical data log and the event log. These logs provide measurement data for the 15-minute polling interval of the Vigilohm IM20-H. You can filter the data in the logs by date range.

Historical data log

The following image shows the historical log table from the Power Monitoring Expert view:

Device Diagram | Change Date Range | Show Graph

Node	Timestamp	Resistance Maximum kohms	Resistance Mean kohms	Transformer Load Current % Mean	Transformer Load Current % Maximum
OT_Group.IM20H_01	4/3/2013 12:15:00.000 PM	500.000	500.000	37.904	38.355
OT_Group.IM20H_01	4/3/2013 12:00:00.000 PM	500.000	500.000	37.863	38.256
OT_Group.IM20H_01	4/3/2013 11:45:00.000 AM	500.000	500.000	37.732	38.455
OT_Group.IM20H_01	4/3/2013 11:30:00.000 AM	500.000	500.000	37.909	38.660
OT_Group.IM20H_01	4/3/2013 11:15:00.000 AM	500.000	500.000	37.849	38.320
OT_Group.IM20H_01	4/3/2013 11:00:00.000 AM	500.000	500.000	37.705	38.560
OT_Group.IM20H_01	4/3/2013 10:45:00.000 AM	500.000	500.000	37.687	37.997
OT_Group.IM20H_01	4/3/2013 10:30:00.000 AM	500.000	500.000	37.658	38.092
OT_Group.IM20H_01	4/3/2013 10:15:00.000 AM	500.000	500.000	38.089	38.405
OT_Group.IM20H_01	4/3/2013 10:00:00.000 AM	500.000	500.000	37.837	38.286
OT_Group.IM20H_01	4/3/2013 9:45:00.000 AM	500.000	500.000	37.931	38.329
OT_Group.IM20H_01	4/3/2013 9:30:00.000 AM	500.000	500.000	38.065	38.491
OT_Group.IM20H_01	4/3/2013 9:15:00.000 AM	500.000	500.000	37.799	38.106
OT_Group.IM20H_01	4/3/2013 9:00:00.000 AM	500.000	500.000	37.363	38.120
OT_Group.IM20H_01	4/3/2013 8:45:00.000 AM	500.000	500.000	36.773	37.036
OT_Group.IM20H_01	4/3/2013 8:30:00.000 AM	500.000	500.000	36.563	37.142
OT_Group.IM20H_01	4/3/2013 8:15:00.000 AM	500.000	500.000	36.367	36.661
OT_Group.IM20H_01	4/3/2013 8:00:00.000 AM	500.000	500.000	36.406	36.854

The buttons located at the top of the table are:

- **Device Diagram** – Click this to return to the diagram.
- **Change Date Range** – Click this to view data for different dates. See "Select Date Range" below for more information.
- **Show Graph** – Select one or more column headers in the table and then click **Show Graph** to see a graph of the data. The graph shows the data at 5-minute intervals.

The following figure shows the historical log table from the Vista client view:

	Node	Timestamp	Resistance Maximum kohms	Resistance Mean kohms	Transformer Load Current % Mean	Transformer Load Current % Maximum
1	IEC.IM20H_01	03/12/2013 08:45:00.000 A	500	500	32.354	33.002
2	IEC.IM20H_01	03/12/2013 08:30:00.000 A	500	500	32.255	32.884
3	IEC.IM20H_01	03/12/2013 08:15:00.000 A	500	500	32.175	32.936
4	IEC.IM20H_01	03/12/2013 08:00:00.000 A	500	500	32.15	32.967
5	IEC.IM20H_01	03/12/2013 07:45:00.000 A	500	500	32.118	32.871
6	IEC.IM20H_01	03/12/2013 07:30:00.000 A	500	500	32.14	32.882
7	IEC.IM20H_01	03/12/2013 07:15:00.000 A	500	500	32.153	32.796
8	IEC.IM20H_01	03/12/2013 07:00:00.000 A	500	500	32.065	32.676
9	IEC.IM20H_01	03/12/2013 06:45:00.000 A	500	500	31.995	32.823
10	IEC.IM20H_01	03/12/2013 06:30:00.000 A	500	500	32.26	32.821
11	IEC.IM20H_01	03/12/2013 06:15:00.000 A	500	500	32.278	32.899
12	IEC.IM20H_01	03/12/2013 06:00:00.000 A	500	500	32.22	33.067
13	IEC.IM20H_01	03/12/2013 05:45:00.000 A	500	500	32.132	32.812
14	IEC.IM20H_01	03/12/2013 05:30:00.000 A	500	500	32.058	32.55
15	IEC.IM20H_01	03/12/2013 05:15:00.000 A	500	500	31.992	32.972
16	IEC.IM20H_01	03/12/2013 05:00:00.000 A	500	500	31.901	32.672
17	IEC.IM20H_01	03/12/2013 04:45:00.000 A	500	500	31.926	32.558
18	IEC.IM20H_01	03/12/2013 04:30:00.000 A	500	500	31.893	32.644
19	IEC.IM20H_01	03/12/2013 04:15:00.000 A	500	500	31.871	32.479
20	IEC.IM20H_01	03/12/2013 04:00:00.000 A	500	500	31.897	32.789
21	IEC.IM20H_01	03/12/2013 03:45:00.000 A	500	500	31.885	32.413
22	IEC.IM20H_01	03/12/2013 03:30:00.000 A	500	500	31.886	32.977
23	IEC.IM20H_01	03/12/2013 03:15:00.000 A	500	500	31.968	33.343

Event Log

The following figure shows the event log table from the Power Monitoring Expert view:

Device Diagram | Change Date Range

Node	Log	Timestamp	Cause	Cause Value	Effect	Effect Value	Priority	Ack Time	User Name
OT_Group.IM20H_01	EventLogCtl 1	4/2/2013 10:27:21.000 AM	Insulation Status Alarm	Insulation Status Alarm Inactive	Insulation Status Alarm	Insulation Status Alarm	200	-	-
OT_Group.IM20H_01	EventLogCtl 1	4/2/2013 10:27:17.000 AM	Resistance kohms	Resistance Register Active	Insulation Status Alarm	Resistance reached 190	200	-	-
OT_Group.IM20H_01	EventLogCtl 1	3/25/2013 2:33:11.000 PM	Insulation Status Alarm	Insulation Status Alarm Inactive	Insulation Status Alarm	Insulation Status Alarm	200	-	-
OT_Group.IM20H_01	EventLogCtl 1	3/25/2013 2:32:57.000 PM	Resistance kohms	Resistance Register Active	Insulation Status Alarm	Resistance reached 150	200	-	-
OT_Group.IM20H_01	EventLogCtl 1	3/25/2013 2:32:55.000 PM	Insulation Status Alarm	Insulation Status Alarm Inactive	Insulation Status Alarm	Insulation Status Alarm	200	-	-
OT_Group.IM20H_01	EventLogCtl 1	3/25/2013 2:32:49.000 PM	Resistance kohms	Resistance Register Active	Insulation Status Alarm	Resistance reached 300	200	-	-
OT_Group.IM20H_01	EventLogCtl 1	3/25/2013 12:09:37.000 PM	Insulation Status Alarm	Insulation Status Alarm Inactive	Insulation Status Alarm	Insulation Status Alarm	200	-	-
OT_Group.IM20H_01	EventLogCtl 1	3/25/2013 11:35:27.000 AM	Resistance kohms	Resistance Register Active	Insulation Status Alarm	Resistance reached 140	200	-	-
OT_Group.IM20H_01	EventLogCtl 1	3/25/2013 9:12:00.000 AM	Insulation Status Alarm	Insulation Status Alarm Inactive	Insulation Status Alarm	Insulation Status Alarm	200	-	-
OT_Group.IM20H_01	EventLogCtl 1	3/25/2013 9:11:49.000 AM	Resistance kohms	Resistance Register Active	Insulation Status Alarm	Resistance reached 160	200	-	-
OT_Group.IM20H_01	EventLogCtl 1	3/25/2013 8:05:57.000 AM	Insulation Status Alarm	Insulation Status Alarm Inactive	Insulation Status Alarm	Insulation Status Alarm	200	-	-
OT_Group.IM20H_01	EventLogCtl 1	3/25/2013 8:05:54.000 AM	Resistance kohms	Resistance Register Active	Insulation Status Alarm	Resistance reached 270	200	-	-
OT_Group.IM20H_01	EventLogCtl 1	3/25/2013 8:05:51.000 AM	Insulation Status Alarm	Insulation Status Alarm Inactive	Insulation Status Alarm	Insulation Status Alarm	200	-	-
OT_Group.IM20H_01	EventLogCtl 1	3/25/2013 8:05:17.000 AM	Resistance kohms	Resistance Register Active	Insulation Status Alarm	Resistance reached 230	200	-	-
OT_Group.IM20H_01	EventLogCtl 1	3/22/2013 3:52:23.000 PM	Insulation Status Alarm	Insulation Status Alarm Inactive	Insulation Status Alarm	Insulation Status Alarm	200	-	-
OT_Group.IM20H_01	EventLogCtl 1	3/22/2013 3:51:30.000 PM	Resistance kohms	Resistance Register Active	Insulation Status Alarm	Resistance reached 250	200	-	-

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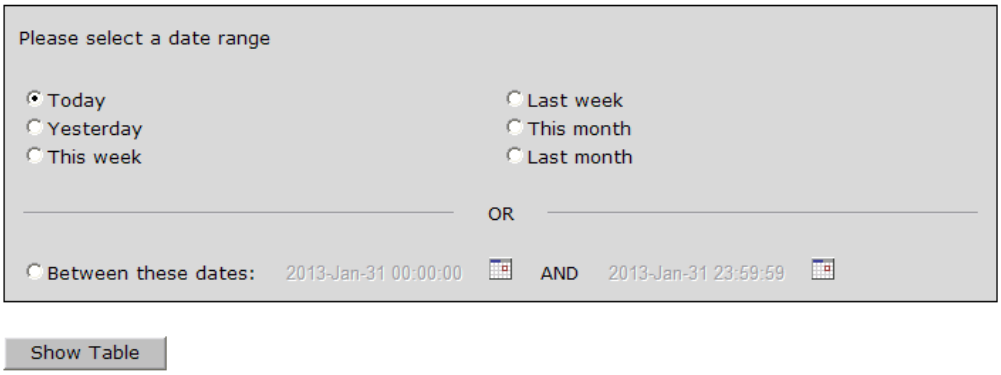

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3. Click **Show Table** to see the data.

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See the following topics:

- Using the diagrams
- Data logs

Different diagrams are provided for ANSI and IEC applications:

- Insulation Monitoring diagrams for ANSI
- Insulation Monitoring diagrams for IEC

Related topics:

- The Diagrams user interface
- User authentication
- Viewing historical (trend) data
- Viewing meter events
- Stale data and error indicators
- Power Quality Performance diagrams
- Insulation Monitoring diagrams
- UPS Auto Test diagrams
- EPSS diagrams
- Breaker Aging diagrams

For information on how to configure Diagrams, see Diagrams configuration.

UPS Auto Test diagrams

NOTE: These diagrams are part of the Backup Power Module. This Module requires a separate license. The module must be configured before the diagrams can be used.

Overview

The diagrams show status and operational details for the UPS devices.

Diagrams

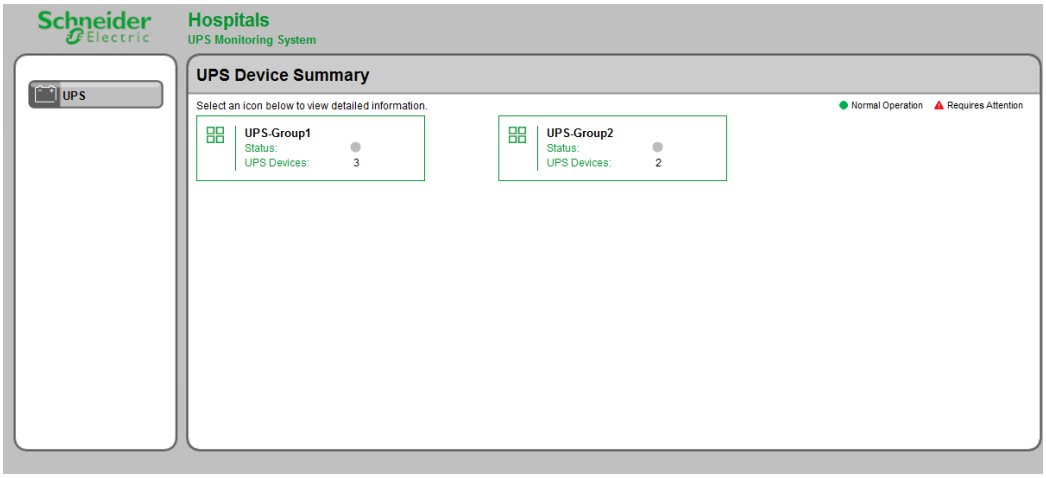
UPS Auto Test diagrams are organized into 3 levels:

1. Groups summary page
2. Group details pages
3. Device details pages

1. Groups summary page

This page shows a summary of the status for each UPS group.

Example groups summary page:

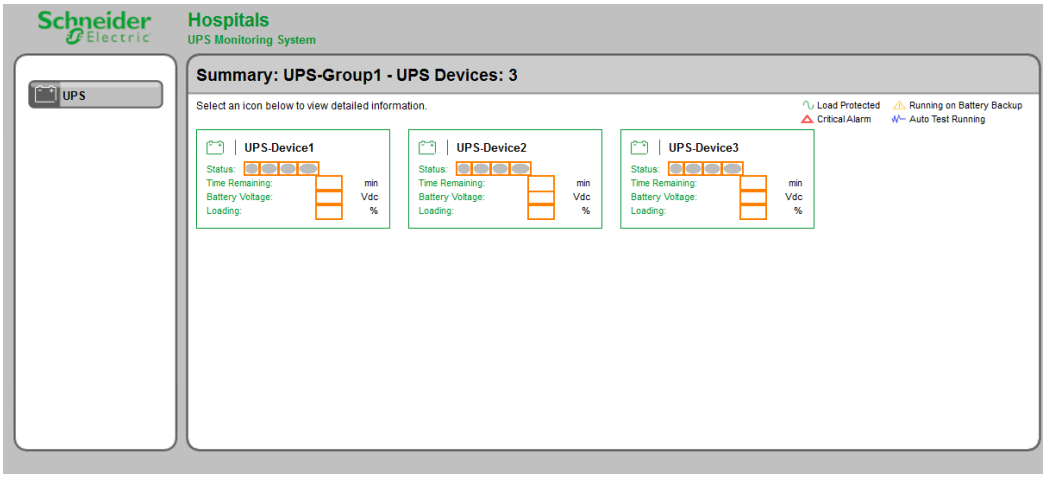


2. Group details page

This page shows details for each UPS device in the group.

TIP: Click the group icon for a group in the groups summary page to open the respective group details page.

Example group details page:



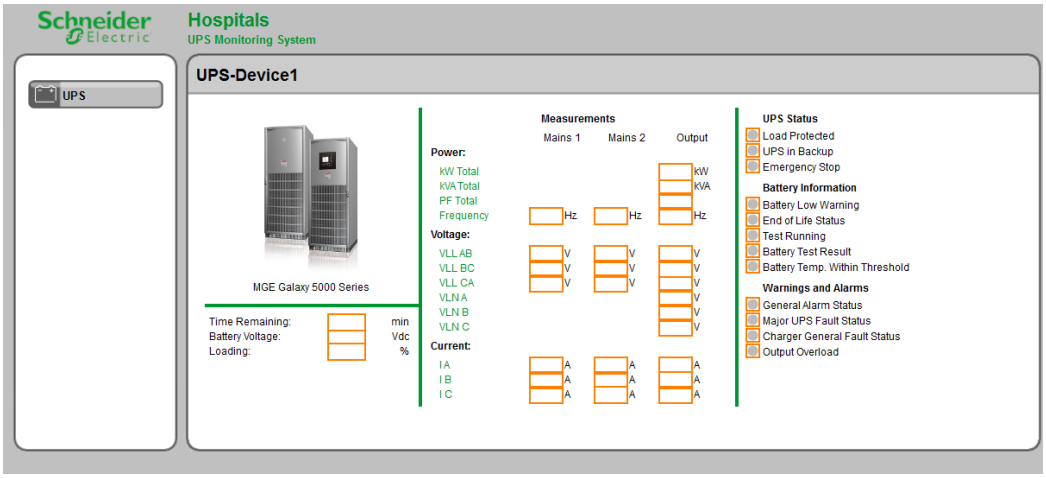
(The colored outline boxes around the measurements indicate that the diagram in this example is not linked to an actual UPS device.)

3. Device details page

This page shows details for a specific UPS device.

TIP: Click a battery icon for a UPS in the group details page to open the respective device details page.

Example device details page:



(The colored outline boxes around the measurements indicate that the diagram in this example is not linked to an actual UPS device.)

Related topics:

- The Diagrams user interface
- User authentication
- Viewing historical (trend) data
- Viewing meter events
- Performing manual control actions

- Stale data and error indicators
- Power Quality Performance diagrams
- Insulation Monitoring diagrams
- UPS Auto Test diagrams
- EPSS diagrams
- Breaker Aging diagrams

For information on how to configure Diagrams, see Diagrams configuration.

EPSS diagrams

NOTE: These diagrams are part of the Backup Power Module. This Module requires a separate license. The module must be configured before the diagrams can be used.

Overview

The diagrams show status and operational details for the generators and transfer switches that are part of the EPSS system.

Diagrams

EPSS diagrams are organized into 3 levels:

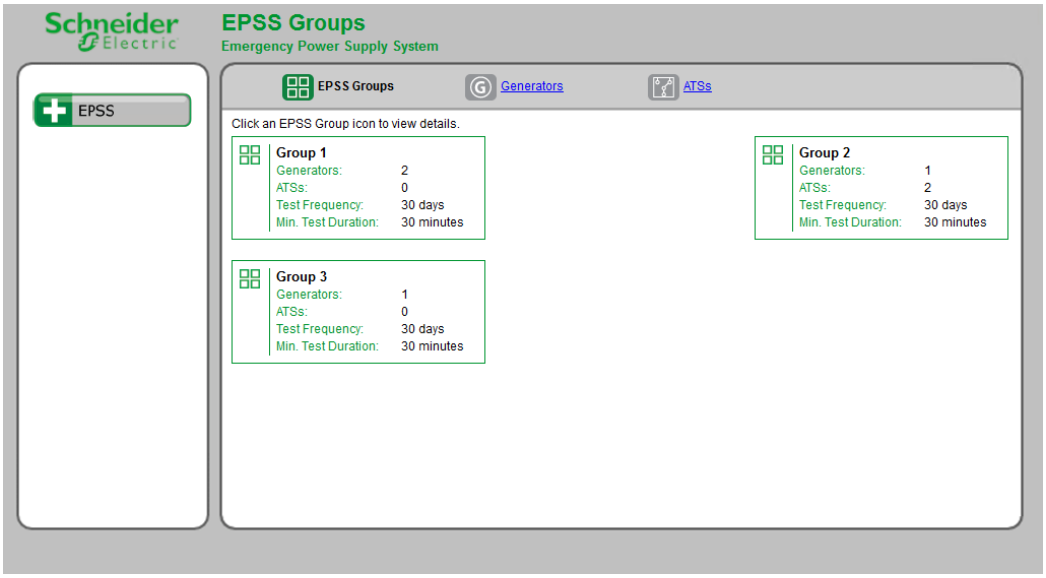
1. Groups summary page
2. Group details pages
3. Device details pages

In addition, there are summary pages for all the generators and all the transfer switches in the system.

1. Groups summary page

This page shows a summary for each EPSS group.

Example groups summary page:

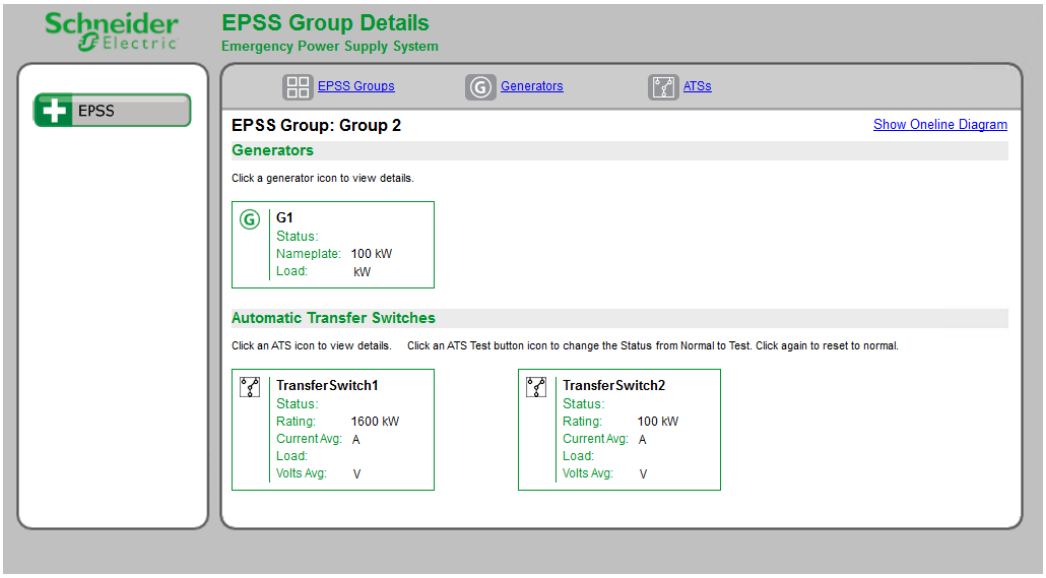


2. Group details page

This page shows details for each generator and transfer switch device in the group.

TIP: Click the group icon for a group in the groups summary page to open the respective group details page.

Example group details page:



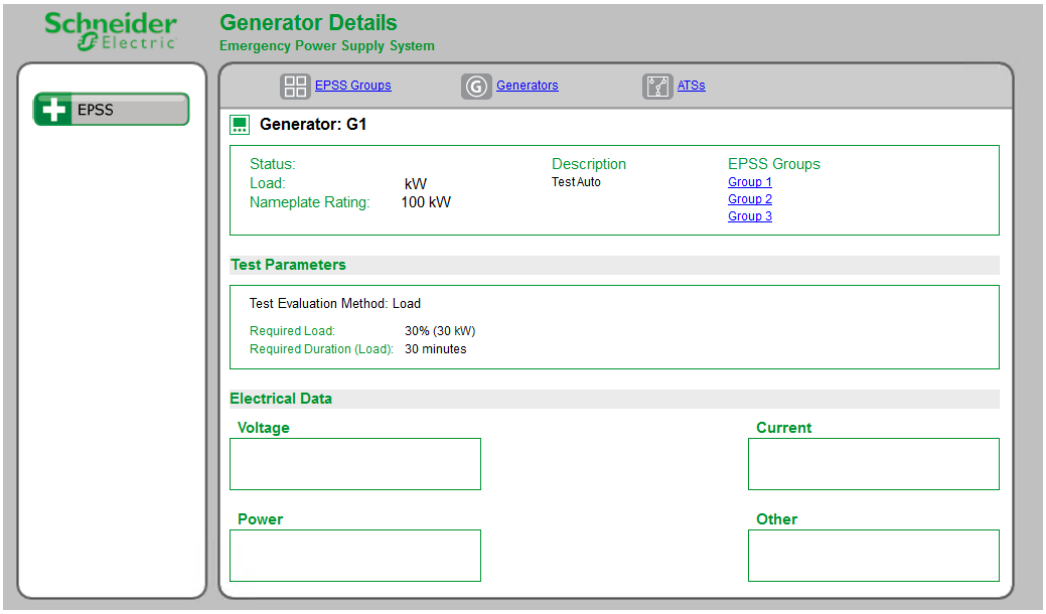
(No data is shown in this example because the diagram is not linked to actual devices.)

3. Device details page

This page shows details for a specific generator or transfer switch device.

TIP: Click a device icon for a generator or transfer switch in the group details page to open the respective device details page.

Example device details page:

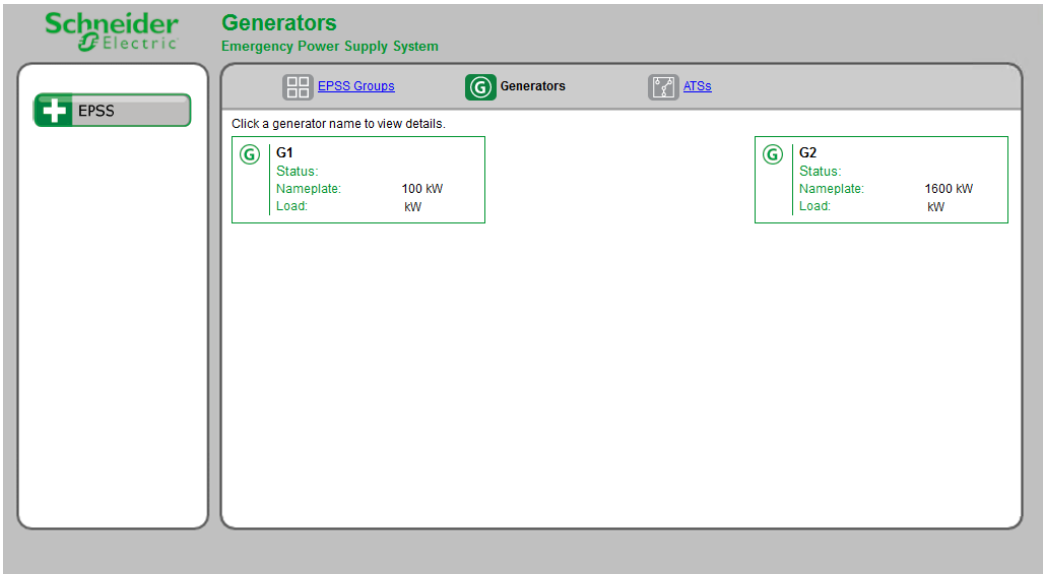


(No data is shown in this example because the diagram is not linked to actual devices.)

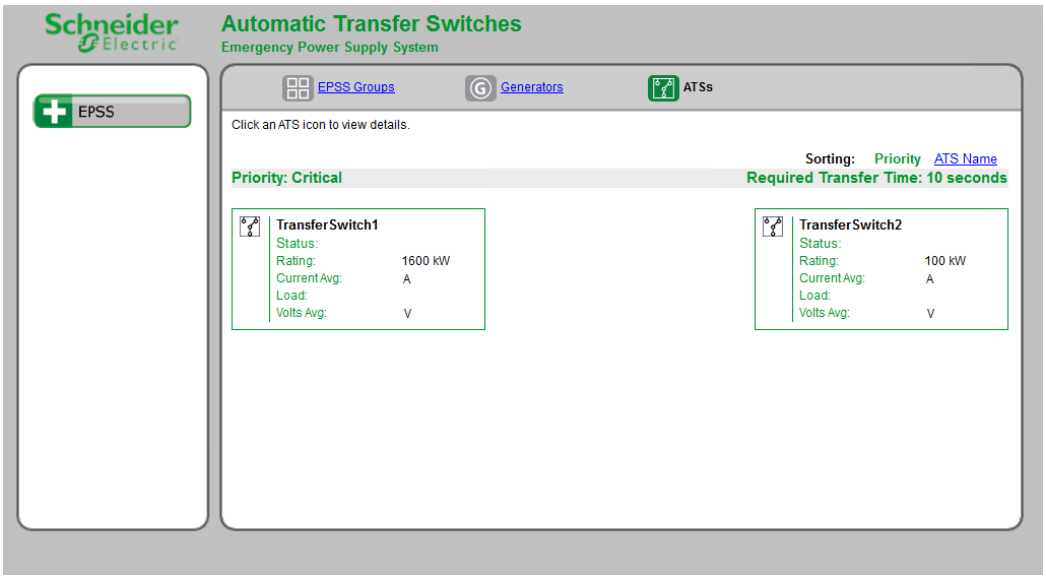
Summary pages

These pages show details for all the generators and all the transfer switches that are defined in the system.

Example generator summary page:



Example transfer switch summary page:



Related topics:

- The Diagrams user interface
- User authentication
- Viewing historical (trend) data
- Viewing meter events
- Performing manual control actions
- Stale data and error indicators
- Power Quality Performance diagrams
- Insulation Monitoring diagrams
- UPS Auto Test diagrams

- EPSS diagrams
- Breaker Aging diagrams

For information on how to configure Diagrams, see Diagrams configuration.

Breaker Aging diagrams

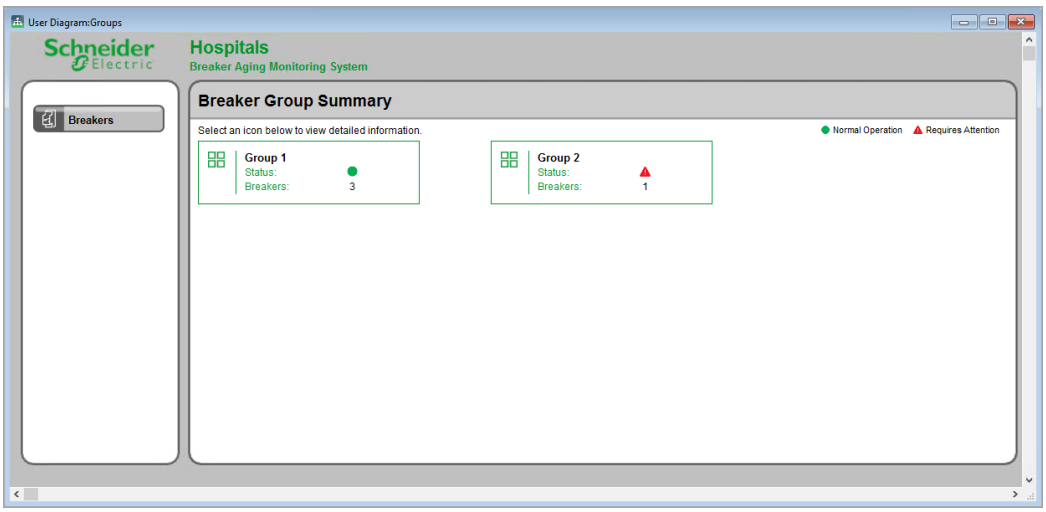
NOTE: These diagrams are part of the Breaker Performance Module. This Module requires a separate license. The module must be configured before the diagrams can be used.

The breaker aging diagrams show aging and wear related details for the breaker devices. There are three different types of diagrams: Group summary diagram, group details diagram, and switchboard details diagram.

Group Summary Diagram

The group summary diagram shows the group summary status and the number of breakers in the group, for each of the groups setup with the Breaker Configuration tool.

Example:

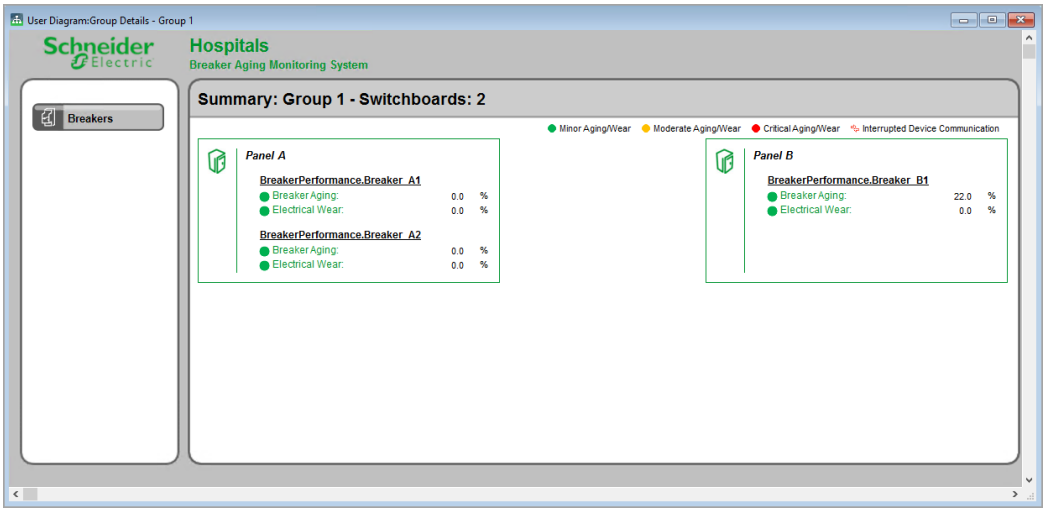


Group Details Diagrams

A group details diagram shows the switchboards that are part of the group and the breakers in each switchboard.

TIP: Click the group icon for a group in the groups summary page to open the respective group details page.

Example (shows details page for Group 1):

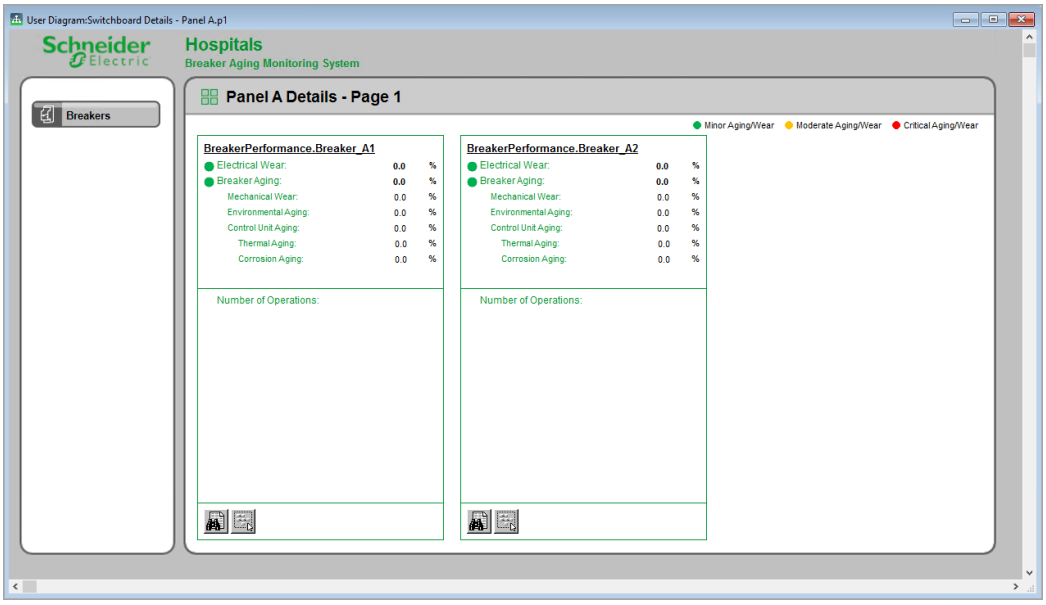


Switchboard Details Diagrams

A switchboard details diagram shows detailed information for each breaker in the switchboard.

TIP: Click the switchboard icon for a switchboard in the group details page to open the device details page.

Example (shows details for Panel A):



Related topics:

- The Diagrams user interface
- User authentication
- Viewing historical (trend) data
- Viewing meter events
- Performing manual control actions
- Stale data and error indicators

- Power Quality Performance diagrams
- Insulation Monitoring diagrams
- UPS Auto Test diagrams
- EPSS diagrams
- Breaker Aging diagrams

For information on how to configure Diagrams, see Diagrams configuration.

Reports

⚠ WARNING

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Do not use the software to control time-critical functions.
- Do not use the software to control remote equipment without proper access control and status feedback.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Use the Reports application to generate historical data reports. You can view the reports in PME or download them in different formats for sharing or storing externally. To generate a report, you can either run it manually, setup an automatic schedule, or define trigger events such as a system disturbance.

Reports are based on historical data that is stored in the PME database. A report can simply display the historical data, or it can process data to show patterns and relationships. The Tabular Report is an example of a simple report that shows data in a table. The Energy Modeling report is an example of a report that processes different types of input data to produce predictions and comparisons displayed in chart and diagram formats.

Reports are generated based on report templates. PME provides a wide range of default templates. You can change the colors and logo used for these templates. To customize the types of inputs or outputs of the default templates you need to create custom templates. Creating custom templates requires engineering work outside of PME.

The Reports user interface (UI) has two main areas: Report Library and Reports Display. To see a report in the Reports Display, you select the report in the Report Library.

TIP: You can open Reports from the **REPORTS** link in the Web Applications banner.

For more information see:

- Reports UI
- Generating a report
- Downloading a report

Report templates

The default PME report templates cover a wide range of applications. The templates are grouped into categories based on application. Choose the templates that best meet your reporting needs. The following table shows the default templates and folders.

NOTE: Some report templates are part of add-on software modules for PME. Those reports are enabled through the module licenses.

Category	Template	Licensing
Backup Power	- Generator Activity - Generator Battery Health - Generator Battery Health Export - Generator Load Summary - Generator Test EPSS - UPS Auto Test - UPS Battery Health	Needs Backup Power Module license.
Billing	- Billing - Billing Summary - Billing Verification - Multiple Billing - Multiple Billing Export	Needs Energy Billing Module license.
Breaker Performance	- Circuit Breaker Aging - Circuit Breaker Settings	Needs Breaker Performance Module license.
Energy Analysis	- Create Model - Duration Curve - Energy Regression Analysis - Energy Usage per State - KPI - Multiple Equipment Operation - Power Usage Per State - PUE Summary - Single Equipment Operation - Use Model	Needs Energy Analysis Reports Module license.

Category	Template	Licensing
Energy Management	- Calendar Trend Month - Calendar Trend Week - Consumption Ranking - Energy Comparison - Energy Cost - Energy Period over Period - Energy Usage - Energy Usage by Shift - Energy Usage by Time of Use (TOU) - Load Profile - Measurement Aggregation - Measurement Aggregation Export	Included in Base license, except for Measurement Aggregation Export. This report requires a Data Exchange Module license.
General	- 100 ms - Dashboard - Dashboard - Portrait - Data Export - Extended - Data Export - Standard - Event History - System Configuration - Tabular	Included in Base license.
Insulation Monitoring	- Insulation Monitoring (ANSI) - Insulation Monitoring (IEC)	Needs Insulation Monitoring Module license.
IT Billing	- Energy by IT Customer	Needs Energy Billing Module license.
Power Capacity	- Branch Circuit Power - Equipment Capacity - Generator Capacity - Generator Power - Power Load Demand & Capacity - Power Losses - UPS Power	Needs Capacity Management Module license.
Power Quality	- EN50160:2000 - EN50160:2000 Mains Signaling - EN50160:2010 - EN50160:2010 Mains Signaling - Harmonic Compliance - Harmonic Compliance 2014 - IEC61000-4-30 - Power Quality - Power Quality Analysis - Power Quality Impact	Included in Base license, except for Power Quality Analysis and Power Quality Impact. Both of these reports require a Power Quality Performance Module license.

Category	Template	Licensing
Usage Trending	- Hourly Usage - Multi Device Usage - Multiple Trend - Single Device Usage - Trend	Included in Base license.

Use the following links to find the descriptions of the different report templates:

Backup Power Reports
Billing Reports
Breaker Performance Reports
Energy Analysis Reports
Energy Management Reports
General Reports
Insulation Monitoring Reports
IT Billing Reports
Power Capacity Reports
Power Quality Reports
Usage Trending Reports

Subscriptions

Subscribe to a report to have it generated automatically based on a schedule or on a trigger event. For example, you can subscribe to a report and have it generated daily at a certain time, or monthly on a certain day and time. A trigger event can be any event in the system, for example a device setpoint going active, or a breaker tripping.

Time display

See Time Display in Web Applications for information on how time is displayed in a system where the monitoring devices, the PME/Web server, and the Web client (browser) are in different time zones.

Terminology

See Reports Terminology for definitions of the terms used in the Reports application.

For information on how to configure Alarms, see Reports configuration.

Generating a report

Generate a report to view power monitoring system information.

To generate a report:

1. In Reports, open the Report Library and navigate to the report you want to generate.
2. Click the report name to display the report in the Reports Display pane.
3. Set the input parameters for the report and click **Generate Report**.

   NOTE: Saved input parameters are preset to their saved values. Not saved input parameters have generic default values.

4. The report output is displayed in the Reports Display pane.

Related topics:

- Generating a report
- Downloading a report
- Report descriptions
- Reports
- Reports UI
- Reports Terminology

For information on how to configure Reports, see Reports configuration.

Downloading a report

Download a report in one of the supported formats (PDF, Excel, Tiff Image) to share the report output with others, or to save it externally

To download a report:

1. In Reports, generate a report.
2. In the Reports Display pane, view the generated report and click **Download report as** on the toolbar immediately above the report output. Choose the format you want to download the report in.
3. The report is downloaded in the selected format.

Related topics:

- Generating a report
- Downloading a report
- Report descriptions
- Reports
- Reports UI
- Reports Terminology

For information on how to configure Reports, see Reports configuration.

Report descriptions

Use the following links to find the descriptions of the different report types:

Related topics:

- Generating a report
- Downloading a report
- Report descriptions
- Reports
- Reports UI
- Reports Terminology

For information on how to configure Reports, see Reports configuration.

Backup Power Reports

NOTE: These reports are part of the Backup Power Module. This module requires a separate license.

PME has the following backup power report templates:

- Generator Activity Report
- Generator Battery Health Report
- Generator Battery Health Export Report
- Generator Test EPSS Report
- Generator Load Summary Report
- UPS Auto Test Report
- UPS Battery Health Report

⚠ CAUTION

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.

Failure to follow these instructions can result in injury or equipment damage.

Generator Activity Report

NOTE: This report is part of the Backup Power Module. This module requires a separate license.

Summary

The Generator Activity Report shows run information for backup generators, such as run times, durations, run reason, and overall run hours. Use this report to understand and manage your backup generator operation.

Details

The Generator Activity Report shows:

- The number of non-emergency running hours as an annual total.
- Running hours broken out into categories for Test, Power Outage, Load Shedding.
- Bar graphs for generators with the number of hours of non-emergency run time.
- A table with non-emergency and emergency run hours for each generator.

Prerequisites

- The Backup Power Module must be configured.
- The measurement data must be available as historical data logs in the database.

Report inputs:

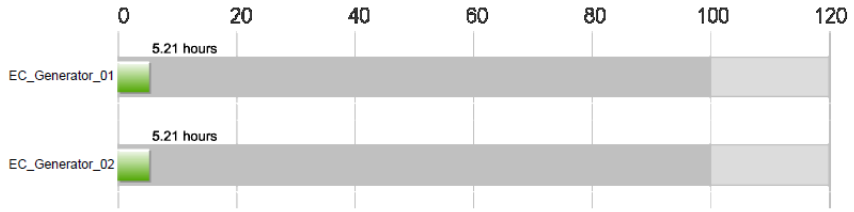
- Title
- EPSS Group
- Reporting Period
- Threshold
- Include Activity Details
- Include Data Warnings

Example:

Generator Activity Report

12/1/2015 12:00:00 AM - 1/1/2016 12:00:00 AM (Server Local)

Non Emergency Activity for RJH_EC_Generator

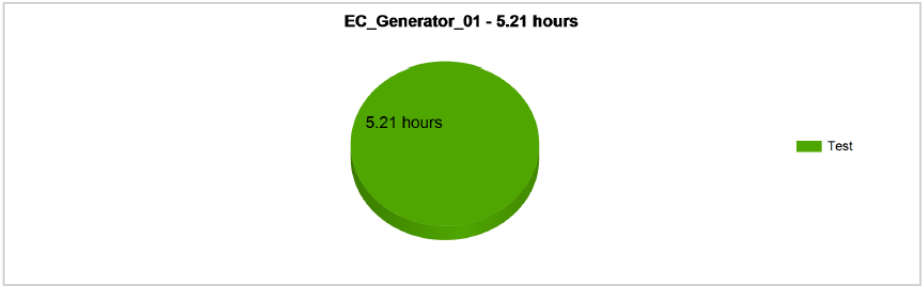


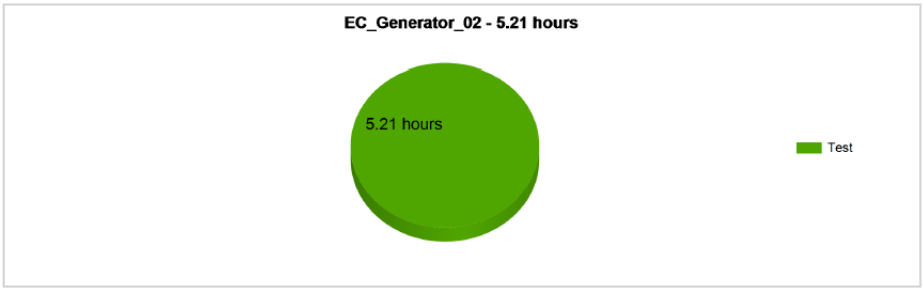
Generator	Non Emergency Hours	Remaining Non Emergency Hours
EC_Generator_01	5.21 hours	94.79 hours
EC_Generator_02	5.21 hours	94.79 hours

Generator Activity Report

12/1/2015 12:00:00 AM - 1/1/2016 12:00:00 AM (Server Local)

Generator Activity Details for RJH_EC_Generator





Generator Activity Report

12/1/2015 12:00:00 AM - 1/1/2016 12:00:00 AM (Server Local)

RJH_EC_Generator

Generator	Start Time	Stop Time	Duration (hours)	Run Reason
EC_Generator_01	12/2/2015 10:33:05 AM	12/2/2015 11:37:41 AM	1.08	Test
EC_Generator_01	12/9/2015 10:29:46 AM	12/9/2015 11:33:01 AM	1.05	Test
EC_Generator_01	12/16/2015 10:32:42 AM	12/16/2015 11:35:35 AM	1.05	Test
EC_Generator_01	12/23/2015 10:34:51 AM	12/23/2015 11:34:05 AM	0.99	Test
EC_Generator_01	12/30/2015 10:30:30 AM	12/30/2015 11:32:54 AM	1.04	Test
EC_Generator_02	12/2/2015 10:33:06 AM	12/2/2015 11:37:41 AM	1.08	Test
EC_Generator_02	12/9/2015 10:29:47 AM	12/9/2015 11:33:02 AM	1.05	Test
EC_Generator_02	12/16/2015 10:32:44 AM	12/16/2015 11:35:37 AM	1.05	Test
EC_Generator_02	12/23/2015 10:34:53 AM	12/23/2015 11:34:07 AM	0.99	Test
EC_Generator_02	12/30/2015 10:30:31 AM	12/30/2015 11:32:55 AM	1.04	Test

NOTE: This example only shows selected content from the report, it does not show the entire report.

Generator Battery Health Report

NOTE: This report is part of the Backup Power Module. This module requires a separate license.

Summary

The Generator Battery Health Report compares the generator starter battery voltage, during start-up, with a reference voltage signature. Use this report to check the generator starter battery performance and to plan preventive maintenance.

Prerequisites

- The Backup Power Module must be configured.
- The measurement data must be available as historical data logs in the database.

Report inputs:

- Title
- Select EPSS Group
- Exclude Sources
- Select Generator Starts
- Include Data Warnings
- Cumulative Degradation Threshold

Example:

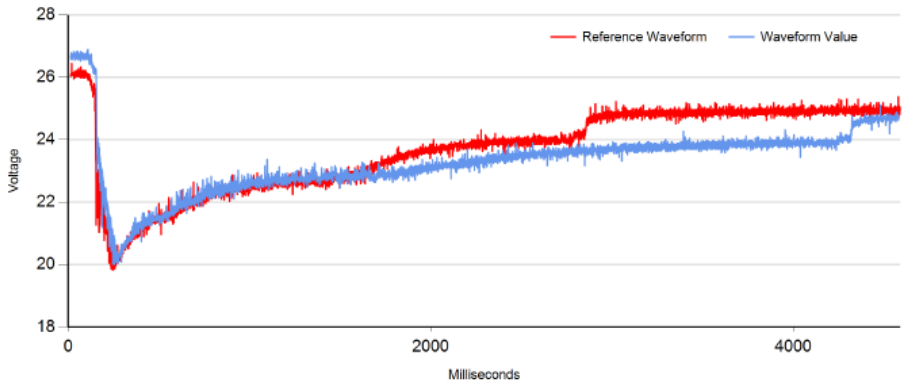
Schneider Electric

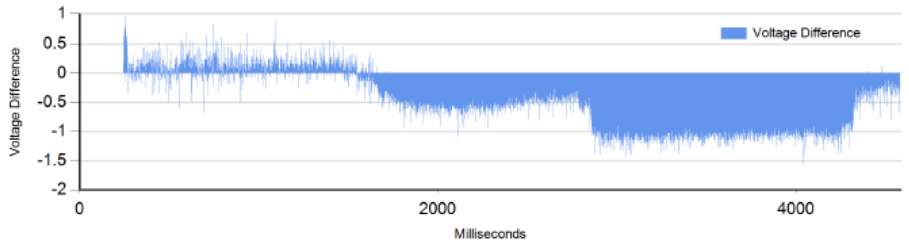
Battery Health Report

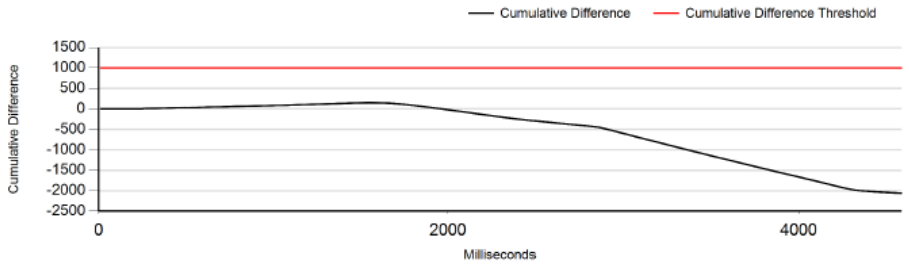
G1

Battery Waveform Health Evaluation for Generator: G1 at 4/10/2013 12:31:46 PM.

Reference Waveform Timestamp	12/19/2012 1:33:55 PM	Cumulative Difference	2,058.56
Waveform Timestamp	4/10/2013 12:31:46 PM	Status	Below Threshold







NOTE: This example only shows selected content from the report, it does not show the entire report.

Generator Battery Health Export Report

NOTE: This report is part of the Backup Power Module. This module requires a separate license.

Summary

The Generator Battery Health Export Report gives the same data as the Generator Battery Health Report but in a CSV file format. Use this report for sharing the battery performance data with other systems.

Prerequisites

- The Backup Power Module must be configured.
- The measurement data must be available as historical data logs in the database.

Report inputs:

- Title
- Select EPSS Group
- Exclude Sources
- Select Generator Starts
- Cumulative Degradation Threshold

Example:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	2	G1	2012-02-22T15:06:57	733	2012-02-29T15:11:02	187	0	1000	2839.898804	1256	2939.623901	99.72509766	80	99.72509766
2	2	G1	2012-02-22T15:06:57	733	2012-02-29T15:11:02	187	0	1000	2839.898804	1256	2939.623901	99.72509766	80	199.4501953
3	2	G1	2012-02-22T15:06:57	733	2012-02-29T15:11:02	187	0	1000	2839.898804	1256	2939.623901	99.72509766	80	299.175293
4	2	G1	2012-02-22T15:06:57	733	2012-02-29T15:11:02	187	0	1000	2839.898804	1256	2939.623901	99.72509766	80	398.9003906
5	2	G1	2012-02-22T15:06:57	733	2012-02-29T15:11:02	187	0	1000	2839.898804	1256	2939.623901	99.72509766	80	498.6254883
6	2	G1	2012-02-22T15:06:57	733	2012-02-29T15:11:02	187	0	1000	2839.898804	1256	2939.623901	99.72509766	80	598.3505859
7	2	G1	2012-02-22T15:06:57	733	2012-02-29T15:11:02	187	0	1000	2839.898804	1256	2939.623901	99.72509766	80	698.0756836
8	2	G1	2012-02-22T15:06:57	733	2012-02-29T15:11:02	187	0	1000	2839.898804	1256	2939.623901	99.72509766	80	797.8007813
9	2	G1	2012-02-22T15:06:57	733	2012-02-29T15:11:02	187	0	1000	2839.898804	1256	2939.623901	99.72509766	80	897.5258789
10	2	G1	2012-02-22T15:06:57	733	2012-02-29T15:11:02	187	0	1000	2839.898804	1256	2939.623901	99.72509766	80	997.2509766
11	2	G1	2012-02-22T15:06:57	733	2012-02-29T15:11:02	187	0	1000	2839.898804	1256	2939.623901	99.72509766	80	1096.976074
12	2	G1	2012-02-22T15:06:57	733	2012-02-29T15:11:02	187	0	1000	2839.898804	1256	2939.623901	99.72509766	80	1196.701172
13	2	G1	2012-02-22T15:06:57	733	2012-02-29T15:11:02	187	0	1000	2839.898804	1256	2939.623901	99.72509766	80	1296.42627
14	2	G1	2012-02-22T15:06:57	733	2012-02-29T15:11:02	187	0	1000	2839.898804	1256	2939.623901	99.72509766	80	1396.151367
15	2	G1	2012-02-22T15:06:57	733	2012-02-29T15:11:02	187	0	1000	2839.898804	1256	2939.623901	99.72509766	80	1495.876465
16	2	G1	2012-02-22T15:06:57	733	2012-02-29T15:11:02	187	0	1000	2839.898804	1256	2939.623901	99.72509766	80	1595.601563
17	2	G1	2012-02-22T15:06:57	733	2012-02-29T15:11:02	187	0	1000	2839.898804	1256	2939.623901	99.72509766	80	1695.32666
18	2	G1	2012-02-22T15:06:57	733	2012-02-29T15:11:02	187	0	1000	2839.898804	1256	2939.623901	99.72509766	80	1795.051758

NOTE: This example only shows selected content from the report, it does not show the entire report.

Generator Test EPSS Report

NOTE: This report is part of the Backup Power Module. This module requires a separate license.

Summary

The Generator Test EPSS Report shows load measurements and the sequence of events for generator test runs. You can configure it to meet the requirements of an Emergency Power Supply System (EPSS) test, including Automatic Transfer Switches (ATS). Use this report to assess the performance of your backup generation systems during test runs. You can also use this report to evaluate pass/fail criteria for EPSS testing.

NOTE: Emergency Power Supply System (EPSS) is a North American term used in the healthcare segment. It describes an arrangement of generators and automatic transfer switches, designed to provide backup power in case of a utility power interruption.

Prerequisites

- The Backup Power Module must be configured.
- The measurement data must be available as historical data logs in the database.

Report inputs:

- Title
- Company Name
- Technician Name
- Report Group
- Exclude Sources
- Use Run History
- Select Date Range
- ATS Summary
- Events Summary
- Generator Summary
- Comments
- Show Data Warnings

Example:

Generator 01 and Generator 02 Test Report

5/23/2018 6:25:50 AM - 5/23/2018 7:28:06 AM

Sources in EPSS Group: RJH_EC_Generator

Source	Type	Description
ATS_G	Transfer Switch	
EC_Generator_01	Generator	
EC_Generator_02	Generator	

Generator 01 and Generator 02 Test Report

5/23/2018 6:25:50 AM - 5/23/2018 7:28:06 AM

ATS and Generator Events Summary

Timestamp	Source Name	Status
5/23/2018 6:25:50.49 AM	ATS_G	Test
5/23/2018 6:25:50.82 AM	EC_Generator_02	Running
5/23/2018 6:25:51.13 AM	EC_Generator_01	Running
5/23/2018 6:26:22.46 AM	ATS_G	Emergency
5/23/2018 7:24:59.99 AM	ATS_G	Normal
5/23/2018 7:25:05.92 AM	ATS_G	Normal
5/23/2018 7:28:06.52 AM	EC_Generator_02	Stopped
5/23/2018 7:28:06.79 AM	EC_Generator_01	Stopped

Generator 01 and Generator 02 Test Report

5/23/2018 6:25:50 AM - 5/23/2018 7:28:06 AM

Automatic Transfer Switch Summary

Lead ATS

Lead ATS	Transfer Time	Required Transfer Time	Test Status
ATS_G	31.96 s	45 s	PASS

All Automatic Transfer Switches

Transfer Switch	Priority Level	Transfer Time	In Emergency (hh:mm:ss)
ATS_G	Test	31.96 s	00:58:37

Generator 01 and Generator 02 Test Report

5/23/2018 6:25:50 AM - 5/23/2018 7:28:06 AM

Generator Summary

Generator: EC_Generator_01 **Nameplate: 3000 kW**

Start Time: 5/23/2018 6:25:51 AM Stop Time: 5/23/2018 7:28:06 AM

Evaluation Method	Overall Test Status
Load	PASS

Test	Stage	Test Status
Load	One	PASS

Generator 01 and Generator 02 Test Report

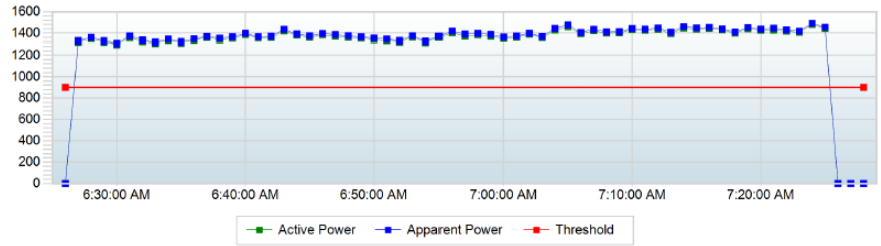
5/23/2018 6:25:50 AM - 5/23/2018 7:28:06 AM

Generator Load Summary

Generator: EC_Generator_01 **Nameplate: 3000 kW**

Start Time: 5/23/2018 6:25:51 AM Stop Time: 5/23/2018 7:28:06 AM

Longest Continuous Load	Nameplate %	Threshold	Actual Run Duration	Required Run Duration	Test Status
5/23/2018 6:27:00 AM - 5/23/2018 7:25:00 AM	30%	900 kW	58.0 min	30 min	PASS



Min, Avg, Max Readings for the Longest Continuous Load

Measurement	Min	Avg	Max	Units
Active Power	1,297.62	1,380.35	1,480.93	kW
Apparent Power	1,306.00	1,392.64	1,491.23	kVA
Current Phase A	59.51	63.64	68.01	A
Current Phase B	59.81	63.94	68.44	A
Current Phase C	62.80	66.98	71.49	A
Voltage Phases AB	12,353.70	12,494.34	12,562.30	V
Voltage Phases AN	7,102.19	7,180.05	7,218.35	V
Voltage Phases BC	12,366.30	12,516.63	12,584.21	V
Voltage Phases BN	7,151.54	7,237.21	7,276.80	V
Voltage Phases CA	12,280.87	12,417.80	12,483.22	V
Voltages Phase CN	7,108.76	7,192.28	7,234.19	V

Generator 01 and Generator 02 Test Report

5/23/2018 6:25:50 AM - 5/23/2018 7:28:06 AM

Generator Electrical Details

Generator: EC_Generator_01 Nameplate: 3000 kW

Start Time: 5/23/2018 6:25:51 AM Stop Time: 5/23/2018 7:28:06 AM

Timestamp	Active Power	Apparent Power	Load %	PFS	I avg	Vll avg	Vln avg	Frequency
6:26:00 AM	0.00	0.00	0.00	100.00	0.00	12,306.11	7,104.94	62.60
6:27:00 AM	1,320.09	1,330.86	44.00	-99.19	62.00	12,482.99	7,207.07	60.04
6:28:00 AM	1,347.82	1,359.12	44.93	-99.17	63.26	12,489.99	7,211.11	59.98
6:29:00 AM	1,319.94	1,330.68	44.00	-99.19	61.84	12,504.74	7,219.62	60.04
6:30:00 AM	1,297.62	1,306.00	43.25	-99.36	60.70	12,507.34	7,221.13	60.05
6:31:00 AM	1,356.75	1,373.29	45.23	-98.80	64.08	12,451.28	7,188.76	60.06
6:32:00 AM	1,326.63	1,337.70	44.22	-99.17	62.22	12,493.10	7,212.91	60.01
6:33:00 AM	1,306.96	1,317.17	43.57	-99.22	61.39	12,472.75	7,201.16	60.01
6:34:00 AM	1,335.75	1,345.85	44.52	-99.25	62.64	12,487.46	7,209.65	59.99
6:35:00 AM	1,310.55	1,321.18	43.69	-99.20	61.56	12,477.60	7,203.96	60.02
6:36:00 AM	1,337.29	1,347.94	44.58	-99.21	62.83	12,470.22	7,199.70	59.97
6:37:00 AM	1,359.08	1,369.33	45.30	-99.25	63.75	12,484.51	7,207.94	60.01
6:38:00 AM	1,340.23	1,353.00	44.67	-99.06	63.19	12,452.34	7,189.37	59.96
6:39:00 AM	1,352.53	1,366.37	45.08	-98.99	63.72	12,468.05	7,198.44	59.92
6:40:00 AM	1,384.85	1,397.01	46.16	-99.13	64.96	12,497.46	7,215.42	60.01
6:41:00 AM	1,355.92	1,366.29	45.20	-99.24	63.52	12,496.49	7,214.86	60.15
6:42:00 AM	1,359.42	1,370.99	45.31	-99.16	63.80	12,482.43	7,206.75	60.03
6:43:00 AM	1,418.83	1,434.04	47.29	-98.94	66.80	12,449.34	7,187.64	59.94
6:44:00 AM	1,379.27	1,390.71	45.98	-99.18	64.42	12,536.66	7,238.05	60.05
6:45:00 AM	1,361.17	1,374.76	45.37	-99.01	64.09	12,464.18	7,196.21	59.96
6:46:00 AM	1,382.90	1,394.76	46.10	-99.15	64.84	12,496.69	7,214.98	60.06
6:47:00 AM	1,371.34	1,384.68	45.71	-99.04	64.49	12,474.88	7,202.39	59.99
6:48:00 AM	1,361.80	1,375.23	45.39	-99.02	64.08	12,460.34	7,193.99	59.95
6:49:00 AM	1,353.48	1,364.80	45.12	-99.17	63.43	12,504.78	7,219.65	60.02
6:50:00 AM	1,342.87	1,354.23	44.76	-99.16	62.87	12,518.32	7,227.46	60.01
6:51:00 AM	1,335.10	1,345.88	44.50	-99.20	62.35	12,543.24	7,241.85	60.08
6:52:00 AM	1,321.53	1,332.08	44.05	-99.21	61.88	12,513.05	7,224.42	60.20
6:53:00 AM	1,363.74	1,374.65	45.46	-99.21	63.88	12,492.67	7,212.66	60.09
6:54:00 AM	1,316.32	1,326.18	43.88	-99.26	61.77	12,474.85	7,202.37	59.95

NOTE: This example only shows selected content from the report, it does not show the entire report.

Generator Load Summary Report

NOTE: This report is part of the Backup Power Module. This module requires a separate license.

Summary

The Generator Load Summary Report shows load (kW, PF, Iavg, and so on) measurements recorded during generator runs. Use this report to understand the electrical performance and loading of your backup generator operations.

Prerequisites

- The Backup Power Module must be configured.
- The measurement data must be available as historical data logs in the database.

Report inputs:

- Title
- Select EPSS Group
- Exclude Sources
- Use Run History
- Select Date range
- Reporting Period
- Include Electrical Details
- Include Data Warnings

Example:

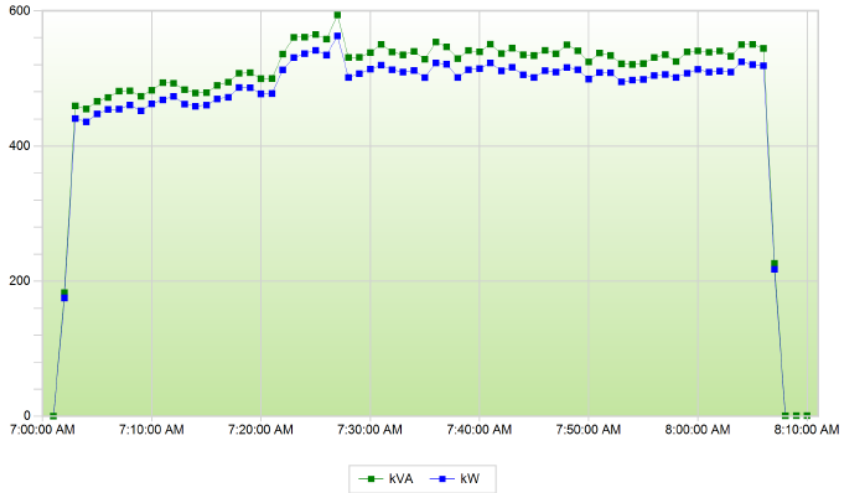
Generator Run Report

4/19/2013 7:00:50 AM - 4/19/2013 8:10:46 AM

G2

Nameplate Rating 400 kW

Running 4/19/2013 7:00:50 AM Stopped 4/19/2013 8:10:46 AM



Measurement	Min	Avg	Max	Units
Active Power	-0.64	461.50	562.98	kW
Apparent Power	0.17	485.04	594.02	kVA

Schneider Electric

Generator Run Report

4/19/2013 7:00:50 AM - 4/19/2013 8:10:46 AM

Electrical Details for G2

Nameplate Rating 400 kW

Running 4/19/2013 7:00:50 AM Stopped 4/19/2013 8:10:46 AM

Timestamp	kW	kVA	Load %	PFS	I avg	Vll avg	Vln avg	Frequency
4/19/2013 7:01:00 AM	-0.12	0.17	-0.03	-69.40	0.03	4,123.35	2,380.63	55.56
4/19/2013 7:02:00 AM	175.09	182.80	43.77	-95.78	8.69	12,453.43	7,190.00	60.01
4/19/2013 7:03:00 AM	440.57	459.45	110.14	-95.89	21.73	12,435.59	7,179.69	60.01
4/19/2013 7:04:00 AM	435.84	454.77	108.96	-95.84	21.50	12,448.23	7,186.99	60.01
4/19/2013 7:05:00 AM	447.59	466.00	111.90	-96.05	22.02	12,448.48	7,187.14	60.01
4/19/2013 7:06:00 AM	453.94	471.88	113.49	-96.20	22.29	12,448.93	7,187.39	60.01
4/19/2013 7:07:00 AM	454.46	481.37	113.61	-94.41	22.71	12,445.40	7,185.36	60.01
4/19/2013 7:08:00 AM	460.61	481.79	115.15	-95.60	22.70	12,473.31	7,201.47	60.01
4/19/2013 7:09:00 AM	452.02	473.48	113.00	-95.47	22.32	12,475.60	7,202.79	60.02
4/19/2013 7:10:00 AM	462.39	482.57	115.60	-95.82	22.73	12,470.57	7,199.89	60.01
4/19/2013 7:11:00 AM	468.54	493.89	117.13	-94.87	23.26	12,443.29	7,184.14	60.02
4/19/2013 7:12:00 AM	473.39	492.96	118.35	-96.03	23.21	12,458.48	7,192.91	60.01
4/19/2013 7:13:00 AM	461.99	483.42	115.50	-95.57	22.78	12,451.80	7,189.05	60.01
4/19/2013 7:14:00 AM	458.85	478.58	114.71	-95.88	22.55	12,458.38	7,192.85	60.01
4/19/2013 7:15:00 AM	460.53	479.21	115.13	-96.10	22.59	12,454.18	7,190.43	60.01
4/19/2013 7:16:00 AM	469.76	489.89	117.44	-95.89	23.08	12,449.11	7,187.50	60.01
4/19/2013 7:17:00 AM	472.13	494.60	118.03	-95.46	23.29	12,452.12	7,189.24	60.02
4/19/2013 7:18:00 AM	486.43	507.66	121.61	-95.82	23.91	12,442.39	7,183.62	60.01
4/19/2013 7:19:00 AM	486.14	508.50	121.54	-95.60	23.92	12,447.30	7,186.45	60.01
4/19/2013 7:20:00 AM	477.16	499.80	119.29	-95.47	23.49	12,465.17	7,196.77	60.01
4/19/2013 7:21:00 AM	477.82	500.02	119.46	-95.56	23.56	12,448.48	7,187.13	60.02
4/19/2013 7:22:00 AM	512.95	536.27	128.24	-95.65	25.19	12,481.17	7,206.01	60.01
4/19/2013 7:23:00 AM	530.74	560.94	132.69	-94.62	26.36	12,455.55	7,191.22	60.01
4/19/2013 7:24:00 AM	536.87	561.21	134.22	-95.66	26.37	12,462.48	7,195.22	60.01
4/19/2013 7:25:00 AM	541.51	564.96	135.38	-95.85	26.51	12,484.36	7,207.85	60.01
4/19/2013 7:26:00 AM	534.65	558.45	133.66	-95.74	26.24	12,469.24	7,199.12	60.01
4/19/2013 7:27:00 AM	562.98	594.02	140.74	-94.77	27.88	12,458.20	7,192.75	60.02
4/19/2013 7:28:00 AM	501.59	530.89	125.40	-94.48	24.93	12,438.19	7,181.20	60.01
4/19/2013 7:29:00 AM	506.99	531.17	126.75	-95.45	24.93	12,448.61	7,187.21	60.01

NOTE: This example only shows selected content from the report, it does not show the entire report.

UPS Auto Test Report

NOTE: This report is part of the Backup Power Module. This module requires a separate license.

Summary

The UPS Auto Test Report shows test information for UPS systems, such as test times, pass/fail evaluation, and event logs. Use this report to assess the performance of your UPS systems during test runs.

NOTE: You can only use this report with certain types of UPS systems. See Backup Power Module configuration for details.

Prerequisites

- The Backup Power Module must be configured.
- The measurement data must be available as historical data logs in the database.

Report inputs

- Title
- UPS Group
- Reporting Period
- Include Event History
- Include Data Warnings

Example:

Schneider Electric

UPS Auto Test Report

12/1/2014 12:00:00 AM - 12/1/2014 11:00:00 PM (Server Local)

Auto Test Results

Groups-01

Device Name	Test Start Time	Test End Time	Test Result
UPS.Galaxy-02	12/1/2014 6:22:35.000 PM	12/1/2014 6:28:55.000 PM	PASS

Groups-03

Device Name	Test Start Time	Test End Time	Test Result
UPS.Galaxy-04	12/1/2014 8:22:35.000 PM	12/1/2014 8:28:55.000 PM	PASS
UPS.Galaxy-03	12/1/2014 7:52:35.000 PM	12/1/2014 7:58:55.000 PM	FAIL
UPS.Galaxy-04	12/1/2014 7:25:35.000 PM	12/1/2014 7:33:55.000 PM	PASS
UPS.Galaxy-03	12/1/2014 7:22:35.000 PM	12/1/2014 7:28:55.000 PM	PASS
UPS.Galaxy-02	12/1/2014 6:22:35.000 PM	12/1/2014 6:28:55.000 PM	PASS

Groups-02

Device Name	Test Start Time	Test End Time	Test Result
UPS.Galaxy-04	12/1/2014 8:22:35.000 PM	12/1/2014 8:28:55.000 PM	PASS
UPS.Galaxy-03	12/1/2014 7:52:35.000 PM	12/1/2014 7:58:55.000 PM	FAIL
UPS.Galaxy-04	12/1/2014 7:25:35.000 PM	12/1/2014 7:33:55.000 PM	PASS
UPS.Galaxy-03	12/1/2014 7:22:35.000 PM	12/1/2014 7:28:55.000 PM	PASS

Event Log Data

Groups-01

Device Name	Timestamp	Priority	Cause	Cause Value	Effect	Effect Value
UPS.Galaxy-02	12/1/2014 6:28:55.000 PM	25	Battery Automatic Test In Progress	1.00	SP1 Status	Extreme
UPS.Galaxy-02	12/1/2014 6:28:55.000 PM	25	Battery Automatic Test In Progress	OFF	SP1 Status	OFF
UPS.Galaxy-02	12/1/2014 6:28:55.000 PM	25	Battery Status	256.00	SP{0} Status	Extreme
UPS.Galaxy-02	12/1/2014 6:28:55.000 PM	25	Battery Status	0.000	SP{0} Status	Battery Test Completed
UPS.Galaxy-02	12/1/2014 6:22:35.000 PM	25	Battery Automatic Test In Progress	ON	SP1 Status	ON
UPS.Galaxy-02	12/1/2014 6:22:35.000 PM	25	Battery Status	256.000	SP{0} Status	Battery Test in Progress
UPS.Galaxy-02	12/1/2014 6:13:08.000 PM	25	Load Protected	ON	SP{0} Status	ON

NOTE: This example only shows selected content from the report, it does not show the entire report.

UPS Battery Health Report

NOTE: This report is part of the Backup Power Module. This module requires a separate license.

Summary

The UPS Battery Health Report compares the UPS battery voltage, during test conditions, with a reference voltage signature. Use this report to check the UPS battery performance and to plan preventive maintenance.

For information on the terms and calculations used in this report, see UPS Battery Health Report calculations.

Prerequisites

- The Backup Power Module must be configured.
- The measurement data must be available as historical data logs in the database.

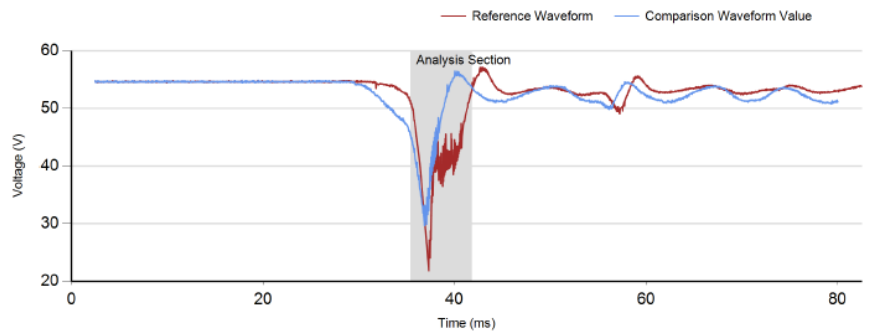
Report inputs:

- Title
- Select Waveforms
- Waveform Drop Percentage
- Waveform Drop Sample Size
- Recovery Value Multiplier
- Voltage Threshold
- Include Data Warnings

Example:

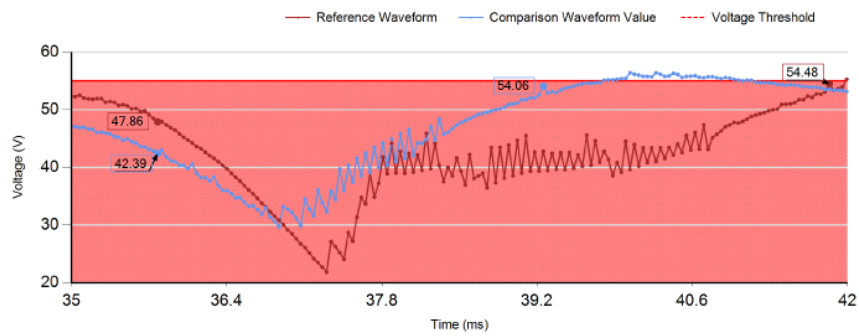
Ups Battery Health Report

Battery Waveform Health Evaluation for Ups: at 7/28/2014 1:45:23 PM.			
	Timestamp	Drop Found?	Recovery Found?
Reference Waveform	7/25/2014 3:46:51 PM	Yes	Yes
Comparison Waveform	7/28/2014 1:45:23 PM	Yes	Yes



	First Voltage Drop Analysis			Voltage Recovery Analysis		
	Minimum Drop Voltage (V)	Maximum Drop Voltage (V)	Difference (%)	Target Recovery Voltage (V)	Actual Recovery Voltage (V)	Recovery Time (ms)
Reference Waveform	**47.86**	50.87	5.90%	53.89	**54.48**	6.06
Comparison Waveform	**42.39**	45.24	6.30%	53.89	**54.06**	3.48

Ups Battery Health Report



NOTE: This example only shows selected content from the report, it does not show the entire report.

Billing Reports

NOTE: These reports are part of the Energy Billing Module. This module requires a separate license.

PME includes the following billing report templates:

- Billing Report
- Billing Summary Report
- Billing Verification Report
- Multiple Billing Export Report
- Multiple Billing Report

⚠ CAUTION

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.

Failure to follow these instructions can result in injury or equipment damage.

For information about changing the unit cost values in a rate file used for billing reports, see the Rate Editor tool.

Billing Report

NOTE: This report is part of the Energy Billing Module. This module requires a separate license.

Summary

The Billing Report shows a single bill with itemized energy and demand cost based on a customer defined rate structure. It can be configured to include taxes and other charges. Use this report to produce individual tenant energy bills, allocate cost to departments or processes, or verify utility bills.

Prerequisites

- The Energy Billing Module must be configured.
- The measurement data must be available as historical data logs in the database.

Report inputs:

- Title
- Tenant
- Reporting Period
- Rate

Example:

Schneider Electric

Monthly Shadow Bill

3/1/2015 12:00:00 AM - 4/1/2015 12:00:00 AM (Server Local)

Tenant	Campus Main Incomer
Devices	LV_Main_SWB.Main_Incomer_PM
Rate	Example Rate - Advanced

	Number of Units	Unit Cost	Cost ($)
Energy Register Readings			
LV_Main_SWB.Main_Incomer_PM: Start: 919,157.79 kWh @ 3/1/2015 12:00 AM End: 990,286.42 kWh @ 4/1/2015 12:00 AM			
Energy Consumption Charge LV_Main_SWB.Main_Incomer_PM: 71,128.64 kWh	71,128.64 kWh	$0.05762	4,098.43
Transmission Charge	71,128.64 kWh	$0.00340	241.84
Line Maintenance Charge	71,128.64 kWh	$0.00193	137.28
On Peak Usage Charge [Weekdays between 8:00am-6:00pm] LV_Main_SWB.Main_Incomer_PM: 25,931.28 kWh	25,931.28 kWh	$0.02458	637.39
Off Peak Usage Charge LV_Main_SWB.Main_Incomer_PM: 45,197.35 kWh	45,197.35 kWh	$0.00743	335.82
Peak Demand Charge [Campus Main Incomer Peak @ 3/26/2015 10:00 AM] LV_Main_SWB.Main_Incomer_PM: 157.91 kW	157.91 kW	$6.89	1,087.97
State Tax	Subtotal: $6,538.73	4.65 %	304.05
Daily Charge	31.0 Days	$0.87 per Day	26.97
Processing Fee			20.00
Recycling Fee			1.25
VAT (Tax)	Subtotal: $6,586.95	6.00 %	395.22

Total ($)	**7,286.21**

NOTE: This example only shows selected content from the report, it does not show the entire report.

Billing Summary Report

NOTE: This report is part of the Energy Billing Module. This module requires a separate license.

Summary

The Billing Summary Report shows a listing of the consumption costs for multiple consumers in one report and gives an overall total cost. Use this report to see the costs for multiple consumers in a single report, for example for an office building with different tenants.

Details

You can select multiple tenants and multiple rates to create a single report for all your tenants.

Prerequisites

- The Energy Billing Module must be configured.
- The measurement data must be available as historical data logs in the database.

Report inputs:

- Title
- Tenants & Rates
- Reporting Period
- Tenant Filter
- Line Item Filter
- Save Billing Totals
- Keep True Totals
- Order By

Example:

Schneider Electric

Billing Summary Report

Billing Period: 2015-03-01 12:00:00 AM - 2015-04-01 12:00:00 AM (Server Local)

Tenant	Item	Units	Unit Cost	Cost
ABC Soft Victoria_Keating.main_7650 (24 %) Example Rate - Basic	Energy Consumption Charge Victoria_Keating.main_7650 (24 %): 44,929.32 kWh	44,929.32 kWh	$0.05762	2,588.83
	Peak Demand Charge [ABC Soft Peak @ 2015-03-01 2:00 PM] Victoria_Keating.main_7650 (24 %): 81.17 kW	81.17 kW	$6.89	559.29
	Processing Fee			20.00
			Total	$3168.12
ACME Technology Victoria_Keating.main_7650 (32 %) Example Rate - Basic	Energy Consumption Charge Victoria_Keating.main_7650 (32 %): 59,905.76 kWh	59,905.76 kWh	$0.05762	3,451.77
	Peak Demand Charge [ACME Technology Peak @ 2015-03-01 2:00 PM] Victoria_Keating.main_7650 (32 %): 108.23 kW	108.23 kW	$6.89	745.72
	Processing Fee			20.00
			Total	$4217.49
Apex Co. Victoria_Keating.main_7650 (16 %) Example Rate - Basic	Energy Consumption Charge Victoria_Keating.main_7650 (16 %): 29,952.88 kWh	29,952.88 kWh	$0.05762	1,725.88
	Peak Demand Charge [Apex Co. Peak @ 2015-03-01 2:00 PM] Victoria_Keating.main_7650 (16 %): 54.12 kW	54.12 kW	$6.89	372.86
	Processing Fee			20.00
			Total	$2118.75
Group Financial Victoria_Keating.main_7650 (15 %) Example Rate - Basic	Energy Consumption Charge Victoria_Keating.main_7650 (15 %): 28,080.82 kWh	28,080.82 kWh	$0.05762	1,618.02
	Peak Demand Charge [Group Financial Peak @ 2015-03-01 2:00 PM] Victoria_Keating.main_7650 (15 %): 50.73 kW	50.73 kW	$6.89	349.56
	Processing Fee			20.00
			Total	$1987.58
Pinnacle Inc Victoria_Keating.main_7650 (10 %) Example Rate - Basic	Energy Consumption Charge Victoria_Keating.main_7650 (10 %): 18,720.55 kWh	18,720.55 kWh	$0.05762	1,078.68
	Peak Demand Charge [Pinnacle Inc Peak @ 2015-03-01 2:00 PM] Victoria_Keating.main_7650 (10 %): 33.82 kW	33.82 kW	$6.89	233.04
	Processing Fee			20.00
			Total	$1331.72
			Grand Total	$12,823.65

NOTE: This example only shows selected content from the report, it does not show the entire report.

Billing Verification Report

NOTE: This report is part of the Energy Billing Module. This module requires a separate license.

Summary

The Billing Verification Report shows the difference between two bills, generated from different data sources, or between a generated bill and a manually entered cost value. Use this report to compare a utility bill with an internally generated bill.

Details

You can configure the report to send out an email notification if the difference in the bill values exceeds a programmable limit.

Prerequisites

- The Energy Billing Module must be configured.
- The measurement data must be available as historical data logs in the database.

Report inputs:

- Title
- Private Source
- Check Source
- Reporting Period
- Rate
- Actual Bill Cost
- Alarm Threshold - Check Source vs Actual Total (%)
- Alarm Threshold - Check Source vs Private Source (%)
- Show Bill Details
- Notify On
- Email Address
- Email Subject

Example:

Comparison summary page

Schneider Electric

Billing Verification Report

Date of Meter Reading: 7/3/2019 12:00:00 AM - 7/10/2019 12:00:00 AM (Server Local)

Meter Accuracy	
Main Feed (Private) Cost ($):	3410.85 ($)
Utility (Check/NMI) Cost ($):	1905.35 ($)
Check/NMI vs Private Difference (%):	-56.64 (%) ✓

Tariff Application Verification	
Utility (Check/NMI) Cost ($):	1905.35 ($)
Actual Total Cost ($):	2155 ($)
Check/NMI vs Actual Total Difference (%):	-12.3 (%) ✓

Billing details page for internal source

Schneider Electric

Billing Verification Report

Date of Meter Reading: 7/3/2019 12:00:00 AM - 7/10/2019 12:00:00 AM (Server Local)

Buildings	Main Feed
Devices	Campus.Dining_Hall
Rate	Campus Rate

	Number of Units	Unit Cost	Cost ($)
Energy Consumption Charge Campus.Dining_Hall: 13,564.21 kWh	13,564.21 kWh	$0.12	1,627.71
kW Demand: Demand Peak Time @ 7/3/2019 1:30 AM Campus.Dining_Hall: 141.00 kW	141.00 kW	$10.00	1,410.00
Meter Reading Fee			150.00
Goods and Services Tax	Subtotal $3,187.71	7.00 %	223.14
		Total ($)	3,410.85

Billing details page for utility source

Schneider Electric

Billing Verification Report

Date of Meter Reading: 7/3/2019 12:00:00 AM - 7/10/2019 12:00:00 AM (Server Local)

Buildings	Utility
Devices	Campus.Academic_Hall
Rate	Campus Rate

	Number of Units	Unit Cost	Cost ($)
Energy Consumption Charge Campus.Academic_Hall: 8,005.83 kWh	8,005.83 kWh	$0.12	960.70
kW Demand: Demand Peak Time @ 7/3/2019 7:30 AM Campus.Academic_Hall: 67.00 kW	67.00 kW	$10.00	670.00
Meter Reading Fee			150.00
Goods and Services Tax	Subtotal $1,780.70	7.00 %	124.65
		Total ($)	1,905.35

NOTE: This example only shows selected content from the report, it does not show the entire report.

Multiple Billing Export Report

NOTE: This report is part of the Energy Billing Module. This module requires a separate license.

Summary

The Multiple Billing Export Report gives the same data as the Multiple Billing Report but in an XML file format. Use this report for sharing the billing data with third-party billing systems.

Prerequisites

- The Energy Billing Module must be configured.
- The measurement data must be available as historical data logs in the database.

Report inputs

- Title
- Tenants & Rates
- Reporting Period
- XML Transform File
- XML Export File
- Overwrite XML Export
- Stylesheet (optional)
- Save Billing Totals
- Email XML Export
- Email Recipients (comma separated)
- Order By

Multiple Billing Report

NOTE: This report is part of the Energy Billing Module. This module requires a separate license.

Summary

The Multiple Billing Report gives the same output as the Billing Report, but for more than one consumer. Use this report to create bills for more than one customer, rather than running the Billing Report multiple times.

Details

The output of this report is a single file, so if you choose to save or subscribe to a PDF file, then each bill appears on its own page for review and printing purposes.

Prerequisites

- The Energy Billing Module must be configured.
- The measurement data must be available as historical data logs in the database.

Report inputs

- Title
- Tenants & Rates
- Reporting Period
- Load Profile Measurements
- Previous Period Energy Measurement
- Energy Period Comparison Range
- Energy Period Rollup
- Align Day of Week for Months on Energy Chart
- Save Billing Totals
- Notes
- Order By
- Show Footer Image

Example:

Schneider Electric

Multiple Billing Report

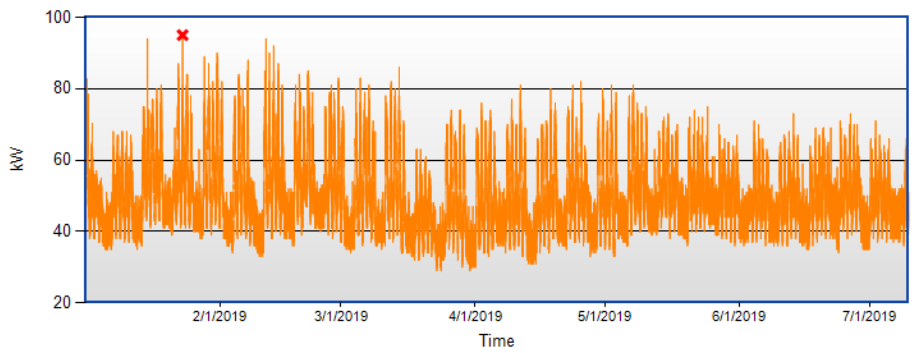
Date of Meter Reading: 1/1/2019 12:00:00 AM - 7/10/2019 12:00:00 AM (Server Local)

Buildings	Utility
Devices	Campus.Utility_Meter
Rate	Campus Rate

	Number of Units	Unit Cost	Cost ($)
Energy Consumption Charge Campus.Utility_Meter: 225,999.54 kWh	225,999.54 kWh	$0.12	27,119.95
kW Demand: Demand Peak Time @ 1/23/2019 10:00 AM Campus.Utility_Meter: 95.00 kW	95.00 kW	$10.00	950.00
Meter Reading Fee			150.00
Goods and Services Tax	Subtotal $28,219.95	7.00 %	1,975.40
		Total ($)	30,195.34

Load Profile: Utility: Block Demand Real Power

*Maximum Value : 95 kW on 1/23/2019 at 10:00:00 AM



NOTE: This example only shows selected content from the report, it does not show the entire report.

Breaker Performance Reports

NOTE: These reports are part of the Breaker Performance Module. This module requires a separate license.

PME includes the following breaker performance report templates:

- Circuit Breaker Aging Report
- Circuit Breaker Settings Report

⚠ CAUTION

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.

Failure to follow these instructions can result in injury or equipment damage.

Circuit Breaker Aging Report

NOTE: This report is part of the Breaker Performance Module. This Module requires a separate license.

Summary

The Circuit Breaker Aging Report shows the aging and wear related status of circuit breakers. Use this report to check the condition of your breakers and to plan preventive maintenance.

Prerequisites

- The Breaker Performance Module must be configured.
- The measurement data must be available as historical data logs in the database.

Report inputs:

- Title
- Select Group
- Grouped By
- Include Breakers with Minor Aging and Wear
- Include Data Warnings

Example:

Circuit Breaker Aging Report

3/23/2015

Breaker Aging and Wear Summary				
Switchboard	Level	Breaker Name	Electrical Aging (%)	Electrical Wear (%)
Switchboard A1	Critical			
		Breaker A2	84.8	53.7
		Breaker A3	87.8	85.7
		Breaker A4	96.7	71.9
		Breaker A5	30.8	90.3
		Breaker A7	73.2	74.5
		Breaker A8	38.2	66.3
		Breaker A9	42.5	66.8
		Breaker A10	6.3	89.1
		Breaker A11	2.3	78.3
		Breaker A12	47.4	53.2
		Breaker A13	67.3	71.7
		Breaker A14	57.2	69.5
		Breaker A15	80.7	50.8
		Breaker A16	12.1	93.9
		Breaker A17	81.4	13.6
		Breaker A18	19.7	53.5
		Breaker A21	56.6	3.4
		Breaker A22	55.9	61.0
		Breaker A24	6.1	93.5
		Breaker A25	47.0	81.1
		Breaker A26	98.6	35.4
		Breaker A27	11.9	72.4
		Breaker A28	14.0	62.3
		Breaker A29	96.5	31.6
		Breaker A30	86.4	16.2
		Breaker A32	91.1	80.0
		Breaker A33	78.2	50.9
		Breaker A34	31.4	59.6
		Breaker A35	54.8	84.7
		Breaker A36	28.6	99.5
		Breaker A37	36.0	59.1

NOTE: This example only shows selected content from the report, it does not show the entire report.

Circuit Breaker Settings Report

NOTE: This report is part of the Breaker Performance Module. This Module requires a separate license.

Summary

The Circuit Breaker Settings Report shows the protection settings for your breakers and highlights changes in these settings between report runs. Use this report to analyze and plan your protection schemes and to confirm or detect protection settings changes.

Prerequisites

- The Breaker Performance Module must be configured.
- The measurement data must be available as historical data logs in the database.

Report inputs:

- Title
- Select Group
- Include Unassociated Breakers
- Baseline Date
- Circuit Breaker Inventory
- Trip Settings
- Protection Modes
- Maintenance Status
- Change Summary
- Include Data Warnings

Example:

Circuit Breaker Settings Report

Circuit Breaker Inventory - Johnson Building

Auxiliary Switchboard

Breaker Name	Type	Protection Type	Serial Number	Protection Standard	Rated Voltage	Rated Current	Rated Frequency	Number of Poles	Date of Data Reading
CB 3	MicrologicH	60	07143294	N/A	N/A	100	50/60Hz	3-Pole	5/22/2018 3:18:35 PM
CB 7	Micrologic X	6.0 (LSIG)	N/A	IEC	400	630	50Hz	4-Pole	5/22/2018 3:18:37 PM
CB 8	CompactNSXa	N/A	N/A	UL	N/A	N/A	N/A	3-Pole	5/22/2018 3:18:34 PM

Main Switchboard

Breaker Name	Type	Protection Type	Serial Number	Protection Standard	Rated Voltage	Rated Current	Rated Frequency	Number of Poles	Date of Data Reading
CB 1	Micrologic H IFE_IFM	60	07208615	N/A	N/A	1250	50/60Hz	3-Pole	5/22/2018 3:18:34 PM
CB 4	Micrologic X	6.0 (LSIG)	N/A	IEC	400	2000	50Hz	3-Pole	5/20/2018 11:16:36 PM
CB 6	Micrologic X	5.0 (LSI)	N/A	IEC	201	1250	50Hz	3-Pole	5/22/2018 3:18:32 PM

Value has changed since the baseline date of 4/1/2018 12:00:00 AM - (Pacific Daylight Time).

Circuit Breaker Settings Report

Trip Settings - Johnson Building

Main Switchboard

Breaker Name	Protection Type	Active Protection Settings	Long Time			Short Time			Instantaneous	Date of Data Reading
			Pickup (A)	Delay (S)	I2t	Pickup (A)	Delay (S)	I2t	Pickup (A)	
CB 1	60	N/A	500	24	I2T On	1000	0.20	I2T On	10000	5/22/2018 3:18:34 PM
CB 4	6.0 (LSIG)	Group A	2000	1.50	N/A	N/A	0.10	I2T Off	N/A	5/20/2018 11:16:36 PM
CB 6	5.0 (LSI)	Group A	625	1	N/A	N/A	0.40	I2T On	N/A	5/22/2018 3:18:32 PM

Breaker Name	Ground Fault			Earth Leakage		Date of Data Reading
	Pickup (A)	Delay (S)	I2t	Pickup (A)	Delay (S)	
CB 1	500	0.10	I2T On	N/A	N/A	5/22/2018 3:18:34 PM
CB 4	480	0	I2T Off	N/A	N/A	5/20/2018 11:16:36 PM
CB 6	N/A	N/A	N/A	N/A	N/A	5/22/2018 3:18:32 PM

Value has changed since the baseline date of 4/1/2018 12:00:00 AM - (Pacific Daylight Time).

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Circuit Breaker Settings Report

Protection Modes - Johnson Building

Auxiliary Switchboard

Breaker Name	Protection Type	Active Protection Settings	Long Time Enabled	Short Time Enabled	Instantaneous Enabled	Ground Fault Enabled	Neutral Enabled	VIGI (I delta N) Enabled	Date of Data Reading
CB 3	60	N/A	True	True	True	True	N/A	N/A	5/22/2018 3:18:35 PM
CB 7	6.0 (LSIG)	Group A	True	True	True	True	True	N/A	5/22/2018 3:18:37 PM
CB 8	N/A	N/A	N/A	N/A	True	True	N/A	N/A	5/22/2018 3:18:34 PM

Main Switchboard

Breaker Name	Protection Type	Active Protection Settings	Long Time Enabled	Short Time Enabled	Instantaneous Enabled	Ground Fault Enabled	Neutral Enabled	VIGI (I delta N) Enabled	Date of Data Reading
CB 1	60	N/A	True	True	True	True	N/A	N/A	5/22/2018 3:18:34 PM
CB 4	6.0 (LSIG)	Group A	True	True	True	True	True	N/A	5/20/2018 11:16:36 PM
CB 6	5.0 (LSI)	Group A	True	True	True	N/A	True	N/A	5/22/2018 3:18:32 PM

Value has changed since the baseline date of 4/1/2018 12:00:00 AM - (Pacific Daylight Time).

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Circuit Breaker Settings Report

Maintenance Status - Johnson Building

Auxiliary Switchboard

Breaker Name	Trip Counters						Breaker Health Status	Date/Time Of Last Trip
	All	Long Time	Short Time	Instantaneous	Ground Fault	Other		
CB 3	0	N/A	N/A	N/A	N/A	N/A	N/A	12/31/1969 11:59:59 PM
CB 7	N/A	4294967294	2147483648	4294967294	1143148820	4294967294	Malfunction	5/18/2018 5:23:52 AM
CB 8	N/A	0	0	0	0	N/A	N/A	1/19/2068 2:14:08 AM

Main Switchboard

Breaker Name	Trip Counters						Breaker Health Status	Date/Time Of Last Trip
	All	Long Time	Short Time	Instantaneous	Ground Fault	Other		
CB 1	9	N/A	N/A	N/A	N/A	N/A	N/A	1/1/2000 12:00:00 AM
CB 4	3672380225	1319373024	28573732	1903951928	401082520	19399021	Warning	1/1/2000 12:00:02 AM
CB 6	0	0	0	0	0	0	Malfunction	4/9/2018 10:28:15 AM

Value has changed since the baseline date of 4/1/2018 12:00:00 AM - (Pacific Daylight Time).

Circuit Breaker Settings Report

Summary of Changes - Johnson Building

Auxiliary Switchboard

Breaker Name	Setting	Value		Change Detected On	Value Last Verified
CB 7	Ground Fault Protection Trip Count	Current	1143148820	5/18/2018 5:49:36 AM	5/22/2018 3:18:37 PM
		Baseline	1143148818	5/17/2018 1:03:42 PM	5/18/2018 4:49:41 AM
	Last Trip DateTime	Current	5/18/2018 5:23:52 AM	5/18/2018 5:49:36 AM	5/22/2018 3:18:37 PM
		Baseline	5/17/2018 5:12:59 PM	5/17/2018 1:03:42 PM	5/18/2018 4:49:41 AM

Main Switchboard

No changed detected since baseline date of 4/1/2018 12:00:00 AM - (Pacific Daylight Time).

Value has changed since the baseline date of 4/1/2018 12:00:00 AM - (Pacific Daylight Time).

NOTE: This example only shows selected content from the report, it does not show the entire report.

Energy Analysis Reports

NOTE: These reports are part of the Energy Analysis Reports Module. This module requires a separate license.

PME includes the following energy analysis report templates:

- Create Model Report
- Duration Curve Report
- Energy Regression Analysis Report
- Energy Usage Per State Report
- KPI Report
- Multi Equipment Operation Report
- Power Usage Per State Report
- PUE Summary Report
- Single Equipment Operation Report
- Use Model Report

⚠ CAUTION

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.

Failure to follow these instructions can result in injury or equipment damage.

Create Model Report

NOTE: This report is part of the Energy Analysis Reports Module. This module requires a separate license.

Summary

The Create Model Report is used to create a model of your facility or process. The model is then used in the Use Model Report to compare expected consumption to actual consumption. You only use the Create Model Report during configuration. After you created the model, you do not need to run this report again, unless you want to create a new model.

Details

See Configuring the Energy Modeling report, in the Configuring chapter of this guide, for more details.

Prerequisites

To use this report, the data for the independent variables and for the dependent variable must be available in the Power Monitoring Expert database for the reporting period. If you want to use sub-models and exception periods, then these must be defined.

Report inputs:

- Title
- Dependent Variable
- Independent Variable(s)
- Reporting Period
- Interval and Sub Model Configuration
- Use Exception Periods
- Show Detailed Results
- Save Model Configuration

Example:

See Model creation example

To calculate the models, PME uses the Accord Framework Library which can be found at: http://accord-framework.net/index.html

Duration Curve Report

NOTE: This report is part of the Energy Analysis Reports Module. This module requires a separate license.

Summary

The Duration Curve Report shows the load (kW) levels in a system and the duration this load persisted over the reporting period. Use this report to find opportunities for reducing peak demand and for lowering base load.

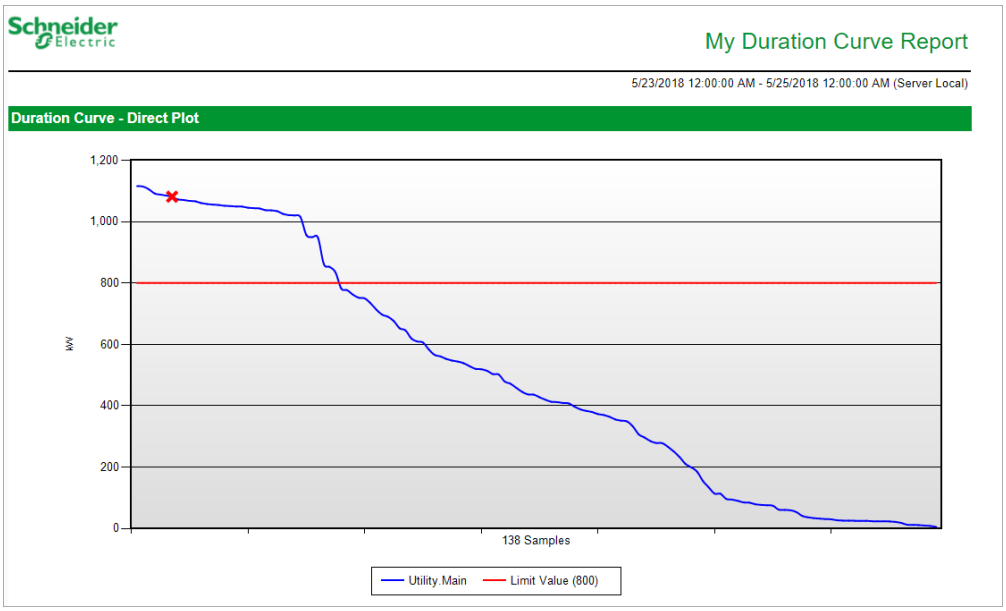
Prerequisites

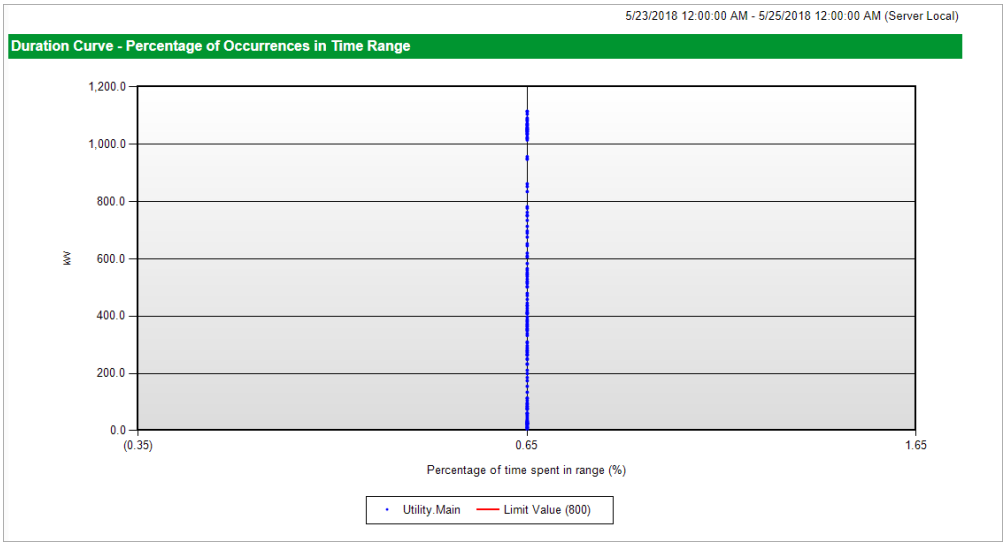
- The Energy Analysis Reports Module must be configured.
- The measurement data must be available as historical data logs in the database.

Report inputs

- Title
- Single Source – see Sources (Devices and Views)
- Measurement – see Measurements (with Smart Mode)
- n % Crossing
- Exclude Values Over
- Exclude Values Under
- Reporting Period
- Target Line
- Source Label
- Auto-scale Y-Axis
- Include Data Table
- Show Occurrences Chart
- Show Data Warnings

Example:





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My Duration Curve Report

5/23/2018 12:00:00 AM - 5/25/2018 12:00:00 AM (Server Local)

All Occurrences above Limit			
Source Name	Measurement		Value
Utility.Main	kW	5/23/2018 1:00:00 PM	1,115.80
Utility.Main	kW	5/23/2018 1:15:00 PM	1,114.60
Utility.Main	kW	5/23/2018 1:30:00 PM	1,105.60
Utility.Main	kW	5/23/2018 12:45:00 PM	1,092.00
Utility.Main	kW	5/23/2018 11:15:00 AM	1,088.30
Utility.Main	kW	5/23/2018 11:00:00 AM	1,085.00
Utility.Main	kW	5/23/2018 10:45:00 AM	1,081.30
Utility.Main	kW	5/23/2018 10:15:00 AM	1,072.20
Utility.Main	kW	5/23/2018 10:30:00 AM	1,070.90
Utility.Main	kW	5/23/2018 1:45:00 PM	1,067.80
Utility.Main	kW	5/23/2018 11:30:00 AM	1,066.40
Utility.Main	kW	5/23/2018 10:00:00 AM	1,060.70
Utility.Main	kW	5/24/2018 10:15:00 AM	1,057.50
Utility.Main	kW	5/23/2018 9:45:00 AM	1,055.60
Utility.Main	kW	5/23/2018 2:00:00 PM	1,054.40
Utility.Main	kW	5/23/2018 9:30:00 AM	1,051.70
Utility.Main	kW	5/24/2018 10:30:00 AM	1,051.00
Utility.Main	kW	5/23/2018 12:30:00 PM	1,049.40
Utility.Main	kW	5/24/2018 9:45:00 AM	1,049.20
Utility.Main	kW	5/24/2018 10:00:00 AM	1,045.50
Utility.Main	kW	5/24/2018 9:30:00 AM	1,044.00
Utility.Main	kW	5/23/2018 11:45:00 AM	1,043.20
Utility.Main	kW	5/23/2018 9:15:00 AM	1,037.40
Utility.Main	kW	5/24/2018 9:15:00 AM	1,036.70
Utility.Main	kW	5/23/2018 2:15:00 PM	1,034.40
Utility.Main	kW	5/23/2018 12:00:00 PM	1,025.40
Utility.Main	kW	5/23/2018 12:15:00 PM	1,021.40

NOTE: This example only shows selected content from the report, it does not show the entire report.

Energy Regression Analysis Report

NOTE: This report is part of the Energy Analysis Reports Module. This module requires a separate license.

Summary

The Energy Regression Analysis Report uses simple regression analysis to model load behavior with respect to an influencing driver, such as weather. Use this report to compare the performance of your facility or of a load to the expected (modeled) behavior.

Details

See Interpreting the Energy Regression Analysis Report results for more information on this topic.

Prerequisites

- The Energy Analysis Reports Module must be configured.
- The measurement data must be available as historical data logs in the database.

Report inputs

- Title
- Driver Data Source
- Driver Data Quantity
- Model Data Source
- Model Data Quantity
- Reporting Period
- Regression Type
- X Axis Calculation Method
- Degree Days Pivot Point
- Y Axis Calculation Method
- Aggregation Interval
- Exclude Incomplete Weeks
- Exclude Incomplete Days
- Exclude Days with Rollover
- Deviation Type
- Max Authorized Deviation
- Include Data Warnings
- Include Report Parameters Summary

Example:

Schneider Electric

Energy Modeling Report

3/9/2011 12:00:00 AM - 9/9/2011 12:00:00 AM (Server Local

Report Parameters Summary

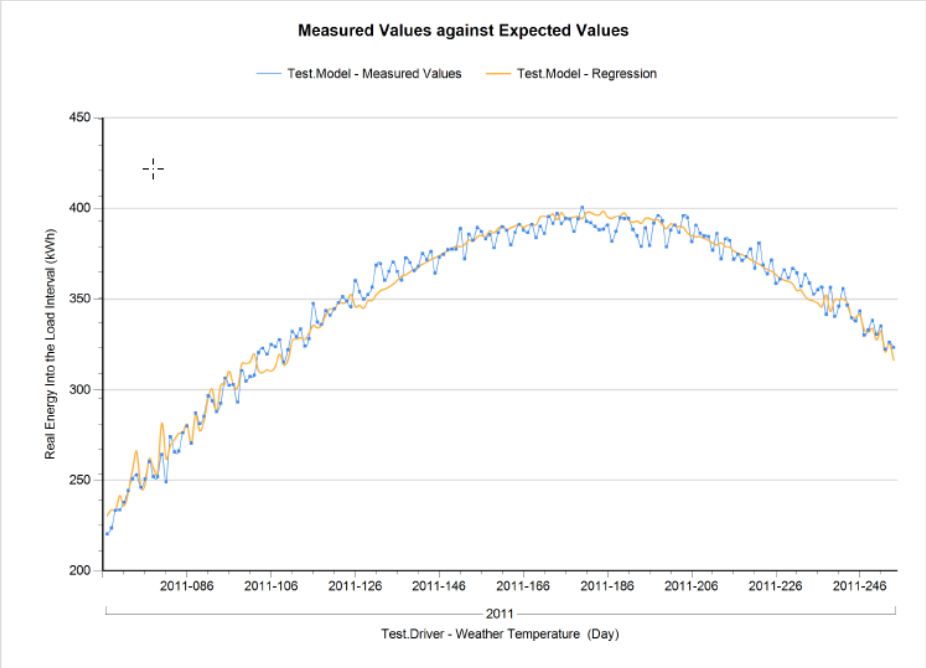
Driver Data Source	Test.Driver	**Driver Data Quantity**	Weather Temperature (°C)
Model Data Source	Test.Model	**Model Data Quantity**	Real Energy Into the Load Interval (kWh)
X Axis Calculation Method	Cooling Degree Days	**Degree Days Pivot Point**	18
Y Axis Calculation Method	Average		
Regression Type	Single Line	**Aggregation Period**	Day
Deviation Type	Percent	**Max Authorized Deviation**	10

Energy Modeling Report

3/9/2011 12:00:00 AM - 9/9/2011 12:00:00 AM (Server Local

Regression Analysis Main Characteristics Table

Side	Slope	Y-Intercept	R^2	RMSE
Single	26.78	85.89	0.989	6.45



Schneider Electric

Energy Modeling Report

3/9/2011 12:00:00 AM - 9/9/2011 12:00:00 AM (Server Local

Full Table

Device Name	Aggregation Period (Day)	X-Axis Value (Cooling Degree Days)	Y-Axis Value (kWh)	Regression Value (kWh)	Delta Value (kWh)	Delta Value Percent (%)
Test.Model	2011-067	5.40	220.35	230.47	-10.12	-4.39 %
Test.Model	2011-068	5.52	223.64	233.66	-10.02	-4.29 %
Test.Model	2011-069	5.51	233.39	233.54	-0.14	-0.06 %
Test.Model	2011-070	5.81	233.65	241.49	-7.84	-3.25 %
Test.Model	2011-071	5.60	237.82	235.86	1.96	0.83 %
Test.Model	2011-072	5.87	244.31	243.19	1.11	0.46 %
Test.Model	2011-073	6.33	250.75	255.35	-4.60	-1.80 %
Test.Model	2011-074	6.73	252.96	266.13	-13.18	-4.95 %
Test.Model	2011-075	5.99	246.06	246.24	-0.18	-0.07 %
Test.Model	2011-076	6.04	250.73	247.55	3.18	1.29 %
Test.Model	2011-077	6.58	260.50	261.98	-1.48	-0.57 %
Test.Model	2011-078	6.38	252.06	256.66	-4.60	-1.79 %
Test.Model	2011-079	6.28	251.99	254.17	-2.18	-0.86 %
Test.Model	2011-080	7.31	264.41	281.63	-17.22	-6.11 %
Test.Model	2011-081	6.58	249.13	262.03	-12.90	-4.92 %
Test.Model	2011-082	6.84	274.16	269.13	5.02	1.87 %
Test.Model	2011-083	6.97	265.83	272.46	-6.63	-2.43 %
Test.Model	2011-084	7.09	266.21	275.82	-9.61	-3.48 %
Test.Model	2011-085	7.11	276.37	276.35	0.01	0.01 %
Test.Model	2011-086	7.29	279.99	281.07	-1.08	-0.38 %
Test.Model	2011-087	6.88	270.62	270.20	0.43	0.16 %
Test.Model	2011-088	7.49	287.26	286.57	0.69	0.24 %
Test.Model	2011-089	7.16	281.35	277.51	3.84	1.38 %
Test.Model	2011-090	7.34	285.39	282.43	2.96	1.05 %
Test.Model	2011-091	7.83	296.68	295.60	1.07	0.36 %
Test.Model	2011-092	8.00	293.96	300.21	-6.26	-2.08 %
Test.Model	2011-093	7.54	288.02	287.73	0.29	0.10 %
Test.Model	2011-094	8.08	292.66	302.28	-9.63	-3.18 %
Test.Model	2011-095	8.11	306.54	303.17	3.37	1.11 %
Test.Model	2011-096	8.38	302.49	310.24	-7.75	-2.50 %

NOTE: This example only shows selected content from the report, it does not show the entire report.

Energy Usage Per State Report

NOTE: This report is part of the Energy Analysis Reports Module. This module requires a separate license.

Summary

The Energy Usage per State Report shows energy consumption for a process or load based on certain state variables of this process or load. Use this report to understand the energy consumption pattern of complex processes and find opportunities for efficiency improvements.

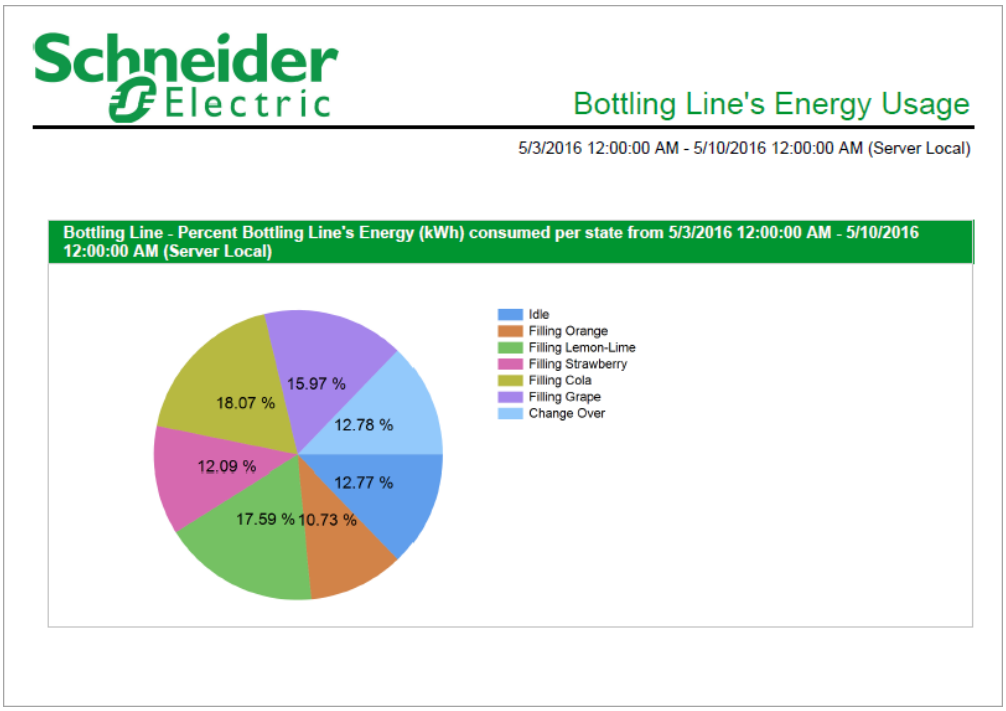
Prerequisites

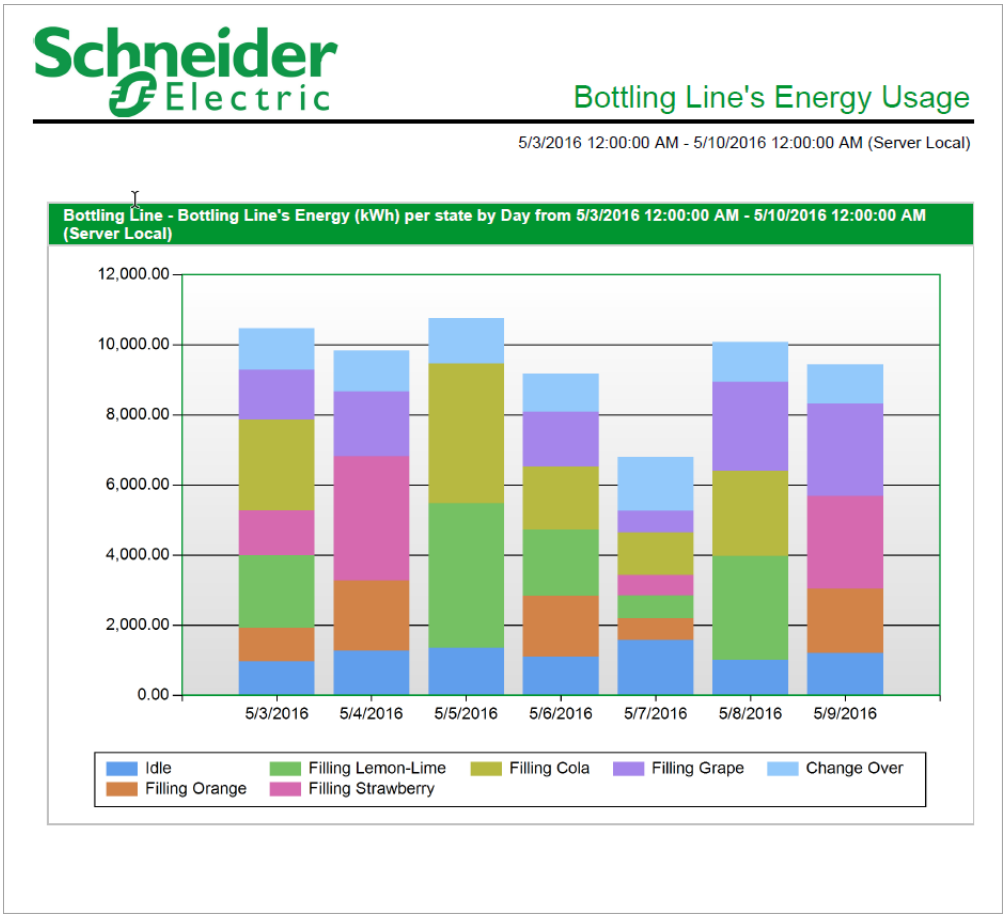
- The Energy Analysis Reports Module must be configured.
- The measurement data must be available as historical data logs in the database.

Report inputs

- Title
- Energy Measurements
- Energy Measurement Label
- State Measurement
- State Labels
- Rollup
- Aggregation Interval
- Auto-scale Y-Axis
- Include Data Table
- Show Data Warnings

Example:





Schneider Electric

Bottling Line's Energy Usage

5/3/2016 12:00:00 AM - 5/10/2016 12:00:00 AM (Server Local)

Bottling Line - Interval comparison for Bottling Line's Energy (kWh) per state by Day from 5/3/2016 12:00:00 AM - 5/10/2016 12:00:00 AM (Server Local)

Interval	State Name	Bottling Line's Energy (kWh)
5/3/2016	Idle	979.33
	Filling Orange	949.34
	Filling Lemon-Lime	2,075.70
	Filling Strawberry	1,271.95
	Filling Cola	2,594.54
	Filling Grape	1,421.97
	Change Over	1,177.95
5/4/2016	Idle	1,278.33
	Filling Orange	1,993.99
	Filling Strawberry	3,547.27
	Filling Grape	1,856.22
	Change Over	1,163.18
5/5/2016	Idle	1,355.04
	Filling Lemon-Lime	4,123.63
	Filling Cola	3,993.54
	Change Over	1,296.56
5/6/2016	Idle	1,094.31
	Filling Orange	1,749.71
	Filling Lemon-Lime	1,881.79
	Filling Cola	1,803.60
	Filling Grape	1,558.05
	Change Over	1,088.37
5/7/2016	Idle	1,575.16
	Filling Orange	626.51
	Filling Lemon-Lime	653.42
	Filling Strawberry	582.27
	Filling Cola	1,215.49

NOTE: This example only shows selected content from the report, it does not show the entire report.

KPI Report

NOTE: This report is part of the Energy Analysis Reports Module. This module requires a separate license.

Summary

The KPI Report calculates a Key Performance Indicator (KPI) based on one or more input parameters. The input parameters can be electrical and non-electrical consumption data, weather data, and business-related data. Use this report to translate energy consumption into business relevant information that you can use to benchmark and improve your energy productivity.

Details

To calculate the KPI, you must specify the input parameters, the formula that is used to calculate the KPI from the input parameters, the measurement that is used to represent the KPI output value, and a number for processing instructions. See the report inputs list below for details.

The KPI data calculated by the report can be stored in the Power Monitoring Expert database to be used in applications such as Dashboards, Reports, VIP, ...

Prerequisites

- The Energy Analysis Reports Module must be configured.
- The measurement data must be available as historical data logs in the database.

Report inputs

- Title
- Rollup
- Input Source Measurements
- KPI Source
- KPI Measurement
- KPI Measurement Override
- KPI Formula
- Save Calculated Values
- Reporting Period
- Show Data Warnings

Example:

KPI Engine Report

1/08/2016 12:00:00 AM - 1/09/2016 12:00:00 AM (Server Local)

Daily Calculation Table

Timestamp	East Wing.Real Energy [B]	Site A.Real Energy Into the Load [C]	University Theatre.Real Energy [A]	University.EnergyKPI.NormalizedUsage_Daily [((A+B)/C*4.0643)]
1/08/2016	5.27	0.50	5.77	90.33
2/08/2016	4.26	0.49	4.80	74.68
3/08/2016	17.27	0.50	5.75	187.60
4/08/2016	13.67	0.50	6.05	160.57
5/08/2016	14.38	0.51	4.90	155.03
6/08/2016	9.82	0.52	3.00	100.09
7/08/2016	4.42	0.53	3.01	57.22
8/08/2016	6.10	0.51	5.59	93.21
9/08/2016	5.13	0.51	5.08	81.85
10/08/2016	7.92	0.50	5.85	111.42
11/08/2016	7.11	0.51	4.85	95.66
12/08/2016	8.94	0.51	4.83	109.95
13/08/2016	2.69	0.52	3.02	44.32
14/08/2016	2.74	0.53	3.03	44.22
15/08/2016	7.94	0.51	4.97	102.71
16/08/2016	6.37	0.51	4.68	87.89
17/08/2016	8.95	0.51	4.56	108.18
18/08/2016	10.28	0.51	4.71	119.88
19/08/2016	7.06	0.53	5.87	99.76
20/08/2016	3.10	0.57	3.70	48.82
21/08/2016	3.10	0.57	3.70	48.41
22/08/2016	6.32	0.55	6.47	94.92

Generated on: 9/09/2016 10:46:50 AM Page 1 of 2

KPI Engine Report

1/08/2016 12:00:00 AM - 1/09/2016 12:00:00 AM (Server Local)

Timestamp	East Wing.Real Energy [B]	Site A.Real Energy Into the Load [C]	University Theatre.Real Energy [A]	University.EnergyKPI.NormalizedUsage_Daily [((A+B)/C*4.0643)]
23/08/2016	8.39	0.54	6.12	108.40
24/08/2016	1.24	0.56	1.88	22.82
29/08/2016	30.71	0.55	30.78	456.87
30/08/2016	4.31	0.54	6.88	83.75
31/08/2016	4.95	0.55	6.93	87.75

Weekly Calculation Table

Timestamp	East Wing.Real Energy [B]	Site A.Real Energy Into the Load [C]	University Theatre.Real Energy [A]	University.EnergyKPI.NormalizedUsage_Weekly [((A+B)/C*4.0643)]
1/08/2016	69.09	3.54	33.27	117.48
8/08/2016	40.62	3.59	32.25	82.52
15/08/2016	46.80	3.70	32.19	86.73
22/08/2016	15.96	3.86	14.47	32.02
29/08/2016	39.96	1.64	44.59	209.55

NOTE: This example only shows selected content from the report, it does not show the entire report.

Multi Equipment Operation Report

NOTE: This report is part of the Energy Analysis Reports Module. This module requires a separate license.

Summary

The Multi Equipment Operation Report shows how much time different equipment spends in a certain state, the number of activations, and the average activation duration. Use this report to gain an understanding of the operations of your facility or processes.

Prerequisites

- The Energy Analysis Reports Module must be configured.
- The measurement data must be available as historical data logs in the database.

Report inputs (update)

- Title
- State Measurements
- State Labels
- Reporting Period
- Auto-scale Y-Axis
- Include Data Table
- Show Data Warnings

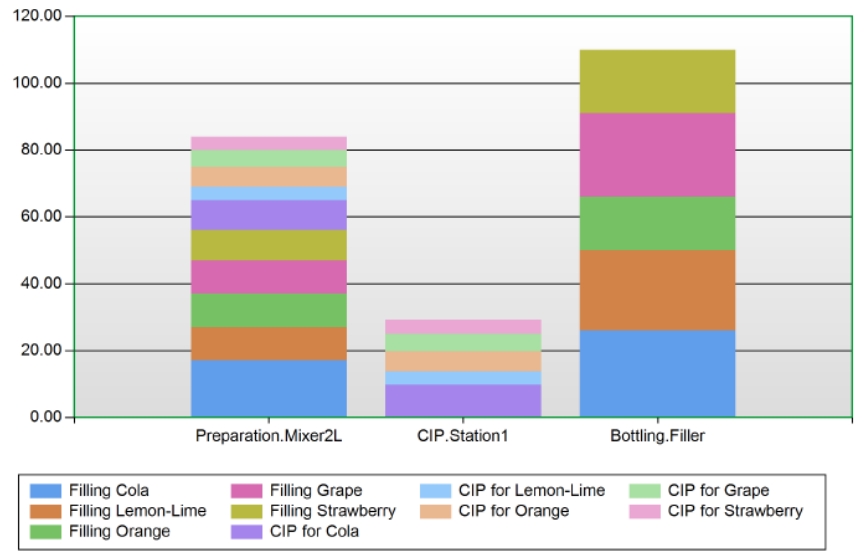
Example:

Schneider Electric

Equipment Operation for 2L Bottles

5/3/2016 12:00:00 AM - 5/10/2016 12:00:00 AM (Server Local)

Hours per state by device from 5/3/2016 12:00:00 AM - 5/10/2016 12:00:00 AM (Server Local)



Schneider Electric

Equipment Operation for 2L Bottles

5/3/2016 12:00:00 AM - 5/10/2016 12:00:00 AM (Server Local)

Device comparison data from 5/3/2016 12:00:00 AM - 5/10/2016 12:00:00 AM (Server Local)

Device	State	Hours of Operation	Hours of Operation (%)	Number of Activations	Average Activation Duration (Hours)
Bottling.Filler	Filling Cola	26	24	14	1.86
	Filling Lemon-Lime	24	22	13	1.85
	Filling Orange	16	15	9	1.78
	Filling Grape	25	23	12	2.08
	Filling Strawberry	19	17	11	1.73
Preparation.Mixer2L	Filling Cola	17	20	9	1.89
	Filling Lemon-Lime	10	12	8	1.25
	Filling Orange	10	12	6	1.67
	Filling Grape	10	12	5	2
	Filling Strawberry	9	11	6	1.5
	CIP for Cola	9	11	9	1
	CIP for Lemon-Lime	4	5	4	1
	CIP for Orange	6	7	6	1
	CIP for Grape	5	6	5	1
	CIP for Strawberry	4	5	4	1
CIP.Station1	CIP for Cola	9.75	33	9	1.08
	CIP for Lemon-Lime	4	14	4	1
	CIP for Orange	6	21	6	1
	CIP for Grape	5.25	18	5	1.05
	CIP for Strawberry	4.25	15	4	1.06

NOTE: This example only shows selected content from the report, it does not show the entire report.

Power Usage Per State Report

NOTE: This report is part of the Energy Analysis Reports Module. This module requires a separate license.

Summary

The Power Usage per State Report shows the power (kW) consumed by different equipment in certain states. Use this report to gain an understanding of the operations of your facility or processes.

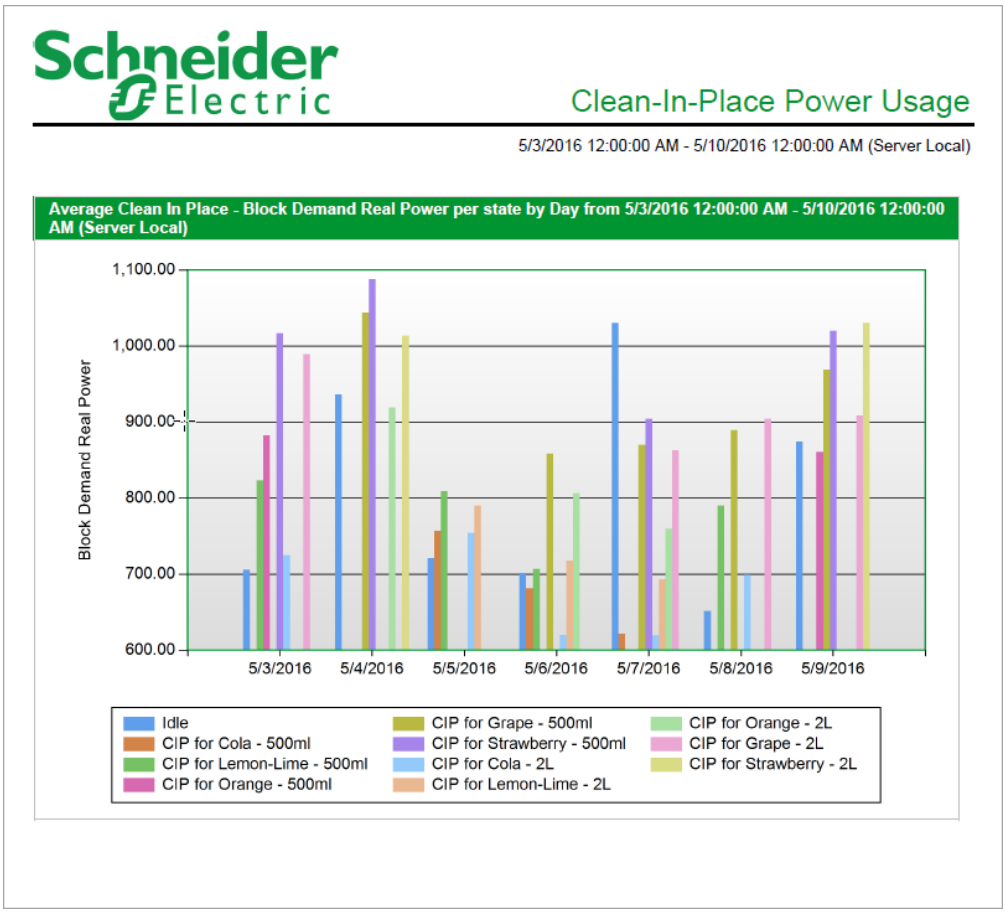
Prerequisites

- The Energy Analysis Reports Module must be configured.
- The measurement data must be available as historical data logs in the database.

Report inputs (update)

- Title
- Logged Measurement
- State Measurement
- State Labels
- Reporting Period
- Rollup
- Aggregation Type
- Show Min/Max Timestamps
- Auto-scale Y-Axis
- Include Data Table
- Show Data Warnings

Example:



Schneider Electric

Clean-In-Place Power Usage

5/3/2016 12:00:00 AM - 5/10/2016 12:00:00 AM (Server Local)

Clean In Place - Period comparison for Block Demand Real Power per state by Day from 5/3/2016 12:00:00 AM - 5/10/2016 12:00:00 AM (Server Local)

Period	State Name	Average Block Demand Real Power	Maximum Timestamp
5/3/2016	Idle	705.62	5/3/2016 3:00:00 AM
	CIP for Lemon-Lime - 500ml	823.10	5/3/2016 11:15:00 PM
	CIP for Orange - 500ml	882.83	5/3/2016 8:15:00 PM
	CIP for Strawberry - 500ml	1,016.66	5/3/2016 3:15:00 AM
	CIP for Cola - 2L	725.05	5/3/2016 2:15:00 PM
	CIP for Grape - 2L	989.48	5/3/2016 7:15:00 AM
5/4/2016	Idle	936.45	5/4/2016 2:00:00 AM
	CIP for Grape - 500ml	1,043.94	5/4/2016 8:15:00 PM
	CIP for Strawberry - 500ml	1,088.07	5/4/2016 2:15:00 AM
	CIP for Orange - 2L	919.02	5/4/2016 8:15:00 AM
	CIP for Strawberry - 2L	1,013.45	5/4/2016 5:15:00 AM
5/5/2016	Idle	721.49	5/5/2016 5:00:00 PM
	CIP for Cola - 500ml	756.59	5/5/2016 2:15:00 AM
	CIP for Lemon-Lime - 500ml	808.66	5/5/2016 5:15:00 PM
	CIP for Cola - 2L	754.20	5/5/2016 8:15:00 AM
	CIP for Lemon-Lime - 2L	790.28	5/5/2016 2:15:00 PM
5/6/2016	Idle	701.80	5/6/2016 8:00:00 PM
	CIP for Cola - 500ml	681.69	5/6/2016 2:15:00 AM
	CIP for Lemon-Lime - 500ml	706.92	5/6/2016 5:15:00 PM
	CIP for Grape - 500ml	858.51	5/6/2016 8:15:00 PM
	CIP for Cola - 2L	619.47	5/6/2016 5:15:00 AM
	CIP for Lemon-Lime - 2L	717.40	5/6/2016 2:15:00 PM
	CIP for Orange - 2L	806.14	5/6/2016 8:15:00 AM
5/7/2016	Idle	1,030.77	5/7/2016 9:00:00 PM
	CIP for Cola - 500ml	621.53	5/7/2016 1:15:00 AM
	CIP for Grape - 500ml	870.33	5/7/2016 5:15:00 PM
	CIP for Strawberry - 500ml	904.49	5/7/2016 9:15:00 PM
	CIP for Cola - 2L	619.16	5/7/2016 5:15:00 AM
	CIP for Lemon-Lime - 2L	693.57	5/7/2016 7:15:00 AM

NOTE: This example only shows selected content from the report, it does not show the entire report.

PUE Summary Report

NOTE: This report is part of the Energy Analysis Reports Module. This module requires a separate license.

Summary

The PUE Summary Report shows the Power Usage Effectiveness (PUE) index and the average power consumed for a data center facility. It also shows the average power consumed for the IT equipment running in the facility. Use this report to check the efficiency of your data center facility.

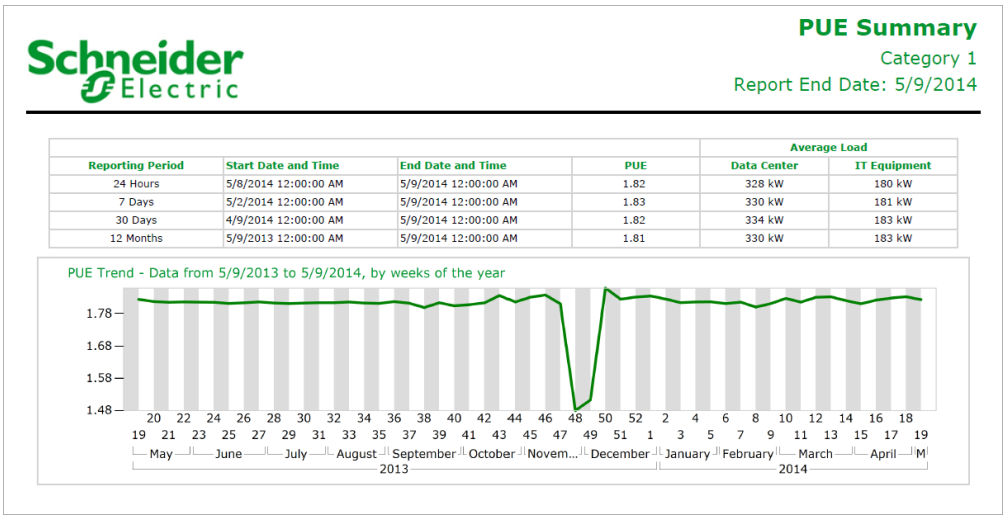
Prerequisites

- The Energy Analysis Reports Module must be configured.
- The measurement data must be available as historical data logs in the database.

Report inputs:

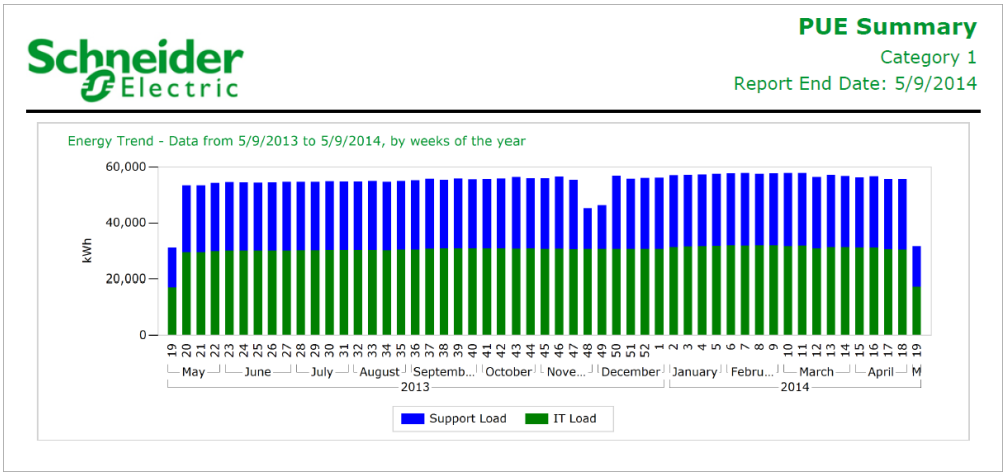
- Title
- Data Center Source
- Data Center Power Measurement
- Data Center Energy Measurement
- IT Equipment Source
- IT Equipment Power Measurement
- IT Equipment Energy Measurement
- PUE Category
- Report End Date
- Show Data Warnings

Example:



PUE Summary
Category 1
Report End Date: 5/9/2014

				Average Load	
Reporting Period	Start Date and Time	End Date and Time	PUE	Data Center	IT Equipment
24 Hours	5/8/2014 12:00:00 AM	5/9/2014 12:00:00 AM	1.82	328 kW	180 kW
7 Days	5/2/2014 12:00:00 AM	5/9/2014 12:00:00 AM	1.83	330 kW	181 kW
30 Days	4/9/2014 12:00:00 AM	5/9/2014 12:00:00 AM	1.82	334 kW	183 kW
12 Months	5/9/2013 12:00:00 AM	5/9/2014 12:00:00 AM	1.81	330 kW	183 kW



NOTE: This example only shows selected content from the report, it does not show the entire report.

Single Equipment Operation Report

NOTE: This report is part of the Energy Analysis Reports Module. This module requires a separate license.

Summary

The Single Equipment Operation Report shows how much time an equipment spends in a certain state, the number of activations, and the average activation duration. Use this report to gain an understanding of the operations of your facility or processes.

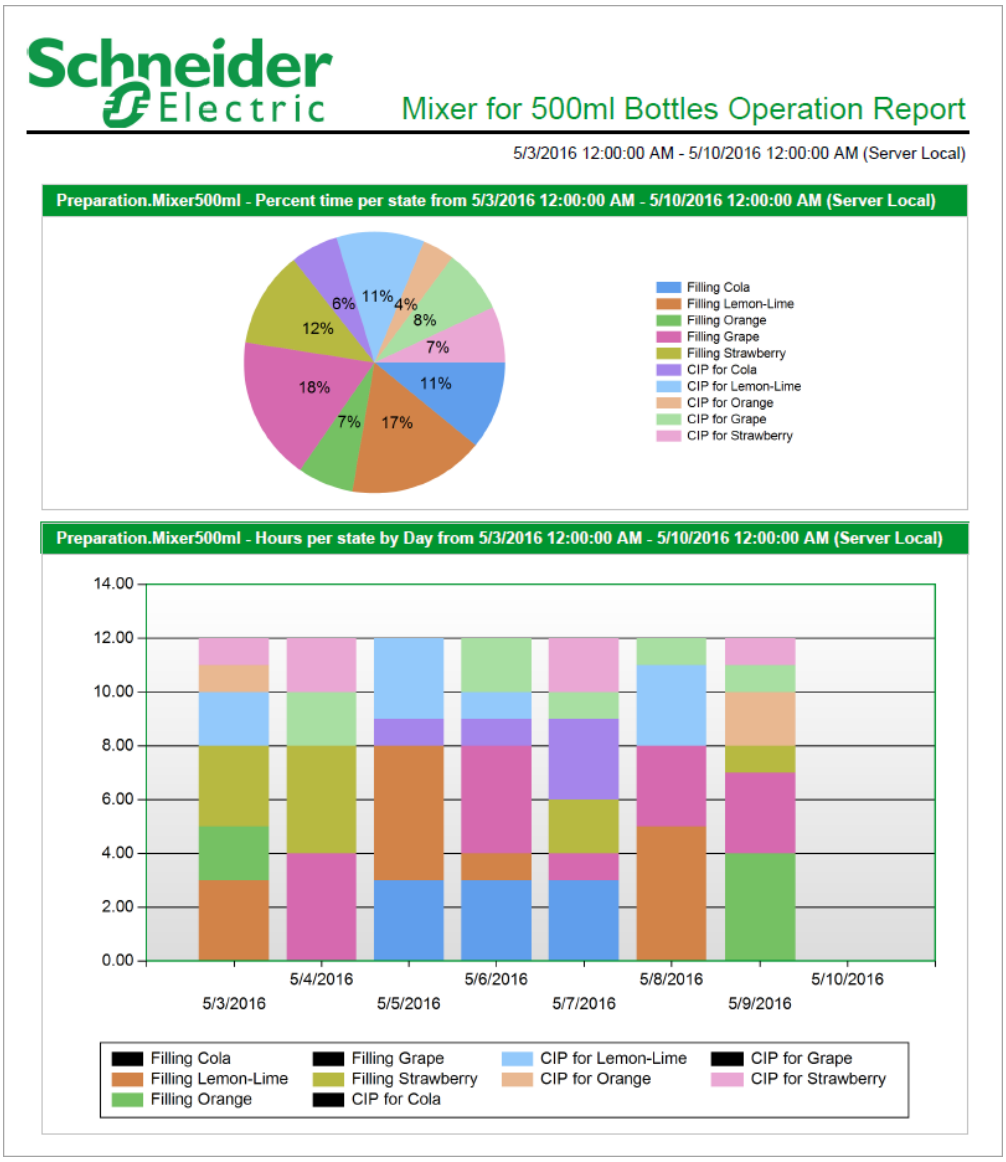
Prerequisites

- The Energy Analysis Reports Module must be configured.
- The measurement data must be available as historical data logs in the database.

Report inputs (update)

- Title
- State Measurement
- State Labels
- Reporting Period
- Rollup
- Auto-scale Y-Axis
- Include Data Table
- Show Data Warnings

Example:



Schneider Electric

Mixer for 500ml Bottles Operation Report

5/3/2016 12:00:00 AM - 5/10/2016 12:00:00 AM (Server Local)

Preparation.Mixer500ml - Period comparison data per state by Day from 5/3/2016 12:00:00 AM - 5/10/2016 12:00:00 AM (Server Local)

Period	State	Hours of Operation	Hours of Operation (%)	Number of Activations	Average Activation Duration (Hours)
5/3/2016	Filling Lemon-Lime	3	25	2	1.5
	Filling Orange	2	17	1	2
	Filling Strawberry	3	25	1	3
	CIP for Lemon-Lime	2	17	2	1
	CIP for Orange	1	8	1	1
	CIP for Strawberry	1	8	1	1
5/4/2016	Filling Grape	4	33	2	2
	Filling Strawberry	4	33	3	1.33
	CIP for Grape	2	17	2	1
	CIP for Strawberry	2	17	2	1
5/5/2016	Filling Cola	3	25	2	1.5
	Filling Lemon-Lime	5	42	3	1.67
	CIP for Cola	1	8	1	1
	CIP for Lemon-Lime	3	25	3	1
5/6/2016	Filling Cola	3	25	2	1.5
	Filling Lemon-Lime	1	8	1	1
	Filling Grape	4	33	2	2
	CIP for Cola	1	8	1	1
	CIP for Lemon-Lime	1	8	1	1
	CIP for Grape	2	17	2	1
5/7/2016	Filling Cola	3	25	3	1
	Filling Grape	1	8	1	1
	Filling Strawberry	2	17	2	1
	CIP for Cola	3	25	3	1
	CIP for Grape	1	8	1	1
	CIP for Strawberry	2	17	2	1
5/8/2016	Filling Lemon-Lime	5	42	3	1.67
	Filling Grape	3	25	1	3
	CIP for Lemon-Lime	3	25	3	1

NOTE: This example only shows selected content from the report, it does not show the entire report.

Use Model Report

NOTE: This report is part of the Energy Analysis Reports Module. This module requires a separate license.

Summary

The Use Model Report shows the expected consumption of your facility or process, based on a model created with the Create Model Report. The report shows modeled data, the measured data, and the delta between the two. Use this report to find unexpected changes in your consumption, or to find actual savings as a result of energy management measures.

NOTE: The report is not limited to energy consumption modeling. You can use it to model any quantity that is dependent on drivers, for example you can model Power Factor based on power demand.

Prerequisites

To use this report, at least one model must have been defined for your facility or process. The data for the independent variables must be available in the Power Monitoring Expert database for the reporting period.

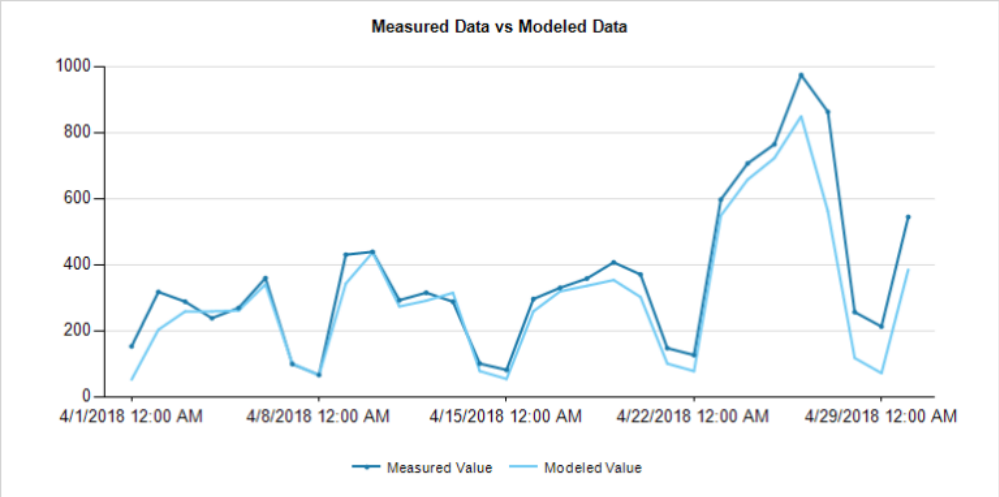
Report inputs:

- Title
- Choose a Model and a Reporting Aggregation Interval
- Display Mode
- Reporting Period
- Include Measured Data
- Enter an optional coefficient in % to be applied on the modeled data
- Insert Data

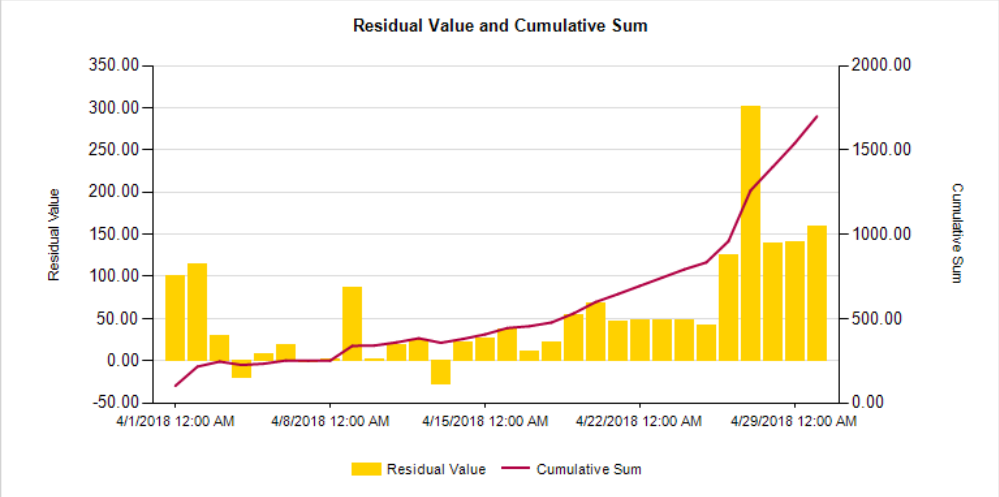
Example:

Display Mode : Forecast
Sum of measured data for the reporting period : 10674.28
Sum of modeled data for the reporting period : 8975.22
CuSum value at the end of the reporting period : 1699.06 or 18.93%

Errors							
No errors or warnings detected.							
Sub Model	Driver	Base Period				Rpt Period	Valid
		Std Dev	Min	Avg	Max	Avg	
Weekday [n]=20	Victoria.Weather·Weather Temperature Celsius·CDD·9	3.67	0.00	3.23	13.83	1.72	True
Saturday [n]=4	Victoria.Weather·Weather Temperature Celsius·CDD·9	3.59	0.00	2.95	11.71	1.36	True
Sunday [n]=5	Victoria.Weather·Weather Temperature Celsius·CDD·9	3.91	0.00	3.27	12.42	0.83	True
Holiday [n]=1	Victoria.Weather·Weather Temperature Celsius·CDD·9	4.68	0.00	3.62	13.33	0.18	True



TIP: Move your pointer over the chart line to see tooltips with measurement details.



Period	Measured	Modeled	Residual [%]	Residual	CuSum	CuSum [%]
4/1/2018 12:00:00 AM	152.29	51.33	196.70	100.97	100.97	196.70
4/2/2018 12:00:00 AM	316.93	202.56	56.46	114.36	215.33	84.81
4/3/2018 12:00:00 AM	287.55	257.94	11.48	29.61	244.94	47.85
4/4/2018 12:00:00 AM	237.53	257.94	-7.91	-20.41	224.53	29.17
4/5/2018 12:00:00 AM	268.67	260.67	3.07	8.01	232.53	22.57
4/6/2018 12:00:00 AM	358.98	340.00	5.58	18.99	251.52	18.35
4/7/2018 12:00:00 AM	98.53	100.43	-1.89	-1.90	249.62	16.97
4/8/2018 12:00:00 AM	65.44	64.27	1.82	1.17	250.79	16.34
4/9/2018 12:00:00 AM	429.72	342.34	25.52	87.38	338.17	18.01
4/10/2018 12:00:00 AM	438.38	436.48	0.44	1.91	340.07	14.70
4/11/2018 12:00:00 AM	291.91	273.01	6.92	18.90	358.97	13.88
4/12/2018 12:00:00 AM	314.67	290.40	8.36	24.27	383.24	13.32
4/13/2018 12:00:00 AM	287.47	314.21	-8.51	-26.74	356.50	11.17
4/14/2018 12:00:00 AM	99.88	77.29	29.22	22.58	379.09	11.60
4/15/2018 12:00:00 AM	80.69	53.45	50.98	27.25	406.33	12.23

NOTE: This example only shows selected content from the report, it does not show the entire report.

To calculate the models, PME uses the Accord Framework Library which can be found at: http://accord-framework.net/index.html

Energy Management Reports

PME includes the following energy management report templates:

- Calendar Trend Month Report
- Calendar Trend Week Report
- Consumption Ranking Report
- Energy Comparison Report
- Energy Cost Report
- Energy Period over Period Report
- Energy Usage Report
- Energy Usage by Shift Report
- Energy Usage by TOU Report
- Load Profile Report
- Measurement Aggregation Report
- Measurement Aggregation Export Report

⚠ CAUTION

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.

Failure to follow these instructions can result in injury or equipment damage.

Calendar Trend Month Report

Summary

The Calendar Trend Month Report shows a daily demand profile for a load for each day of a month. Use this report to see out-of-hours usage, benchmark performance targets, and to find peak and off-peak usage patterns.

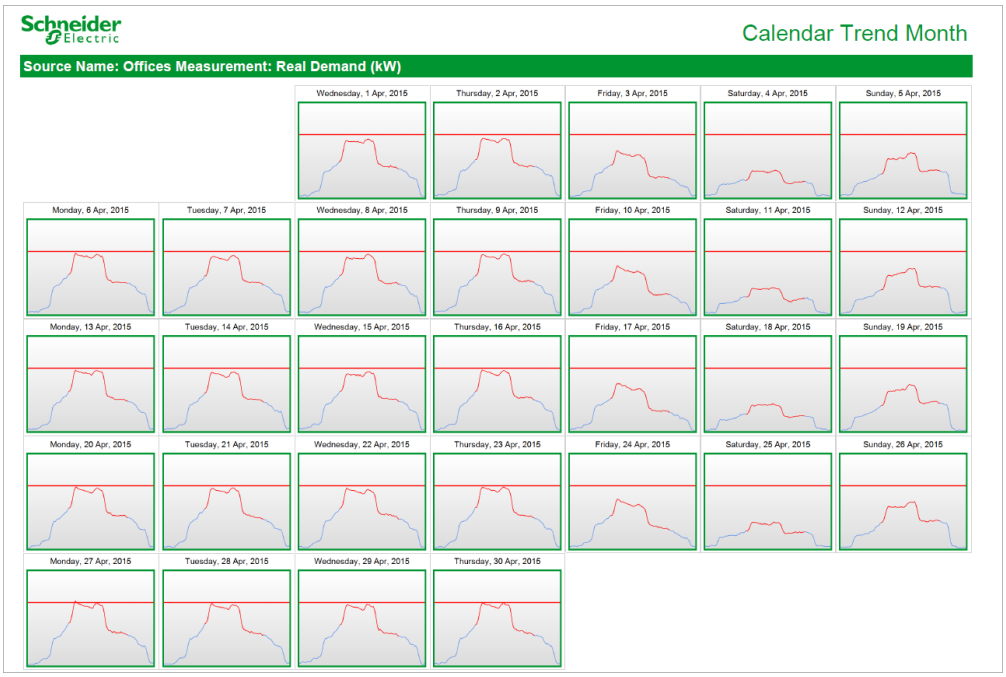
Prerequisites

- The measurement data must be available as historical data logs in the database.

Report inputs

- Title
- Single Source – see Sources (Devices and Views)
- Measurement – see Measurements (with Smart Mode)
- Start Hour
- End Hour
- Highlight Start
- Highlight End
- Reporting Period
- Target Line
- Source Label
- Display Zero Days
- Auto-scale Y-Axis
- Show Data Warnings.

Example:



NOTE: This example only shows selected content from the report, it does not show the entire report.

Calendar Trend Week Report

Summary

The Calendar Trend Week Report shows a daily demand profile for a load for each day of the week. Use this report to see out-of-hours usage, benchmark performance targets, and to find peak and off-peak usage patterns.

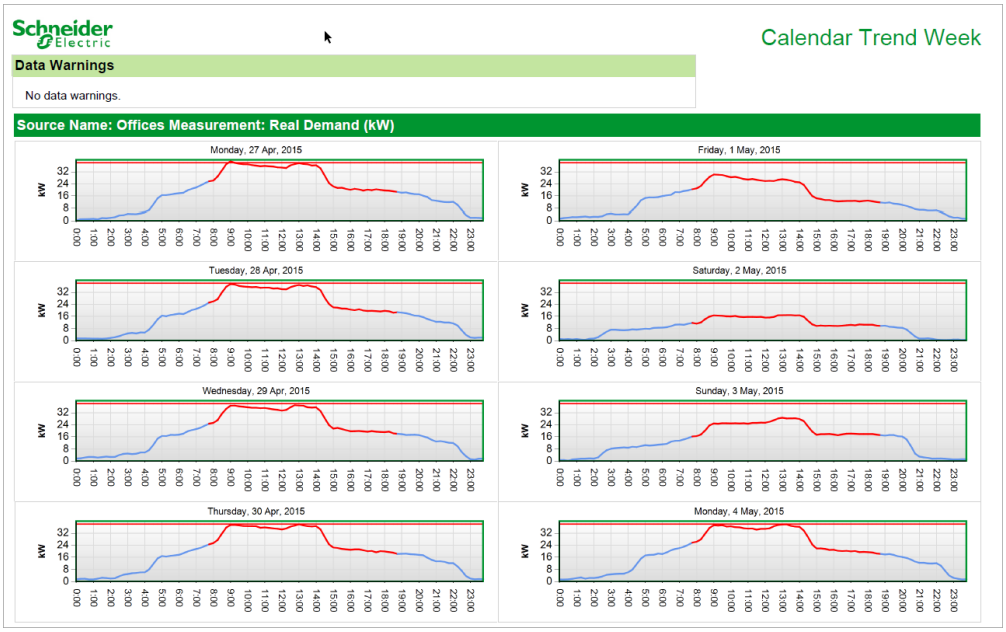
Prerequisites

- The measurement data must be available as historical data logs in the database.

Report inputs

- Title
- Single Source – see Sources (Devices and Views)
- Measurement – see Measurements (with Smart Mode)
- Start Hour
- End Hour
- Highlight Start
- Highlight End
- Reporting Period
- Target Line
- Source Label
- Auto-scale Y-Axis
- Show Data Warnings.

Example:



NOTE: This example only shows selected content from the report, it does not show the entire report.

Consumption Ranking Report

Summary

The Consumption Ranking Report shows the relative ranking of energy consumption for one or more loads. Use this report to gain an understanding of the operations of your facility or processes.

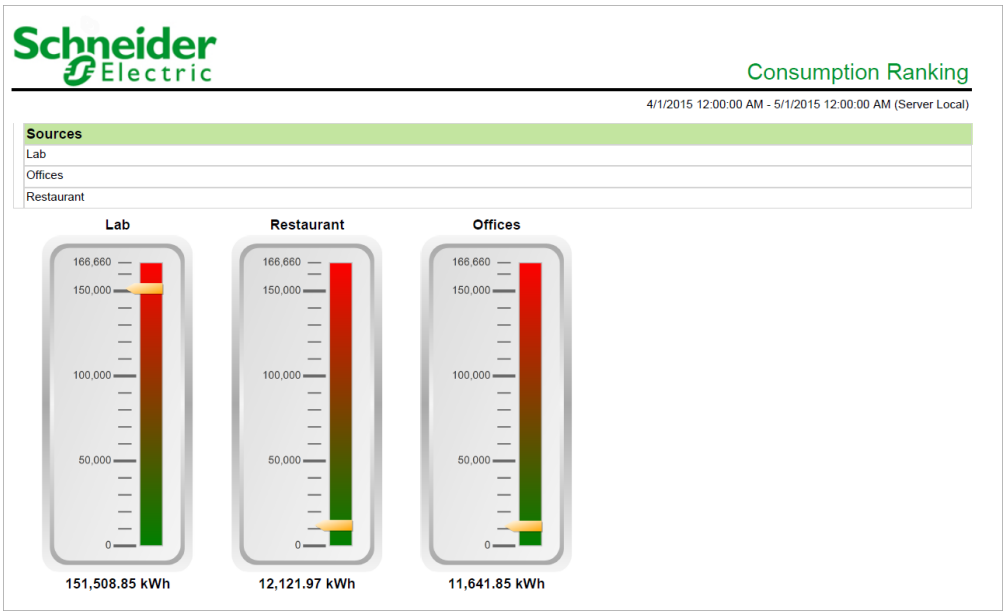
Prerequisites

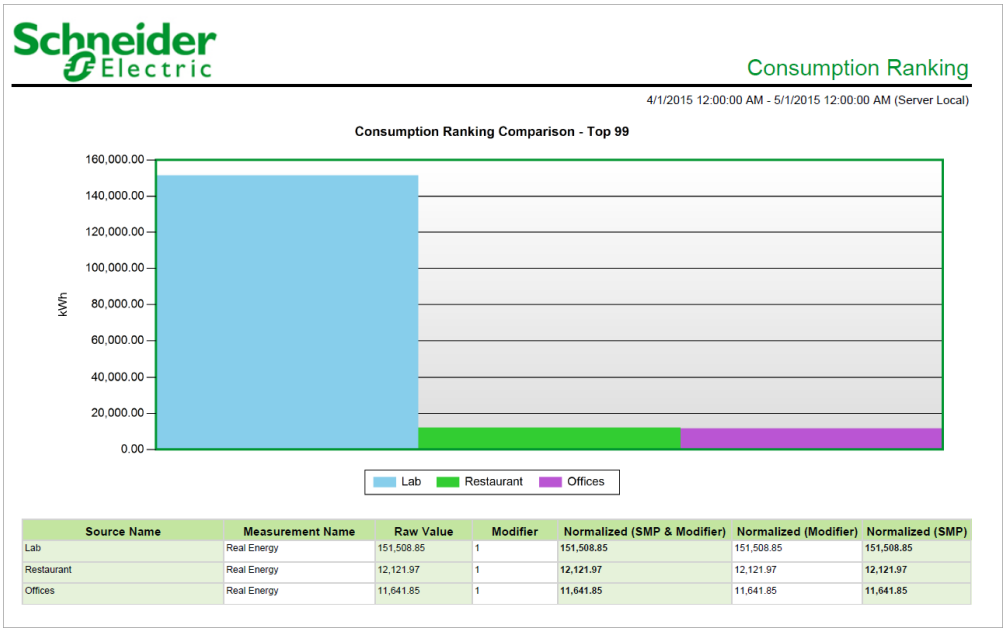
- The measurement data must be available as historical data logs in the database.

Report inputs

- Title
- Select Sources – see Sources (Devices and Views)
- Select Measurement – see Measurements (with Smart Mode)
- Multiplier
- Scale Source
- Scale Measurement
- Reporting Period
- Gauge Scale Override
- Select
- Select Number
- Custom Units Label
- Source Label
- Include Chart
- Include Gauges
- Include Tables
- Auto-scale Y-Axis
- Show Data Warnings.

Example:





Source Name	Measurement Name	Raw Value	Modifier	Normalized (SMP & Modifier)	Normalized (Modifier)	Normalized (SMP)
Lab	Real Energy	151,508.85	1	**151,508.85**	151,508.85	**151,508.85**
Restaurant	Real Energy	12,121.97	1	**12,121.97**	12,121.97	**12,121.97**
Offices	Real Energy	11,641.85	1	**11,641.85**	11,641.85	**11,641.85**

NOTE: This example only shows selected content from the report, it does not show the entire report.

Energy Comparison Report

Summary

The Energy Comparison Report converts different types of energy measurements to a common energy unit and then normalizes it by criteria, such as area. Use this report to benchmark building or process energy performance.

Prerequisites

- The measurement data must be available as historical data logs in the database.

Report inputs

- Title
- Energy Measurements
- Energy Measurement Label
- Rollup
- Reporting Period
- Show Start & End Periods Only
- Chart Type
- Auto-scale Y-Axis
- Include Data Table
- Show Data Warnings

Example:

Energy Comparison Report

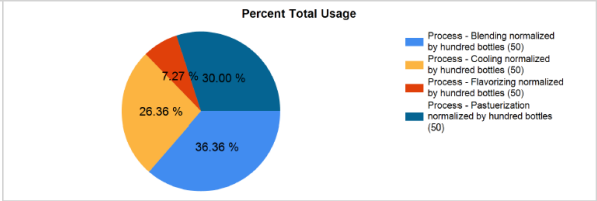
Usage Summary

Source	kWh per hundred bottles 5/24/2015
Process - Blending normalized by hundred bottles (50)	31.84
Process - Cooling normalized by hundred bottles (50)	23.08
Process - Flavorizing normalized by hundred bottles (50)	6.37
Process - Pastuerization normalized by hundred bottles (50)	26.27
Total	87.56

Energy Comparison Report

Relative Usage Pie Chart

5/24/2015



Energy Comparison Report

Interval Usage Data

Period : 5/24/2015 Interval : Weekday	Process - Blending normalized by hundred bottles (50)	Process - Cooling normalized by hundred bottles (50)	Process - Flavorizing normalized by hundred bottles (50)	Process - Pastuerization normalized by hundred bottles (50)	Interval Total
Sunday	3.16	2.29	0.63	2.61	8.70
Monday	2.33	1.69	0.47	1.92	6.41
Tuesday	5.82	4.22	1.16	4.80	16.00
Wednesday	5.59	4.05	1.12	4.61	15.37
Thursday	5.74	4.16	1.15	4.74	15.79
Friday	5.35	3.88	1.07	4.41	14.72
Saturday	3.84	2.79	0.77	3.17	10.57
Period Totals	31.84	23.08	6.37	26.27	

NOTE: This example only shows selected content from the report, it does not show the entire report.

Energy Cost Report

Summary

The Energy Cost Report shows energy and demand cost based on time of use and flat rate energy and demand charges. Use this report for internal cost allocation or utility bill verification.

Details

With an Energy Cost Report, you can:

- Use a time of use (TOU) schedule that you define using the Time of Use Editor (see the "Time of Use Editor" topic in the Management Console Tools section of the online Power Monitoring Expert *Help*).

  or

- Set a flat rate on the **Energy and Demand** tab of the Energy Rates dialog. See Rates report input description for more information.

NOTE: This report is intended to be used for positive power flow applications only (where kW and kvar are both positive). Use with bi-directional flow gives incorrect results.

Prerequisites

- The measurement data must be available as historical data logs in the database.

Report inputs

- Title
- Sources
- Rates
- Reporting Period
- Show Data Warnings
- Source Label

Example:

Schneider Electric

Energy Cost

11/1/2015 12:00:00 AM - 12/1/2015 12:00:00 AM (Server Local)

Data Warnings

Message	Date Added
One or more gaps were detected in data used for this report.	12/20/2015 2:00:58 AM
A Daylight Savings Time transition occurred during the requested date range. Data for the DST transition interval is duplicated/missing.	12/20/2015 2:00:54 AM
One or more gaps were detected in data used for this report.	12/20/2015 2:00:52 AM

Source: Utility.Main

Energy Cost

Time of Use	Total	Unit Cost ($)	Cost for Tariff ($)
Real Energy (kWh)			
Off Peak	56,763.01	0.03	1,702.89
Partial Peak	328,547.96	0.05	16,427.40
		SubTotal ($)	**18,130.29**
Reactive Energy (kVArh)			
Off Peak	18,657.10	0.02	373.14
Partial Peak	107,988.49	0.02	2,159.77
		SubTotal ($)	**2,532.91**
		Energy Cost Total ($)	**20,663.20**

Demand Cost

Time of Use	Timestamp of Peak	Max Value	Unit Cost ($)	Cost for Tariff ($)
Real Demand (kW)				
Off Peak	11/30/2015 8:30:00 AM	1,118.05	0.08	89.44
Partial Peak	11/30/2015 1:00:00 PM	1,444.83	0.08	115.59
			SubTotal ($)	**205.03**
			Demand Cost Total ($)	**205.03**
			Utility.Main Total ($)	**20,868.23**

WAGES Cost

Name	Source	Measurement	Total	Unit Cost ($)	Cost for Tariff ($)
Natural Gas	Utility.Main	AI2 scaled ()	96,188.26	0.01	961.88
				WAGES Cost Total ($)	**961.88**

NOTE: This example only shows selected content from the report, it does not show the entire report.

Energy Period over Period Report

Summary

The Energy Period over Period Report shows energy consumption for one or more loads for two different time periods. Use this report to detect changes in consumption over time, for example this month vs. the same month last year.

Prerequisites

- The measurement data must be available as historical data logs in the database.

Report inputs

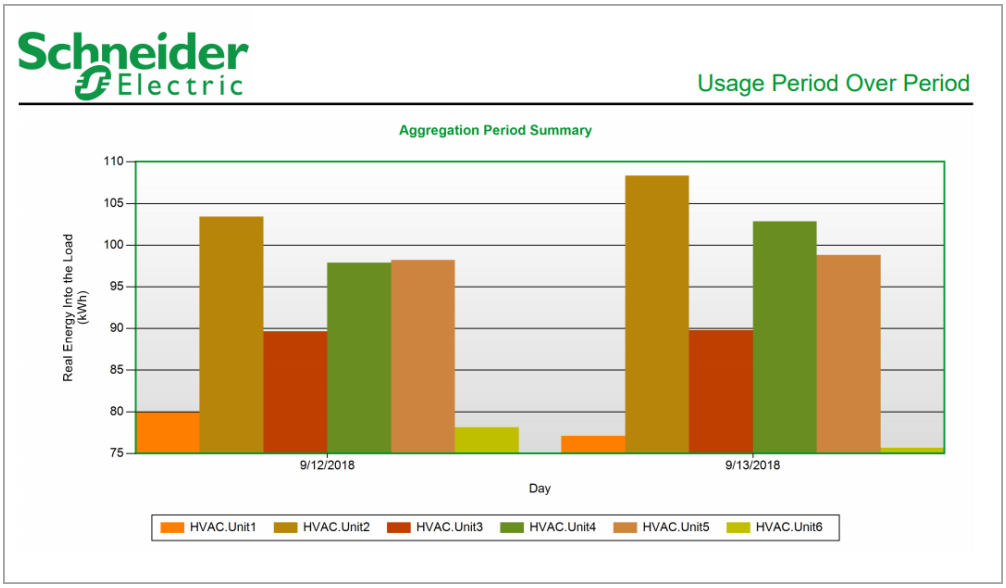
- Title
- Sources
- Measurement
- Report Period (with additional options)
- Auto-scale Y-Axis
- Include Aggregation Chart
- Include Stacked Aggregation Chart
- Include Interval Line Trend
- Include Interval Column Trend
- Source Label
- Include Data Table
- Show Data Warnings.

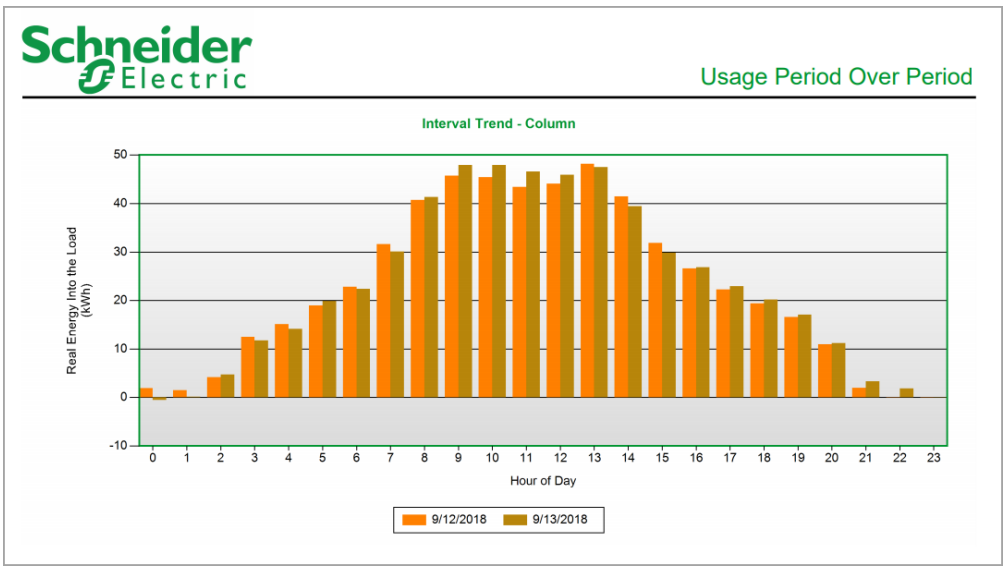
Example:

Usage Period Over Period

Report Parameters

Period Over Period Parameters		
Selected Period	Week	
Start Date	12/13/2015 12:15:00 AM	
Selected Interval	Current Week vs. Previous Week	
Number of Comparisons	1	
Selected Timezone	Server Local Time	(UTC-08:00) Pacific Time (US & Canada)
Sources	LV.Transformer15 LV.Transformer15b LV.Transformer16a LV.Transformer16b	





Schneider Electric

Usage Period Over Period

Interval Data (kWh)

	Week	
Weekday	12/13/2015	Total
Sunday	5,794.40	5,794.40
Monday	8,073.43	8,073.43
Tuesday	8,156.51	8,156.51
Wednesday	8,215.16	8,215.16
Thursday	8,156.92	8,156.92
Friday	5,652.88	5,652.88
Saturday	3,382.37	3,382.37
Total	47,431.68	47,431.68

NOTE: This example only shows selected content from the report, it does not show the entire report.

Energy Usage Report

Summary

The Energy Usage Report shows energy consumption for one or more loads, rolled up by day, week, month, or year. Use this report to compare energy consumption for different loads and gain an understanding of the operations of your facility or processes.

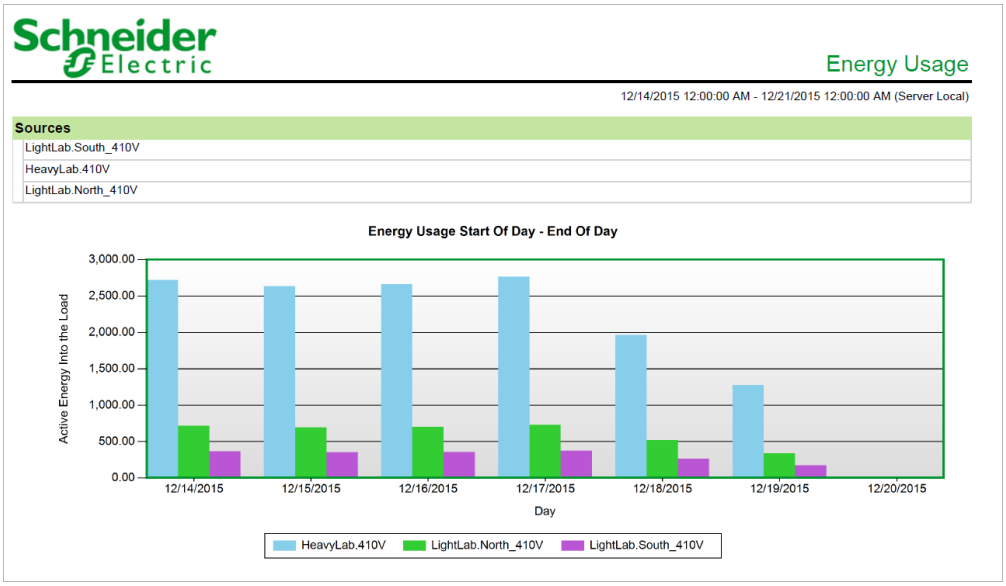
Prerequisites

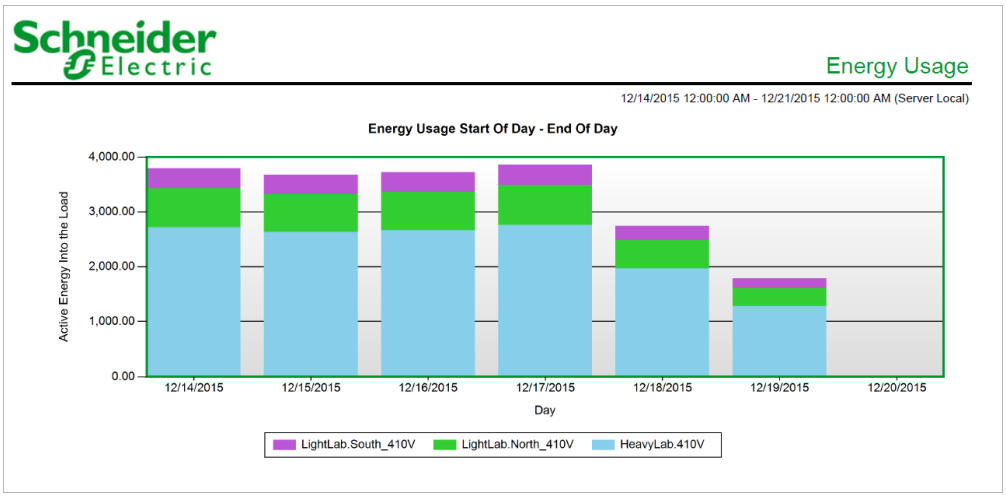
- The measurement data must be available as historical data logs in the database.

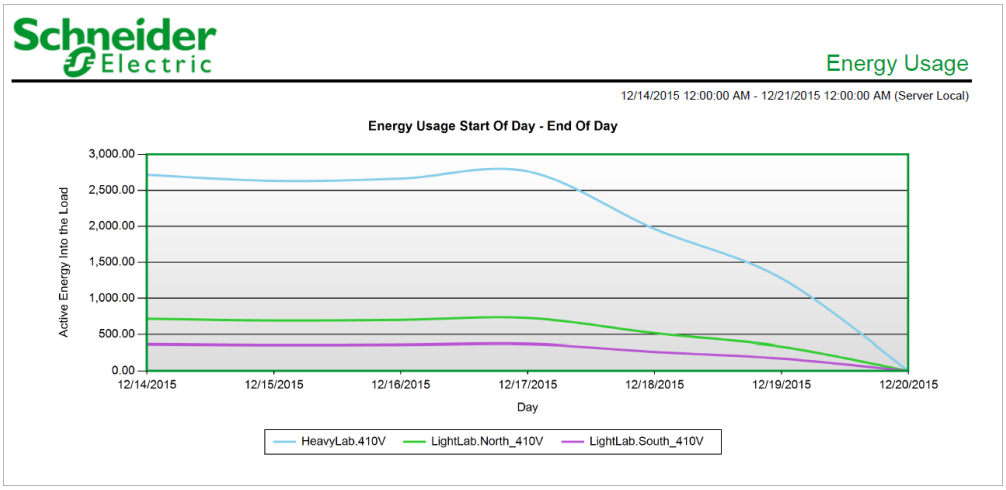
Report inputs

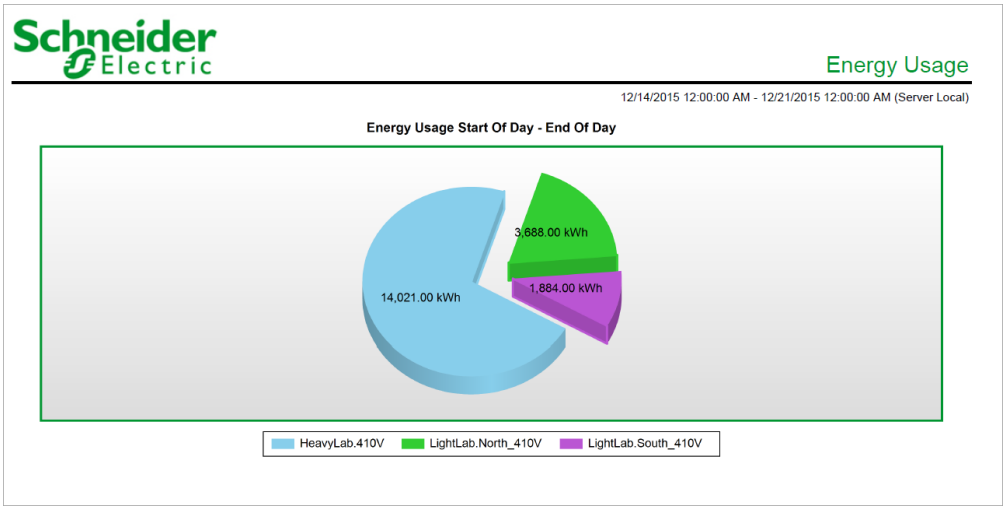
- Title
- Sources (Devices and Views)
- Measurements (with Smart Mode)
- Reporting Period
- Rollup
- Start Hour
- End Hour
- Lower Target Line
- Upper Target Line
- Source Label
- Include Column Chart
- Include Stacked Column Chart
- Include Line Chart
- Include Pie Chart
- Include 100% Area Chart
- Include Area Chart
- Include Gauges
- Auto-scale Y-Axis
- Show Data Warnings.

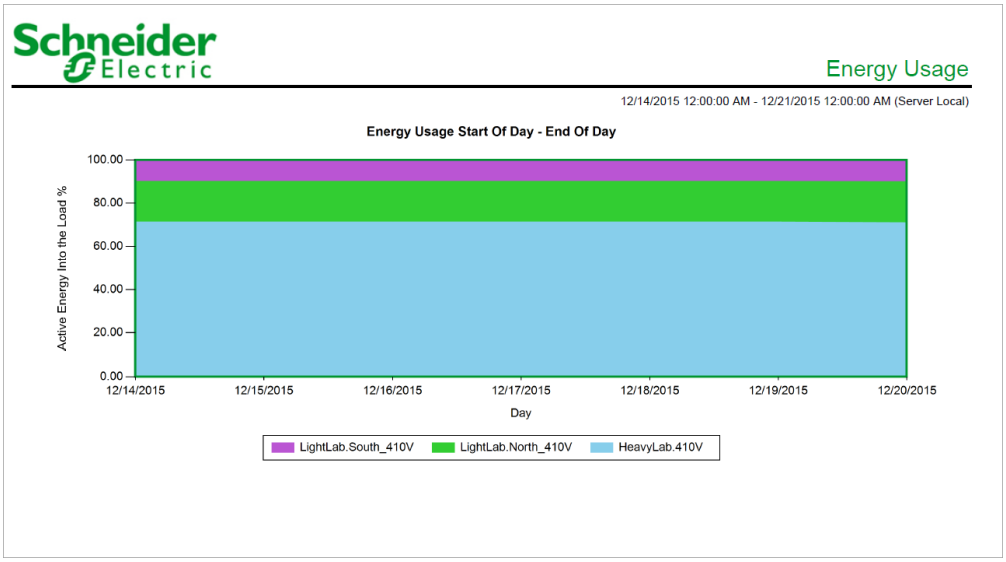
Example:

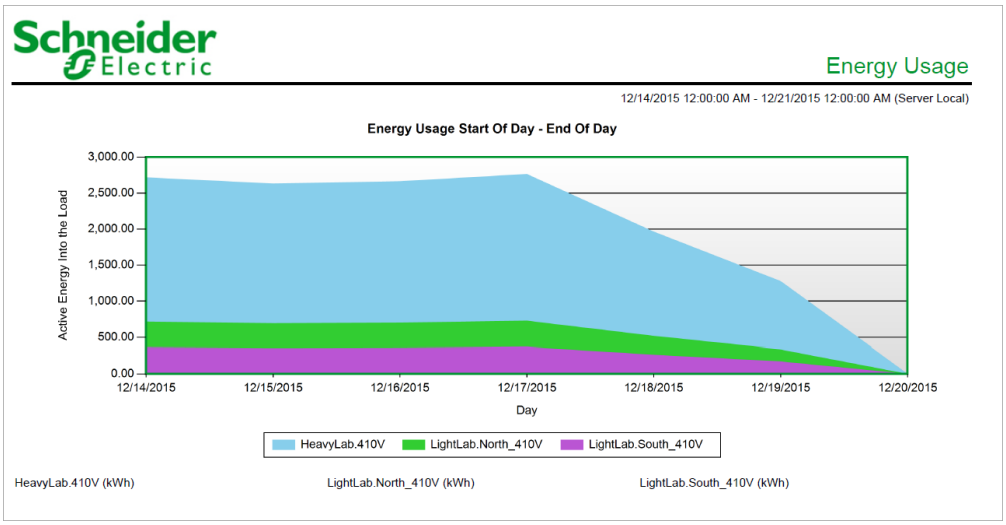












NOTE: This example only shows selected content from the report, it does not show the entire report.

Energy Usage by Shift Report

Summary

The Energy Usage by Shift Report shows energy consumption for one or more loads broken down by shifts. Use this report to compare energy consumption for different loads and gain an understanding of the operations of your facility or processes.

Details

NOTE: If you generate a report before the end of a shift that spans midnight, a portion of the usage data for that shift is included under the equivalent shift for the current day.

Example:

1. You specify three 8-hour shifts:

   Shift 1: 7:00 AM to 3:00 PM
   Shift 2: 3:00 PM to 11:00 PM
   Shift 3: 11:00 PM to 7:00 AM

   NOTE: Shift 3 spans midnight (12:00 a.m.).

2. Your **Reporting Period** is **Last 7 Days**.
3. You generate the report on day 8 before 7:00 a.m., that is, before the end of Shift 3 for day 7.

The generated report will include usage data under Shift 3 for day 8. However, this shift 3 usage data is the portion of shift 3 from the previous day (day 7) that occurred after midnight. In addition, this allocation of usage data to the next day for shift 3 from midnight to 7:00 a.m. occurs for all the days throughout the reporting period. To avoid this situation, select specific days (**Fixed Date**) for the **Reporting Period**.

Prerequisites

- The measurement data must be available as historical data logs in the database.

Report inputs

- Title
- Sources
- Measurement
- Reporting Period
- Rollup
- Shifts
- Show Data Warnings
- Source Label

Example:

Schneider Electric

Energy Usage By Shift

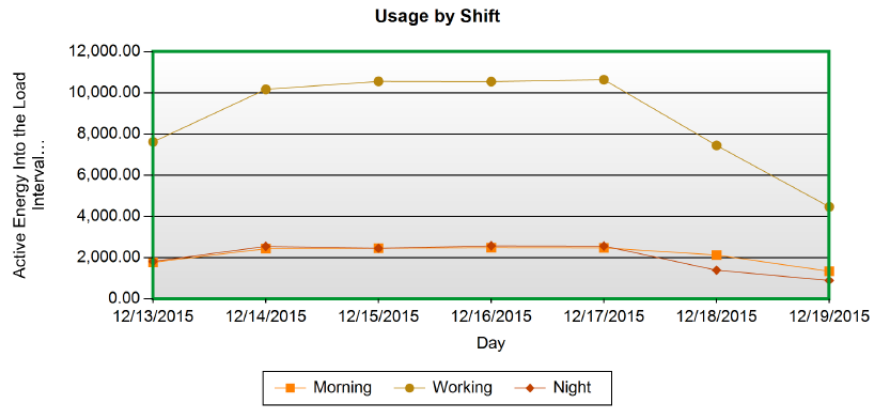
12/13/2015 12:00:00 AM - 12/20/2015 12:00:00 AM (Server Local)

Sources

Utility.Main

Shifts

Shift names	Shift start times	Shift end times
Morning	12:00 AM	8:00 AM
Working	8:00 AM	5:00 PM
Night	5:00 PM	12:00 AM



Schneider Electric

Energy Usage By Shift

12/13/2015 12:00:00 AM - 12/20/2015 12:00:00 AM (Server Local)

Aggregation Interval	Morning (kWh)	Working (kWh)	Night (kWh)	Total (kWh)
12/13/2015	1,769.81	7,616.93	1,811.76	11,198.50
12/14/2015	2,432.28	10,165.98	2,544.29	15,142.56
12/15/2015	2,453.15	10,551.95	2,452.01	15,457.12
12/16/2015	2,481.10	10,541.91	2,572.69	15,595.70
12/17/2015	2,472.14	10,635.36	2,561.44	15,668.94
12/18/2015	2,124.96	7,445.98	1,389.11	10,960.05
12/19/2015	1,340.41	4,467.95	891.86	6,700.22
Total	15,073.86	61,426.06	14,223.16	90,723.08

Schneider Electric

Energy Usage By Shift

12/13/2015 12:00:00 AM - 12/20/2015 12:00:00 AM (Server Local)

12/13/2015

Source	Night (kWh)	Working (kWh)	Morning (kWh)	Total (kWh)
Utility.Main	1,811.76	7,616.93	1,769.81	11,198.50
Total	1,811.76	7,616.93	1,769.81	11,198.50

12/14/2015

Source	Night (kWh)	Working (kWh)	Morning (kWh)	Total (kWh)
Utility.Main	2,544.29	10,165.98	2,432.28	15,142.56
Total	2,544.29	10,165.98	2,432.28	15,142.56

12/15/2015

Source	Night (kWh)	Working (kWh)	Morning (kWh)	Total (kWh)
Utility.Main	2,452.01	10,551.95	2,453.15	15,457.12
Total	2,452.01	10,551.95	2,453.15	15,457.12

12/16/2015

Source	Night (kWh)	Working (kWh)	Morning (kWh)	Total (kWh)
Utility.Main	2,572.69	10,541.91	2,481.10	15,595.70
Total	2,572.69	10,541.91	2,481.10	15,595.70

12/17/2015

Source	Night (kWh)	Working (kWh)	Morning (kWh)	Total (kWh)
Utility.Main	2,561.44	10,635.36	2,472.14	15,668.94
Total	2,561.44	10,635.36	2,472.14	15,668.94

12/18/2015

Source	Night (kWh)	Working (kWh)	Morning (kWh)	Total (kWh)
Utility.Main	1,389.11	7,445.98	2,124.96	10,960.05
Total	1,389.11	7,445.98	2,124.96	10,960.05

12/19/2015

Source	Night (kWh)	Working (kWh)	Morning (kWh)	Total (kWh)
Utility.Main	891.86	4,467.95	1,340.41	6,700.22
Total	891.86	4,467.95	1,340.41	6,700.22

NOTE: This example only shows selected content from the report, it does not show the entire report.

Energy Usage by TOU Report

Summary

The Energy Usage by TOU Report shows energy consumption for one or more loads based on a time of use (TOU) schedule. Use this report to compare energy consumption for different loads and gain an understanding of the operations of your facility or processes.

Prerequisites

- The measurement data must be available as historical data logs in the database.

Report inputs

- Title
- Sources (Devices and Views)
- Measurements (with Smart Mode)
- Reporting Period
- Rollup
- Select Time of Use
- Lower Target Line
- Upper Target Line
- Source Target Line
- Measurement Target Line
- Chart Type
- Source Label
- Include Data Tables
- Auto-scale Y-Axis
- Show Data Warnings.

Example:

Schneider Electric

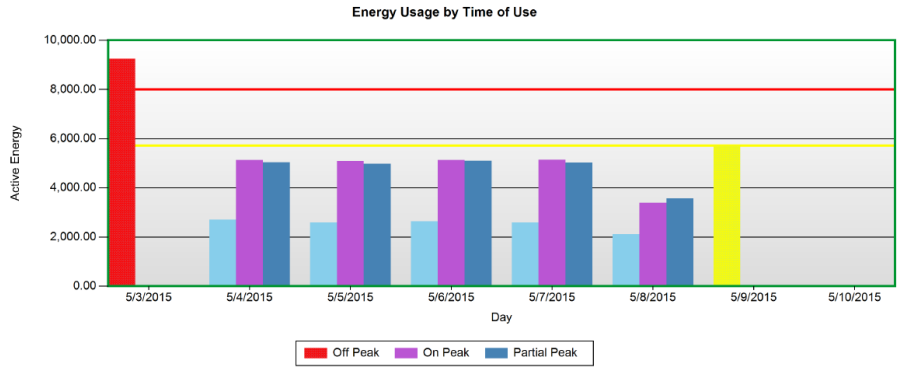
Energy Usage By Time of Use

5/3/2015 12:00:00 AM - 5/10/2015 12:00:00 AM (Server Local)

Sources

Utility.Main

Limit Source



Schneider Electric

Energy Usage By Time of Use

5/3/2015 12:00:00 AM - 5/10/2015 12:00:00 AM (Server Local)

Usage by Time of Use Table

Aggregation Interval	Off Peak (kWh)	Partial Peak (kWh)	On Peak (kWh)	Total (kWh)
5/3/2015	9,250.46			9,250.46
5/4/2015	2,705.52	5,035.61	5,126.59	12,867.72
5/5/2015	2,586.69	4,981.52	5,081.33	12,649.55
5/6/2015	2,629.15	5,087.13	5,128.07	12,844.35
5/7/2015	2,583.23	5,019.69	5,144.01	12,746.94
5/8/2015	2,114.95	3,569.79	3,381.64	9,066.39
5/9/2015	5,724.32			5,724.32
5/10/2015	1.73			1.73
Total	27,596.05	23,693.75	23,861.65	75,151.45

Schneider Electric

Energy Usage By Time of Use

5/3/2015 12:00:00 AM - 5/10/2015 12:00:00 AM (Server Local)

5/3/2015

Source	Off Peak (kWh)	Total (kWh)
Utility.Main	9,250.46	9,250.46
Total	9,250.46	9,250.46

5/4/2015

Source	Off Peak (kWh)	Partial Peak	On Peak (kWh)	Total (kWh)
Utility.Main	2,705.52	5,035.61	5,126.59	12,867.72
Total	2,705.52	5,035.61	5,126.59	12,867.72

5/5/2015

Source	Off Peak (kWh)	Partial Peak	On Peak (kWh)	Total (kWh)
Utility.Main	2,586.69	4,981.52	5,081.33	12,649.55
Total	2,586.69	4,981.52	5,081.33	12,649.55

5/6/2015

Source	Off Peak (kWh)	Partial Peak	On Peak (kWh)	Total (kWh)
Utility.Main	2,629.15	5,087.13	5,128.07	12,844.35
Total	2,629.15	5,087.13	5,128.07	12,844.35

5/7/2015

Source	Off Peak (kWh)	Partial Peak	On Peak (kWh)	Total (kWh)
Utility.Main	2,583.23	5,019.69	5,144.01	12,746.94
Total	2,583.23	5,019.69	5,144.01	12,746.94

NOTE: This example only shows selected content from the report, it does not show the entire report.

Load Profile Report

Summary

The Load Profile Report shows demand or load levels, including peak demand, over the reporting period. Use this report to understand the power consumption patterns of your facility or processes.

Details

The Load Profile report template uses similar measurements as the Energy Cost report template but does not use a TOU schedule.

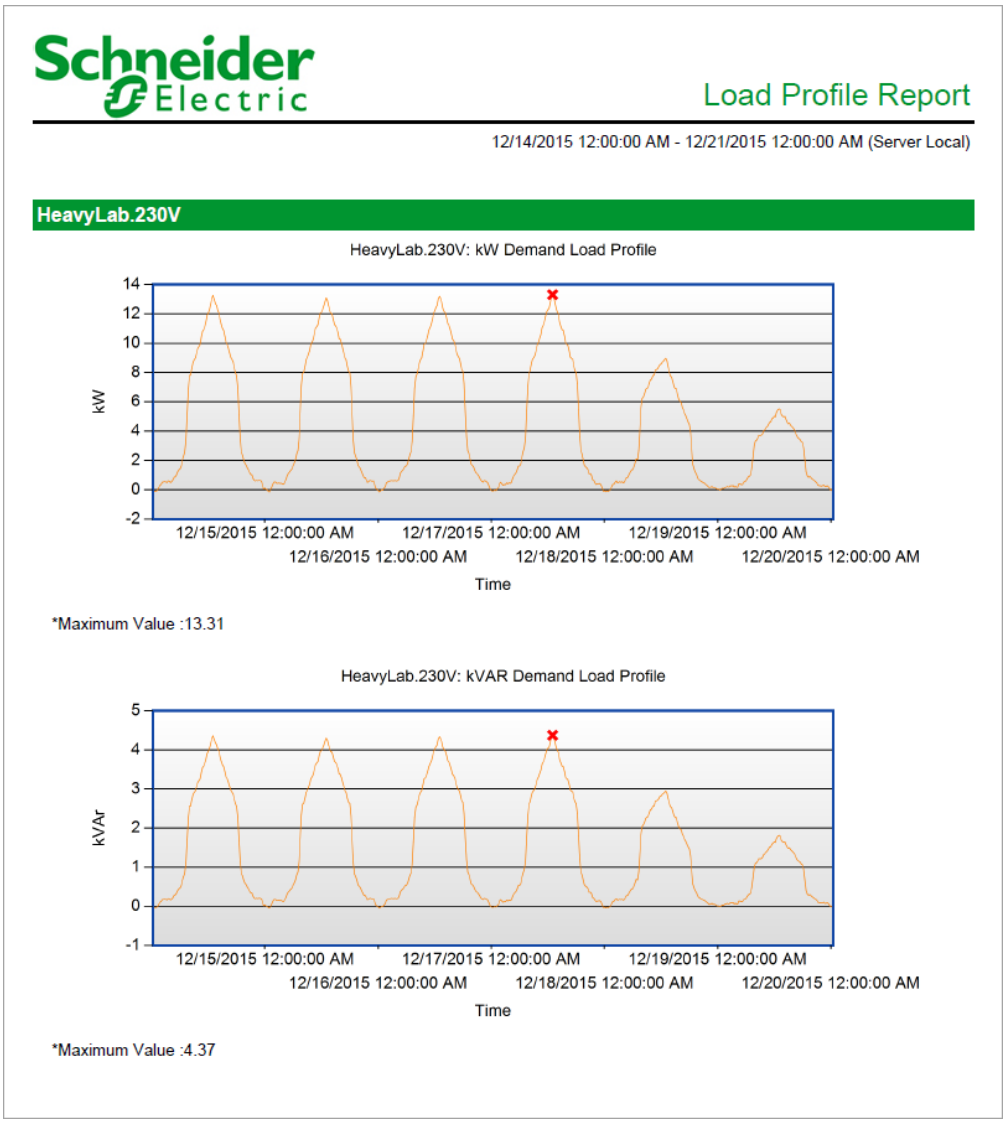
Prerequisites

- The measurement data must be available as historical data logs in the database.

Report inputs

- Title
- Sources
- Measurements
- Reporting Period
- Include Data Table
- Auto-scale Y-Axis
- Target Line (kW)
- Target Line (kvar)
- Target Line (kVA)
- Source Label
- Show Data Warnings

Example:



NOTE: This example only shows selected content from the report, it does not show the entire report.

Measurement Aggregation Report

Summary

The Measurement Aggregation Report gives aggregated logged measurement data in tabular format. The aggregation intervals are configurable, and the report supports aggregation by time of use. Use this report to understand the consumption patterns of your facility or processes.

Prerequisites

- The measurement data must be available as historical data logs in the database.

Report inputs

- Title
- Sources
- Measurements
- Reporting Period
- Rollup
- Non Cumulative Measurement Calculation
- Apply Time of Use / Select Time of Use Schedule
- Source Label
- Rollup Table Type
- Show Totals
- Show Data Warnings.
- Show Header

Example 1 - Report output with Rollup set to Interval:

Schneider Electric

Measurement Aggregation Report

	Campus.Academic_Hall		Campus.Dining_Hall		Total	Total %
	Real Energy (kWh)	Real Energy (kWh)	Real Energy (kWh)	Real Energy (kWh)		
Timestamp	Off Peak	On Peak	Off Peak	On Peak		
7/5/2019 7:15 AM	13.97		27.99		41.96	13.19
7/5/2019 7:30 AM	12.67		25.20		37.87	11.9
7/5/2019 7:45 AM	15.32		24.61		39.93	12.55
7/5/2019 8:00 AM	14.17		27.17		41.34	12.99
7/5/2019 8:15 AM		14.61		23.60	38.21	12.01
7/5/2019 8:30 AM		13.42		24.59	38.01	11.95
7/5/2019 8:45 AM		13.50		26.04	39.53	12.42
7/5/2019 9:00 AM		14.67		26.67	41.33	12.99
Total	56.12	56.19	104.97	100.9		

Example 2 - Report output with Rollup set to Hour:

Measurement Aggregation Report

	Campus.Academic_Hall		Campus.Dining_Hall		Total	Total %
	Real Energy (kWh)	Real Energy (kWh)	Real Energy (kWh)	Real Energy (kWh)		
Timestamp	Off Peak	On Peak	Off Peak	On Peak		
7/5/2019 7:00 AM	56.12		104.97		161.09	50.63
7/5/2019 8:00 AM		56.19		100.90	157.08	49.37
Total	56.12	56.19	104.97	100.9		

NOTE: This example only shows selected content from the report, it does not show the entire report.

Measurement Aggregation Export Report

NOTE: This report is part of the Data Exchange Module. This module requires a separate license.

Summary

The Measurement Aggregation Export Report gives aggregated logged measurement data in tabular format. It provides the same data as the Measurement Aggregation Report but in CSV, RepGen compatible, or Tidy file export formats. Use this report to share consumption data with third-party systems or for use in existing RepGen reports.

NOTE: RepGen is a Microsoft Excel based reporting system that was part of earlier versions of PME.

NOTE: The output file of this report is saved to the PME server, not the web client computer.

Prerequisites

- The measurement data must be available as historical data logs in the database.

Report inputs

- Sources
- Measurements
- Reporting Period
- Rollup
- Non Cumulative Measurement Calculation
- Apply Time of Use / Select Time of Use Schedule
- Include Empty Intervals
- Base Interval
- Export File Path
- Overwrite File
- Export Format
- Show Data Warnings.

Example - CSV output format:

```
SourceName,SourceDescription,MeasurementName,MeasurementShortUnitName,TouPeriod,Timestamp,Value
Campus.Academic_Hall,This is Academic Hall,Real Energy,kWh,Off Peak,7/5/2019 7:15:00 AM,13.9669999997132
Campus.Dining_Hall,,Real Energy,kWh,Off Peak,7/5/2019 7:15:00 AM,27.9909999999218
Campus.Academic_Hall,This is Academic Hall,Real Energy,kWh,Off Peak,7/5/2019 7:30:00 AM,12.6699999999255
Campus.Dining_Hall,,Real Energy,kWh,Off Peak,7/5/2019 7:30:00 AM,25.1970000001602
Campus.Academic_Hall,This is Academic Hall,Real Energy,kWh,Off Peak,7/5/2019 7:45:00 AM,15.3179999999702
Campus.Dining_Hall,,Real Energy,kWh,Off Peak,7/5/2019 7:45:00 AM,24.6099999998696
Campus.Academic_Hall,This is Academic Hall,Real Energy,kWh,Off Peak,7/5/2019 8:00:00 AM,14.1650000000373
Campus.Dining_Hall,,Real Energy,kWh,Off Peak,7/5/2019 8:00:00 AM,27.1710000000894
Campus.Academic_Hall,This is Academic Hall,Real Energy,kWh,On Peak,7/5/2019 8:15:00 AM,14.6060000001453
Campus.Dining_Hall,,Real Energy,kWh,On Peak,7/5/2019 8:15:00 AM,23.6030000001192
Campus.Academic_Hall,This is Academic Hall,Real Energy,kWh,On Peak,7/5/2019 8:30:00 AM,13.4190000002272
Campus.Dining_Hall,,Real Energy,kWh,On Peak,7/5/2019 8:30:00 AM,24.589999999851
Campus.Academic_Hall,This is Academic Hall,Real Energy,kWh,On Peak,7/5/2019 8:45:00 AM,13.4969999999739
Campus.Dining_Hall,,Real Energy,kWh,On Peak,7/5/2019 8:45:00 AM,26.035000000149
Campus.Academic_Hall,This is Academic Hall,Real Energy,kWh,On Peak,7/5/2019 9:00:00 AM,14.6650000000373
Campus.Dining Hall,,Real Energy,kWh,On Peak,7/5/2019 9:00:00 AM,26.6680000000633
```

NOTE: This example only shows selected content from the report, it does not show the entire report.

General Reports

PME includes the following general report templates:

- 100 ms Report
- Dashboard Report
- Dashboard - Portrait Report
- Data Export - Extended
- Data Export - Standard
- Event History Report
- System Configuration Report
- Tabular Report

⚠ CAUTION

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.

Failure to follow these instructions can result in injury or equipment damage.

100 ms Report

Summary

The 100ms Report shows 100 ms measurements from PowerLogic™ Circuit Monitors, for example CM4000 in a tabular format. Use this report to analyze high speed data samples from these devices.

Prerequisites

- The measurement data must be available as historical data logs in the database.

Report inputs

- Title
- Sources
- Measurements
- Reporting Period
- Show Data Warnings
- Source Label

Example:

Schneider Electric

100 ms

3/1/2015 12:00:00 AM - 3/8/2015 12:00:00 AM (Server Local)

Timestamp	CM.4000T_84_247 100ms Apparent Power (kVA)
3/2/2015 8:44:47.965 AM	141.00
3/2/2015 8:44:48.065 AM	141.00
3/2/2015 8:44:48.165 AM	141.00
3/2/2015 8:44:48.265 AM	141.00
3/2/2015 8:44:48.365 AM	141.00
3/2/2015 8:44:48.465 AM	141.00
3/2/2015 8:44:48.565 AM	140.00
3/2/2015 8:44:48.671 AM	141.00
3/2/2015 8:44:48.765 AM	141.00
3/2/2015 8:44:48.865 AM	141.00
3/2/2015 8:44:48.965 AM	139.00
3/2/2015 8:44:49.081 AM	129.00
3/2/2015 8:44:49.165 AM	142.00
3/2/2015 8:44:49.265 AM	144.00
3/2/2015 8:44:49.365 AM	141.00
3/2/2015 8:44:49.519 AM	139.00
3/2/2015 8:44:49.882 AM	141.00
3/2/2015 8:44:49.883 AM	141.00
3/5/2015 2:57:36.724 PM	136.00
3/5/2015 2:57:36.824 PM	136.00
3/5/2015 2:57:36.924 PM	136.00
3/5/2015 2:57:37.024 PM	136.00
3/5/2015 2:57:37.124 PM	136.00
3/5/2015 2:57:37.224 PM	136.00
3/5/2015 2:57:37.324 PM	136.00
3/5/2015 2:57:37.424 PM	136.00
3/5/2015 2:57:37.524 PM	136.00
3/5/2015 2:57:37.640 PM	136.00
3/5/2015 2:57:37.724 PM	142.00
3/5/2015 2:57:37.824 PM	154.00

NOTE: This example only shows selected content from the report, it does not show the entire report.

Dashboard Report

Summary

The Dashboard Report shows screen captures of a dashboard slideshow in a landscape page layout. Use this report to share dashboard and Web content in any of the supported report formats, such as PDF and so on.

Details

You can include the screen capture of an additional, custom page, by specifying the page URL.

TIP: Create separate slideshows for each dashboard page you want to report on.

Prerequisites

- A Dashboard slideshow must be configured.

Report inputs

- Title
- Page Size
- Custom Page Height
- Custom Page Width
- Slideshows
- Custom URL
- Page Wait Time in Seconds
- Show Header & Footer
- Show Data Warnings

Dashboard - Portrait Report

Summary

The Dashboard - Portrait Report shows screen captures of a dashboard slideshow in a portrait page layout. Use this report to share dashboard and Web content in any of the supported report formats, such as PDF and so on.

Details

You can include the screen capture of an additional, custom page by specifying the page URL.

TIP: Create separate slideshows for each dashboard page you want to report on.

Prerequisites

- A Dashboard slideshow must be configured.

Report inputs

- Title
- Page Size
- Custom Page Height
- Custom Page Width
- Slideshows
- Custom URL
- Page Wait Time in Seconds
- Show Header & Footer
- Show Data Warnings

Data Export - Extended

Summary

The Data Export - Extended Report gives logged measurement data in CSV file format. Use this report to import and analyze data in a third-party application, such as Microsoft Excel.

NOTE: This report has more details than the Data Export - Standard Report, but it supports a smaller data set.

Details

The data is organized in columns labeled **Timestamp UTC**, **Timestamp**, **Value**, **Source**, **Measurement**, and **Unit**. This makes it easier to create an Excel pivot table for analyzing the data in the file. The data is listed for each source and measurement by date and in the specified time segments for the data. This report can export 80 source measurements for 10 months.

Prerequisites

- The measurement data must be available as historical data logs in the database.

Report inputs

- Title
- Sources (Devices and Views)
- Measurements (with Smart Mode)
- Reporting Period
- Include Duplicates

Example:

Timestamp UTC	Timestamp	Value	Source	Measurement	Unit
5/16/2018 4:15	5/16/2018 0:15	0.041545	Restaurant.HVAC2	Block Demand Real Power	kW
5/16/2018 4:15	5/16/2018 0:15	9072.233	Restaurant.HVAC2	Real Energy Into the Load	kWh
5/16/2018 4:15	5/16/2018 0:15	-3.34E-05	Restaurant.Equipment	Block Demand Real Power	kW
5/16/2018 4:15	5/16/2018 0:15	57.03068	Restaurant.Equipment	Real Energy Into the Load	kWh
5/16/2018 4:15	5/16/2018 0:15	-0.43983	Restaurant.HVAC1	Block Demand Real Power	kW
5/16/2018 4:15	5/16/2018 0:15	368298.2	Restaurant.HVAC1	Real Energy Into the Load	kWh
5/16/2018 4:30	5/16/2018 0:30	0.042137	Restaurant.HVAC2	Block Demand Real Power	kW
5/16/2018 4:30	5/16/2018 0:30	9072.243	Restaurant.HVAC2	Real Energy Into the Load	kWh
5/16/2018 4:30	5/16/2018 0:30	-3.07E-05	Restaurant.Equipment	Block Demand Real Power	kW
5/16/2018 4:30	5/16/2018 0:30	57.03067	Restaurant.Equipment	Real Energy Into the Load	kWh
5/16/2018 4:30	5/16/2018 0:30	-0.40463	Restaurant.HVAC1	Block Demand Real Power	kW
5/16/2018 4:30	5/16/2018 0:30	368298.1	Restaurant.HVAC1	Real Energy Into the Load	kWh
5/16/2018 4:45	5/16/2018 0:45	0.044002	Restaurant.HVAC2	Block Demand Real Power	kW
5/16/2018 4:45	5/16/2018 0:45	9072.254	Restaurant.HVAC2	Real Energy Into the Load	kWh
5/16/2018 4:45	5/16/2018 0:45	-2.53E-05	Restaurant.Equipment	Block Demand Real Power	kW
5/16/2018 4:45	5/16/2018 0:45	57.03067	Restaurant.Equipment	Real Energy Into the Load	kWh
5/16/2018 4:45	5/16/2018 0:45	-0.33413	Restaurant.HVAC1	Block Demand Real Power	kW
5/16/2018 4:45	5/16/2018 0:45	368298	Restaurant.HVAC1	Real Energy Into the Load	kWh
5/16/2018 5:00	5/16/2018 1:00	0.038037	Restaurant.HVAC2	Block Demand Real Power	kW
5/16/2018 5:00	5/16/2018 1:00	9072.263	Restaurant.HVAC2	Real Energy Into the Load	kWh
5/16/2018 5:00	5/16/2018 1:00	-4.18E-05	Restaurant.Equipment	Block Demand Real Power	kW
5/16/2018 5:00	5/16/2018 1:00	57.03066	Restaurant.Equipment	Real Energy Into the Load	kWh
5/16/2018 5:00	5/16/2018 1:00	-0.55053	Restaurant.HVAC1	Block Demand Real Power	kW
5/16/2018 5:00	5/16/2018 1:00	368297.8	Restaurant.HVAC1	Real Energy Into the Load	kWh
5/16/2018 5:15	5/16/2018 1:15	0.043509	Restaurant.HVAC2	Block Demand Real Power	kW
5/16/2018 5:15	5/16/2018 1:15	9072.276	Restaurant.HVAC2	Real Energy Into the Load	kWh
5/16/2018 5:15	5/16/2018 1:15	-4.90E-05	Restaurant.Equipment	Block Demand Real Power	kW
5/16/2018 5:15	5/16/2018 1:15	57.03065	Restaurant.Equipment	Real Energy Into the Load	kWh

CSV_2018-05-22-15-03-39

NOTE: This example only shows selected content from the report, it does not show the entire report.

Data Export - Standard

Summary

The Data Export - Standard Report gives logged measurement data in CSV file format. Use this report to import and analyze data in a third-party application, such as Microsoft Excel.

NOTE: This report has fewer details than the Data Export - Extended Report, but it supports a larger data set.

Details

The data is organized by column, with column A labeled **Timestamp**. The remaining columns are labeled with the source name and measurement. The data is listed by date and in the specified time segments for the data. This report can export 600 source measurements for 11 months.

Prerequisites

- The measurement data must be available as historical data logs in the database.

Report inputs

- Title
- Sources (Devices and Views)
- Measurements (with Smart Mode)
- Reporting Period
- Include Duplicates

Example:

	A	B	C	D	E	
1	Timestamp	Restaurant.Equipment#Block Demand Real Power#kW	Restaurant.Equipment#Real Energy Into the Load#kWh	Restaurant.HVAC1#Block Demand Real Power#kW	Restaurant.HVAC1#Real Energy Into the Load#kWh	Res
2	5/16/2018 3:45	0.000117992	57.03066729	4.050947156	368299.8191	0.2
3	5/16/2018 4:00	0.000125054	57.03069341	4.357127489	368300.7354	0.2
4	5/16/2018 4:15	0.000150174	57.03072954	4.897778367	368301.879	0.2
5	5/16/2018 4:30	0.000158284	57.03076298	5.471432474	368303.1213	0.3
6	5/16/2018 4:45	0.000188515	57.03080665	6.334771314	368304.5582	0.3
7	5/16/2018 5:00	0.000207896	57.03085105	6.810574702	368306.0497	0.3
8	5/16/2018 5:15	0.000270059	57.03091348	8.269104206	368308.0003	0.3
9	5/16/2018 5:30	0.000352822	57.03098675	10.73714714	368310.3228	0.4
10	5/16/2018 5:45	0.000412319	57.03107069	12.91734774	368312.9396	0.4
11	5/16/2018 6:00	0.000446639	57.03115913	14.00695051	368315.9009	0.4
12	5/16/2018 6:15	0.000503794	57.03128368	15.53096072	368319.3995	0.5
13	5/16/2018 6:30	0.000618209	57.0314238	18.87097888	368323.716	0.6
14	5/16/2018 6:45	0.000731384	57.03157804	22.2368071	368328.4433	0.7
15	5/16/2018 7:00	0.000801004	57.03175058	24.0738008	368333.6345	0.8
16	5/16/2018 7:15	0.000876318	57.03195288	26.01535683	368339.6942	0.9
17	5/16/2018 7:30	0.000998106	57.03218391	29.92463399	368346.678	1.0
18	5/16/2018 7:45	0.001140004	57.03243857	34.10535471	368354.1903	1.2
19	5/16/2018 8:00	0.001209233	57.03268929	36.16715885	368362.239	1.3
20	5/16/2018 8:15	0.001247346	57.03299159	37.62510254	368371.1687	1.
21	5/16/2018 8:30	0.001388746	57.03332952	41.86725691	368381.2946	1.3
22	5/16/2018 8:45	0.001507003	57.03367893	45.71716368	368391.7204	1.2
23	5/16/2018 9:00	0.001557018	57.03403964	47.44337805	368402.6242	1.2
24	5/16/2018 9:15	0.001623302	57.03443427	49.36818051	368414.7001	1.2
25	5/16/2018 9:30	0.001758307	57.03484804	53.44794107	368427.4646	1.1
26	5/16/2018 9:45	0.001869703	57.03528165	57.217948	368440.7724	1.0
27	5/16/2018 10:00	0.001947398	57.03574172	59.27504661	368454.5247	1.0
28	5/16/2018 10:15	0.002011899	57.0362251	61.15438271	368469.4851	0.9

NOTE: This example only shows selected content from the report, it does not show the entire report.

Event History Report

Summary

The Event History Report gives a tabular list of event log entries for the selected sources. Use this report to analyze system events, for example for root cause analysis or sequence of events analysis.

Details

If no event has occurred that matches the inputs entered when generating the report, no data is returned.

Prerequisites

- None

Report inputs

- Title
- Sources
- Reporting Period
- Show Data Warnings
- Priority
- Source Label

Example:

Schneider Electric

Event History Report

1/1/2016 12:00:00 AM - 5/11/2016 12:00:00 AM (Server Local)

Data Warnings

No data warnings.

Event Log Data

Source	Timestamp	Priority	Cause	Cause Value	Effect	Effect Value
Production.Utility	5/7/2016 5:37:34.674 PM	200	Sag/Swell 1	Disturbance End	Voltage Disturbance State	Normal
Utility.Main	5/7/2016 5:37:34.674 PM	200	Sag/Swell 1	Disturbance End	Voltage Disturbance State	Normal
LV.Transformer16b	5/7/2016 5:37:34.604 PM	200	Sag/Swell 1	Disturbance End	Voltage Disturbance State	Normal
Production.Bottling	5/7/2016 5:37:34.604 PM	200	Sag/Swell 1	Disturbance End	Voltage Disturbance State	Normal
LV.Transformer15b	5/7/2016 5:37:34.596 PM	200	Sag/Swell 1	Disturbance End	Voltage Disturbance State	Normal
Production.CleanInPlace	5/7/2016 5:37:34.596 PM	200	Sag/Swell 1	Disturbance End	Voltage Disturbance State	Normal
LV.Transformer16a	5/7/2016 5:37:34.578 PM	200	Sag/Swell 1	Disturbance End	Voltage Disturbance State	Normal
Production.Warehouse	5/7/2016 5:37:34.578 PM	200	Sag/Swell 1	Disturbance End	Voltage Disturbance State	Normal
LV.Transformer15	5/7/2016 5:37:34.577 PM	200	Sag/Swell 1	Disturbance End	Voltage Disturbance State	Normal
Production.Preparation	5/7/2016 5:37:34.577 PM	200	Sag/Swell 1	Disturbance End	Voltage Disturbance State	Normal
Production.Incomer	5/7/2016 5:37:34.564 PM	200	Sag/Swell 1	Disturbance End	Voltage Disturbance State	Normal
Utility.Revenue	5/7/2016 5:37:34.564 PM	200	Sag/Swell 1	Disturbance End	Voltage Disturbance State	Normal
Production.Utility	5/7/2016 5:37:32.213 PM	200	Sag/Swell 1	Disturbance Start	Voltage Disturbance State	Disturbance
Production.Utility	5/7/2016 5:37:32.213 PM	127	Dist Direction Detection 1	DDD Analysis Done	Dist Direction Detection 1	Disturbance Direction Detected - Upstream - High Confidence
Utility.Main	5/7/2016 5:37:32.213 PM	200	Sag/Swell 1	Disturbance Start	Voltage Disturbance State	Disturbance
Utility.Main	5/7/2016 5:37:32.213 PM	127	Dist Direction Detection 1	DDD Analysis Done	Dist Direction Detection 1	Disturbance Direction Detected - Upstream - High Confidence
LV.Transformer16b	5/7/2016 5:37:32.153 PM	200	Sag/Swell 1	Disturbance Start	Voltage Disturbance State	Disturbance
LV.Transformer16b	5/7/2016 5:37:32.153 PM	127	Dist Direction Detection 1	DDD Analysis Done	Dist Direction Detection 1	Disturbance Direction Detected - Upstream - High Confidence
Production.Bottling	5/7/2016 5:37:32.153 PM	200	Sag/Swell 1	Disturbance Start	Voltage Disturbance State	Disturbance
Production.Bottling	5/7/2016 5:37:32.153 PM	127	Dist Direction Detection 1	DDD Analysis Done	Dist Direction Detection 1	Disturbance Direction Detected - Upstream - High Confidence

NOTE: This example only shows selected content from the report, it does not show the entire report.

System Configuration Report

Summary

The System Configuration Report shows details about the monitoring devices in your network, including communications information. Use this report for device and communications network inventory and planning.

Prerequisites

- None

Report inputs

- Title
- Show Data Warnings.

Example:

Schneider Electric

System Configuration Report

Data Warnings

No data warnings.

Total devices: 70

Distinct device types: 5

Name	Type	Address	Site	Status	Protocol	Description
Guardhouse.Total	CompactNSXe	127.0.0.1/11000/36	DemoSite	Device Connected	MODBUS	
Hallway.HVAC1	CompactNSXe	127.0.0.1/11000/37	DemoSite	Device Connected	MODBUS	
Hallway.HVAC2	CompactNSXe	127.0.0.1/11000/38	DemoSite	Device Connected	MODBUS	
Hallway.HVAC3	CompactNSXe	127.0.0.1/11000/39	DemoSite	Device Connected	MODBUS	
Hallway.Lighting1	PM3250	127.0.0.1/11000/7	DemoSite	Device Connected	MODBUS	
Hallway.Lighting2	PM3250	127.0.0.1/11000/8	DemoSite	Device Connected	MODBUS	
HeavyLab.230V	MicrologicP	127.0.0.1/11000/28	DemoSite	Device Connected	MODBUS	
HeavyLab.410V	MicrologicP	127.0.0.1/11000/29	DemoSite	Device Connected	MODBUS	
HeavyLab.AirCompressor	PM3250	127.0.0.1/11000/9	DemoSite	Device Connected	MODBUS	
HeavyLab.Fans	PM3250	127.0.0.1/11000/10	DemoSite	Device Connected	MODBUS	
HeavyLab.HVAC	MicrologicP	127.0.0.1/11000/30	DemoSite	Device Connected	MODBUS	
HeavyLab.Lighting	MicrologicP	127.0.0.1/11000/31	DemoSite	Device Connected	MODBUS	
LightLab.North_410V	MicrologicP	127.0.0.1/11000/32	DemoSite	Device Connected	MODBUS	
LightLab.South_230V	MicrologicP	127.0.0.1/11000/33	DemoSite	Device Connected	MODBUS	
LightLab.South_410V	MicrologicP	127.0.0.1/11000/34	DemoSite	Device Connected	MODBUS	
LV.Transformer15	7650	127.0.0.1/11000/3	DemoSite	Device Connected	MODBUS	
LV.Transformer15b	7650	127.0.0.1/11000/4	DemoSite	Device Connected	MODBUS	
LV.Transformer16a	7650	127.0.0.1/11000/5	DemoSite	Device Connected	MODBUS	
LV.Transformer16b	7650	127.0.0.1/11000/6	DemoSite	Device Connected	MODBUS	
LV.Transformer20	PM3250	127.0.0.1/11000/11	DemoSite	Device Connected	MODBUS	
Restaurant.Equipment	PM3250	127.0.0.1/11000/12	DemoSite	Device Connected	MODBUS	
Restaurant.HVAC1	PM3250	127.0.0.1/11000/13	DemoSite	Device Connected	MODBUS	
Restaurant.HVAC2	PM3250	127.0.0.1/11000/14	DemoSite	Device Connected	MODBUS	
Restaurant.Kitchen1	PM3250	127.0.0.1/11000/15	DemoSite	Device Connected	MODBUS	
Restaurant.Lighting2	PM3250	127.0.0.1/11000/16	DemoSite	Device Connected	MODBUS	
Restaurant.Lighting3	PM3250	127.0.0.1/11000/17	DemoSite	Device Connected	MODBUS	

NOTE: This example only shows selected content from the report, it does not show the entire report.

Tabular Report

Summary

The Tabular Report gives logged measurement data in tabular format. Use this report to analyze logged data.

Details

You can create a report with multiple measurements from multiple sources. You can also select the option to include duplicate data in the report. This data can then be exported for use in another program, such as Microsoft Excel. If you want to only export your data to an Excel file, use the Data Export - Extended report or the Data Export - Standard report.

NOTE: The Tabular Report is limited to 30 source-measurement pairs. Multiple reports are required if the number of source-measurement pairs exceeds 30. Alternatively, consider using the Data Export - Standard report or the Data Export Extended report to generate a CSV file containing the data for the selected sources and measurements.

The generated report contains the following information: source; measurement; timestamp; and values.

Prerequisites

- The measurement data must be available as historical data logs in the database.

Report inputs

- Title
- Sources (Devices and Views)
- Measurements (with Smart Mode)
- Reporting Period
- Source Label
- Include Duplicates
- Show Data Warnings

Example:

Schneider Electric

Tabular

12/14/2015 12:00:00 AM - 12/21/2015 12:00:00 AM (Server Local)

Timestamp	Zone5.HVAC1 Current Avg (A)	Zone5.HVAC2 Current Avg (A)	Zone5.HVAC3 Current Avg (A)	Zone5.HVAC4 Current Avg (A)	Zone5.HVAC5 Current Avg (A)
12/14/2015 12:15:00 AM	0.13	0.10	0.58	0.93	0.20
12/14/2015 12:30:00 AM	0.07	0.06	0.32	1.04	0.11
12/14/2015 12:45:00 AM	0.12	0.09	0.52	0.95	0.18
12/14/2015 1:00:00 AM	0.10	0.07	0.44	0.99	0.15
12/14/2015 1:15:00 AM	0.08	0.06	0.01	1.19	0.13
12/14/2015 1:30:00 AM	0.09	0.07	0.78	1.59	0.14
12/14/2015 1:45:00 AM	0.13	0.10	1.41	1.91	0.20
12/14/2015 2:00:00 AM	0.18	0.14	1.60	2.02	0.27
12/14/2015 2:15:00 AM	0.81	0.63	2.33	2.51	1.22
12/14/2015 2:30:00 AM	2.65	2.05	2.40	2.94	4.01
12/14/2015 2:45:00 AM	4.51	3.48	2.50	3.39	6.79
12/14/2015 3:00:00 AM	5.32	4.10	2.37	3.52	8.03
12/14/2015 3:15:00 AM	5.30	4.09	2.20	3.83	8.00
12/14/2015 3:30:00 AM	5.41	4.18	2.76	4.87	8.17
12/14/2015 3:45:00 AM	5.37	4.14	2.61	5.61	8.11
12/14/2015 4:00:00 AM	5.28	4.08	2.22	5.83	7.98
12/14/2015 4:15:00 AM	5.26	4.06	2.53	6.15	7.94
12/14/2015 4:30:00 AM	5.23	4.04	3.19	6.92	7.91
12/14/2015 4:45:00 AM	5.24	4.05	4.01	7.74	7.92
12/14/2015 5:00:00 AM	5.15	3.97	4.01	7.94	7.78
12/14/2015 5:15:00 AM	5.18	4.00	4.54	8.38	7.83
12/14/2015 5:30:00 AM	5.23	4.04	5.63	9.28	7.90
12/14/2015 5:45:00 AM	5.15	3.98	6.18	9.96	7.78
12/14/2015 6:00:00 AM	5.14	3.97	6.50	10.31	7.76
12/14/2015 6:15:00 AM	5.17	3.99	7.36	11.46	7.81
12/14/2015 6:30:00 AM	5.17	3.99	9.05	13.88	7.81
12/14/2015 6:45:00 AM	5.10	3.93	10.41	16.18	7.70
12/14/2015 7:00:00 AM	5.19	4.00	11.58	17.48	7.84
12/14/2015 7:15:00 AM	5.19	4.00	15.27	19.27	7.83
12/14/2015 7:30:00 AM	5.19	4.00	23.54	23.33	7.84
12/14/2015 7:45:00 AM	5.11	3.94	31.37	27.19	7.71
12/14/2015 8:00:00 AM	5.17	3.99	35.47	29.20	7.81
12/14/2015 8:15:00 AM	5.83	4.49	35.53	28.57	8.80
12/14/2015 8:30:00 AM	7.72	5.96	37.62	27.94	11.68
12/14/2015 8:45:00 AM	9.55	7.37	39.41	27.18	14.43
12/14/2015 9:00:00 AM	10.46	8.07	40.43	26.95	15.79
12/14/2015 9:15:00 AM	10.42	8.04	41.03	26.16	15.74

NOTE: This example only shows selected content from the report, it does not show the entire report.

Insulation Monitoring Reports

NOTE: These reports are part of the Insulation Monitoring Module. This module requires a separate license.

PME includes the following insulation monitoring report templates:

- Insulation Monitoring Report (ANSI)
- Insulation Monitoring Report (IEC)

⚠ CAUTION

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.

Failure to follow these instructions can result in injury or equipment damage.

Insulation Monitoring Report (ANSI)

NOTE: This report is part of the Insulation Monitoring Module. This Module requires a separate license.

Summary

The Insulation Monitoring (ANSI) Report shows Total Hazard Current, relevant event log entries, and logged insulation related measurements, over the reporting period. Use this report to analyze and report on the insulation status of your ungrounded IT power system.

Details

The report includes:

- A Total Hazard Current graph, showing measured currents against the Total Hazard Current limits.
- An events table, showing information for each event that occurred in the reporting range.
- A data log table, showing Total Hazard Current measurements and other meter data.

Prerequisites

- The Insulation Monitoring Module must be configured.
- The measurement data must be available as historical data logs in the database.

Report inputs

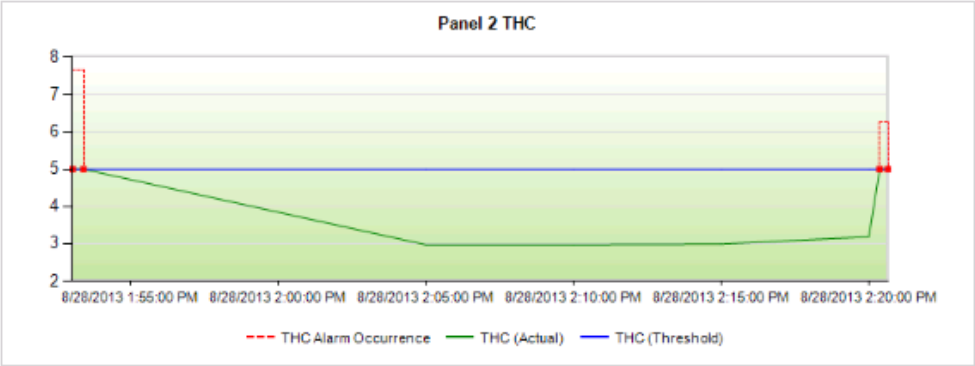
- Title
- Area
- Reporting Period
- Include Data Table
- Include Data Warnings

Hospital Operating Room Example:

Schneider Electric

Operating Room Isolated Power Report (ANSI)

Report ID: Room 2
Description: Logs from Room 2
Report Generated: 8/28/2013 2:25:12 PM



Timestamp	THC	THC Threshold	Load %	Voltage L1-L2	Voltage L1-Gnd	Voltage L2-Gnd	Impedance	Resistance	Capacitance
8/28/2013 2:20:00 PM	3.183	5	22	121	10	119	40	40	9
8/28/2013 2:15:00 PM	2.987	5	22	121	10	119	43	43	9
8/28/2013 2:10:00 PM	2.97	5	22	120	10	118	43	43	9
8/28/2013 2:05:00 PM	2.969	5	22	120	10	118	43	43	9

Report ID: Room 2
Description: Events from Room 2
Report Generated: 8/28/2013 2:25:12 PM

Timestamp	Cause	Cause Value	Effect	Effect Value	Priority
8/28/2013 2:20:39 PM	Total Hazard Current Alarm	InActive	Total Hazard Current Value	THC Safe	100
8/28/2013 2:20:38 PM	Impedance Alarm	InActive	Impedance Value	Impedance Normal	100
8/28/2013 2:20:38 PM	Resistance Alarm	InActive	Resistance Value	Resistance Normal	100
8/28/2013 2:20:38 PM	Ground Fault Location Alarm	InActive	Ground Fault Location Value	Ground Fault Location Normal	100
8/28/2013 2:20:22 PM	Impedance Alarm	Active	Impedance Value	Impedance Alarm	100
8/28/2013 2:20:22 PM	Resistance Alarm	Active	Resistance Value	Resistance Alarm	100
8/28/2013 2:20:22 PM	Total Hazard Current Alarm	Active	Total Hazard Current Value	THC Hazard	100
8/28/2013 2:20:22 PM	Ground Fault Location Alarm	Active	Ground Fault Location Value	Ground Fault Location Alarm	100
8/28/2013 1:53:25 PM	Total Hazard Current Alarm	InActive	Total Hazard Current Value	THC Safe	100

NOTE: This example only shows selected content from the report, it does not show the entire report.

Insulation Monitoring Report (IEC)

NOTE: This report is part of the Insulation Monitoring Module. This Module requires a separate license.

Summary

The Insulation Monitoring (IEC) Report shows resistance, transformer load, relevant event log entries, and logged insulation related measurements, over the reporting period. Use this report to analyze and report on the insulation status of your ungrounded IT power system.

Details

The report includes:

- An impedance graph, showing a comparison of impedance measurements to the impedance threshold.
- A transformer load graph, showing a comparison of transformer load measurements to the load threshold.
- An events table, showing information for each event that occurred in the reporting range.
- A data log table, showing measurements for impedance, load, and temperature.

Prerequisites

- The Insulation Monitoring Module must be configured.
- The measurement data must be available as historical data logs in the database.

Report inputs

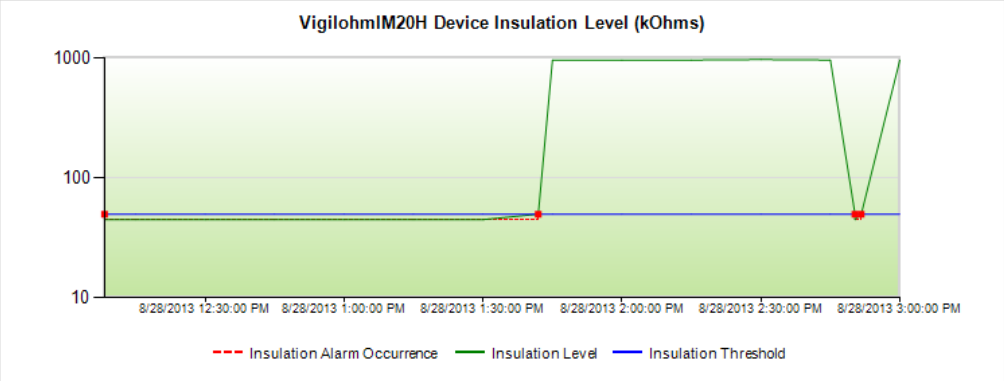
- Title
- Area
- Reporting Period
- Include Data Table
- Include Data Warnings

Hospital Operating Room Example:

Report ID: Operating Room 1a

Description: Logs from Operating Room 1a

Report Generated: 8/28/2013 3:03:44 PM



Timestamp	Insulation Level	Insulation Threshold
8/28/2013 3:00:00 PM	970	50
8/28/2013 2:51:40 PM	50	50
8/28/2013 2:51:39 PM	50	50
8/28/2013 2:50:20 PM	45	50
8/28/2013 2:50:20 PM	50	50
8/28/2013 2:45:00 PM	970	50
8/28/2013 2:30:00 PM	980	50
8/28/2013 2:15:00 PM	970	50
8/28/2013 2:00:00 PM	970	50
8/28/2013 1:45:00 PM	970	50
8/28/2013 1:41:56 PM	50	50
8/28/2013 1:41:55 PM	50	50
8/28/2013 1:30:00 PM	45	50
8/28/2013 1:15:00 PM	45	50
8/28/2013 1:00:00 PM	45	50
8/28/2013 12:45:00 PM	45	50
8/28/2013 12:30:00 PM	45	50
8/28/2013 12:15:00 PM	45	50
8/28/2013 12:08:19 PM	45	50
8/28/2013 12:08:19 PM	50	50

NOTE: This example only shows selected content from the report, it does not show the entire report.

IT Billing Reports

NOTE: These reports are part of the Energy Billing Module. This module requires a separate license.

PME includes the following IT billing report templates:

- Energy by IT Customer Report

⚠ CAUTION

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.

Failure to follow these instructions can result in injury or equipment damage.

Energy by IT Customer Report

NOTE: This report is part of the Energy Billing Module. This module requires a separate license.

Summary

The Energy by IT Customer Report gives consumption data for different IT customers, down to the rack and circuit level. Use this report to understand the consumption of IT customer loads in your data center, and for exporting billing system information.

Prerequisites

- The Energy Billing Module must be configured.
- The measurement data must be available as historical data logs in the database.

Report inputs

- Title
- Facility Name
- Facility Location
- Customers
- Reporting Period
- Report Type
- Timestamp Coincidence
- Display Billing ID
- Show Errors

Example:

Energy by IT Customer

Data Center

Peak Demand Timestamp: Calculated by Customer 5/28/2015 12:00:00 AM - 6/4/2015 12:00:00 AM (Server Local)

Customer Detail

Customer	Billing Id	Time Range	Energy (kWh)	Peak Demand (kW)	Peak Current (A)	Peak Timestamp
IT Customer 1	SC1001	5/28/2015 - 6/4/2015	11,659.2*	69.4	238.9	5/28/2015 12:15:00

Rack	Time Range	Energy (kWh)	Coincident Demand (kW)	Coincident Current (A)
Rack 01_0001	5/28/2015 - 6/4/2015	201.6*	1.2	5.6

Circuits	Time Range	Energy (kWh)	Coincident Demand (kW)	Coincident Current (A)
PDU A1 Pnl 01 Ct 01	5/28/2015 - 6/4/2015	100.8*	0.6	2.8
PDU B1 Pnl 01 Ct 01	5/28/2015 - 6/4/2015	100.8*	0.6	2.8

Rack	Time Range	Energy (kWh)	Coincident Demand (kW)	Coincident Current (A)
Rack 01_0002	5/28/2015 - 6/4/2015	235.2*	1.4	6.6

* Value estimated

** Value based on incomplete data

*** Expected value missing

NOTE: This example only shows selected content from the report, it does not show the entire report.

Power Capacity Reports

NOTE: These reports are part of the Capacity Management Module. This module requires a separate license.

PME includes the following power capacity report templates:

- Branch Circuit Power Report
- Equipment Capacity Report
- Generator Capacity Report
- Generator Power Report
- Power Load Demand & Capacity Report
- Power Losses Report
- UPS Power Report

⚠ CAUTION

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.

Failure to follow these instructions can result in injury or equipment damage.

Branch Circuit Power Report

NOTE: This report is part of the Capacity Management Module. This Module requires a separate license.

Summary

The Branch Circuit Power Report shows branch circuit loading for different IT customers. Use this report for proactive capacity management, incident management, customer expansion planning, and Service Level Agreement (SLA) management.

Prerequisites

- The Capacity Management Module must be configured.
- The measurement data must be available as historical data logs in the database.

Report inputs:

- Title
- Facility Name
- Facility Location
- Customers
- Reporting Period
- Primary Sort
- Include Data Warnings

Example:

Branch Circuit Power
Data Center

4/26/2014 12:00:00 AM - 4/27/2014 12:00:00 AM (Server Local)

Customer	Rack	Branch Circuit	Breaker Size (A)	Avg Loading (A)	Avg Loading (kW)	Avg Loading (%)	Max Loading (A)	Max Loading (kW)	Max Loading (%)
Customer 1	Rack 01_0001	PDU A1 Pnl A Ct 01	25	10.1	2.4	40	10.1	2.5	40
		PDU B1 Pnl A Ct 01	25	10.1	2.4	40	10.1	2.5	40
Customer 1	Rack 01_0002	PDU A1 Pnl A Ct 02	25	10.1	2.4	40	10.1	2.5	40
		PDU B1 Pnl A Ct 02	25	10.1	2.4	40	10.1	2.5	40
Customer 1	Rack 01_0003	PDU A1 Pnl A Ct 03	25	10.1	2.4	40	10.1	2.5	40
		PDU B1 Pnl A Ct 03	25	10.1	2.4	40	10.1	2.5	40
Customer 1	Rack 01_0004	PDU A1 Pnl A Ct 04	25	10.1	2.4	40	10.1	2.5	40
		PDU B1 Pnl A Ct 04	25	10.1	2.4	40	10.1	2.5	40
Customer 1	Rack 01_0005	PDU A1 Pnl A Ct 05	25	10.1	2.4	40	10.1	2.5	40
		PDU B1 Pnl A Ct 05	25	10.1	2.4	40	10.1	2.5	40
Customer 1	Rack 01_0006	PDU A1 Pnl A Ct 06	25	10.1	2.4	40	10.1	2.5	40

* Value estimated
** Value based on incomplete data
*** Expected value missing

NOTE: This example only shows selected content from the report, it does not show the entire report.

Equipment Capacity Report

NOTE: This report is part of the Capacity Management Module. This Module requires a separate license.

Summary

The Equipment Capacity Report shows loading (kW) and available capacity for equipment such as transformers, transfer switches, and so on. Use this report for capacity analysis and planning.

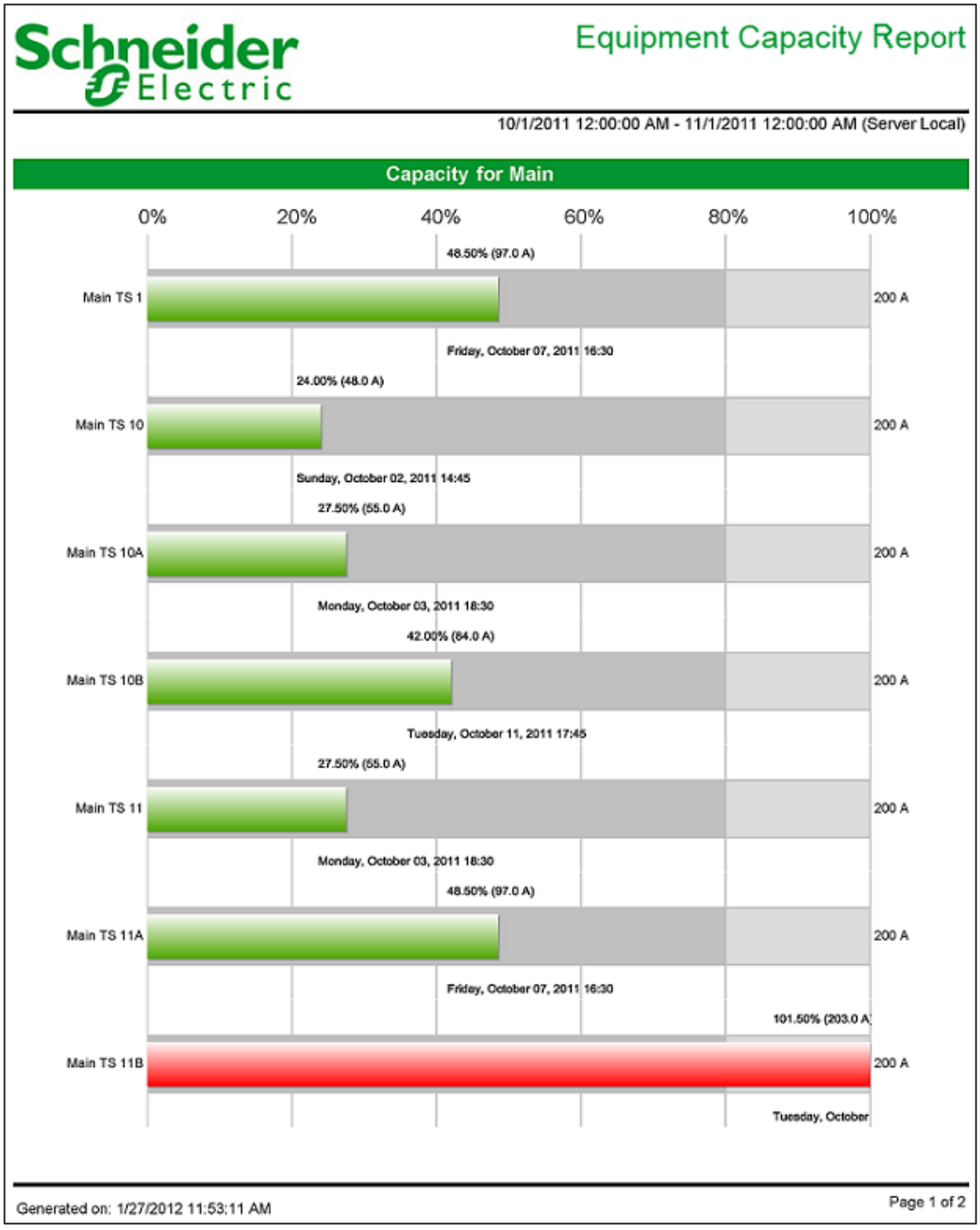
Prerequisites

- The Capacity Management Module must be configured.
- The measurement data must be available as historical data logs in the database.

Report inputs:

- Title
- EPSS Group
- Exclude Sources
- Reporting Period
- Threshold
- Show Daily Rollups
- Include Data Table
- Include Data Warnings

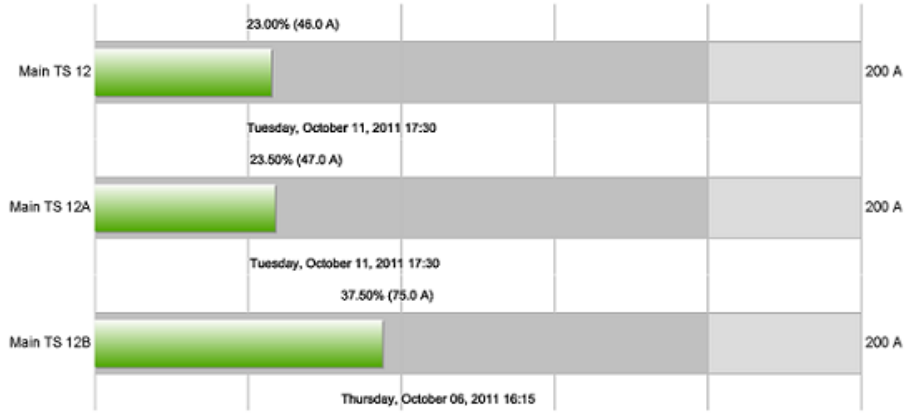
Example:



Schneider Electric

Equipment Capacity Report

10/1/2011 12:00:00 AM - 11/1/2011 12:00:00 AM (Server Local)



Transfer Switch	Peak	Peak Date	Available Capacity
Main TS 1	97.00 A (49%)	Friday, October 07, 2011 16:30	103.00 A (52%)
Main TS 10	48.00 A (24%)	Sunday, October 02, 2011 14:45	152.00 A (76%)
Main TS 10A	55.00 A (28%)	Monday, October 03, 2011 18:30	145.00 A (73%)
Main TS 10B	84.00 A (42%)	Tuesday, October 11, 2011 17:45	116.00 A (58%)
Main TS 11	55.00 A (28%)	Monday, October 03, 2011 18:30	145.00 A (73%)
Main TS 11A	97.00 A (49%)	Friday, October 07, 2011 16:30	103.00 A (52%)
Main TS 11B	203.00 A (102%)	Tuesday, October 11, 2011 14:45	-3.00 A (-2%)
Main TS 12	46.00 A (23%)	Tuesday, October 11, 2011 17:30	154.00 A (77%)
Main TS 12A	47.00 A (24%)	Tuesday, October 11, 2011 17:30	153.00 A (77%)
Main TS 12B	75.00 A (38%)	Thursday, October 06, 2011 16:15	125.00 A (63%)

Generated on: 1/27/2012 11:53:11 AM

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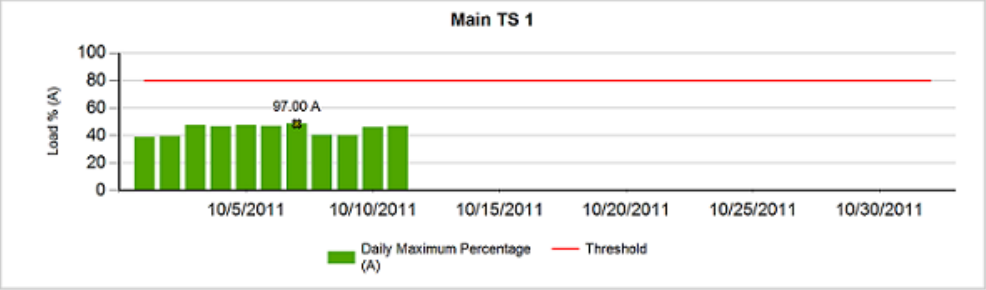
Schneider Electric

Equipment Capacity Report

10/1/2011 12:00:00 AM - 11/1/2011 12:00:00 AM (Server Local)

Capacity for Main



Date	Peak	Available Capacity
Saturday, October 01, 2011	78.00 A (39%)	122.00 A (61%)
Sunday, October 02, 2011	79.00 A (40%)	121.00 A (61%)
Monday, October 03, 2011	95.00 A (48%)	105.00 A (53%)
Tuesday, October 04, 2011	93.00 A (47%)	107.00 A (54%)
Wednesday, October 05, 2011	95.00 A (48%)	105.00 A (53%)
Thursday, October 06, 2011	94.00 A (47%)	106.00 A (53%)
Friday, October 07, 2011	97.00 A (49%)	103.00 A (52%)
Saturday, October 08, 2011	81.00 A (41%)	119.00 A (60%)
Sunday, October 09, 2011	80.00 A (40%)	120.00 A (60%)
Monday, October 10, 2011	92.00 A (46%)	108.00 A (54%)
Tuesday, October 11, 2011	94.00 A (47%)	106.00 A (53%)

Generated on: 1/27/2012 11:48:28 AM

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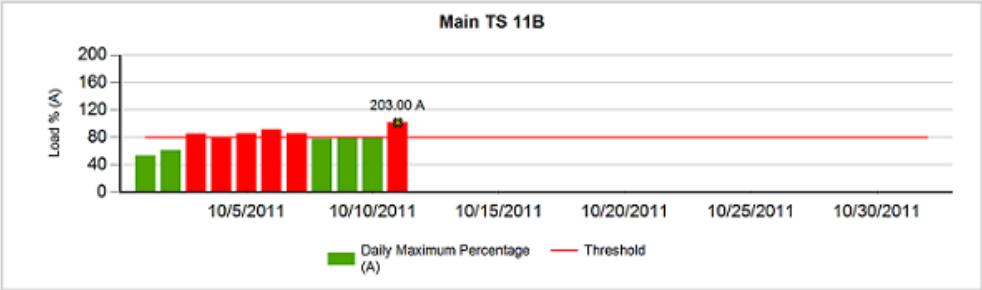
Schneider Electric

Equipment Capacity Report

10/1/2011 12:00:00 AM - 11/1/2011 12:00:00 AM (Server Local)



Date	Peak	Available Capacity
Saturday, October 01, 2011	106.00 A (53%)	94.00 A (47%)
Sunday, October 02, 2011	122.00 A (61%)	78.00 A (39%)
Monday, October 03, 2011	170.00 A (85%)	30.00 A (15%)
Tuesday, October 04, 2011	162.00 A (81%)	38.00 A (19%)
Wednesday, October 05, 2011	172.00 A (86%)	28.00 A (14%)
Thursday, October 06, 2011	183.00 A (92%)	17.00 A (9%)
Friday, October 07, 2011	172.00 A (86%)	28.00 A (14%)
Saturday, October 08, 2011	155.00 A (78%)	45.00 A (23%)
Sunday, October 09, 2011	157.00 A (79%)	43.00 A (22%)
Monday, October 10, 2011	159.00 A (80%)	41.00 A (21%)
Tuesday, October 11, 2011	203.00 A (102%)	-3.00 A (-2%)

Generated on: 1/27/2012 11:48:28 AM

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NOTE: This example only shows selected content from the report, it does not show the entire report.

Generator Capacity Report

NOTE: This report is part of the Capacity Management Module. This Module requires a separate license.

Summary

The Generator Capacity Report shows loading (kW) and available capacity for backup generator systems. Use this report for generator system capacity analysis and planning.

Details

The report shows:

- Power consumption grouped by load type (Equipment, Life Safety, Critical)
- The generator capacity used/available.
- The redundancy levels (N-1, N-2, …).

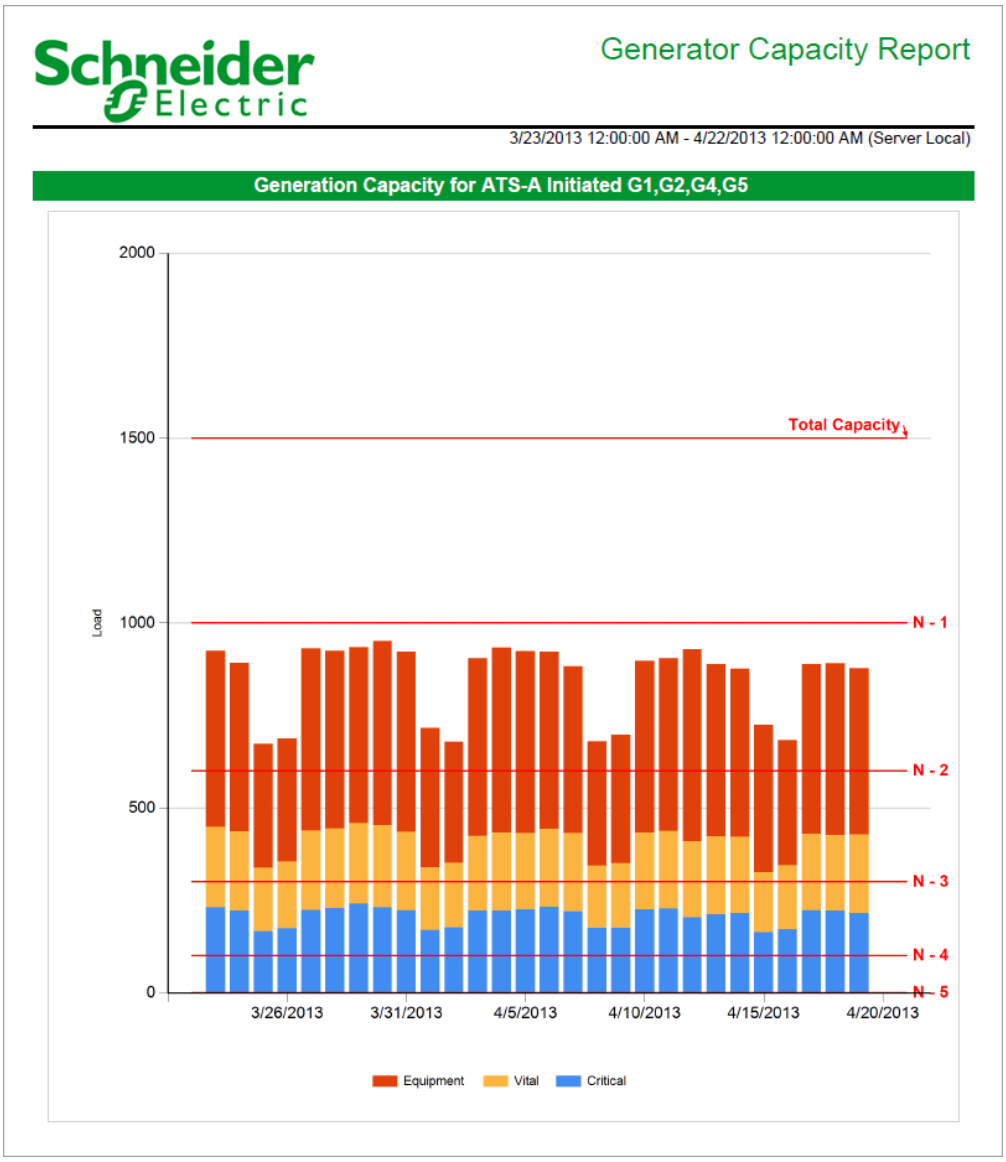
Prerequisites

- The Capacity Management Module must be configured.
- The measurement data must be available as historical data logs in the database.

Report inputs:

- Title
- EPSS Group
- Exclude Sources
- Reporting Period
- Aggregation Period
- Include Data Table
- Include Data Warnings

Example:



Schneider Electric

Generator Capacity Report

3/23/2013 12:00:00 AM - 4/22/2013 12:00:00 AM (Server Local)

Date	Total Capacity	Total Load	Available Capacity	Critical	Vital	Equipment
3/22/2013	1,501.00		1,501.00			
3/23/2013	1,501.00	925.14	575.86	231.82	217.32	476.00
3/24/2013	1,501.00	892.95	608.05	221.90	215.05	456.00
3/25/2013	1,501.00	673.71	827.29	166.88	171.83	335.00
3/26/2013	1,501.00	687.82	813.18	174.03	181.79	332.00
3/27/2013	1,501.00	931.63	569.37	223.78	215.85	492.00
3/28/2013	1,501.00	925.04	575.96	229.20	214.84	481.00
3/29/2013	1,501.00	934.45	566.55	240.84	218.62	475.00
3/30/2013	1,501.00	952.06	548.94	231.07	222.99	498.00
3/31/2013	1,501.00	922.24	578.76	223.14	213.10	486.00
4/1/2013	1,501.00	717.09	783.91	169.78	170.31	377.00
4/2/2013	1,501.00	679.31	821.69	176.89	175.41	327.00
4/3/2013	1,501.00	905.48	595.52	221.89	202.58	481.00
4/4/2013	1,501.00	933.47	567.53	221.83	211.64	500.00
4/5/2013	1,501.00	924.45	576.55	225.93	206.53	492.00
4/6/2013	1,501.00	921.96	579.04	232.99	209.97	479.00
4/7/2013	1,501.00	882.85	618.15	220.11	212.73	450.00
4/8/2013	1,501.00	680.74	820.26	175.84	167.90	337.00
4/9/2013	1,501.00	698.16	802.84	175.72	175.44	347.00
4/10/2013	1,501.00	897.69	603.31	226.22	207.46	464.00
4/11/2013	1,501.00	905.07	595.93	228.89	209.18	467.00
4/12/2013	1,501.00	929.60	571.40	204.36	206.23	519.00
4/13/2013	1,501.00	889.16	611.84	212.55	210.61	466.00
4/14/2013	1,501.00	876.95	624.05	216.11	205.84	455.00
4/15/2013	1,501.00	725.64	775.36	163.40	162.23	400.00
4/16/2013	1,501.00	683.35	817.65	172.26	173.09	338.00
4/17/2013	1,501.00	889.19	611.81	223.20	206.99	459.00
4/18/2013	1,501.00	891.68	609.32	222.09	204.60	465.00
4/19/2013	1,501.00	877.39	623.61	215.97	212.43	449.00
4/20/2013	1,501.00		1,501.00			
4/21/2013	1,501.00		1,501.00			

NOTE: This example only shows selected content from the report, it does not show the entire report.

Generator Power Report

NOTE: This report is part of the Capacity Management Module. This Module requires a separate license.

Summary

The Generator Power Report shows system loading compared to backup generator rating and redundancy design limits. Use this report for backup power system capacity analysis and planning.

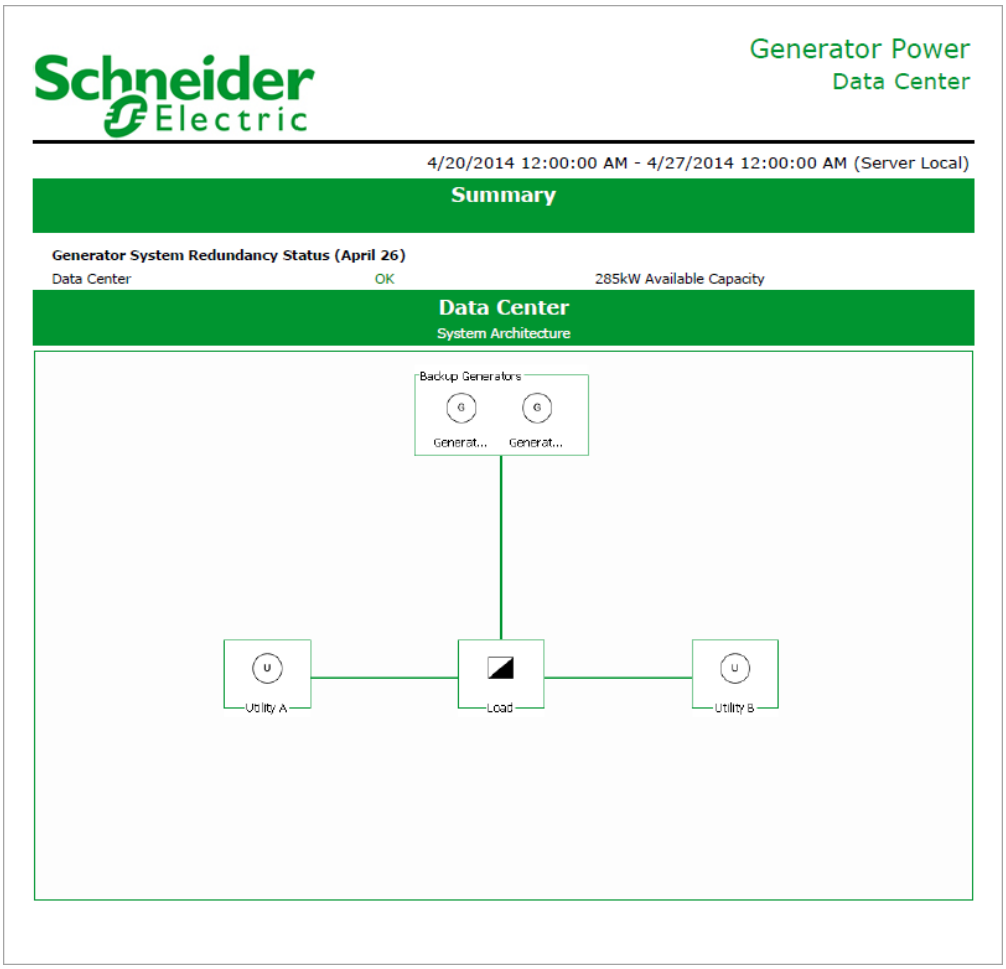
Prerequisites

- The Capacity Management Module must be configured.
- The measurement data must be available as historical data logs in the database.

Report inputs:

- Title
- Facility Name
- Facility Location
- Report Data
- Reporting Period
- Aggregation Data
- Include Data Tables
- Show Data Warnings

Example:



Generator Power
Data Center

4/20/2014 12:00:00 AM - 4/27/2014 12:00:00 AM (Server Local)

Data Center
Load Chart

System Configuration: N+1

Generator Power
Data Center

4/20/2014 12:00:00 AM - 4/27/2014 12:00:00 AM (Server Local)

Data Center
Data Table

Date	Derated Nameplate Rating (kW)	Redundancy Design Limit (kW)	Peak Load (kW)		Available Power Capacity (kW)
April 20	4,400	2,200	1,913	4/20/2014 8:15:00 AM	287
April 21	4,400	2,200	1,913	4/22/2014 12:00:00 AM	287
April 22	4,400	2,200	1,914	4/22/2014 6:15:00 PM	286
April 23	4,400	2,200	1,914	4/23/2014 6:15:00 PM	286
April 24	4,400	2,200	1,914	4/24/2014 8:00:00 PM	286
April 25	4,400	2,200	1,914	4/25/2014 4:15:00 PM	286
April 26	4,400	2,200	1,915	4/26/2014 12:30:00 AM	285

NOTE: This example only shows selected content from the report, it does not show the entire report.

Power Load Demand & Capacity Report

NOTE: This report is part of the Capacity Management Module. This Module requires a separate license.

NOTE: This report is not available in PME 2020 systems while using the Trial license. You must activate purchased licenses to access this report.

Summary

The Power Load Demand & Capacity Report shows a comparison of the load capacity and the applied load, for example for an automatic transfer switch (ATS). The peak load vs. capacity is shown for preset reporting intervals (last: 5 minutes, hour, 24 hours, 30 days, 12 months) and per month for the entire available data range. Use this report to analyze and monitor the loading and compliance of equipment such as an ATS.

Prerequisites

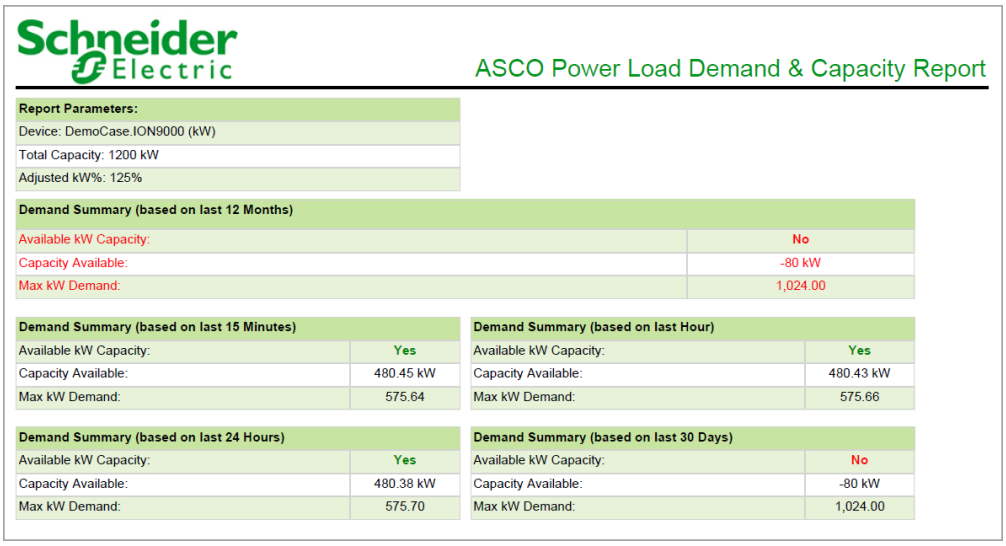
- The measurement data must be available as historical data logs in the database.

Report inputs

NOTE: This report is designed to be used with Active Power (kW) measurements.

- Title
- Single Source – see Sources (Devices and Views)
- Measurement – see Measurements (with Smart Mode)
- Demand Rating kW
- Demand Adjustment (%)
- Show Data Warnings.

Example:



Schneider Electric

ASCO Power Load Demand & Capacity Report

Report Parameters:
Device: DemoCase.ION9000 (kW)
Total Capacity: 1200 kW
Adjusted kW%: 125%

Demand Summary (based on last 12 Months)	
Available kW Capacity:	No
Capacity Available:	-80 kW
Max kW Demand:	1,024.00

Demand Summary (based on last 15 Minutes)	
Available kW Capacity:	Yes
Capacity Available:	480.45 kW
Max kW Demand:	575.64

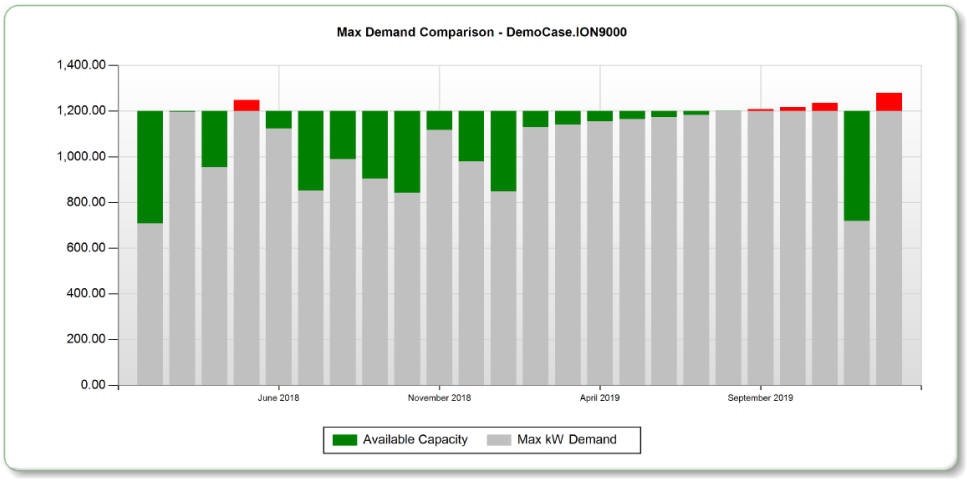
Demand Summary (based on last Hour)	
Available kW Capacity:	Yes
Capacity Available:	480.43 kW
Max kW Demand:	575.66

Demand Summary (based on last 24 Hours)	
Available kW Capacity:	Yes
Capacity Available:	480.38 kW
Max kW Demand:	575.70

Demand Summary (based on last 30 Days)	
Available kW Capacity:	No
Capacity Available:	-80 kW
Max kW Demand:	1,024.00

Schneider Electric

ASCO Power Load Demand & Capacity Report



Schneider Electric

ASCO Power Load Demand & Capacity Report

Month	Load kW	Adjusted kW	Available kW Capacity	kW Rating
February 2018	567.00	708.75	491.25	1200
March 2018	957.00	1,196.25	3.75	1200
April 2018	763.00	953.75	246.25	1200
May 2018	999.00	1,248.75	-48.75	1200
June 2018	899.00	1,123.75	76.25	1200
July 2018	682.00	852.50	347.50	1200
August 2018	792.00	990.00	210.00	1200
September 2018	723.00	903.75	296.25	1200
October 2018	674.00	842.50	357.50	1200
November 2018	894.00	1,117.50	82.50	1200
December 2018	784.00	980.00	220.00	1200
January 2019	678.00	847.50	352.50	1200
February 2019	904.00	1,130.00	70.00	1200
March 2019	912.00	1,140.00	60.00	1200
April 2019	924.00	1,155.00	45.00	1200
May 2019	933.00	1,166.25	33.75	1200
June 2019	939.00	1,173.75	26.25	1200
July 2019	946.00	1,182.50	17.50	1200
August 2019	959.00	1,198.75	1.25	1200
September 2019	967.00	1,208.75	-8.75	1200
October 2019	974.00	1,217.50	-17.50	1200
November 2019	988.00	1,235.00	-35.00	1200
December 2019	575.69	719.62	480.38	1200
January 2020	1,024.00	1,280.00	-80.00	1200

NOTE: This example only shows selected content from the report, it does not show the entire report.

Power Losses Report

NOTE: This report is part of the Capacity Management Module. This Module requires a separate license.

Summary

The Power Losses Report shows losses (kW and cost) in transformers and UPS systems. The cost calculations are based on a configurable flat rate energy cost. Use this report to analyze and quantify the power losses in your transformer and UPS networks.

Prerequisites

- The Capacity Management Module must be configured.
- The measurement data must be available as historical data logs in the database.

Report inputs:

- Title
- Facility Name
- Facility Location
- Reporting Period
- Energy Cost (per kWh)
- Aggregation Data
- Include Data Tables
- Show Data Warnings

Example:

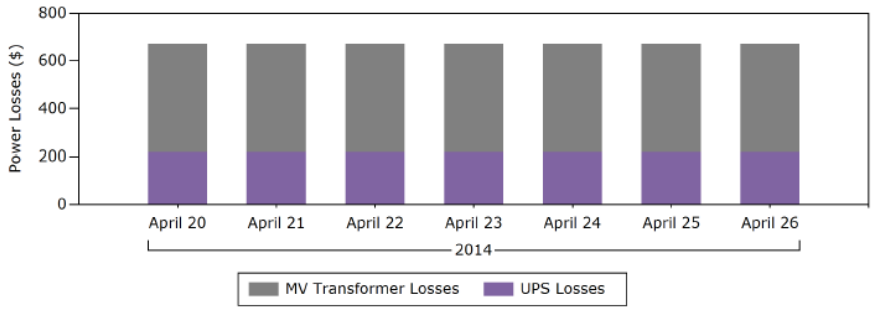
Power Losses
Data Center

4/20/2014 12:00:00 AM - 4/27/2014 12:00:00 AM (Server Local)

Summary

Cost of Losses for Reporting Period ($) = 4,698

Power System Losses
Chart ($)



Power System Losses
Data Table ($)

Date	MV Transformer	UPS
April 20	454.24	216.80
April 21	454.09	216.73
April 22	454.25	217.33
April 23	454.52	217.22
April 24	453.76	217.07
April 25	453.87	216.91
April 26	454.05	217.32

Power Losses
Data Center

4/20/2014 12:00:00 AM - 4/27/2014 12:00:00 AM (Server Local)

Power System Losses
Data Table for MV Transformers (kW)

Date	Equipment	Efficiency (%)	Losses (kW)	Losses ($)
April 20	MV Transformer A	90	96	227.01
April 21	MV Transformer A	90	96	227.05
April 22	MV Transformer A	90	96	227.15
April 23	MV Transformer A	90	96	227.24
April 24	MV Transformer A	90	96	227.06
April 25	MV Transformer A	90	96	227.09
April 26	MV Transformer A	90	96	227.11
	Average	90	96	227.10
April 20	MV Transformer B	90	96	227.23
April 21	MV Transformer B	90	96	227.05
April 22	MV Transformer B	90	96	227.10
April 23	MV Transformer B	90	96	227.28
April 24	MV Transformer B	90	96	226.70
April 25	MV Transformer B	90	96	226.78
April 26	MV Transformer B	90	96	226.95
	Average	90	96	227.01

NOTE: This example only shows selected content from the report, it does not show the entire report.

UPS Power Report

NOTE: This report is part of the Capacity Management Module. This Module requires a separate license.

Summary

The UPS Power Report shows system loading compared to UPS backup power rating and redundancy design limits. Use this report for backup power system capacity analysis and planning.

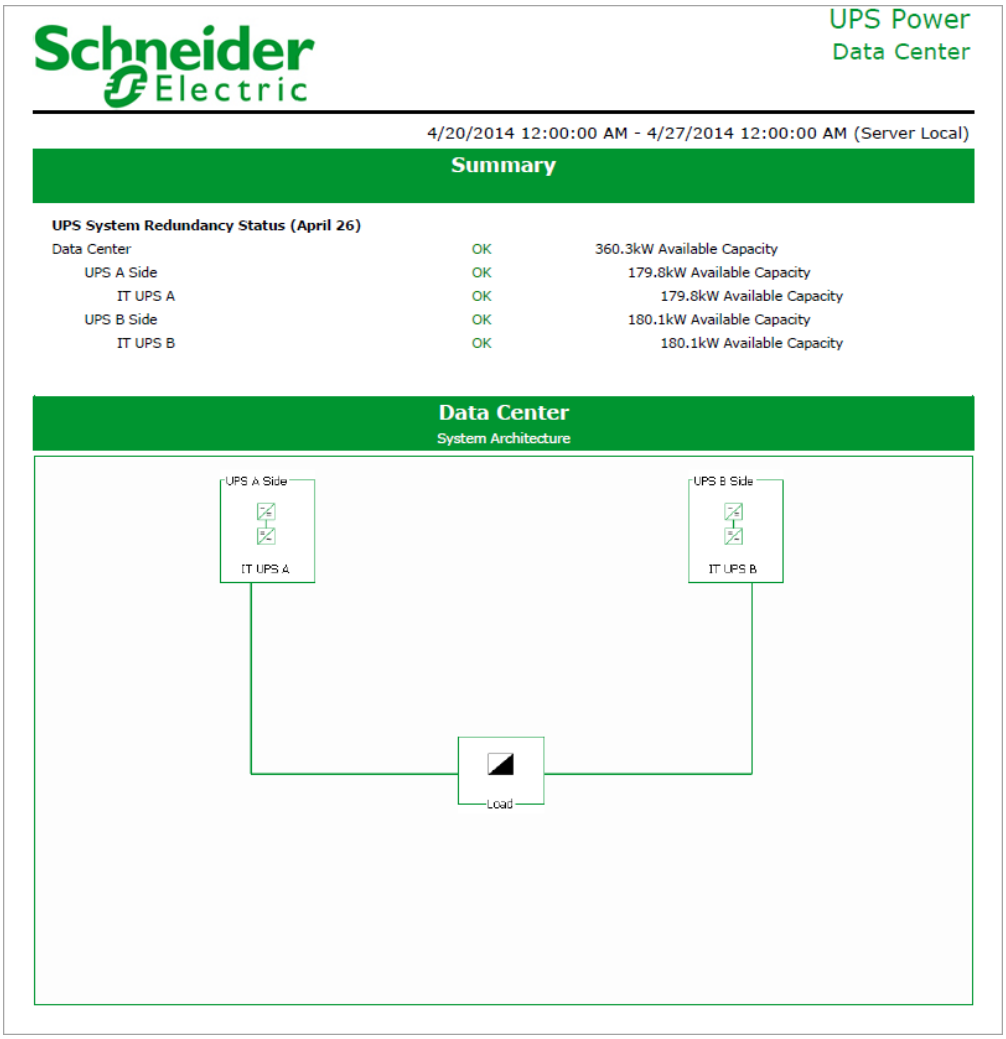
Prerequisites

- The Capacity Management Module must be configured.
- The measurement data must be available as historical data logs in the database.

Report inputs:

- Title
- Facility Name
- Facility Location
- Report Data
- Reporting Period
- Aggregation Data
- Include Data Tables
- Show Data Warnings

Example:



UPS Power
Data Center

4/20/2014 12:00:00 AM - 4/27/2014 12:00:00 AM (Server Local)

Data Center
Load Chart

System Configuration: 2N
System UPS Groups: UPS A Side, UPS B Side

UPS Power
Data Center

4/20/2014 12:00:00 AM - 4/27/2014 12:00:00 AM (Server Local)

Data Center
Data Table

Date	Derated Nameplate Rating (kW)	Redundancy Design Limit (kW)	Peak Load (kW)		Available Power Capacity (kW)
April 20	2,800	1,400	1,040	4/20/2014 12:45:00 AM	360
April 21	2,800	1,400	1,040	4/21/2014 6:30:00 PM	360
April 22	2,800	1,400	1,040	4/22/2014 12:30:00 AM	360
April 23	2,800	1,400	1,040	4/23/2014 5:45:00 AM	360
April 24	2,800	1,400	1,040	4/24/2014 8:30:00 AM	360
April 25	2,800	1,400	1,040	4/25/2014 10:00:00 PM	360
April 26	2,800	1,400	1,040	4/26/2014 9:15:00 AM	360

NOTE: This example only shows selected content from the report, it does not show the entire report.

Power Quality Reports

NOTE: The **Power Quality Analysis** and **Power Quality Impact** reports are part of the Power Quality Performance Module. This module requires a separate license.

PME includes the following power quality report templates:

- EN50160:2000 Report
- EN50160:2000 Mains Signaling Report
- EN50160:2010 Report
- EN50160:2010 Mains Signaling Report
- Harmonic Compliance Report
- Harmonic Compliance 2014 Report
- IEC61000-4-30 Report
- Power Quality Report
- Power Quality Analysis Report
- Power Quality Impact Report

⚠ CAUTION

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.

Failure to follow these instructions can result in injury or equipment damage.

EN50160:2000 Report

Summary

The EN50160:2000 Report shows an analysis of the compliance of selected sources based on the EN50160:2000 power quality standard. Use this report for an analysis and compliance assessment of your facility against the EN50160:2000 power quality standard.

NOTE: This report needs data from monitoring devices with EN50160:2000 monitoring capabilities.

Details

EN50160:2000 is a set of power quality standards used by certain energy suppliers and energy consumers.

The EN50160:2000 report uses the following measurements:

- Supply voltage dips
- Temporary overvoltage
- Supply voltage unbalance
- Harmonic voltage
- Interharmonic voltage
- Frequency
- Voltage magnitude
- Flicker
- Short- and long-term interruptions

The compliance summary in the report is based on the EN50160 2000 limits for each observation period.

Prerequisites

- The measurement data must be available as historical data logs in the database.

Report inputs

- Title
- Sources
- Evaluation Limits
- Reporting Period
- Include EN50160 Configuration Parameters
- Include Data Warnings
- Source Label

Example:

Schneider Electric

EN50160

4/12/2016 12:00:00 AM - 5/12/2016 12:00:00 AM (Server Local)

EN50160 Evaluation Configuration

Basic EN50160 Limits

Depth (%) / Limit Type	N1 Limit	N2 Limit
Power Frequency	5	0
Supply Voltage Magnitude	5	2
Flicker	5	N/A
Supply Voltage Unbalance	5	N/A
Harmonic Voltage	5	2
Interharmonic Voltage	5	N/A

Supply Voltage Dip Limits: Method A

Depth (%) / Duration	10ms < t < 100ms	100ms < t < 500ms	500ms < t < 1s	1s < t < 3s	3s < t < 20s	20s < t < 1min
10 < d < 15	0	0	0	0	0	0
15 < d < 30	0	0	0	0	0	0
30 < d < 60	0	0	0	0	0	0
60 < d < 99	0	0	0	0	0	0

Supply Voltage Dip Limits: Method B

Depth (%) / Duration	10ms < t < 20ms	20ms < t < 50ms	50ms < t < 100ms	100ms < t < 200ms	200ms < t < 500ms	500ms < t < 1s	1s < t < 3s	3s < t < 10s	10s < t < 20s	20s < t < 1min	1min < t < 3min
10 < d < 15	0	0	0	0	0	0	0	0	0	0	0
15 < d < 30	0	0	0	0	0	0	0	0	0	0	0
30 < d < 45	0	0	0	0	0	0	0	0	0	0	0
45 < d < 60	0	0	0	0	0	0	0	0	0	0	0
60 < d < 75	0	0	0	0	0	0	0	0	0	0	0
75 < d < 90	0	0	0	0	0	0	0	0	0	0	0
90 < d < 99	0	0	0	0	0	0	0	0	0	0	0

Short and Long Interruption Limits: Method A

Interrupts / Duration	t < 1s	1s < t < 3 min	t > 3 min
Total	0	0	0

Schneider Electric

EN50160

4/12/2016 12:00:00 AM - 5/12/2016 12:00:00 AM (Server Local)

Short and Long Interruption Limits: Method B

Interrupts / Duration	t < 1s	1s < t < 2s	2s < t < 5s	5s < t < 10s	10s < t < 20s	20s < t < 1min	1min < t < 3min	3min < t < 10min	10min < t < 20min	20min < t
Total	0	0	0	0	0	0	0	0	0	0

Temporary Overvoltage Limits: Method A

Magnitude (%) / Duration	t < 1s	1s < t < 1 min	t > 1 min
110 < m < 120	0	0	0
120 < m < 140	0	0	0
140 < m < 160	0	0	0
160 < m < 200	0	0	0
160 < m < 200	0	0	0

Temporary Overvoltage Limits: Method B

Magnitude (%) / Duration	10ms < t < 20ms	20ms < t < 50ms	50ms < t < 100ms	100ms < t < 200ms	200ms < t < 500ms	500ms < t < 1s	1s < t < 3s	3s < t < 10s	10s < t < 20s	20s < t < 1min	1min < t < 3min
110 < m < 115	0	0	0	0	0	0	0	0	0	0	0
115 < m < 130	0	0	0	0	0	0	0	0	0	0	0
130 < m < 145	0	0	0	0	0	0	0	0	0	0	0
145 < m < 160	0	0	0	0	0	0	0	0	0	0	0
160 < m < 175	0	0	0	0	0	0	0	0	0	0	0
175 < m < 200	0	0	0	0	0	0	0	0	0	0	0
200 < m	0	0	0	0	0	0	0	0	0	0	0

Measurement and Observation Period Compliance Table

Schneider Electric

EN50160

4/12/2016 12:00:00 AM - 5/12/2016 12:00:00 AM (Server Local)

Complete Compliance in this Summary? No

Victoria_Bertram.DataCenter_Lab		Power Frequency	Supply Voltage Magnitude	Flicker	Supply Voltage Dips	Short And Long Interruptions	Temporary Overvoltages	Supply Voltage Unbalance	Harmonic Voltage	Interharmonic Voltage
Observation 1	4/16/2016	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Observation 2	4/23/2016	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Observation 3	4/30/2016	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Observation 4	5/7/2016	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes

NOTE: This example only shows selected content from the report, it does not show the entire report.

EN50160:2000 Mains Signaling

Summary

The EN50160:2000 Mains Signaling Report shows an analysis of the compliance of selected sources based on the mains signaling specifications of the EN50160:2000 power quality standard. Use this report for an analysis and compliance assessment of your facility against the EN50160:2000 power quality standard.

NOTE: This report needs data from monitoring devices with EN50160:2000 monitoring capabilities.

Prerequisites

- The measurement data must be available as historical data logs in the database.

Report inputs:

- Title
- Sources
- Signaling Voltage
- Reporting Period
- Show Data Warnings
- Source Label

Example:

Schneider Electric

EN50160 Mains Signaling

4/12/2016 12:00:00 AM - 5/12/2016 12:00:00 AM (Server Local)

Data Warnings

Message	Date Added
Data was not available for some of the selected source and measurement combinations.	5/11/2016 9:03:58 AM

Mains Signaling Voltage

Signaling Voltage 1 Eval Limit [%]	1
Signaling Voltage 2 Eval Limit [%]	1
Signaling Voltage 3 Eval Limit [%]	1

Measurement and Observation Period Compliance Table

Complete Compliance in this Summary?			Yes
Observation	Timestamp	Source	Mains Signaling Voltage
Observation_1	4/13/2016	Victoria_Bertram.DataCenter_Lab	Yes
Observation_2	4/14/2016	Victoria_Bertram.DataCenter_Lab	Yes
Observation_3	4/15/2016	Victoria_Bertram.DataCenter_Lab	Yes
Observation_4	4/16/2016	Victoria_Bertram.DataCenter_Lab	Yes
Observation_5	4/17/2016	Victoria_Bertram.DataCenter_Lab	Yes
Observation_6	4/18/2016	Victoria_Bertram.DataCenter_Lab	Yes
Observation_7	4/19/2016	Victoria_Bertram.DataCenter_Lab	Yes
Observation_8	4/20/2016	Victoria_Bertram.DataCenter_Lab	Yes
Observation_9	4/21/2016	Victoria_Bertram.DataCenter_Lab	Yes
Observation_10	4/22/2016	Victoria_Bertram.DataCenter_Lab	Yes
Observation_11	4/23/2016	Victoria_Bertram.DataCenter_Lab	Yes
Observation_12	4/24/2016	Victoria_Bertram.DataCenter_Lab	Yes
Observation_13	4/25/2016	Victoria_Bertram.DataCenter_Lab	Yes
Observation_14	4/26/2016	Victoria_Bertram.DataCenter_Lab	Yes

NOTE: This example only shows selected content from the report, it does not show the entire report.

EN50160:2010 Report

Summary

The EN50160:2010 Report shows an analysis of the compliance of selected sources based on the EN50160:2010 power quality standard. Use this report for an analysis and compliance assessment of your facility against the EN50160:2010 power quality standard.

NOTE: This report needs data from monitoring devices with EN50160:2010 monitoring capabilities.

Details

EN50160:2010 is a set of power quality standards used by certain energy suppliers and energy consumers.

The EN50160:2010 report uses the following measurements:

- Supply voltage dips
- Temporary overvoltage
- Supply voltage unbalance
- Harmonic voltage
- Interharmonic voltage
- Frequency
- Voltage magnitude
- Flicker
- Short- and long-term interruptions

Prerequisites

- The measurement data must be available as historical data logs in the database.

Prerequisites

The following firmware versions are required:

Device	Firmware version
ION8650	8650A_FAC_V4.2.0.0.1 8650B_FAC_V4.2.0.0.1 8650C_FAC_V4.2.0.0.1
PM8000	8000_FAC-PQ_V1.1.0.0.0 8000_FAC_V1.1.0.0.0

Use the EN50160:2010 report template to create a report containing comprehensive analysis of all EN50160 2010 compliance data logged by multiple meters. The compliance summary is based on the EN50160 2010 limits for each observation period: each default EN50160 measurement indicates a pass or did not pass on the compliance test with a Y (yes) or N (no) respectively.

Report inputs

- Title
- Sources
- Evaluation Limits
- Reporting Period
- Include EN50160 Configuration Parameters
- Include Data Warnings

Example:

Schneider Electric

EN50160v2010 Report

1/1/2016 12:00:00 AM - 5/12/2016 12:00:00 AM (Server Local)

Data Warnings

No data warnings.

Measurement and Observation Period Compliance Table

Complete Compliance in this Summary?							No			
OOO.PM8000_1		Power Frequency	Supply Voltage Magnitude	Flicker	Supply Voltage Dips	Short And Long Interruptions	Supply Voltage Swells	Supply Voltage Unbalance	Harmonic Voltage	Interharmonic Voltage
Observation 1	2/20/2016	Yes	Yes	N/A	No	No	No	No	Yes	N/A
Observation 2	2/27/2016	Yes	Yes	N/A	No	Yes	No	No	Yes	N/A
Observation 3	3/5/2016	Yes	Yes	N/A	No	Yes	Yes	No	Yes	N/A
Observation 4	3/12/2016	Yes	Yes	N/A	No	Yes	No	No	Yes	N/A
Observation 5	3/19/2016	Yes	Yes	N/A	Yes	Yes	Yes	No	Yes	N/A
Observation 6	3/26/2016	Yes	Yes	N/A	No	Yes	Yes	No	Yes	N/A
Observation 7	4/2/2016	Yes	Yes	N/A	No	Yes	Yes	No	Yes	N/A
Observation 8	4/9/2016	Yes	Yes	N/A	Yes	Yes	Yes	No	Yes	N/A
Observation 9	4/16/2016	Yes	Yes	N/A	Yes	Yes	Yes	No	Yes	N/A
Observation 10	4/23/2016	Yes	Yes	N/A	No	Yes	Yes	No	Yes	N/A
Observation 11	4/30/2016	Yes	Yes	N/A	No	Yes	Yes	No	Yes	N/A
Observation 12	5/7/2016	Yes	Yes	N/A	No	Yes	Yes	No	Yes	N/A

NOTE: This example only shows selected content from the report, it does not show the entire report.

EN50160:2010 Mains Signaling

Summary

The EN50160:2010 Mains Signaling Report shows an analysis of the compliance of selected sources based on the mains signaling specifications of the EN50160:2010 power quality standard. Use this report for an analysis and compliance assessment of your facility against the EN50160:2010 power quality standard.

NOTE: This report needs data from monitoring devices with EN50160:2010 monitoring capabilities.

Prerequisites

- The measurement data must be available as historical data logs in the database.

Prerequisites

The following firmware versions are required:

Device	Firmware version
ION8650	8650A_FAC_V4.2.0.0.1 8650B_FAC_V4.2.0.0.1 8650C_FAC_V4.2.0.0.1
PM8000	8000_FAC-PQ_V1.1.0.0.0 8000_FAC_V1.1.0.0.0

Use the EN50160:2010 Mains Signaling report template to create a report for signal line frequency statistics for multiple sources, for each observation period.

Report inputs:

- Title
- Sources
- Signaling Voltage
- Reporting Period
- Show Data Warnings

Example:

Schneider Electric

EN50160v2010 Mains Signaling Report

4/12/2016 12:00:00 AM - 5/12/2016 12:00:00 AM (Server Local)

Mains Signaling Voltage	
Signaling Voltage 1 Eval Limit [%]	1
Signaling Voltage 2 Eval Limit [%]	1
Signaling Voltage 3 Eval Limit [%]	1

Measurement and Observation Period Compliance Table

Complete Compliance in this Summary?			Yes
Observation	Timestamp	Source	Mains Signaling Voltage
Observation_1	4/13/2016	Victoria_Bertram.DataCenter_Lab	Yes
Observation_2	4/14/2016	Victoria_Bertram.DataCenter_Lab	Yes
Observation_3	4/15/2016	Victoria_Bertram.DataCenter_Lab	Yes
Observation_4	4/16/2016	Victoria_Bertram.DataCenter_Lab	Yes
Observation_5	4/17/2016	Victoria_Bertram.DataCenter_Lab	Yes
Observation_6	4/18/2016	Victoria_Bertram.DataCenter_Lab	Yes
Observation_7	4/19/2016	Victoria_Bertram.DataCenter_Lab	Yes
Observation_8	4/20/2016	Victoria_Bertram.DataCenter_Lab	Yes
Observation_9	4/21/2016	Victoria_Bertram.DataCenter_Lab	Yes
Observation_10	4/22/2016	Victoria_Bertram.DataCenter_Lab	Yes
Observation_11	4/23/2016	Victoria_Bertram.DataCenter_Lab	Yes
Observation_12	4/24/2016	Victoria_Bertram.DataCenter_Lab	Yes
Observation_13	4/25/2016	Victoria_Bertram.DataCenter_Lab	Yes
Observation_14	4/26/2016	Victoria_Bertram.DataCenter_Lab	Yes
Observation_15	4/27/2016	Victoria_Bertram.DataCenter_Lab	Yes
Observation_16	4/28/2016	Victoria_Bertram.DataCenter_Lab	Yes

NOTE: This example only shows selected content from the report, it does not show the entire report.

Harmonic Compliance Report

Summary

The Harmonic Compliance Report shows an analysis of the harmonic compliance of selected sources based on the IEEE 519-1992 standard. Use this report for an analysis and compliance assessment of your facility against the IEEE 519-1992 harmonics standard.

NOTE: This report needs data from monitoring devices with IEEE 519-1992 monitoring capabilities.

Prerequisites

- The measurement data must be available as historical data logs in the database.

Report inputs

- Title
- Sources (Devices and Views)
- Reporting Period
- Comments
- Include THD/TDD Charts
- Include Average Harmonic Charts
- Include Harmonic Detail Charts
- Lock Chart Scales at Zero
- Show Data Warnings

Example:

Schneider Electric

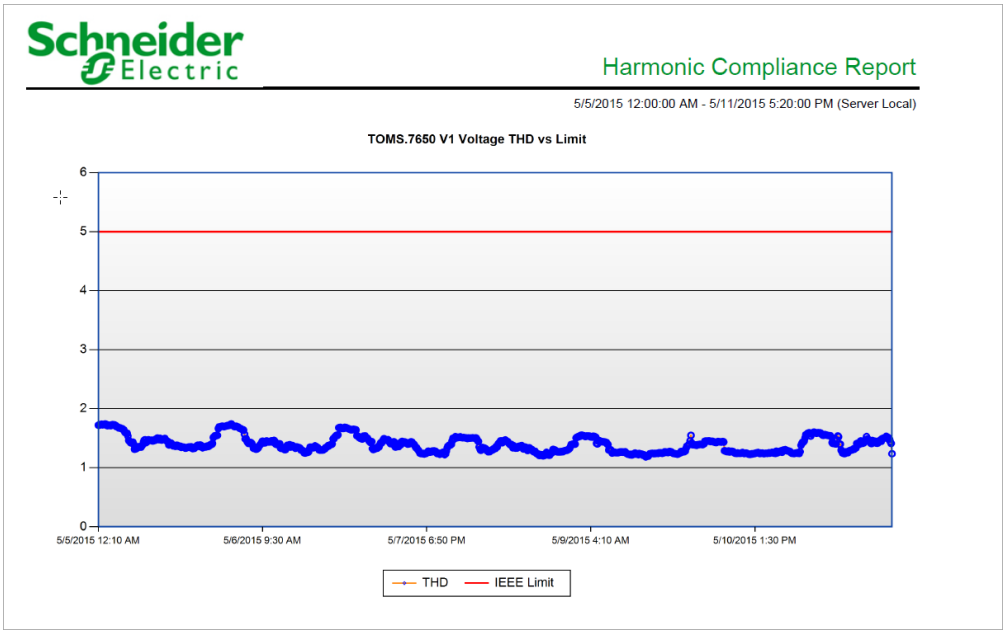
Harmonic Compliance Report

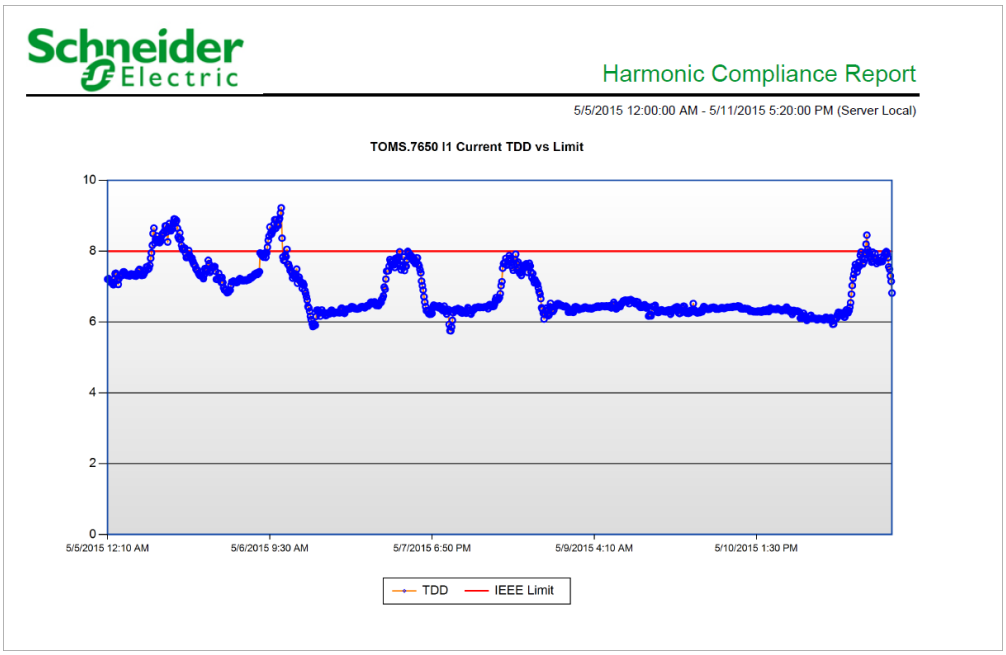
5/5/2015 12:00:00 AM - 5/11/2015 5:20:00 PM (Server Local)

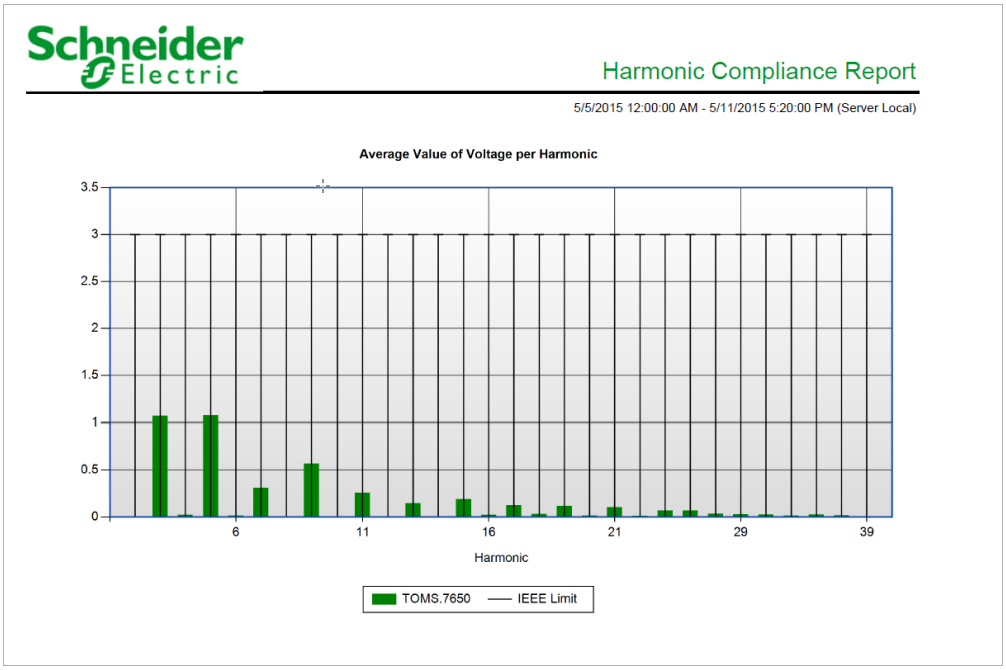
TOMS.7650

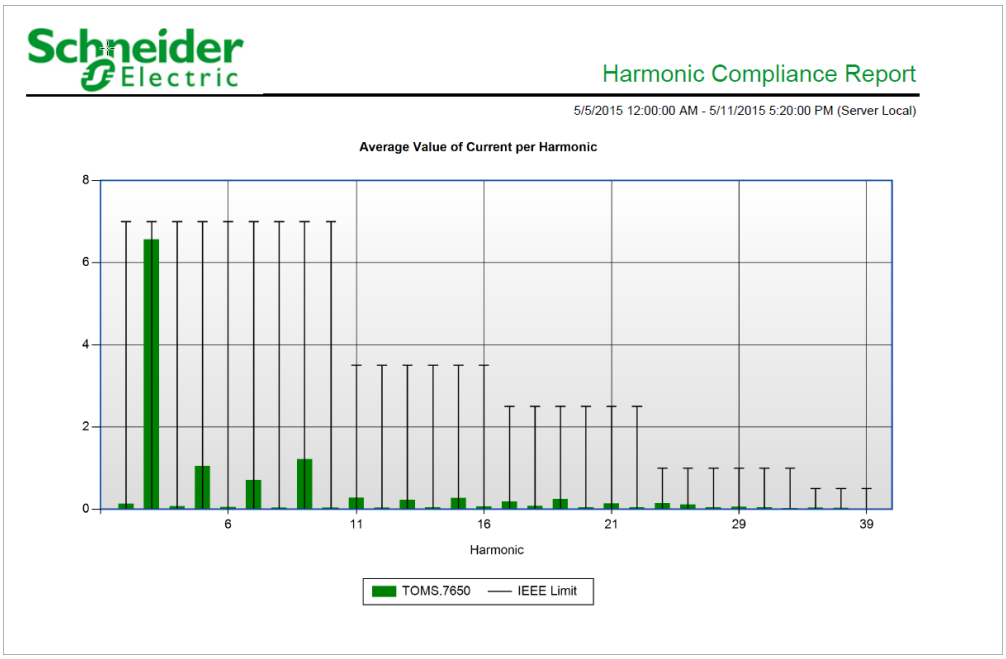
Voltage Compliance - % of Fundamental		
Voltage Level = 1V	**Individual Voltage Distortion (%)**	**Total Voltage Distortion (THD (%))**
IEEE 519 Limit (%)	3.0	5.0
Maximum Value	-	-
Non-compliant 3-second Intervals	0	0
Missing or Invalid Intervals	0	
Total Intervals	580,800	
% Time out of compliance	0.00	0.00
Compliance	PASS	PASS

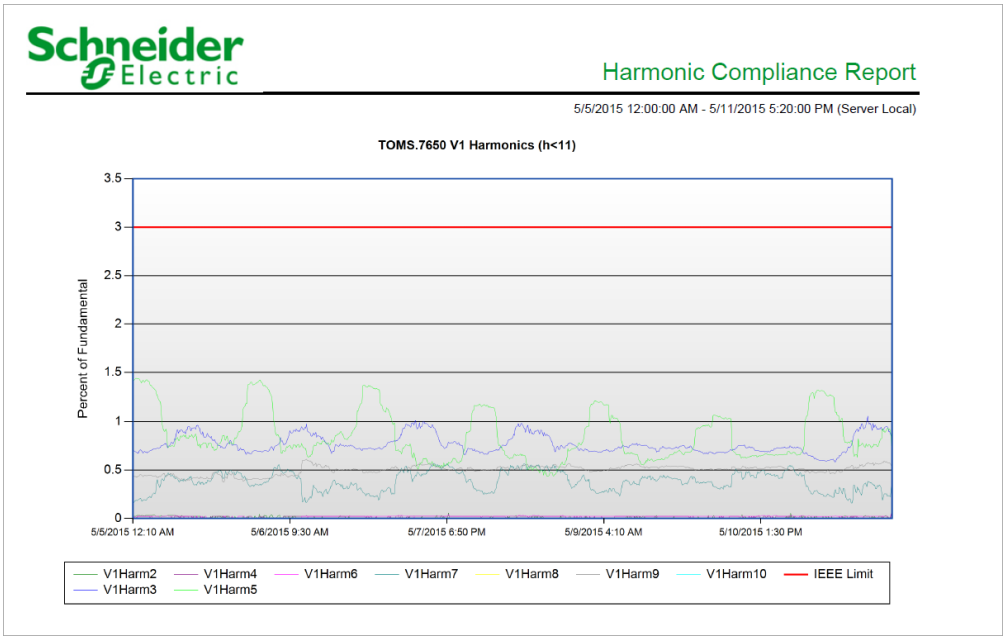
Current Compliance - % of IL						
Isc/IL = 40	**Individual Harmonic Order (Odd)**					**TDD (%)**
Ratio Window Limit (20 - 50)	**<11**	**11≤h<17**	**17≤h<23**	**23≤h<35**	**35≤h**	
IEEE 519 Limit (%)	7	3.5	2.5	1	0.5	8
Maximum Value	I2Hrm 3=9.24 @ 5/11/2015 5:06:54 PM	I1Hrm 15=1.85 @ 5/8/2015 3:11:06 PM	I3Hrm 19=4.22 @ 5/10/2015 6:40:45 PM	I3Hrm 23=0.93 @ 5/6/2015 4:12:54 PM	I1Hrm 37=0.31 @ 5/8/2015 3:11:06 PM	I3 TDD=10.4 @ 5/5/2015 4:23:54 PM
Non-compliant Intervals	123,641					60,237
Missing or Invalid Intervals	0					
Total Intervals	580,800					
% Time out of compliance	21.29					10.37
Recommendation	WARNING					WARNING











NOTE: This example only shows selected content from the report, it does not show the entire report.

Harmonic Compliance 2014 Report

Summary

The Harmonic Compliance 2014 Report shows an analysis of the harmonic compliance of selected sources based on the IEEE 519-2014 standard. Use this report for an analysis and compliance assessment of your facility against the IEEE 519-2014 harmonics standard.

NOTE: This report needs data from monitoring devices with IEEE 519-2014 monitoring capabilities.

Prerequisites

- The measurement data must be available as historical data logs in the database.

Report inputs

- Title
- Sources (Devices and Views)
- Reporting Period
- Comments
- Include THD/TDD Charts
- Include Average Harmonic Charts
- Include Harmonic Detail Charts
- Lock Chart Scales at Zero
- Show Data Warnings

Example:

Harmonic Compliance 2014 Report

5/9/2018 10:40:01 AM - 5/22/2018 4:20:01 PM (Pacific Time)

PQ.Jim8650

Very Short Term Voltage Distortion Compliance		
Voltage Level = 1000-69kV	**Individual Voltage Distortion (%)**	**Total Voltage Distortion (THD (%))**
IEEE 519 Limit (%)	4.5	7.5
Non-compliant 3-second Days	0	0
Total Days	16	
Compliance	PASS	PASS

Short Term Voltage Distortion Compliance		
Voltage Level = 1000-69kV	**Individual Voltage Distortion (%)**	**Total Voltage Distortion (THD (%))**
IEEE 519 Limit (%)	3	5
Non-compliant 10-minute Weeks	0	0
Total Weeks	2	
Compliance	PASS	PASS

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Harmonic Compliance 2014 Report

5/9/2018 10:40:01 AM - 5/22/2018 4:20:01 PM (Pacific Time)

Very Short Term Current Distortion Compliance						
Isc/IL = 10	**Individual Harmonic Order (Odd)**					**TDD (%)**
Ratio Window Limit (0 - 20)	**<11**	**11≤h<17**	**17≤h<23**	**23≤h<35**	**35≤h**	
IEEE 519 Limit (%)	8	4	3	1.2	0.6	10
Non-compliant 3-second Days	7					11
Total Days	16					
Compliance	FAIL					FAIL

Very Short Term Current Distortion Compliance - 99th Percentile								
	Individual Harmonics				**TDD Limit - 10**			
Date	**Aggregate**	**I1**	**I2**	**I3**	**Aggregate**	**I1**	**I2**	**I3**
5/9/2018	0.00%				0.00%			
5/10/2018	96.10%	96.08%	100.00%	99.97%	76.79%	99.99%	100.00%	76.65%
5/11/2018	97.28%	97.30%	100.00%	99.94%	67.23%	100.00%	100.00%	67.03%
5/12/2018	94.52%	94.49%	100.00%	99.99%	75.63%	100.00%	100.00%	75.49%
5/15/2018	98.49%	98.48%	100.00%	100.00%	71.46%	100.00%	100.00%	71.27%
5/16/2018	96.28%	96.26%	100.00%	99.99%	86.69%	100.00%	100.00%	86.60%
5/17/2018	99.63%	99.63%	100.00%	100.00%	92.37%	100.00%	100.00%	92.33%
5/18/2018	99.92%	99.92%	100.00%	100.00%	93.68%	100.00%	100.00%	93.64%
5/19/2018	99.90%	99.90%	100.00%	100.00%	95.85%	100.00%	100.00%	95.82%
5/23/2018	99.64%	99.63%	100.00%	100.00%	77.56%	100.00%	100.00%	77.42%
5/24/2018	87.70%	87.64%	100.00%	99.97%	58.01%	100.00%	100.00%	57.75%

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Harmonic Compliance 2014 Report

5/9/2018 10:40:01 AM - 5/22/2018 4:20:01 PM (Pacific Time)

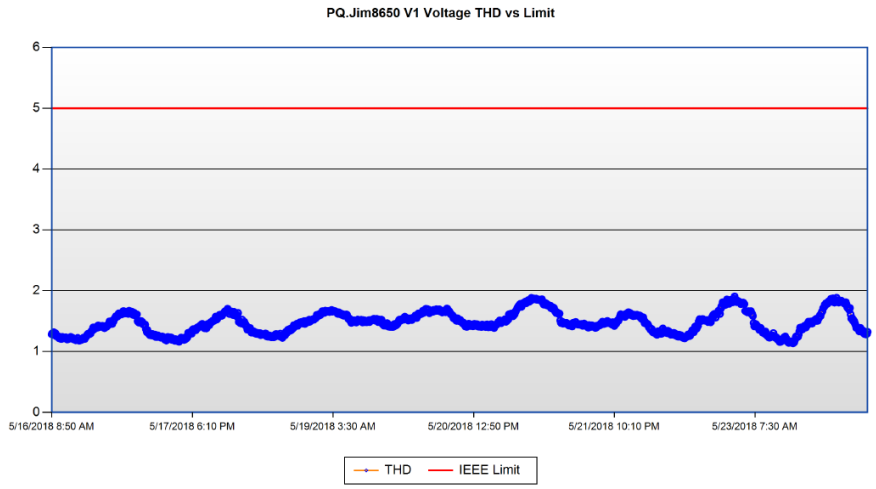
Short Term Current Distortion Compliance - 99th Percentile						
Isc/IL = 10	**Individual Harmonic Order (Odd)**					**TDD (%)**
Ratio Window Limit (0 - 20)	**<11**	**11≤h<17**	**17≤h<23**	**23≤h<35**	**35≤h**	
IEEE 519 Limit (%)	6	3	2.25	0.9	0.45	7.5
Non-compliant 10-minute Weeks	2					2
Total Weeks	2					
Compliance	FAIL					FAIL

Short Term Current Distortion Compliance - 99th Percentile								
	Individual Harmonics				**TDD Limit - 7.5**			
Date	**Aggregate**	**I1**	**I2**	**I3**	**Aggregate**	**I1**	**I2**	**I3**
5/13/2018	55.30%	0.00%	67.05%	12.60%	55.30%	0.00%	99.81%	0.00%
5/20/2018	0.10%	0.00%	84.10%	17.89%	0.10%	0.00%	100.00%	0.00%

Short Term Current Distortion Compliance - 95th Percentile						
Isc/IL = 10	**Individual Harmonic Order (Odd)**					**TDD (%)**
Ratio Window Limit (0 - 20)	**<11**	**11≤h<17**	**17≤h<23**	**23≤h<35**	**35≤h**	
IEEE 519 Limit (%)	4	2	1.5	0.6	0.3	5
Non-compliant 10-minute Weeks	2					2
Total Weeks	2					
Compliance	FAIL					FAIL

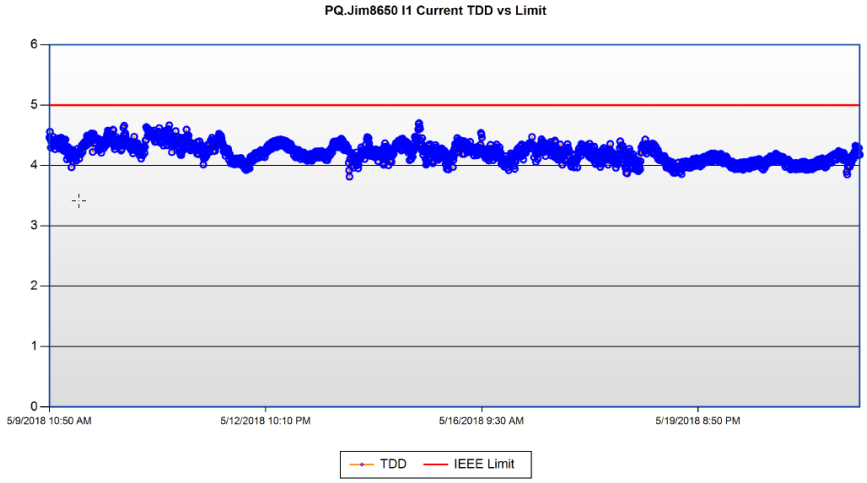
Harmonic Compliance 2014 Report

5/9/2018 10:40:01 AM - 5/22/2018 4:20:01 PM (Pacific Time)



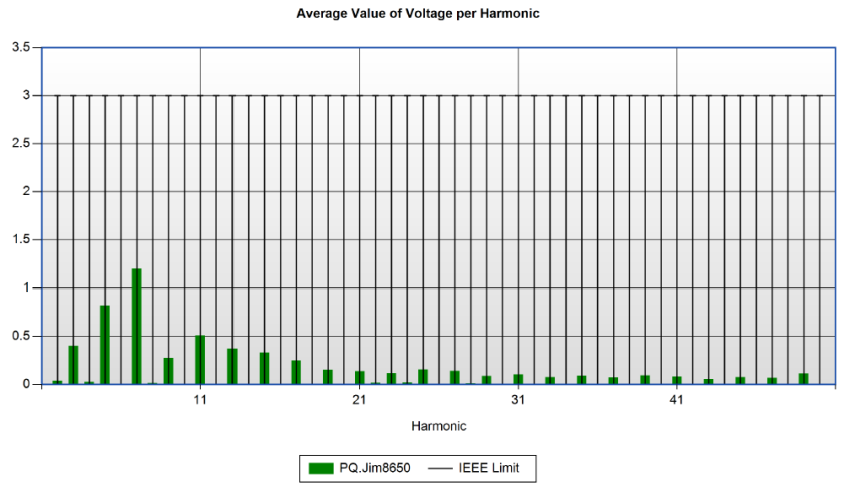
Harmonic Compliance 2014 Report

5/9/2018 10:40:01 AM - 5/22/2018 4:20:01 PM (Pacific Time)



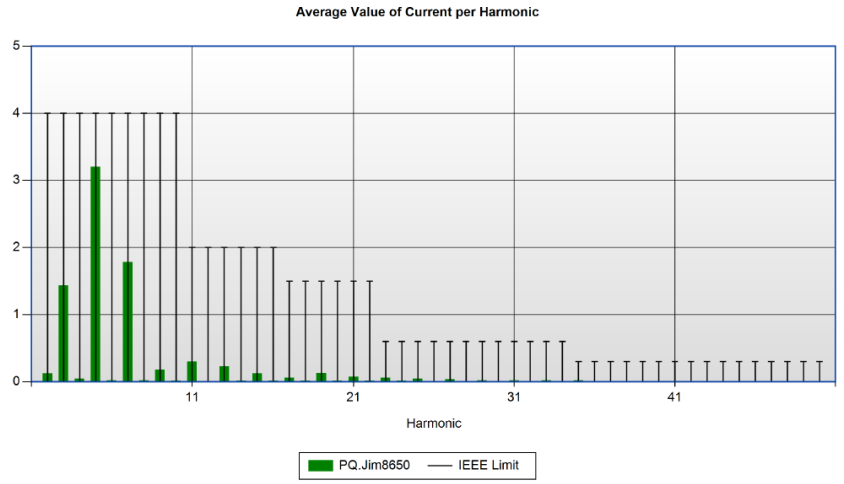
Harmonic Compliance 2014 Report

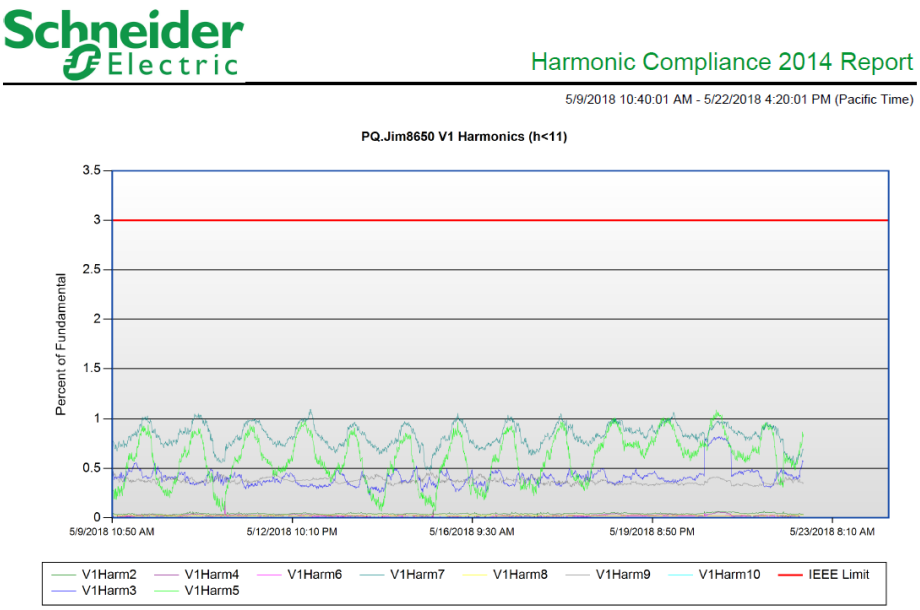
5/9/2018 10:40:01 AM - 5/22/2018 4:20:01 PM (Pacific Time)



Harmonic Compliance 2014 Report

5/9/2018 10:40:01 AM - 5/22/2018 4:20:01 PM (Pacific Time)





NOTE: This example only shows selected content from the report, it does not show the entire report.

IEC61000-4-30 Report

Summary

The IEC61000-4-30 Report shows an analysis of power quality relevant measurements that were taken in compliance with the IEC61000-4-30 standard. Use this report for a power quality analysis of your facility based on the IEC61000-4-30 measurement standard.

NOTE: This report needs data from monitoring devices with IEC61000-4-30 monitoring capabilities.

The IEC61000-4-30 report shows the following types of information:

- Voltage profile
- THD profile
- Unbalance profile
- Flicker profile
- Frequency profile
- Summary table

Prerequisites

- The measurement data must be available as historical data logs in the database.

Report inputs

- Title
- Sources
- Measurement Interval
- Voltage Nominal [V]
- Frequency Nominal [Hz]
- Voltage Baseline [%]
- THD Baseline [%]
- Frequency Baseline [%]
- Unbalance Baseline [%]
- Flicker Baseline - High
- Flicker Baseline - Low
- Reporting Period
- Source Label
- Show Data Warnings

Example:

Schneider Electric

IEC61000-4-30

1/1/2016 12:00:00 AM - 7/14/2016 12:00:00 AM (Server Local)

Data Warnings

Message	Date Added
Data was not available for some of the selected source and measurement combinations.	7/13/2016 2:54:02 PM

Report Parameters

Sampling Period	2hr
Nominal Voltage	120
Nominal Frequency	60
Voltage Baseline	10
THD Baseline	5
Frequency Baseline High	1
Unbalanced Baseline	5
Flicker Baseline High	1
Flicker Baseline Low	0.5

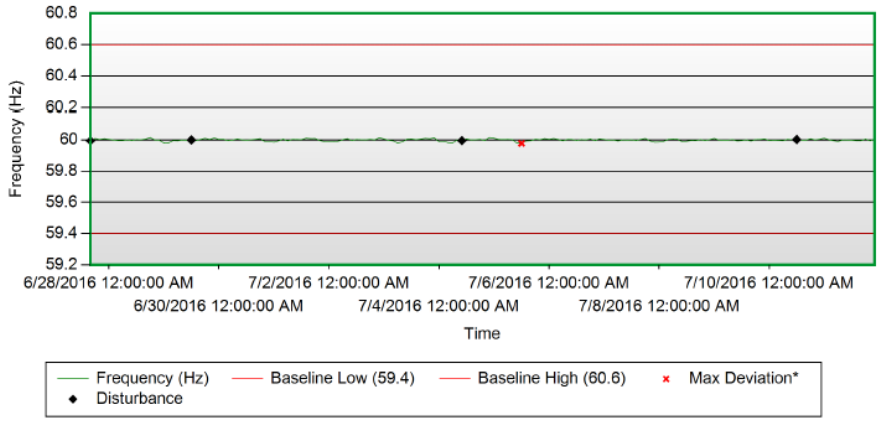
Schneider Electric

IEC61000-4-30

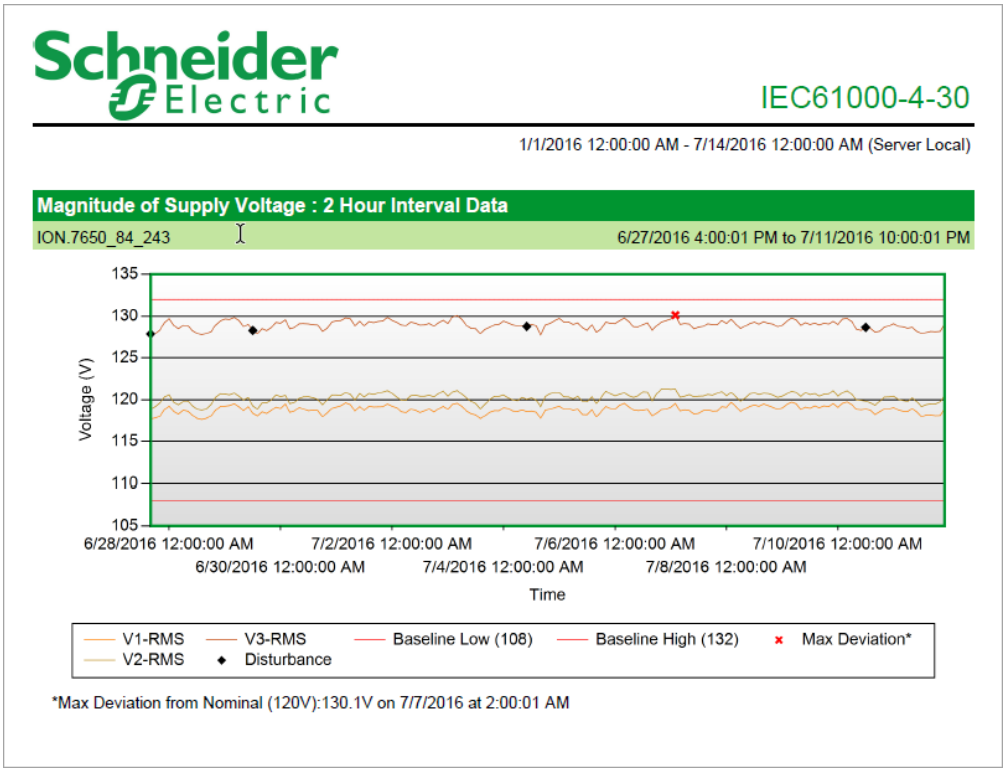
1/1/2016 12:00:00 AM - 7/14/2016 12:00:00 AM (Server Local)

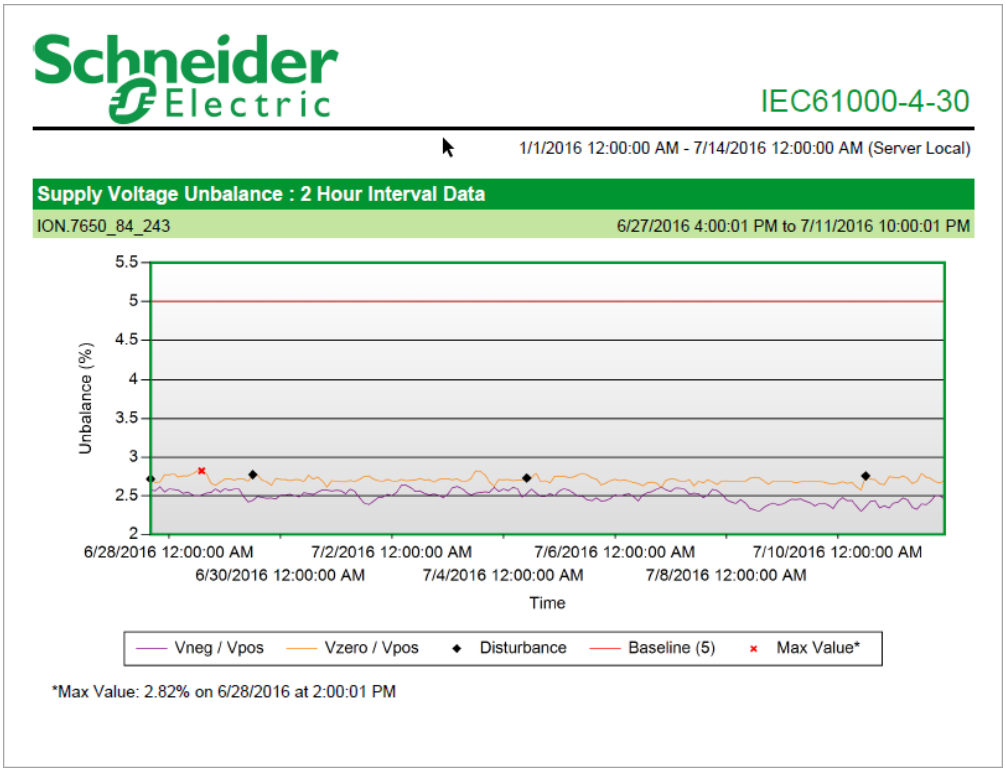
Power Frequency : 2 Hour Interval Data

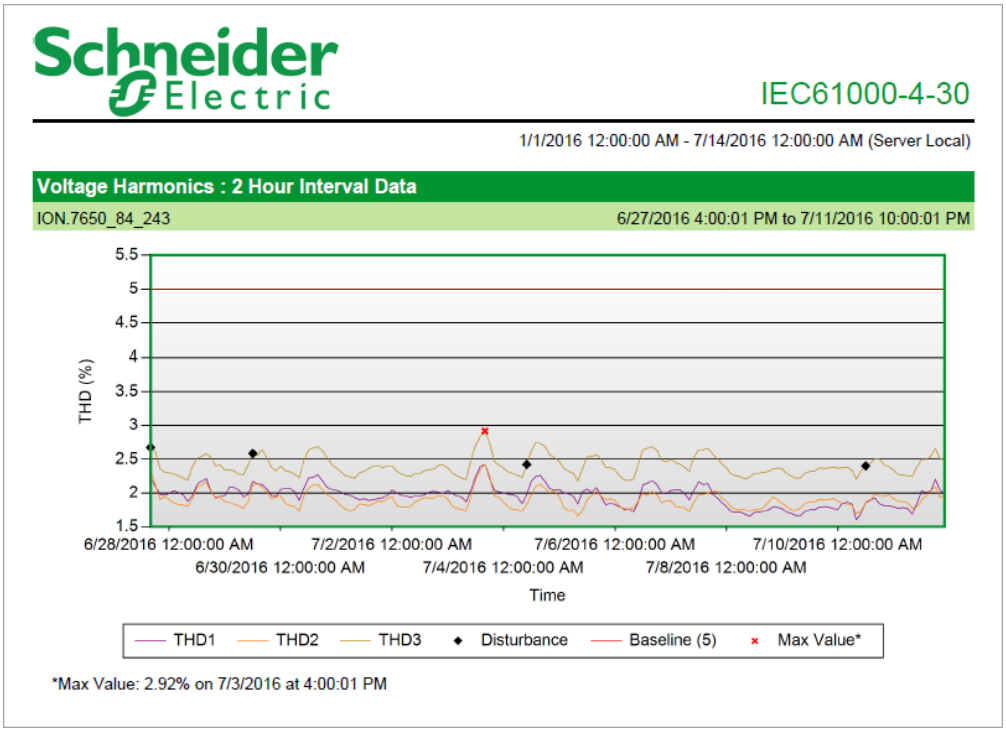
ION.7650_84_243 6/27/2016 4:00:01 PM to 7/11/2016 10:00:01 PM

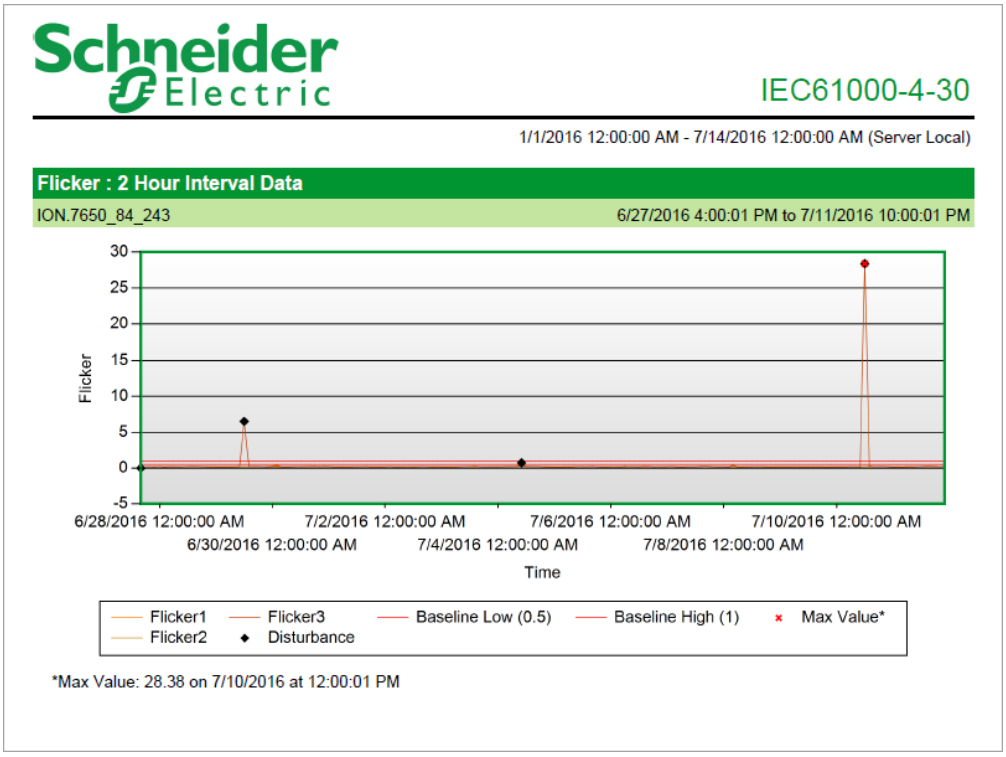


*Max Deviation from Nominal (60Hz): 59.98Hz on 7/5/2016 at 12:00:01 PM









Schneider Electric

IEC61000-4-30

1/1/2016 12:00:00 AM - 7/14/2016 12:00:00 AM (Server Local)

Voltage and Harmonics

Timestamp	Disturbance	V1-RMS (V)	V2-RMS (V)	V3-RMS (V)	THD1 (%)	THD2 (%)	THD3 (%)	Vneg / Vpos	Vzero / Vpos
6/27/2016 4:00:01 PM	1	117.70	118.88	127.87	2.22	2.32	2.67	2.57	2.72
6/27/2016 6:00:01 PM	0	117.80	119.16	127.90	2.10	2.13	2.61	2.56	2.67
6/27/2016 8:00:01 PM	0	118.03	119.61	128.35	1.98	1.91	2.36	2.62	2.68
6/27/2016 10:00:01 PM	0	118.83	120.33	129.24	1.97	1.94	2.31	2.55	2.77
6/28/2016 12:00:01 AM	0	119.23	120.57	129.69	2.00	1.90	2.30	2.59	2.77
6/28/2016 2:00:01 AM	0	118.56	119.65	128.87	2.03	1.85	2.28	2.58	2.78
6/28/2016 4:00:01 AM	0	118.29	119.38	128.50	2.01	1.83	2.25	2.57	2.74
6/28/2016 6:00:01 AM	0	118.74	119.77	128.91	1.97	1.82	2.22	2.53	2.76
6/28/2016 8:00:01 AM	0	118.62	119.84	128.85	1.88	1.80	2.19	2.55	2.76
6/28/2016 10:00:01 AM	0	118.15	119.27	128.28	1.96	1.91	2.39	2.52	2.78
6/28/2016 12:00:01 PM	0	117.75	118.86	127.93	2.13	2.09	2.51	2.50	2.82
6/28/2016 2:00:01 PM	0	117.63	118.75	127.80	2.18	2.12	2.54	2.51	2.82
6/28/2016 4:00:01 PM	0	117.76	118.88	127.92	2.22	2.17	2.58	2.54	2.79
6/28/2016 6:00:01 PM	0	118.07	119.42	128.15	2.02	2.02	2.52	2.54	2.66
6/28/2016 8:00:01 PM	0	118.73	120.28	128.94	1.93	1.92	2.40	2.59	2.64
6/28/2016 10:00:01 PM	0	119.19	120.69	129.42	1.95	1.94	2.41	2.55	2.68
6/29/2016 12:00:01 AM	0	119.22	120.64	129.65	1.97	1.87	2.34	2.59	2.72
6/29/2016 2:00:01 AM	0	119.29	120.56	129.59	2.08	1.86	2.34	2.57	2.72
6/29/2016 4:00:01 AM	0	119.50	120.78	129.83	2.08	1.83	2.33	2.59	2.71
6/29/2016 6:00:01 AM	0	119.16	120.42	129.48	2.04	1.81	2.28	2.59	2.72
6/29/2016 8:00:01 AM	0	118.67	119.95	128.75	1.94	1.77	2.27	2.49	2.72
6/29/2016 10:00:01 AM	0	119.16	120.26	129.01	1.98	1.87	2.42	2.42	2.69
6/29/2016 12:00:01 PM	1	118.38	119.26	128.28	2.17	2.12	2.58	2.44	2.77
6/29/2016 2:00:01 PM	0	118.05	118.85	127.89	2.13	2.14	2.55	2.49	2.77
6/29/2016 4:00:01 PM	0	118.54	119.60	128.50	2.13	2.09	2.64	2.48	2.71
6/29/2016 6:00:01 PM	0	118.36	119.60	128.28	2.06	2.02	2.53	2.47	2.68
6/29/2016 8:00:01 PM	0	118.73	120.00	128.64	1.97	1.92	2.38	2.47	2.64
6/29/2016 10:00:01 PM	0	119.10	120.54	129.25	1.95	1.94	2.33	2.46	2.73
6/30/2016 12:00:01 AM	0	118.94	120.35	129.16	2.05	1.96	2.40	2.51	2.71
6/30/2016 2:00:01 AM	0	119.47	120.50	129.55	2.06	1.84	2.33	2.51	2.71
6/30/2016 4:00:01 AM	0	118.48	119.51	128.48	2.07	1.81	2.32	2.52	2.70

NOTE: This example only shows selected content from the report, it does not show the entire report.

Power Quality Report

Summary

The Power Quality Report shows the number and severity of voltage sags, swells, and transients over a period of time. It includes waveform signatures and susceptibility curve plots, such as CBEMA (1996), CBEMA (Updated), ITIC, or SEMI F47. Use this report to analyze power quality (PQ) incidents, to assess possible impacts of PQ events on your facility or processes, and to help identify causes of PQ events.

Prerequisites

- The measurement data must be available as historical data logs in the database.

Report inputs

- Title
- Sources
- Incident Interval
- Reporting Period
- Source Label
- CBEMA (1996), CBEMA (Updated), ITIC, SEMI F47 curves
- Y-Axis Max Value (% Nominal)
- Sub-reports
- Show Data Warnings

Additional information about incident details and waveform details.

Incident details:

When you use the **Generate Dynamically** sub-reports option, you can view details of an incident by clicking the link in the **TimeStamp** column in the table.

Detailed information about a single power quality incident is displayed, including:

- A CBEMA (1996), CBEMA (Updated), ITIC, or SEMI F47 curve containing the power quality disturbances for the selected incident. (The curve used in the plot is dependent on the overlay options you select for the report.)
- The timestamps, types, phases, duration, and magnitude of disturbances in the selected incident, with the worst event in the selected incident highlighted (worst event = largest magnitude x duration).
- The power quality settings of the device that registered the disturbance (for example, sag/swell limits, transient threshold, and so on).

To return to the summary report, use the report section back button on the report toolbar.

Waveform details:

When you use the **Generate Dynamically** sub-reports option, you can view the waveform details of an incident by clicking the waveform icon in the incident details table in the Incident sub report.

The waveform details include all the waveforms that were recorded for a disturbance. It displays a waveform chart along with an optional table with waveform values.

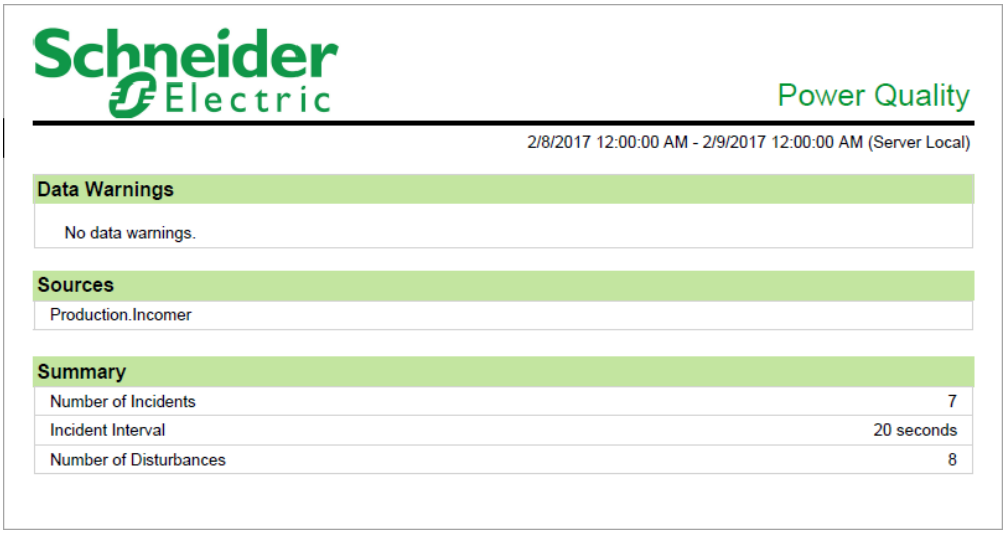
The following waveform plots and data are displayed, based on the timestamp selected:

- A summary waveform plot, displaying a plot of the V1, V2 and V3 waveforms.
- An individual waveform plot for each of:
  - V1 and I1
  - V2 and I2
  - V3 and I3
- If the source queried has digital input logging enabled over the time interval of the waveforms, a waveform showing the digital input status.
- The timestamp for the time the waveforms were triggered.
- The sampling frequency of the waveforms.

To return to the summary report, use the report section back button on the report toolbar.

NOTE: For incident sub-reports with multiple events, some events might reference the same waveform recording. This can happen if the time interval between events is very short. In that case, the waveform and event trigger times for these events do not match exactly.

Example:



Schneider Electric

Power Quality

2/8/2017 12:00:00 AM - 2/9/2017 12:00:00 AM (Server Local)

Data Warnings

No data warnings.

Sources

Production.Incomer

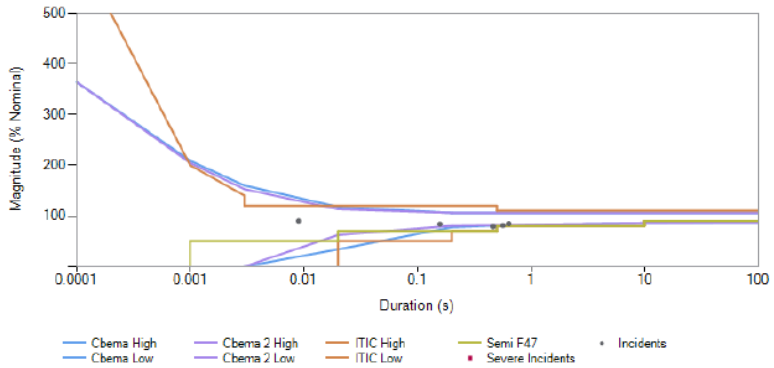
Summary

Number of Incidents	7
Incident Interval	20 seconds
Number of Disturbances	8

Schneider Electric

Power Quality

2/8/2017 12:00:00 AM - 2/9/2017 12:00:00 AM (Server Local)

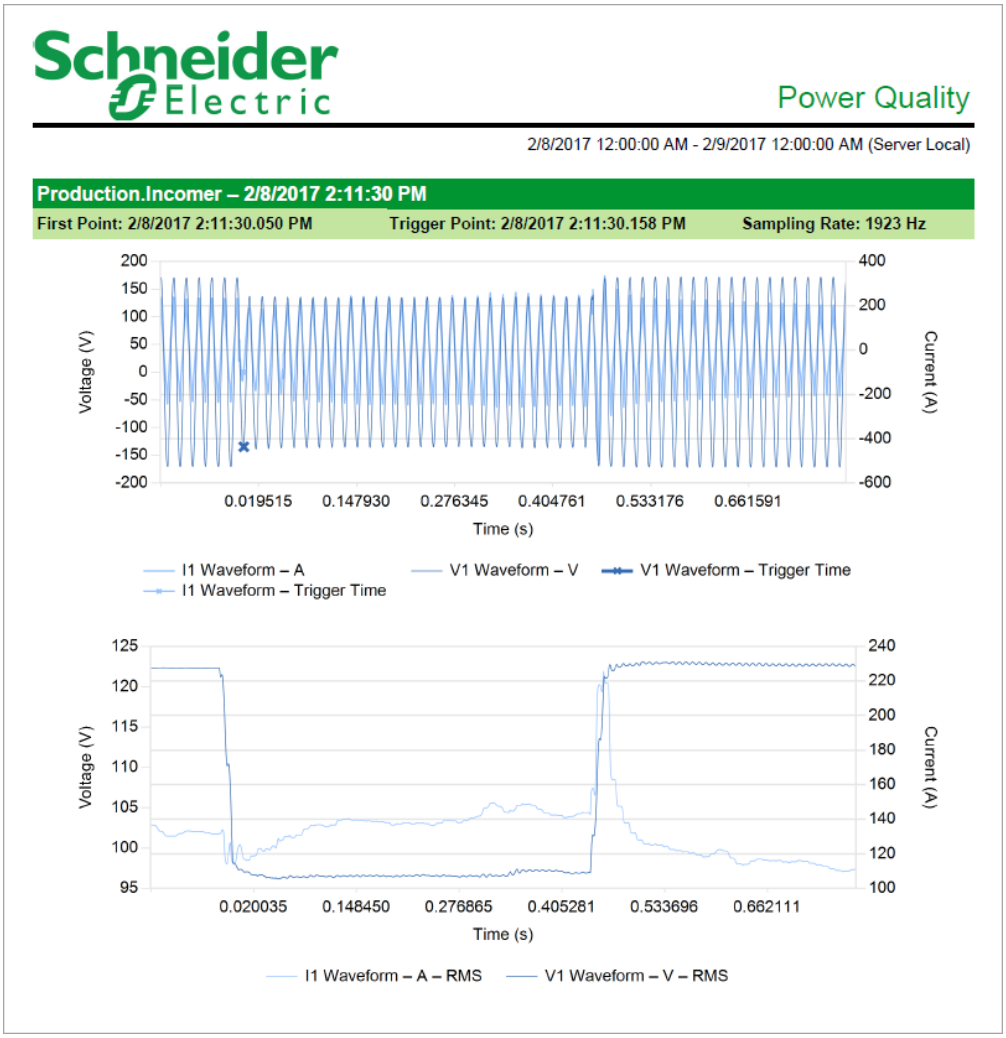


Worst Disturbance per Incident

ID	Incident Time	Meter	Type	Phase	Duration (s)	Magnitude (%)
1	2/8/2017 2:11:30 PM	Production.Incomer	Sag	V2	0.467	78.99
2	2/8/2017 2:12:07 PM	Production.Incomer	Sag	V2	0.458	78.86
3	2/8/2017 8:19:06 PM	Production.Incomer	Sag	V1	0.009	89.89
4	2/8/2017 8:21:33 PM	Production.Incomer	Sag	V3	0.635	84.56
5	2/8/2017 8:22:11 PM	Production.Incomer	Sag	V3	0.634	84.49
6	2/8/2017 8:54:18 PM	Production.Incomer	Sag	V3	0.158	83.64
7	2/8/2017 9:31:23 PM	Production.Incomer	Sag	V1	0.567	81.12

Incident Statistics

ID	Incident First Timestamp	Duration (s)	Transients	Sags	Swells	Interrupt.	Undervolt.	Overvolt.
1	2/8/2017 2:11:30 PM	0.467	0	1	0	0	0	0
2	2/8/2017 2:12:07 PM	0.458	0	1	0	0	0	0
3	2/8/2017 8:19:06 PM	0.009	0	1	0	0	0	0
4	2/8/2017 8:21:33 PM	0.635	0	1	0	0	0	0
5	2/8/2017 8:22:11 PM	0.634	0	1	0	0	0	0
6	2/8/2017 8:54:18 PM	5.533	0	2	0	0	0	0
7	2/8/2017 9:31:23 PM	0.567	0	1	0	0	0	0



NOTE: This example only shows selected content from the report, it does not show the entire report.

Power Quality Analysis Report

NOTE: This report is part of the Power Quality Performance Module. This Module requires a separate license.

Summary

The Power Quality Analysis Report shows power quality (PQ) summary information, such as breakdowns of PQ event types, impact, and location. It also includes information on disturbances (harmonics, unbalance, and so on) and power factor. Use this report to help you understand the power quality in your facility, reduce downtime, and increase equipment reliability and availability.

Details

Depending on the events and disturbances you select, the generated report provides data categorized as follows:

- **Power Quality Event Summary**, consisting of Power Quality Events Breakdown, Power Quality Events Impact, and Power Quality Events Location.
  - Power Quality Events Breakdown shows the percent distribution of the events in a pie chart.
  - Power Quality Events Impact shows a percent distribution of the events with a likely impact and no impact in a pie chart.
  - Power Quality Events Location shows the distribution of the number of events in a bar chart with likely impact and no impact identified for each of the External, Internal, and Undetermined locations.
- **Power Quality Events — Details**, consisting of events impact and events location for each detected event. and Disturbance Details for each detected disturbance.
  - Events Impact shows the number of each event type with a likely impact and no impact.
  - Events Location provides a distribution of the number of each event with a likely impact and no impact in External, Internal, and Undetermined locations.
- **Power Quality Disturbances — Details**, consisting of a graphical representation of the distribution for each disturbance followed by a data table containing measurement and value details.
- **Power Factor — Details**, consisting of additional information on power quality disturbances. The logged data represented in a trend chart is for each Incomer or main meter defined in the PowerQualityGroups.csv file. The table below the chart shows Active and Reactive energy data grouped by each power source meter. The red target line in the chart is set to 92 by default on the report template page.

See Power Quality Performance events and disturbances for additional information.

Prerequisites

- The Power Quality Performance Module must be configured.
- The measurement data must be available as historical data logs in the database.

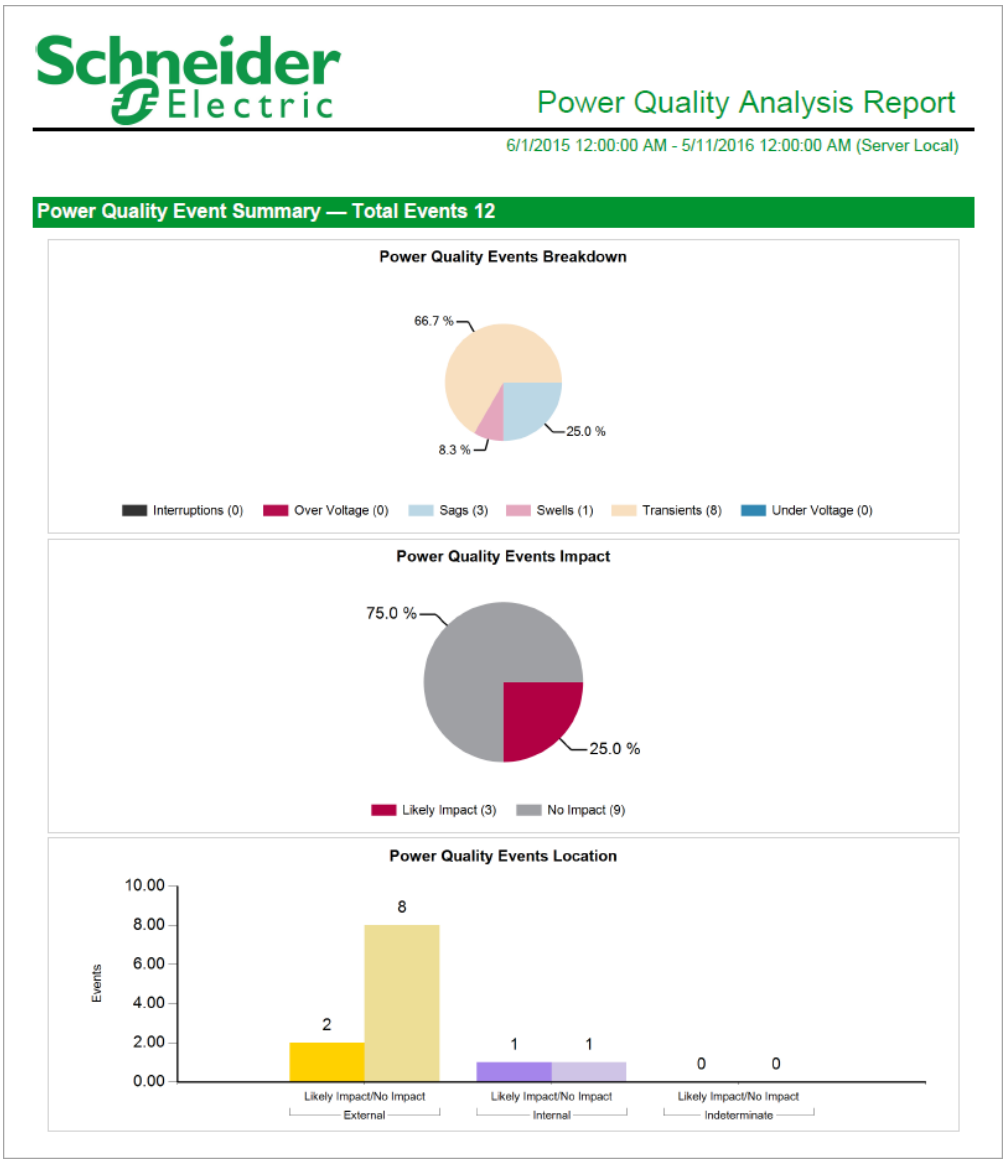
Related

- Power Quality Impact Report – provides an estimated impact of production downtime.
- Power Quality Events Breakdown, Power Quality Events Impact, and Power Quality Events Location gadgets – provide a graphical representation of power quality events.

Report inputs

- Title
- Reporting Period
- Include Events and Disturbances in the Detail Section
- Power Factor Target
- Include Non Impacting Events
- Include Data Tables in the Detail Section
- Include Data Warnings

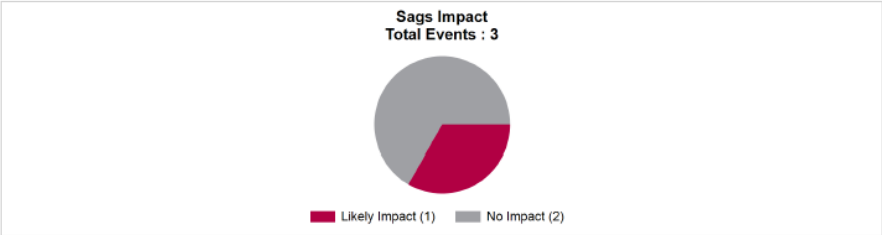
Example:

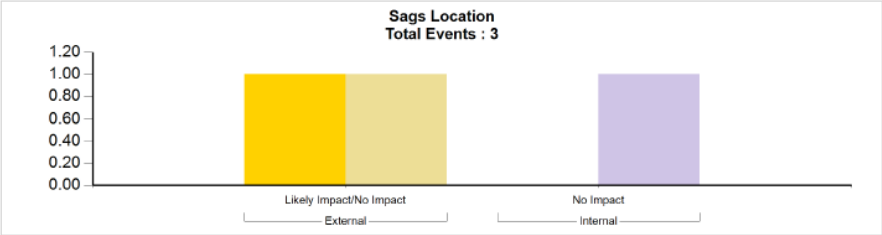


Power Quality Analysis Report

6/1/2015 12:00:00 AM - 5/11/2016 12:00:00 AM (Server Local)

Power Quality Events — Details





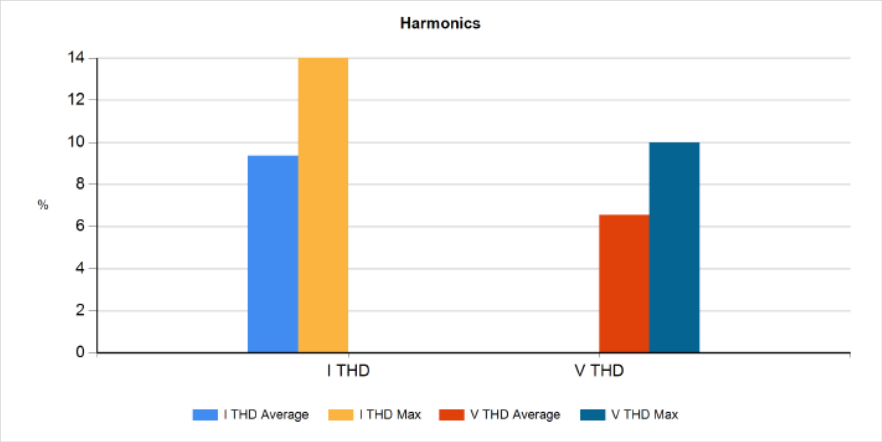
Event Location	Likely Impact	No Impact
External	1	1
Internal	0	1
Total	**1**	**2**

Source Name	Timestamp	Phase	Duration (s)	Magnitude (V)	Impact	Location
Utility.Revenue	4/15/2016 8:52:49 AM	V1	2.49	88.00	No	Internal
Utility.Main	4/19/2016 2:56:17 PM	V1	2.56	78.00	Likely	External
Utility.Main	5/7/2016 5:37:32 PM	V1	2.56	85.00	No	External

Power Quality Analysis Report

6/1/2015 12:00:00 AM - 5/11/2016 12:00:00 AM (Server Local)

Power Quality Disturbances — Details



Measurement	Value
I THD Average	9.36
I THD Max	14.00
V THD Average	6.55
V THD Max	10.00

NOTE: This example only shows selected content from the report, it does not show the entire report.

Power Quality Impact Report

NOTE: This report is part of the Power Quality Performance Module. This Module requires a separate license.

Summary

The Power Quality Impact Report shows the financial impact of power quality related downtime. The impact calculations are based on a configurable, flat rate downtime cost. Use this report to see the cost of power quality related events to your facility or processes.

Prerequisites

- The Power Quality Performance Module must be configured.
- The measurement data must be available as historical data logs in the database.

Related

- Power Quality Impact gadget – provides a graphical representation of external. internal, and undetermined power quality events.
- Power Quality Analysis Report– provides summarizes power quality events and disturbances occurring in a production environment.

Report inputs

- Title
- Group
- Reporting Period
- Event Location
- Include Undetermined Events
- Include Data Warnings

Example:

Schneider Electric

Power Quality Impact Report

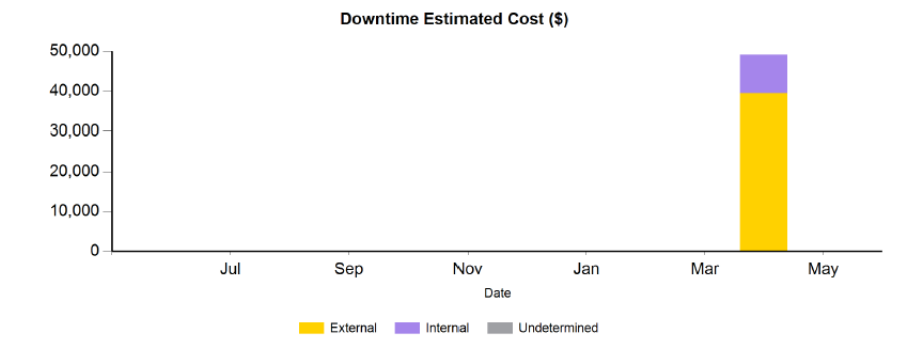
6/1/2015 12:00:00 AM - 5/11/2016 12:00:00 AM (Server Local)

Report Parameters Selected

Event Location	External and Internal	**Include Undetermined Events**	Yes
Group	Bottling	**Downtime Hourly Rate ($)**	10,000

Power Quality Impact Summary

Event Location	Event Count	Downtime Duration	Downtime Estimated Cost ($)
External	1	03:57:05	39,514
Internal	1	00:57:40	9,611
Undetermined	0	00:00:00	0
Total	**2**	**04:54:45**	**49,125**



Schneider Electric

Power Quality Impact Report

6/1/2015 12:00:00 AM - 5/11/2016 12:00:00 AM (Server Local)

Power Quality Impact Details

Power Quality Event				Associated Equipment Downtime			
Type	Detected By	Event Start Time	Event Duration	Downtime Source Name	Downtime Start Time	Downtime Duration	Estimated Cost ($)
External							
Sag	Production.Utility	4/19/2016 2:56:17 PM	00:00:02	Bottling.Filler	4/19/2016 2:56:29 PM	03:57:05	39,514

NOTE: This example only shows selected content from the report, it does not show the entire report.

Usage Trending Reports

PME includes the following usage trending report templates:

- Hourly Usage Report
- Multi Device Usage Report
- Multiple Trend Report
- Single Device Usage Report
- Trend Report

⚠ CAUTION

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.

Failure to follow these instructions can result in injury or equipment damage.

Hourly Usage Report

Summary

The Hourly Usage Report shows the consumption rate, per hour, of various types of utilities, such as electricity, water, and so on, for different consumers for a specific day. Use this report to check and analyze resource consumption in your facility or processes.

Prerequisites

- The measurement data must be available as historical data logs in the database.

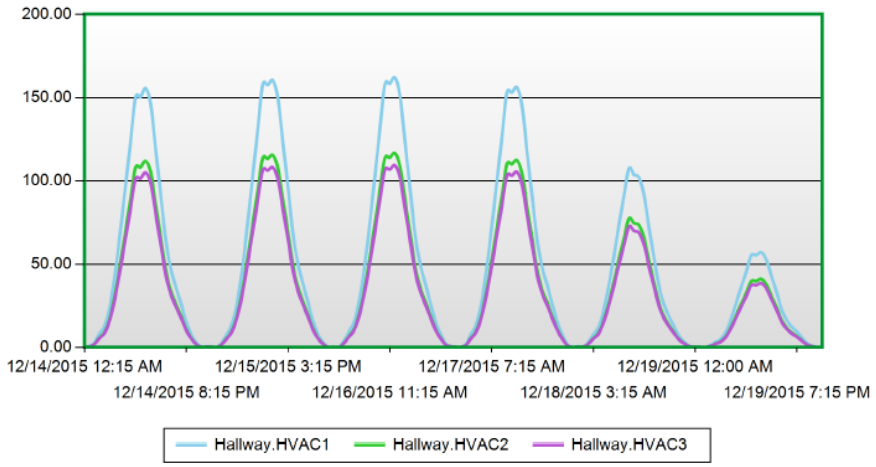
Report inputs

- Title
- Sources (Devices and Views)
- Measurements (with Smart Mode)
- Reporting Period
- Target Line
- Source Label
- Include Data Table
- Include Chart
- Auto-scale Y-Axis
- Show Data Warnings.

Example:

Schneider Electric

Hourly Usage Report



Timestamp	Hallway.HVAC1	Hallway.HVAC2	Hallway.HVAC3
12/14/2015 12:00 AM	0.67	0.50	0.46
12/14/2015 1:00 AM	0.79	0.57	0.53
12/14/2015 2:00 AM	3.30	2.37	2.23
12/14/2015 3:00 AM	8.67	6.24	5.84
12/14/2015 4:00 AM	13.26	9.55	8.96
12/14/2015 5:00 AM	25.03	18.02	16.89
12/14/2015 6:00 AM	44.30	31.91	29.90
12/14/2015 7:00 AM	69.06	49.72	46.59
12/14/2015 8:00 AM	95.68	68.88	64.57
12/14/2015 9:00 AM	122.47	88.19	82.67
12/14/2015 10:00 AM	149.64	107.75	100.98
12/14/2015 11:00 AM	150.46	108.33	101.54
12/14/2015 12:00 PM	155.58	111.93	104.98
12/14/2015 1:00 PM	146.18	105.27	98.68
12/14/2015 2:00 PM	118.43	85.25	79.89

NOTE: This example only shows selected content from the report, it does not show the entire report.

Multi Device Usage Report

Summary

The Multi Device Usage Report shows daily consumption for various types of utilities, such as electricity, water, and so on, for different consumers. Use this report to check and analyze resource consumption in your facility or processes.

Details

NOTE: The measurements that you select for the devices need to provide equivalent data results. For example:

- Correct:

  Real Energy selected for MeterA
  Real Energy into the Load selected for MeterB

- Incorrect:

  Real Energy selected for MeterA
  Reactive Energy selected for MeterA

The report provides a summary of consumption by one or more sources, an interval usage table, and a pie chart.

Prerequisites

- The measurement data must be available as historical data logs in the database.

Report inputs

- Title
- Sources (Devices and Views)
- Measurements (with Smart Mode)
- Rollup
- Reporting Period
- Show Start & End Periods Only
- Source Label
- Chart Type
- Auto-scale Y-Axis
- Include Data Table
- Show Data Warnings

Example:

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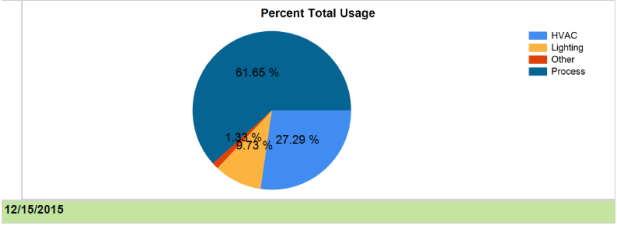
Multi Device Usage Report

Usage Summary

Source	12/14/2015	12/15/2015	12/16/2015	12/17/2015
HVAC	2,360.03	2,406.05	2,420.41	2,380.89
Lighting	841.27	820.83	830.64	854.26
Other	114.65	110.92	112.38	116.57
Process	5,330.57	5,219.41	5,278.90	5,409.80
Total	8,646.51	8,557.20	8,642.34	8,761.51

Relative Usage Pie Chart

12/14/2015



12/15/2015

Schneider Electric

Multi Device Usage Report

Period : 12/14/2015 Interval : Hour Of Day	HVAC	Lighting	Other	Process	Interval Total
0	5.84	2.81	-0.05	3.86	12.46
1	7.50	2.47	-0.12	3.37	13.22
2	17.10	3.04	-0.04	12.89	32.99
3	30.98	3.33	0.00	23.12	57.44
4	45.74	15.56	1.94	98.80	162.03
5	63.22	32.27	4.59	197.48	297.56
6	97.01	34.97	4.76	226.19	362.93
7	158.57	35.78	4.77	273.77	472.90
8	205.25	47.43	6.71	369.83	629.22
9	205.87	64.39	9.36	445.07	724.69
10	194.45	66.22	9.52	427.72	697.91
11	180.43	67.32	9.59	412.85	670.18
12	189.85	68.32	9.69	426.46	694.31
13	204.17	68.51	9.71	441.27	723.66
14	178.89	55.04	7.71	364.45	606.10
15	148.20	36.78	4.97	259.06	449.00
16	120.02	34.92	4.68	236.70	396.32
17	95.01	35.95	4.70	224.12	359.78
18	75.99	36.24	4.69	208.39	325.30
19	58.40	36.00	4.74	196.42	295.56
20	39.06	34.54	4.79	185.22	263.61

NOTE: This example only shows selected content from the report, it does not show the entire report.

Multiple Trend Report

Summary

The Multiple Trend Report shows logged measurement data from multiple loads in a tabular display and as a trend plotted on separate axes. Use this report to compare different loads.

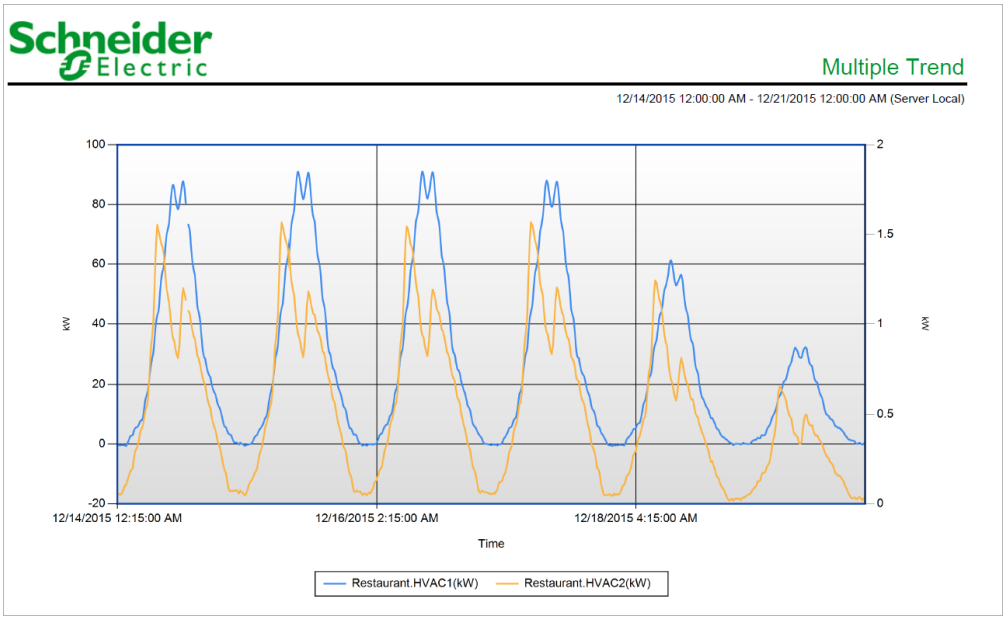
Prerequisites

- The measurement data must be available as historical data logs in the database.

Report inputs

- Title
- Left and Right Axis Sources – see Sources (Devices and Views)
- Left and Right Axis Measurements – see Measurements (with Smart Mode)
- Left Axis High Target Line and Right Axis High Target Line
- Left Axis High Target Name and Right Axis High Target Name
- Left Axis Low Target Line and Right Axis Low Target Line
- Left Axis Low Target Name and Right Axis Low Target Name
- Reporting Period
- Chart Type
- Source Label
- Include Data Table
- Auto-scale Y-Axis
- Show Data Warnings

Example:



Schneider Electric

Multiple Trend

12/14/2015 12:00:00 AM - 12/21/2015 12:00:00 AM (Server Local)

Timestamp	Source Name Left	Measurement Left	Source Id Left	Value Left	Source Name Right	Measurement Right	Source Id Right	Value Right
12/14/2015 12:15:00 AM	Restaurant.HVAC1	kW	11	-0.4805271	Restaurant.HVAC2	kW	33	0.04896913
12/14/2015 12:30:00 AM	Restaurant.HVAC1	kW	11	-0.2547947	Restaurant.HVAC2	kW	33	0.0553078
12/14/2015 12:45:00 AM	Restaurant.HVAC1	kW	11	-0.4183762	Restaurant.HVAC2	kW	33	0.05098733
12/14/2015 1:00:00 AM	Restaurant.HVAC1	kW	11	-0.3461004	Restaurant.HVAC2	kW	33	0.05273265
12/14/2015 1:15:00 AM	Restaurant.HVAC1	kW	11	-0.2965652	Restaurant.HVAC2	kW	33	0.06370243
12/14/2015 1:30:00 AM	Restaurant.HVAC1	kW	11	-0.312045	Restaurant.HVAC2	kW	33	0.08451674
12/14/2015 1:45:00 AM	Restaurant.HVAC1	kW	11	-0.4675825	Restaurant.HVAC2	kW	33	0.101662
12/14/2015 2:00:00 AM	Restaurant.HVAC1	kW	11	-0.6264904	Restaurant.HVAC2	kW	33	0.1071668
12/14/2015 2:15:00 AM	Restaurant.HVAC1	kW	11	0.3656375	Restaurant.HVAC2	kW	33	0.132791
12/14/2015 2:30:00 AM	Restaurant.HVAC1	kW	11	1.418552	Restaurant.HVAC2	kW	33	0.1557085
12/14/2015 2:45:00 AM	Restaurant.HVAC1	kW	11	2.491895	Restaurant.HVAC2	kW	33	0.179435
12/14/2015 3:00:00 AM	Restaurant.HVAC1	kW	11	2.83815	Restaurant.HVAC2	kW	33	0.1867966
12/14/2015 3:15:00 AM	Restaurant.HVAC1	kW	11	3.120735	Restaurant.HVAC2	kW	33	0.2014065
12/14/2015 3:30:00 AM	Restaurant.HVAC1	kW	11	4.571081	Restaurant.HVAC2	kW	33	0.2575004
12/14/2015 3:45:00 AM	Restaurant.HVAC1	kW	11	5.421306	Restaurant.HVAC2	kW	33	0.2964757
12/14/2015 4:00:00 AM	Restaurant.HVAC1	kW	11	5.589268	Restaurant.HVAC2	kW	33	0.308359
12/14/2015 4:15:00 AM	Restaurant.HVAC1	kW	11	5.97416	Restaurant.HVAC2	kW	33	0.3257664
12/14/2015 4:30:00 AM	Restaurant.HVAC1	kW	11	6.819692	Restaurant.HVAC2	kW	33	0.3646381
12/14/2015 4:45:00 AM	Restaurant.HVAC1	kW	11	7.814566	Restaurant.HVAC2	kW	33	0.4077927
12/14/2015 5:00:00 AM	Restaurant.HVAC1	kW	11	7.977629	Restaurant.HVAC2	kW	33	0.4193859
12/14/2015 5:15:00 AM	Restaurant.HVAC1	kW	11	9.445646	Restaurant.HVAC2	kW	33	0.4418048
12/14/2015 5:30:00 AM	Restaurant.HVAC1	kW	11	12.62024	Restaurant.HVAC2	kW	33	0.4910519
12/14/2015 5:45:00 AM	Restaurant.HVAC1	kW	11	15.39329	Restaurant.HVAC2	kW	33	0.5285637

NOTE: This example only shows selected content from the report, it does not show the entire report.

Single Device Usage Report

Summary

The Single Device Usage Report shows daily consumption of a certain type of utility, such as electricity, water, and so on, for a certain consumer. It includes a trend display showing the daily consumption side-by-side. Use this report to check and analyze resource consumption in your facility or processes.

Prerequisites

- The measurement data must be available as historical data logs in the database.

Report inputs

- Title
- Single Source – see Sources (Devices and Views)
- Measurements (with Smart Mode)
- Rollup
- Reporting Period
- Source Label
- Show Start & End Periods Only
- Align Day of Week for Months
- Auto-scale Y-Axis
- Show Data Warnings

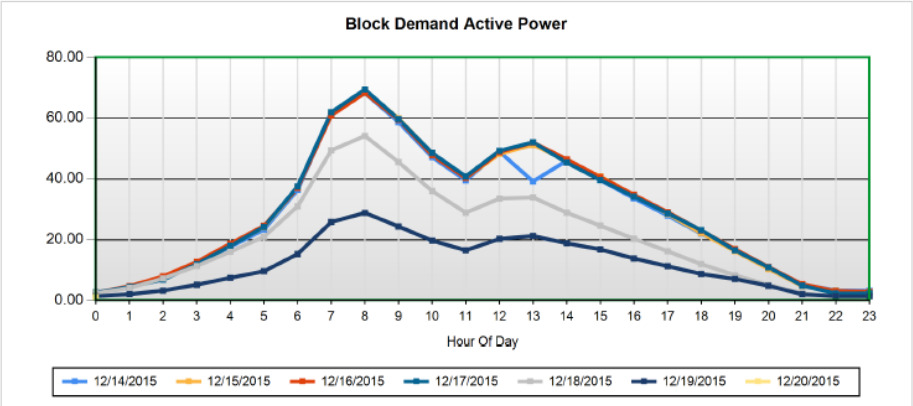
Example:

Schneider Electric

Single Device Usage Report

Usage Summary

Measurement	HeavyLab.AirCompressor		
	12/14/2015	12/15/2015	12/16/2015
	675.74	694.12	699.02



Hour Of Day	12/14/2015	12/15/2015	12/16/2015
0	2.42	2.61	2.61
1	4.15	4.54	4.70
2	7.62	7.32	7.95
3	12.38	11.78	12.70
4	17.66	18.03	18.68
5	23.34	24.08	24.56
6	36.42	37.09	37.04
7	61.22	61.92	60.90
8	68.27	69.20	68.32
9	58.69	59.92	59.49
10	47.17	48.48	47.80

NOTE: This example only shows selected content from the report, it does not show the entire report.

Trend Report

Summary

The Trend Report shows logged measurement data for multiple loads as a trend plot on the same axis. Use this report to compare different loads.

Details

NOTE: The Trend Report is limited to 30 source-measurement pairs. Multiple reports are required if the number of source-measurement pairs exceeds 30.

NOTE: The Trend Report was upgraded in Power Monitoring Expert 7.2.1 to include two new parameters: **Include Data Table** and **Include Duplicates**.

Trend Reports with subscriptions created prior to version 7.2.1 need to be updated and saved with the new parameters. To update a Trend Report:

- Open each saved Trend Report. The new parameters are visible in the display pane.
- Keep or change the default selections for the parameters.
- Save the updated report to overwrite the existing version.

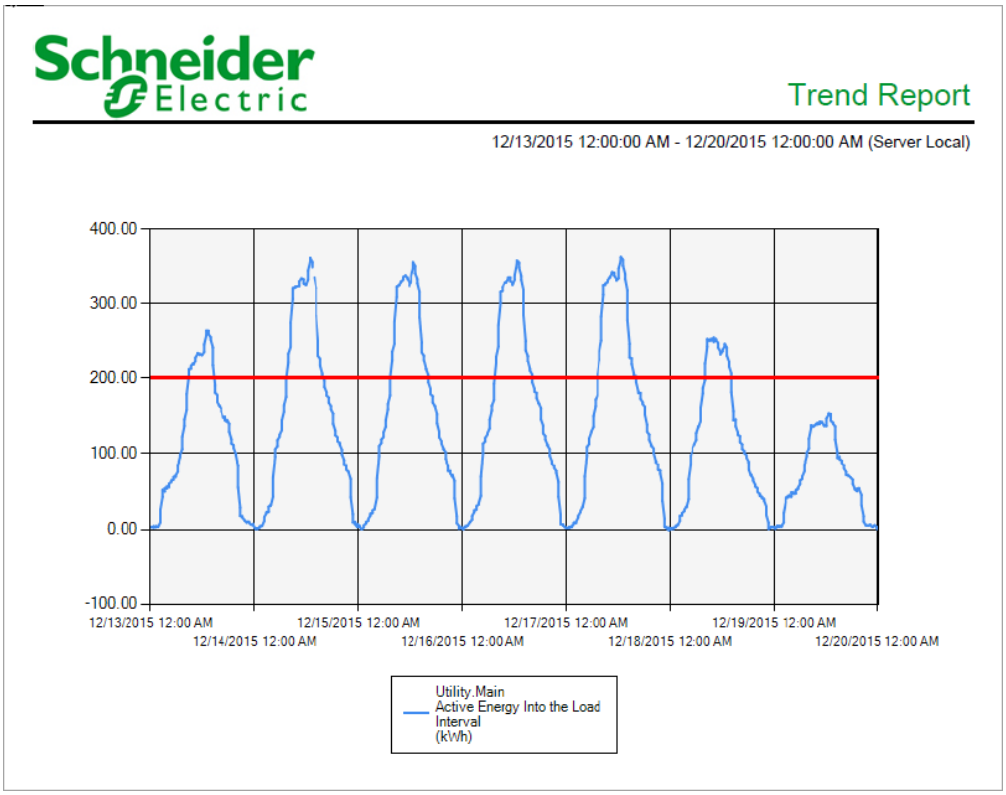
Prerequisites

- The measurement data must be available as historical data logs in the database.

Report inputs

- Title
- Sources (Devices and Views)
- Measurements (with Smart Mode)
- Chart Type
- Reporting Period
- Source Label
- Target Line
- Auto-scale Y-Axis
- Include Data Table
- Include Duplicates
- Show Data Warnings.

Example:



Schneider Electric

Trend Report

12/13/2015 12:00:00 AM - 12/20/2015 12:00:00 AM (Server Local)

Report Data Table

Timestamp	Utility.Main Active Energy Into the Load Interval (kWh)
12/13/2015 12:15 AM	3.77
12/13/2015 12:30 AM	3.09
12/13/2015 12:45 AM	4.47
12/13/2015 1:00 AM	2.69
12/13/2015 1:15 AM	4.73
12/13/2015 1:30 AM	3.18
12/13/2015 1:45 AM	4.37
12/13/2015 2:00 AM	3.77
12/13/2015 2:15 AM	9.58
12/13/2015 2:30 AM	26.58
12/13/2015 2:45 AM	43.36
12/13/2015 3:00 AM	52.74
12/13/2015 3:15 AM	50.42
12/13/2015 3:30 AM	55.05
12/13/2015 3:45 AM	54.17
12/13/2015 4:00 AM	57.17
12/13/2015 4:15 AM	56.33
12/13/2015 4:30 AM	60.80
12/13/2015 4:45 AM	63.23
12/13/2015 5:00 AM	64.99
12/13/2015 5:15 AM	66.11
12/13/2015 5:30 AM	69.70
12/13/2015 5:45 AM	69.80
12/13/2015 6:00 AM	71.77
12/13/2015 6:15 AM	76.84
12/13/2015 6:30 AM	85.02
12/13/2015 6:45 AM	95.78
12/13/2015 7:00 AM	98.54
12/13/2015 7:15 AM	106.20
12/13/2015 7:30 AM	123.06
12/13/2015 7:45 AM	136.99
12/13/2015 8:00 AM	145.51
12/13/2015 8:15 AM	157.87
12/13/2015 8:30 AM	178.95
12/13/2015 8:45 AM	202.45
12/13/2015 9:00 AM	211.87
12/13/2015 9:15 AM	212.36
12/13/2015 9:30 AM	216.29

NOTE: This example only shows selected content from the report, it does not show the entire report.

System integration

This section provides information on how to use Power Monitoring Expert with other EcoStruxure™ systems.

Use the links in the following table to find the content you are looking for:

Topic	Content
Integration with EBO	Detailed configuration information on accessing data in an integrated system of PME with EcoStruxure Building Operation.

Integration with EcoStruxure Building Operation - Operating

This chapter includes the following topics:

NOTE: For these applications to display correctly in Building Operation WebStation, you must use a supported Web browser version. See Operating Environment for details.

1. Accessing Dashboards and Slideshows

See Dashboards for details on how to use dashboards and slideshows.

2. Accessing Reports

See Reports for details on how to use reports.

3. Accessing Alarms

Alarms are automatically transferred from PME to Building Operation through EWS, and appear with all other alarms in the Alarms pane, when both the Interface and the Alarm Polling are enabled.

NOTE: To verify that the Interface and the Alarm Polling are enabled: In the System Tree, right-click on the **PME/EBO Integration > EWS Client** folder, and then select Properties.

⚠ WARNING

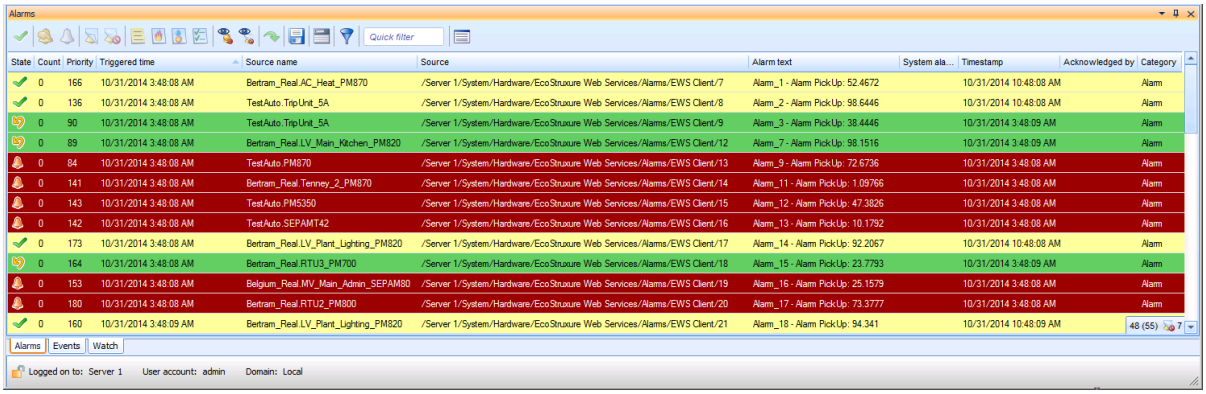
INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

To view the Alarms for this client:

1. Log into Building Operation WorkStation
2. Scroll down to the Alarms viewer pane at the bottom of the dialog to see all active alarms,



The Building Operation “Sum Alarm” is an ideal way to leverage alarms flowing from EWS. It allows the users to create actions and notifications on filtered PME alarms. See the *EcoStruxure Building Operation System Reference Guide* for more information.

4. Accessing EWS real-time values (only for Architecture 2 solutions)

The PME/EBO Integration folder that you imported into Building Operation contains groups, devices and measurements within the EWS Client folder.

⚠ WARNING

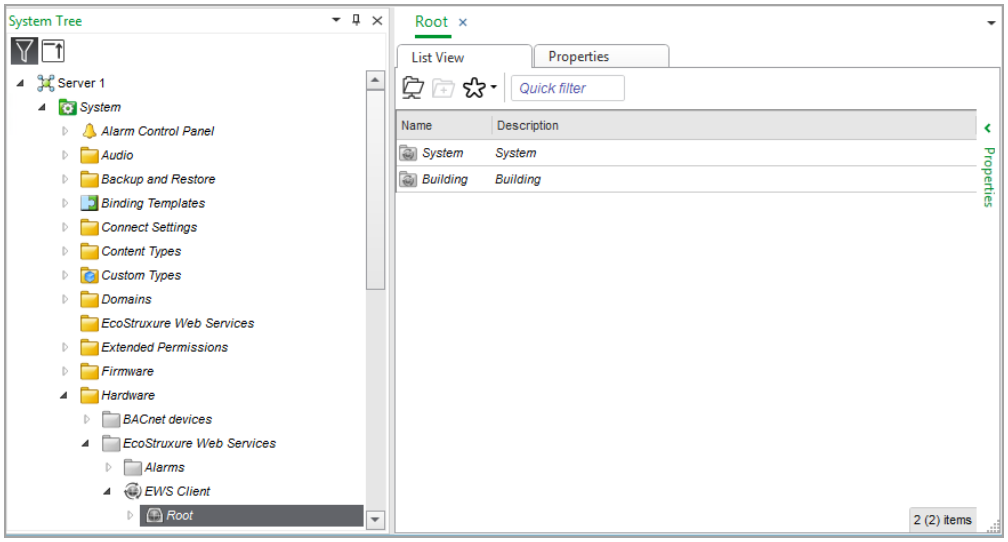
INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

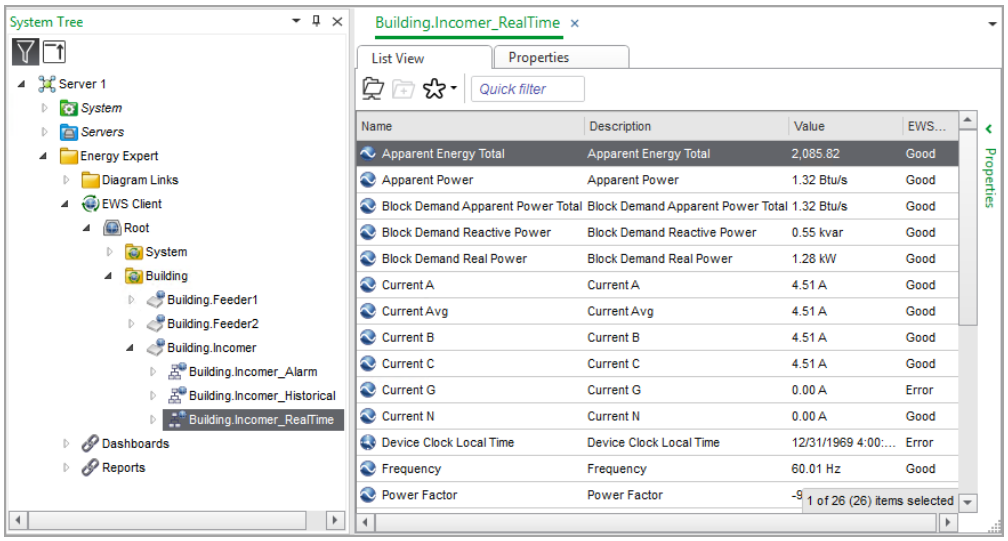
To access EWS real-time values:

1. Log in to Building Operation WorkStation.
2. In the System Tree, navigate to the PME/EBO Integration folder and click the EWS Client folder. The EWS Client tab appears.



3. Click the “+” icon next to each subfolder in the System Tree to expand the contents of each, and then click on an item in the subfolder. The List View appears in the right pane and shows a list of measurements for that item.
4. Double-click a device to view the complete list of measurements for that device.
5. In the EWS Client pane, right-click on a column heading, and then select Add/Remove Columns.
6. Select the check box next to Value and EWS State. Now, the two new columns with data

appear.



NOTE: The default refresh rate for EWS values is set to 20 seconds.

NOTE: If you find that some measurements for a device are missing from the list of measurements, do the following:
Confirm that all of the measurements you want for that device are exposed. See Modifying which measurements EWS Server exposes by default for details. If all of the measurements you want for the device are exposed but still do not appear in the list of measurements, repeat the procedure to create and host the EWS interface. (PME takes some time between enabling the EWS server and when the EWS client shows the exposed measurements.) See Creating and hosting the EWS interface in Building Operation Workstation for details.

5. Accessing device diagrams (only for Architecture 2 solutions)

You can access PME device diagrams from within Building Operation in order to view graphical data for the device data you imported.

⚠ WARNING

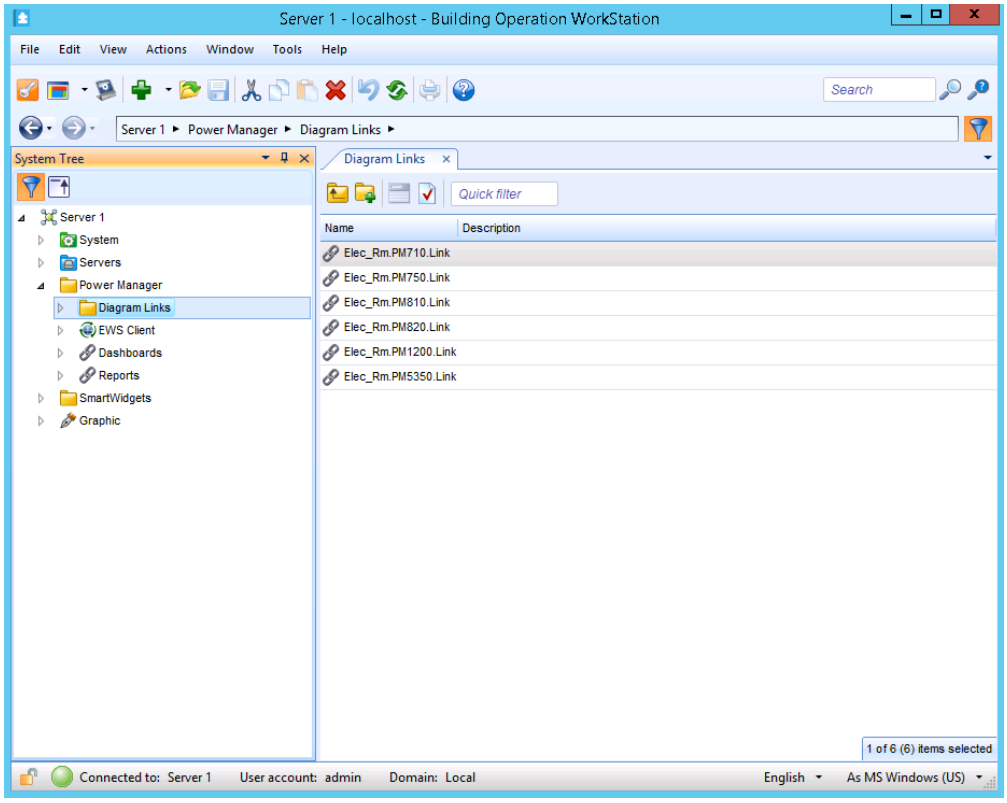
INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

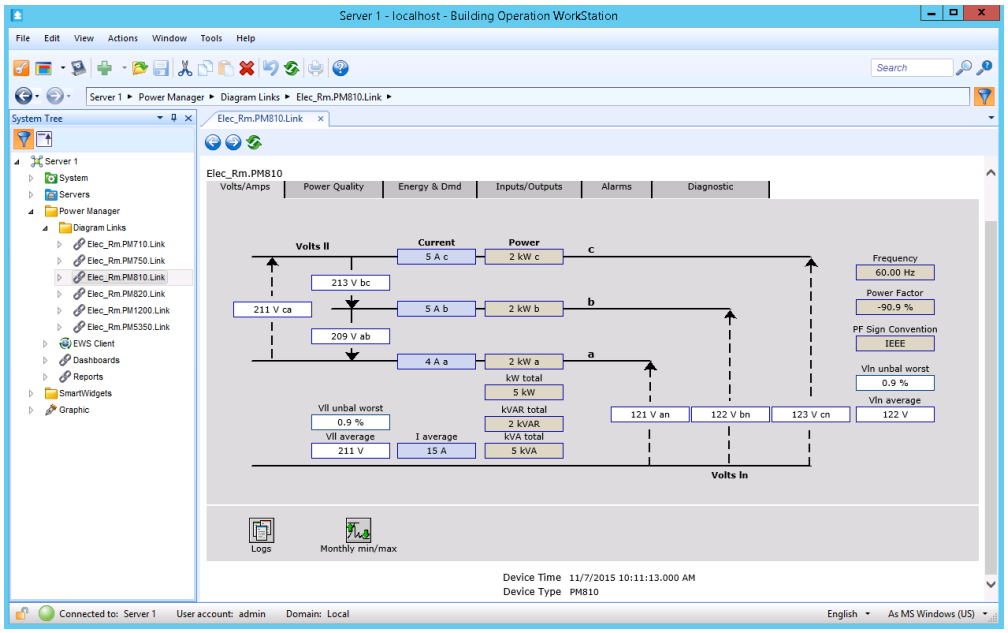
Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

To access device diagrams

1. Log in to Building Operation WorkStation.
2. In the System Tree, navigate to PME/EBO Integration and click the Diagram Links folder. You will find a list of Web Diagram links in the Diagram Links pane at the right for the default Web Diagrams that you selected and exported with the Integration Utility.



3. In the Diagram Links tab, double-click a Web Diagram file. The Web Diagram graphic opens for this device.



4. Select the different tabs in the Web Diagram screen to view other data values for this device.

Trends

⚠ WARNING

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⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

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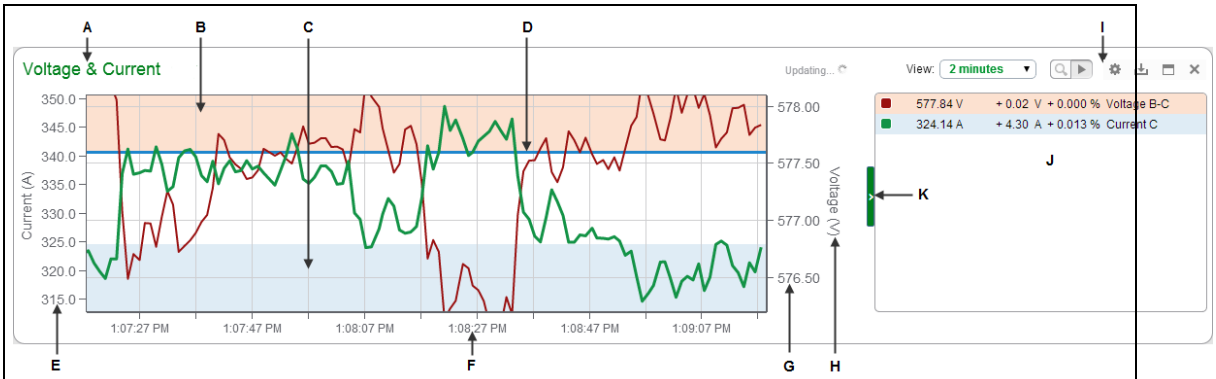
Use the Trends application to monitor current system conditions by displaying real-time data in a graphical format. You can configure trends to view historical data, or you can combine real-time data and historical data in the same trend. In addition, you can save the trend data as a csv file.



A	Title	**B**	Upper threshold	**C**	Lower threshold
D	Target line	**E**	Left axis	**F**	Scale (from View setting)
G	Right axis	**H**	Axis title	**I**	Trend options
J	Legend	**K**	Close/open toggle		

TIP: You can open the Trends application from the **TRENDS** link in the Web Applications banner.

Time display

See Time Display in Web Applications for information on how time is displayed in a system where the monitoring devices, the PME/Web server, and the Web client (browser) are located in different time zones.

For information on how use the Trends application, see The Trends user interface.

For information on how to configure Trends, see Trends configuration.

Vista

Vista is the PME component that displays and controls your power monitoring system.

⚠ WARNING

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⚠ WARNING

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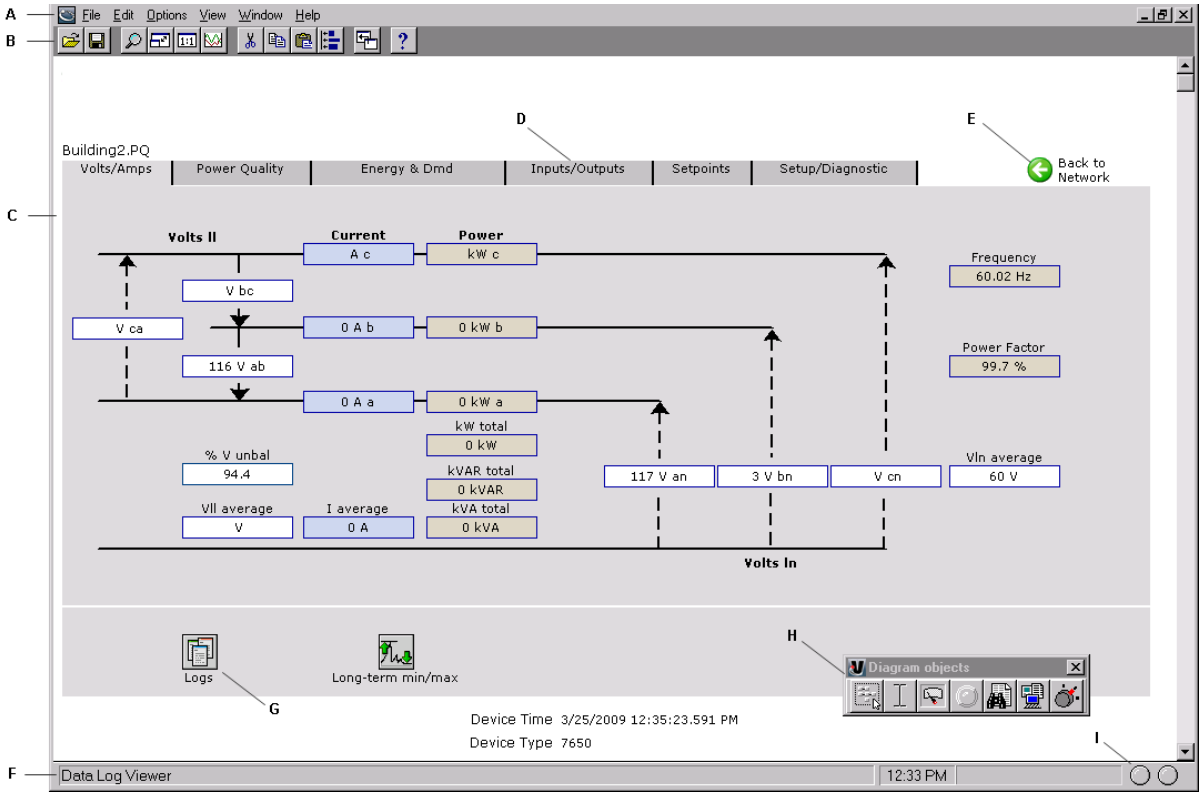
For information on starting and logging on to Vista or ending your Vista session, see Getting started.

The Vista interface

The Vista interface consists of a main screen with a title bar, a menu bar, a toolbar, a workspace, a status bar and (in Edit mode) a toolbox.

For information on opening or generating a Vista diagram, see Generating, opening and closing a user diagram.

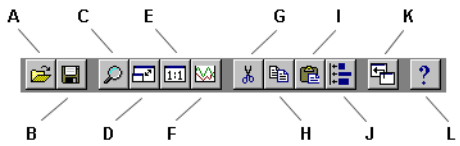
The following image illustrates the Vista interface with a user diagram showing real-time values.



A	Menu Bar	B	Toolbar	C	Workspace
D	Click a tab to display its data	E	Click to return to the Network Diagram view	F	Status Bar
G	Click this grouping object to open another window containing more data	H	Toolbox	I	Receive/Transmit Status indicators

Toolbar

The toolbar offers quick access to the commands that are used most frequently. Each command on the toolbar is also available from the menus.

A	Open		G	Cut
B	Save		H	Copy
C	Zoom		I	Paste
D	Fit to window		J	Layout
E	Restore to 100%		K	Up One Level
F	Plot Selected Data		L	Help

Zoom

Select **View > Zoom In** or click the Zoom button to change the mouse pointer to a crosshair. Use this pointer to drag an outline around the area you want to enlarge.

Restore to 100%

Select **View > Restore to 100%** or click the Restore to 100% button to return to the normal view.

Fit to Window

Select **View > Fit to Window** or click the Fit to Window button to force the user diagram to fit in the current window.

Up One Level

Select **File > Up One Level** or click the **Up One Level** button to return to the previously displayed window. Note that this also closes the current window. If you want to be prompted when you reach the top level of a diagram, make sure **Options > Browse closes active window** is selected.

Workspace

The main area in the center of the Vista screen is the workspace. The workspace is used to display information such as user diagrams and data and event viewers.

Status Bar

The status bar displays:

- The status line, which describes any active processes and provides a brief description of the currently selected command or toolbar button.
- The current time on the workstation.
- A progress indicator bar.
- Two communication status lights.

Toolbox

In Edit mode, the toolbox also appears on the screen. You can add objects to the user diagram using the toolbox. See Creating and customizing a user diagram for more information on the toolbox and Edit mode.

Other display features

Vistaoffers several display features to assist you when viewing a user diagram. Some of these are accessible through the toolbar and menu options (see Toolbar). Those only accessible through menu options are:

Browse closes active window

Select **Options > Browse closes active window** to have each window that you open replace the previous one. This option is selected by default. Without this option selected, any previously opened windows remain open.

Arrange All

Select **Window > Arrange All** to tile all open windows in the workspace.

Display mode and Edit mode

There are two display modes in Vista, which affect how you navigate a user diagram. Whether or not the toolbox is shown indicates the mode you are in: if the toolbox is open, you are in edit mode; if it is closed, you are in display mode.

- **Display** mode allows you to monitor your system, view system data, and control some aspects of your system. In Display mode, **single-click** objects to view the information they contain or perform their associated action.
- **Edit** mode allows you to configure the appearance and function of user diagrams and diagram objects. In Edit mode, **double-click** objects to view the information they contain or perform their associated action. **Right-click** the objects to view configuration options. See Creating and customizing a user diagram and Customizing a diagram object for more information.

When instructed to click a diagram object, either single-click or double-click, depending on the mode you are in.

Vista user diagrams

This section explains how to use Vista user diagrams to view real-time and logged data from your power monitoring system. The information that you obtain from your Power Monitoring Expert network is represented graphically in a user diagram.

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What is a user diagram?

A user diagram is a configurable display that consists of two main elements:

- **Diagram objects** are configurable graphic icons that display your system information. Each diagram object displays a single piece of information from somewhere in your power monitoring network. In some cases, diagram objects are stored within grouping windows.
- **Grouping object**: In some cases, a user diagram stores related information within a grouping object. Click on a grouping object to open a grouping window and display its contents.

  NOTE: To configure a grouping object to open a grouping window, see Specifying an action for numeric, status, or grouping objects.

- **Grouping windows** are a type of folder or “sub-window” that contain diagram objects. Vista uses grouping windows to logically organize diagram objects within a user diagram. When closed, a grouping window is usually represented by a grouping object icon.

TIP: It is better to use grouping objects to open other user diagrams rather than to open grouping windows. Large numbers of grouping windows in a user diagram can slow the performance of Vista.

You can create as many user diagrams as you want and edit each one to suit your needs. You can share user diagrams with multiple users over your network, and users can view them simultaneously and share the same information. For more information on creating user diagrams, see Creating and customizing a user diagram.

Default user diagrams

Vista provides a set of pre-configured user diagrams that you can use to display data. These default diagrams provide a standard set of options that you can use to access your device's most commonly required functions.

The default diagram displays real-time data. It includes a simple power system illustration that displays the various real-time parameters measured by the device.

Generating, opening and closing a user diagram

A user diagram is identified by its “.dgm” extension. You can generate, open, and close user diagrams as needed.

Generating a network diagram

The network diagram displays your entire power monitoring system by linking to individual default user diagrams that display data from each device in your system. When you generate a network diagram, Vista automatically locates all devices in your system and displays them. This diagram is saved with the default name “network.dgm”.

1. Select **File > Generate Network Diagram**.

   The network diagram appears in the workspace containing icons that represent groups of devices on your system.

2. Click on one of the grouping objects to open a window and display the node icons contained within.
3. Click a node icon to display the user diagram for the associated device.
4. Save the network diagram.

NOTE: Regenerating a network diagram and saving it overwrites the previously saved (network.dgm) file.

Opening a user diagram

To open a user diagram:

1. Select **File > Open**.
2. Navigate to the user diagram you want to open and select it from the **Open Diagram** dialog.

3. Click **Open** to open the selected user diagram.

Specifying the user diagram that opens for a given user

To set a specific Vista workspace and set of diagrams to open every time a given user logs on:

1. Log on to Vista using the particular user's logon credentials.
2. Organize Vista to appear as you want it to appear on startup.
3. Click **Save**, then close Vista.
4. Use Windows Explorer to navigate to the ...\Power Monitoring Expert\config\cfg\ud folder.
5. Locate the .wsu file for the user you are setting up (i.e., <username>.wsu). Right-click and select **Properties**.
6. Select the **Read-only** attribute, then click **OK**.

NOTE: Applying the Read-only attribute prevents the workspace information from being modified, so Vista opens the same way for a given user every time. The user can still modify and save user diagrams (if allowed by their access level).

Closing a User Diagram

To close a user diagram:

- Select **File > Close** to close the current diagram.
- Select **File > Close All** to close all diagrams.

Navigating a user diagram

After you open a user diagram, you can use it to interact with your power monitoring system. Each user diagram displays system information through diagram objects, which you can use to monitor and control various aspects of your system.

Monitoring your system in Vista

Use Vista user diagrams to display real-time and logged data, monitor events and alarms, and control a variety of system functions.

⚠ WARNING

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How data is displayed

Information in your user diagram is displayed using diagram objects. Each diagram object communicates a single piece of information from somewhere in your power monitoring network; for example, a single numeric object displays numeric data from a single source.

There are seven types of diagram objects: grouping, text, numeric, status, data log viewer, event log viewer, and control. Each type of object performs a specific type of function.

In most cases, you can identify an object's function by a caption, a label, or both (the text object does not use a caption or a label).

- By default, the caption is usually located below the diagram object and identifies the node to which the diagram object is connected. The caption can be modified to display a custom description. See Caption options for more information.
- When a label is used, it is usually displayed to one side of the diagram object. By default, the label identifies the register (on the node) to which the diagram object is connected. The label can be modified to display a custom label name. See Text options for more information.

TIP: To toggle between default labels and custom labels, select or clear **Options > Show Default Labels**. You can identify the type of diagram object by pointing to it with the mouse. The object type appears on the status line.

Identifying stale data

Real-time data that has not been refreshed is referred to as stale data. Vista detects stale data as it occurs and identifies it with a colored border. By default, Vista identifies data as stale after 60 seconds. Position the mouse pointer over an object to display a ToolTip that explains why the data has become stale.

The stale data settings are user-configurable on a per-diagram basis, and can be customized by anyone with the necessary access level.

Changing the Stale Data settings

To change the amount of time (in seconds) that Vista uses to identify stale data:

1. Ensure that the Toolbox is open (**Options > Show Toolbox**), right-click the background of the diagram and click **Properties**.
2. Click the **Updates** tab and change the settings in the **Stale Data** section.
3. Click **OK**.

Changing the flag settings for Stale Data

To change the flag color:

1. Click **Options > Flag Colors**.
2. Click the **Edit** button for the flag color you want to change, select the new color and click **OK**.

Identifying errors in communication

Vistadetects errors (such as disabled devices, security access restrictions, or configuration errors) and identifies these with a colored border around an object (orange, by default). The border color can be customized (see the previous section, Changing the flag settings for Stale Data). Position the mouse pointer over an object that Vista is indicating has an error to display a ToolTip that explains the error.

Increasing the timeout period of a Vista query

When Vista queries the ION_Data database, the query can timeout if the database is large.

To increase the timeout period of a Vista query, a new entry to the registry of ION_SERVER needs to be created, and the Query Server connect timeout period needs to be increased.

NOTICE

IRREVERSIBLE OPERATING SYSTEM DAMAGE OR DATA CORRUPTION

Before making any changes, back up your Windows Registry in a network folder or other remote location.

Failure to follow these instructions can result in irreparable damage to the operating system of the computer and all existing data.

NOTE: Registry edits must be performed only by qualified and experienced personnel.

Increase the Vista query timeout

1. Select **Start > Run** and type regedit in the **Run** window to open the registry.
2. Navigate to HKEY_LOCAL_MACHINE\SOFTWARE\Schneider Electric\Power Monitoring Expert\x.x, where x.x is the version number.

   If the component is run on a 64-bit operating system, navigate to:

   HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Schneider Electric\Power Monitoring Expert\x.x
3. Right-click an empty area in the pane on the right and select **New > DWORD Value**.
4. Name the new DWORD VistaQueryTimeout_s.
5. Right-click VistaQueryTimeout_s and select **Modify**.
6. Enter a value for the timeout period.

   The timeout period is 60 (for 60 seconds) by default. You can increase the value to 120 initially. If timeouts still occur, modify the value to 180.
7. Select **File > Exit** to exit the registry editor.

NOTE: If your system installation includes Client machines running Vista, you need to update the registry for each one.

Increase the Query Server timeout

1. Open the Power Monitoring Expert folder and double-click the Designer icon to start Designer.
2. Select **File > Open > QUERYSERVER.host_name** (where host_name is your workstation name) to open the Query Server node.
3. Double-click the **Query Modules** grouping object, then right-click the query module to open its setup dialog.
4. Select the Connection String setup register and click **Modify**.
5. Change **Connect_Timeout** from the default 60 to 120 (or 180 if necessary).
6. Save your change and restart the Query Server Service.

Viewing real-time data

Vista uses numeric objects and status objects to display real-time data. Numeric objects display real-time numeric values and status objects display real-time Boolean (ON/OFF) information.

Viewing data with numeric objects

Vista uses numeric objects to display real-time numeric data from your power monitoring system. Numeric objects can display many types of data, such as line voltage or current, power or energy levels, harmonics, or demand parameters.

Depending on their configuration, numeric objects can display data in different formats: alphanumeric, dial, horizontal or vertical bar, or scrolling graph.

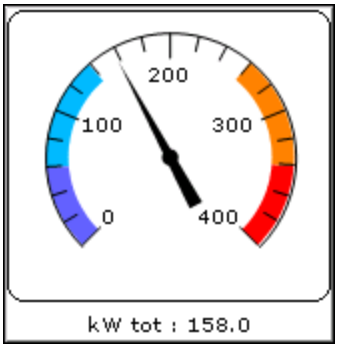
See Customizing the display of a numeric object for more information on configuring numeric objects.

Using flags on a numeric object

In some cases, a numeric object may use flags to indicate the low and high limits of the displayed parameter.

When used on a dial display, flags appear as colored areas on the dial. When used on other types of numeric objects, flags change the object's background color to indicate that a Low, Low Low, High, or High High limit is currently exceeded. To view or change the default colors, select **Options > Flag Colors**.

The following image depicts a Low Limit of 140, a Low Low Limit of 60, a High Limit of 260, and a High High Limit of 340. The portion of the dial between 140 and 260 is transparent in Vista (the background color fills that portion of the dial), and is white in the Web-based Diagrams application.



TIP: If you need only Low Low and High High limits, set the Low limit equal to the Low Low limit and the High limit equal to the High High limit.

Flag colors are stored in the workspace file on a per-user basis. They are configurable and can be customized by anyone who has the necessary access level. See Display options for more information on configuring flags.

Viewing data with status objects

Vista uses status objects to display Boolean (ON/OFF) conditions in your system. A status object may display the status of a digital output (such as a relay), a digital input (status input), or a setpoint in your system.

The default status object appears as an indicator light that changes color to indicate various conditions. Gray indicates the status object is not linked or not receiving data.

Like most diagram objects, status objects can be modified by any user with an appropriate access level. Depending on how a status object has been configured, its appearance and function can differ significantly from the default settings.

You can specify that it appear as an alphanumeric display or you can select custom images representing different conditions, for example for ON, OFF, and Unconnected. See Customizing the display of a status object for more information.

NOTE: In some cases, the active state of a status object may have been changed (inverted) so that an active state appears as inactive and vice versa. See Customizing a diagram object for more information.

Viewing logged data

Data and events recorded by the devices in your system are regularly transferred by the Log Inserter from each device to the database. Vista uses the ION Query Service to transfer this information from the database to your workstation. Vista provides two ways to view logged data and events: the Data Log Viewer and the Event Log Viewer.

- The Data Log Viewer displays data logs from all devices represented in the active user diagram. You can use the Data Log Viewer to display waveform and trend data in tabular format. You can also select a range of logs from the viewer and display the data graphically in the log view plotter.
- The Event Log Viewer typically displays events and alarms from each device represented in the active user diagram. The Event Log Viewer is used primarily to monitor low-priority events and alarms associated with the active user diagram. Each Event Log Viewer is associated with a single user diagram.

Using a Data Log Viewer

Use a Data Log Viewer to view system data stored in the database. Data Log Viewers display historical trend data (from data recorders) and waveform data (from waveform recorders).

You can select any data displayed in a Data Log Viewer and plot it as a graph or copy it to another application (for example, Microsoft Excel) where you can perform advanced calculations or include it in a report.

See Using the Query options for information on log viewer configuration.

Displaying a Data Log Viewer

Click on a Data Log Viewer object in your user diagram. The Data Log Viewer appears.

Each Data Log Viewer displays data as a table of columns and rows. Each labeled column contains a single type of data and each numbered row represents a single data record.

Plotting a range of data from the Data Log Viewer

You can plot data from a Data Log Viewer in the Log View Plotter.

1. Highlight the cells containing the data that you want to plot. The range of data can be selected in one of three ways:
   - To graph trends for all parameters over a particular time span, select a group of rows.
   - To graph the trend for a specific parameter using all available records, select the entire column.
   - To graph multiple parameters over a specific time span, click on the first cell in the desired range then drag to highlight the last cell of the range.
2. Select **Edit > Plot Selected Data** or click .

   The Log View Plotter window appears, displaying a graphical representation of the selected data. See Plotting logged data for more information.

TIP: To quickly plot a single waveform, double-click on its waveform symbol in the Data Log Viewer.

Copying a selection to another application

1. Highlight the cells containing the data that you want to copy.
2. Select **Edit > Copy** or click . This copies the selection to the Windows Clipboard.
3. Switch to another application and paste the selection.

Using the Event Log Viewer

Events and alarms that occur in your system are recorded by the meter and transferred via Log Inserter to the database.

Vista. Use the Event Log Viewer to view event records. The Event Log Viewer displays events and alarms from the device(s) represented in the active user diagram. Use it to monitor low-priority events and alarms associated with the active user diagram. The Event Log Viewer is associated with a single user diagram, so alarms only update when the user diagram is open.

See Using the Query options for information on log viewer configuration.

Displaying an Event Log Viewer

Click an Event Log Viewer object in your user diagram to open the Event Log Viewer.

The Event Log Viewer displays logged events in a table of columns and rows. Each labeled column contains a single category or event description and each numbered row represents a single event record.

Typically, Event Log Viewers display the following information:

- **Timestamp**: This indicates the event's date and time.
- **Priority**: This determines the relative significance of the event. Each type of event has a numeric value assigned to it that represents its relative priority level.
- **Cause**: This is the label and value describing the cause of the event. For example, if the label is "Setpoint #1" and the value is "Active," then the event was caused by setpoint #1 changing to an active state.
- **Effect**: This is the label and value describing the effect of the event. For example, if label is "Relay #1" and the value is "Forced On," then the effect of the event was to force relay #1 on.
- **Ack Time**: This is the date and time that an alarm was acknowledged.

NOTE: Because Event Log Viewers are associated with a single user diagram, they only update when the user diagram is open. All Event Log Viewers need to be re-opened if a diagram is closed or the software is shut down.

Acknowledging alarms

Every type of event has a prioritized value that identifies its relative significance on a scale of 0 (zero) to 255. By default, Vista identifies any event with a priority of 128 (default) or greater as an alarm.

The event record is highlighted in red, and identified under the **Ack Time** column as "ALARM". The **Cause** column lists the source of the alarm and the **Effect** column describes the event.

By default, Vista plays a "beep" to annunciate an event with a priority range of 128-191, and a beep combined with a flashing display to annunciate an event with a priority range of 192-255. To customize these options, see Alarming options.

When you acknowledge an alarm, Vista records the time the alarm was acknowledged (in the **Ack Time** column) and your user ID (in the **User Name** column).

The alarm acknowledgement function is also available in the Alarms application in the Web Applications component. See the online help for the Alarms application for information about acknowledging alarms.

NOTE: In some cases, your access level may not be sufficient to acknowledge an alarm; for example, a critical alarm may require Supervisor access. This is a user-configurable option. See Alarming options for more information.

Acknowledging an alarm

1. Open an Event Log Viewer, then do one of the following:
   - To acknowledge a single alarm, click the word ALARM in the **Ack Time** column or highlight the row containing the alarm.
   - To acknowledge all alarms to date, click the **Ack Time** column heading.

   A confirmation box appears, asking if you want to acknowledge the selected alarms.
2. Select **Yes** to acknowledge the alarms or **No** to cancel.

If you acknowledge the alarm but do not have a sufficient access level, the alarm remains unacknowledged and the message "Insufficient Authorization" appears in the status line.

NOTE: When an alarm has been acknowledged in the Web-based Alarms application, and you view the entry in the Event Log Viewer, the **Ack Time** and **User Name** columns are populated with the appropriate acknowledgement entries for the ON value. However, these columns remain blank for the related OFF value even though the alarm has been acknowledged.

Silencing alarms

If you are not ready or able to acknowledge an alarm, you can silence it until it can be acknowledged by selecting **Options > Silence Outstanding Alarms**.

NOTE: Acknowledging an alarm does not change the operating condition that caused the alarm. You must ensure that the cause is corrected to remove the alarm condition.

Controlling system functions

You can use control objects to send commands from Vista to a node.

⚠ WARNING

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Each control object in your user diagram is configured to perform a single function. When you click a control object, it performs the specified function. For example, you could click a control object to clear an energy accumulator, toggle a relay, reset a counter, or adjust the value of an analog output device.

The default appearance of a control object depends on the function it has been configured to perform:


Boolean


Pulse

Numeric

Regardless of their appearance, all control objects are used the same way—to use a control object, click it.

NOTE: For information on configuring the message, appearance and access level of control objects, see Customizing the action for a control object and Customizing the display of a control object.

When you click on a control object, one of the following happens, depending on how the control object is configured:

- Vista performs the specified action immediately.
- Vista displays a confirmation message. Click **Yes** to proceed or **No** to cancel the operation.
- Vista requests a password. Type the logon password then click **OK** to proceed.

Depending on the function, a dialog prompting for the meter password may also open. If so, type the meter password then click **OK** to proceed.

NOTE: There can be a time delay until Vista displays a new control value or state after it has been written to the device.

Plotting logged data

This section describes how to use and customize the Log View Plotter to view logged data in a graphical representation. Use the Log View Plotter to graphically show trends in numeric data, display logged waveforms, display phasor diagrams, and perform harmonics analysis on waveform data. You can also plot Sag/Swell voltage disturbances and compare them to industry standard voltage tolerance curves (such as the CBEMA/ITIC curve).

TIP: You can copy information displayed by Vista Log Viewers to the Windows Clipboard and paste it into other Windows applications.

Plotting logged data

NOTE: To plot high speed transient waveforms, use the Web Applications waveform viewer in Diagrams or Alarms. High speed transient waveforms cannot be displayed correctly in Vista.

1. Select data from a data log viewer:
   - To graph trends for all parameters over a particular time span, select a group of rows.
   - To graph a trend for a specific parameter using all available records, select an entire column.
   - To graph multiple parameters over a specific time span, select the first cell in the desired range and drag to highlight to the last cell of the range.
2. Select **Edit > Plot Selected Data** or click .

   Vistaplots the data and displays it in the Log View Plotter window.

The Log View Plotter interface

The Log View Plotter is a Vista window that graphically displays selected data.

The default display is the Plot Display tab. Depending on the type of data selected, the Log View Plotter may also offer a Harmonics Analysis tab and a Phasor Diagram tab.

In all cases, the Log View Plotter offers additional information in two floating boxes: the Legend and the Calculations window.

The Legend

Each line or bar in the graph is represented by a pattern of the same color in the legend.

TIP: Click on the curve sample in the legend to select its equivalent in the graph.

Displaying the Legend

1. Right-click the background of the Log View Plotter window.
2. Select **Graph Options** in the menu to open the **Graph Options** dialog.
3. Select the **Show legend** check box then click **OK**.

The Calculations window

The Log View Plotter calculates several values for every line or bar in the graph. You can view the results of these calculations in the Calculations window.

The Calculations window updates automatically, displaying a range of calculated values based on the currently selected parameter. By default, all values displayed in the Calculations window are calculated from the first parameter. To view the calculations for a different parameter, select the line or bar you want.

For example, to view the calculations for a curve on the Plot Display tab, click on the curve line in the graph or on its line pattern in the legend. When you click a different tab, the Calculations window displays the values relevant to that tab.

Displaying the Calculations Window

1. Right-click the background of the Log View Plotter window.
2. Select **Graph Options** from the menu to open the **Graph Options** dialog.
3. Select the Show calculations check box then click **OK**.

Changing graph options

When using the Log View Plotter, you can adjust the graph options to change the title of a graph or the way data is displayed.

1. Right-click the graph background then select Graph Options. The **Graph Options** box appears.
   - Type a name for the graph in the **Title** box. This name appears in the title bar of the Log View Plotter window. The default is Log View Plotter.
   - Select or clear the **Show legend** and **Show calculations** check boxes to show or hide the legend and Calculations window.
   - Select the **Align triggers** check box to align the trigger times of all waveforms in the graph. (When multiple waveforms are plotted, their trigger times may not always be correlated.)
   - Select **Separate curves vertically** to display each curve separately.

   NOTE: See Calculating Harmonics using more than one cycle for more information on the System Frequency and # of cycles for harmonics options.

2. Click **OK** to save your changes.

Displaying curve data in a table

After you plot data in the Log View Plotter, you can select a curve and display its data points in a table. This option is only available on the **Plot Display** and **Harmonic Analysis** tabs.

1. Right-click the curve line in the **Plot Display** or **Harmonic Analysis** tab and select **Data** from the menu.
   - **Plot Display** tab: The data points are displayed. The X column lists the x-axis coordinates and the Y column lists the y-axis coordinates. The first column (#) assigns a number to each set of points.
   - **Harmonic Analysis** tab: A window appears listing each harmonic number and the magnitude of each harmonic for each parameter. The first column numbers the rows. The X column lists the harmonics number and the Y1, Y2, Y3, etc., columns list the harmonic values for each bar in the harmonics histogram. Rows where the X value is not an integer (i.e., .5, 1.5, 2.25) contain sub-harmonic values.
2. Click **Format** to change the number of significant digits displayed in the X and Y columns or to change the width of these columns.
   - Width defines the number of characters the column can display.
   - Precision defines the number of significant digits displayed.
3. Click **Copy** to copy columns to the clipboard. This allows you paste a copy of the data into another application, such as a spreadsheet program or a text file.

NOTE: The Log View Plotter can only display one data table at a time. If you want to display tabular data for another curve (from the same graph or a different one), you must first close any open data window.

Viewing the Plot Display tab

The **Plot Display** tab depicts the specified parameters as curves against a graph.

Each parameter is plotted in a different color. The legend identifies the color of each curve in the selection and what it represents. Click on a curve to select it or right-click it to display additional options. The timestamp at the top of the tab identifies the first point in the selected curve.

The vertical axis (y-axis) represents the specified range; the horizontal axis (x-axis) represents time. Vista automatically adjusts the scale of the y-axis and x-axis to accommodate the largest parameter(s) in the selection. Right-click either axis to change the scale of its properties; right-click the axis numbers to change their format.

The time unit indicator in the lower right corner identifies the time scale of the x-axis (for example, “h” indicates an hourly scale). Possible time scale units include months, days, hours, minutes, and seconds.

Zooming in on the Plot Display tab

To zoom in on the **Plot Display** tab, click on the Zoom button then drag a selection box around the area you want to view. To view the entire plot, click the Restore to 100% button .

Calculations window parameters for the Plot Display tab

The Calculations window updates automatically, displaying the following values for the currently selected curve:

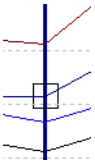
Value Label	Description
Cursor 1	The timestamp and the y-value of the selected curve at Cursor 1.
Cursor 2	The timestamp and the y-value of the selected curve at Cursor 2.
Delta C	The time difference between Cursor 1 and Cursor 2, and the difference between the y-values at Cursor 1 and at Cursor 2.
Min	The minimum value of the selected curve between the two cursors.
Max	The maximum value of the selected curve between the two cursors.
dpeak	The maximum peak-to-peak value of the selected curve between the two cursors (Max-Min).
Avg[1]	The average value of the selected curve between the two cursors.
RMS[1]	The root-mean-square value of the selected curve between the two cursors.
Int(H)[1]	The integration of the selected curve between the two cursors with respect to time in hours (for example, if the curve is in kW, the information is displayed in kWh.)

[1] The last three values (Avg, RMS, INT(H)) on the Calculations window are only available on plots where the x-axis represents time. They are not offered on other types of plots (for example, CBEMA plots).

Both numeric data and waveform data can be plotted in the same graph. On waveform plots, the trigger time is represented by a red vertical line.

Using the cursor lines

There are vertical cursor lines at either end of the curves in the Log View Plotter. These cursor lines define the start and end points used by the Calculations window. By default, Cursor 1 is located on the leftmost point of the selected curve and Cursor 2 on the rightmost point.



To define a new start point, drag Cursor 1 along the curve to the new start point. Repeat this procedure with Cursor 2 to define a new end point. You can also use the arrow keys to move the active cursor left or right. The active cursor is identified by a small box that appears where the cursor line meets the curve. Use the TAB key to switch the active cursor between Cursor 1 and Cursor 2.

As the cursor line moves from point to point along the curve, the information in the Calculations window is updated. You cannot drag Cursor 1 past Cursor 2 or vice versa.

De-indexing parameters and specifying Y-offsets

If you are plotting multiple parameters with different magnitudes, the lower magnitude values may be difficult to see in the default graph. Vista allows you to index any parameter to a different axis that can be scaled and offset independently from the other axes.

The new axis automatically assumes a scale appropriate for the selected parameter. In this way, you can plot parameters of different magnitudes on the same graph (such as voltage and current).

De-indexing a parameter or offsetting a parameter on the Y-axis

1. Right-click the graph background to display the menu. In the last section of the menu, highlight the curve you want to change.

   The curve's sub-menu appears. (You can also access the sub-menu directly by right-clicking on the parameter curve or on its curve sample in the legend.)

2. Select **Options** from the sub-menu to open the **Curve Option** dialog.
3. Choose one of the four axis options for the selected parameter. The axis is indicated by the location of the tick marks.

   Specify a Y-offset if required. This shifts the selected parameter up the y-axis (or down for a negative number) by the amount you specify.

4. Click **OK**. A new axis appears with a default title and a scale appropriate for the selected parameter.

   The scale of the default axis can also be adjusted to accommodate the remaining curves. A parameter has an asterisk after it in the legend if it has been offset.

Repeat these steps for each parameter that you want to de-index from the default axis. You can assign more than one parameter to an axis and the scale adjusts accordingly to incorporate each new parameter. For example, if you have plotted three voltage parameters and three current parameters, you can select the current curves and assign each of them to another common axis, leaving the three voltage curves to share the default axis.

Displaying Power Factor data

If you have plotted power factor data (from historical logs) in the Log View Plotter, you can improve the display to avoid discontinuity by setting the vertical axis to Power Factor Display (-100,+100).

Setting any vertical axis for Power Factor display

1. Right-click the vertical axis or right-click the graph background and select the axis after you have plotted the power factor data.
2. Select Power Factor Display from the menu. A check mark appears beside the option to indicate that it is selected.

You can plot other non-power factor data on the same graph; however, you should not plot the new data on the same axis as the power factor data. De-index the new data on a separate axis as described in De-indexing a parameter or offsetting a parameter on the Y-axis.

Viewing the Harmonics Analysis tab

If any of the parameters you have plotted is a waveform, you can display a histogram of the signal's harmonic content by selecting the Harmonics tab on the Log View Plotter window. The resulting histogram shows the harmonics for all waveforms in the plot.

NOTE: The cycle used is the first full cycle to the right of Cursor 1on the Plot Display tab.

The total harmonic distortion (THD), K-factor and Crest factor values for this waveform are displayed in the Calculations window.

To view the calculations for another parameter, click on it in the graph or on its curve sample in the legend. The Calculations window updates automatically. The currently selected parameter is indicated above the calculations.

Calculating Harmonics using more than one cycle

By default, the harmonics are calculated using one cycle. You can increase the number of cycles by any power of two cycles (i.e., 2, 4, 8, 16, 32 or 64) up to the maximum number of cycles available for the waveform.

1. Right-click the background of the graph area then select **Graph Options** to open the **Graph Options** dialog.
2. Select the number of cycles over which harmonics calculations are to be performed from the “# of cycles for harmonics” list.
3. Select the appropriate frequency in the “System Frequency” box, if the waveform you are analyzing came from a system with a frequency other than 50Hz or 60Hz. (For example, if the waveform was captured from a 400 Hz system using a 3710 ACM, specify “400Hz” in this box.)

NOTE: The Harmonics Analysis tab is only available for waveform records. Vista does not perform a harmonics analysis for trend data or for waveforms with less than eight samples per cycle. You cannot display the harmonics of more than 16 parameters at a time.

Viewing the Phasor Diagram tab

If you have plotted waveforms for all three voltages and/or currents of your system, you can view this information as a phasor diagram. The phasor diagram graphically displays the three phases (voltages and/or currents), showing their relative magnitudes and angles.

You can use a phasor diagram to evaluate important aspects of your power system such as voltage balance, per-phase loading, and type of load (or generator operating mode). A phasor diagram also provides a way to identify PT or CT wiring problems.

NOTE: The timestamp at the top of the Phasor Diagram tab is based on the time of Cursor 1 on the Plot Display tab.

To display a phasor diagram, select the Phasor Diagram tab from the Log View Plotter window.

The Phasor Diagram and calculations are derived from a one-cycle window starting at Cursor 1 on the Plot Display tab. The magnitude and angle of the selected phase is displayed in the Calculations window.

NOTE: The Log View Plotter conforms to the convention where all phasors are plotted with respect to V1 (always at 0°) and rotate in a positive counter-clockwise direction. On a balanced power system, all three phases should appear 120 degrees apart.

To edit a phasor displayed on a phasor diagram, right-click a parameter in the legend to display a menu where you can change the phasor's color or delete the phasor from the diagram.

Symmetrical components

The Log View Plotter calculates the symmetrical components of your power system — the positive, negative, and zero sequences relative to the first phase — for the cycle selected. If you have plotted waveforms for three voltages and/or currents, you can access their symmetrical component calculations. To produce correct symmetrical components, the waveforms must have been plotted in the correct order (for example, V1, V2, V3 — not V1, V3, V2).

The analysis of an unbalanced system, such as determining the effects of a system fault, is made simpler by using symmetrical components. Symmetrical components are a mathematical tool that allows any system of three unbalanced phasors to be represented by three balanced phasor systems. The total current or voltage in any phase wire is expressed as the sum of three balanced, three-phase components.

Positive Sequence Components (1) - these consist of three phasors that are equal in magnitude and displaced from each other by 120º and have the same phase sequence as the original phasors.

Negative Sequence Components (2) - these consist of three phasors that are equal in magnitude and displaced from each other by 120º and have the phase sequence opposite to that of the original phasors.

Zero Sequence Components (0) - these consist of three phasors that are equal in magnitude and with zero phase displacement from each other.

If the original phasors of voltages are Va, Vb, and Vc, then the symmetrical components would be as follows:

Va = Va1 + Va2 + Va0

Vb = Vb1 + Vb2 + Vb0

Vc = Vc1 + Vc2 + Vc0

The symmetrical components function, as implemented inside some ION meters, is useful for steady state analysis (unbalance), since the parameters are updated every second. However, when determining the symmetrical components during a fault, per-cycle analysis is required. For this application, you do not need real-time updates from the meter, because you are only interested in the relatively short time before, during, and after a system fault. This information is contained in the waveforms recorded when triggered by a disturbance.

Viewing symmetrical components

1. From a waveform Data Log Viewer (such as Waveforms/Sequence of Events), select all three phases of a fault (voltage or current).
2. Select **Edit > Plot Selected Data**.
3. Drag the Cursor and move it to the location of the fault.

4. Click on the **Phasor Diagram** tab to view the Symmetrical Components in the Calculations window.

Plotting waveforms from devices with high sampling rates

Waveforms from devices with high sampling rates can be quite large. These large waveforms are split into a series of smaller waveforms when displayed in the data log. To plot all the sections of the waveform in Vista, you must select all the rows that relate to the waveform before you click the Plot button. All the rows related to the one waveform have the same timestamp.

When the waveform is displayed, you may need to zoom in to view the area of the waveform you are interested in. To zoom in, drag a selection box around the area you are interested in.

NOTE: To plot high speed transient waveforms, use the Web Applications waveform viewer in Diagrams or Alarms. High speed transient waveforms cannot be displayed correctly in Vista.

Adding parameters to a Log View Plotter

After you have created a graph and the Log View Plotter window is visible, you can add additional parameters to the graph by copying and pasting them into the graph. These parameters can be copied from the same data log viewer, a different data log viewer, or from a different Windows application such as Microsoft Excel. The x and y-axes are automatically re-scaled to accommodate the new parameters.

When adding waveforms to the log view plotter, you can correlate all of their trigger times. See Overlaying curves in the Log View Plotter for more information.

Adding data from a Data Log Viewer

You can add additional parameters from any data log viewer configured to provide compatible time-based data. Any added parameter is plotted using the same x-axis used by the existing curves. To avoid confusion ensure that the column you selected for your x-axis in the data log viewer (from which you are adding data) contains the same parameter (typically a timestamp) as the original data log viewer.

Adding additional parameters from a Data Log Viewer

1. Select the range of cells you want to plot. Ensure that it contains the same type of information (timestamps) as the data already being plotted.
2. Select **Edit > Copy**.
3. Click on the title bar of the existing Log View Plotter window then select **Edit > Paste**. The parameters you selected are added to the graph.

If you want to plot waveforms on the same graph as historical data, the historical data should originate from high-speed data recorders and span a short time range, typically a few waveform cycles (<1 second).

Adding events from an Event Log Viewer

You can add events to a waveform or trend plot. This is useful for comparing abnormalities of the waveform or trend shape with any corresponding events that happened in the same time period.

1. Select the row(s) you want to add in the Event Log Viewer.
2. Select **Edit > Copy**.
3. Click on the title bar of the existing Log View Plotter window then select **Edit > Paste**. The copied event records are added to the graph.

Each event is represented in the Log View Plotter as a diamond symbol. A diamond symbol is added to the legend and diamond symbols appear at the appropriate areas along the top of the diagram.

Point to a diamond symbol to display a description of the event in the status bar at the bottom of the screen.

Adding data from a spreadsheet or text file

You can select data from a spreadsheet or text file and paste it into an existing graph. This is useful if you want to compare trends from different times, waveforms showing different system events, and other analysis applications.

Ensure that the first column of data in the spreadsheet or text file is the same type as the first column in the data log viewer from which the log plot originated. In particular, for timestamps, make sure the entire timestamp is contained in a single column and that it uses the same date and time format as defined in the Windows Control Panel. If the date portion of the timestamp is in one column and the time is in another, or if the format is different in any way, the data cannot be pasted into the Log View Plotter.

When you paste data into a graph, from both spreadsheets and text files, the Log View Plotter interprets the first row of data in the selection as a heading. The first row in your selection is used to label the parameter in the legend. So, if the first row is not already used for column headings, insert a row and type in the label you want to appear in the Log View Plotter.

To copy data from a text file, the text file must be formatted correctly. Each column in the text file must be separated by a tab and there must be a hard return at the end of each row.

Adding data to a graph from a spreadsheet or text file

1. Open the spreadsheet or text file.
2. Copy the range of values you want to plot, including the first column and the first row. Include other columns in your selection, if required.
3. Click on the title bar of the Log View Plotter window then select **Edit > Paste**.

   The parameters you copied and pasted are added to the graph. The axis scales are adjusted automatically to include the new data.

You can define a trigger for waveform records containing timestamps when you copy records from other applications. Simply add an exclamation mark to the end of the timestamp to indicate that it is the trigger time. For example, the exclamation mark at the end of 22/05/2015@02:00:41.035 PM! indicates that the trigger occurred at this time.

Customizing the Log View Plotter display

Many display attributes for each curve can be adjusted. In most cases, if you right-click an area of the graph, either a menu or a dialog opens with configuration options. Unless otherwise noted, the options you specify for the Log View Plotter window are saved and restored every time you plot data from the original data log viewer. If you plot data from a different data log viewer, its graph has its own optional settings.

Customizing an axis

After you have plotted data in the Log View Plotter, use the following instructions customize the axis or gridlines, change an axis label's format or add an axis title, or change the font or color used on all axes. You can also change the scale of an axis.

Configuring an axis

1. Right-click the graph background to display the menu. Highlight the axis from the menu to reveal the sub-menu. You can also right-click the axis to access the sub-menu directly.
2. Select **Axis Properties** from the sub-menu to open a dialog with the following options.
   - **Range**: Make changes in the **From** and **To** boxes to adjust the axis range.
   - **Ticks**: Make changes in the **Major every** and **Sub-divided by** boxes to adjust the frequency of major and minor ticks respectively.
   - **Grid**: Select or clear the **Major** and **Minor** check boxes to turn graph gridlines on or off. Click the **Style** buttons to change to the line style or width of major and minor gridlines.
   - **Logarithmic scale**: Select this check box to enable the logarithmic scale option.
   - **Line**: Click this button to display the **Line Parameters** dialog and change the line style or the width of the axis.
3. Click **OK** to save your changes.

NOTE: The axis range and the frequency of the major ticks are not stored in the diagram but are recalculated for every new plot.

Changing the color of an axis or the gridlines

1. Right-click the graph background to display the menu. Highlight the axis from the menu to reveal the sub-menu. You can also right-click the axis to access the sub-menu directly.
2. Select **Axis Color**, **Major Grid Color**, or **Minor Grid Color** from the sub-menu to open the **Color** dialog.
3. Select the color you want or click **Define Custom Colors** for more options.
4. Click **OK** to save your changes.

   The axis or the major or minor gridlines change to the color you selected.

Changing the format of the axis labels or adding an axis title

1. Right-click the graph background to display the menu. Highlight the axis from the menu to reveal the sub-menu. You can also right-click the axis labels to access the sub-menu directly.
2. Select **Axis Labels** from the sub-menu to open the **Axis Labels** dialog.
3. Select the format in which you want the axis labels to appear.

   Decimal is used by default (for example, .01, .02, .03) but if the labels are too large or too small, select Scientific (1.0 x 10-2, 2.0 x 10-2, 3.0 x 10-2...) or Engineering (1m, 2m, 3m...).
4. Determine the axis title: select None to have no axis title or Text to enter your own title.

   For time-based plots, the default x-axis title is “s” if the timestamps of the data spans a number of seconds, “mn” for minutes, “h” for hours, “d” for days, “m” for months. (This applies to the Plot Display tab only.)

   For non time-based plots (CBEMA or harmonics), you can change the title. Select Text and type the title in the edit box. The title must be nine characters or less.
5. Click **OK** to save your changes.

NOTE: If the first column of the source data includes a space or @ sign, the Log View Plotter assumes time on the horizontal axis and automatically determines the units based on timestamp information. The axis title is updated whenever the window is updated.

Changing the font used on all axes

1. Right-click anywhere in the graph background and select **Graph Font** to open the **Font** dialog.
2. Specify the font, style, size, effects and color options that you want to use for the axes labels.
3. Click **OK** to save your changes.

Customizing curve style

When displaying multiple parameters, Vista distinguishes between parameters using color. Each parameter is listed in the graph legend accompanied by a sample of its associated curve. The color of a curve can be changed after you have plotted data in the Log View Plotter.

If color is not enough to distinguish one curve from another—for example, if you plan to print the graph on a black and white printer—you can change the curve style after you have plotted data in the Log View Plotter.

By default:

- Each curve is shown by a thin line that connects each point of data. You can customize the style of each curve independently and show or hide the coordinates of each data point.
- Harmonics are displayed in a bar graph. You can distinguish between parameters by customizing the display style of each parameter. Display options include bar type, hatching, width and color.

Use the following instructions to customize curve styles, bar styles, and curve colors.

Changing the style of a curve on the Plot Display tab

1. Right-click the graph background to display the menu. Highlight the curve from the menu to reveal the sub-menu. You can also right-click the parameter curve in the diagram or its entry in the legend to access the sub-menu directly.
2. Select **Curve Properties** from the sub-menu to open the **Curve Style** dialog.
   - Select the type of curve you want from the Type list. Vista offers seven curve types: a simple line, a line with symbols, a scatter plot of markers, horizontal or vertical bars, or 3-D horizontal or vertical bars.
   - Select **Spline** (available for Line or Line + Symbol types) if you want the line that connects each point to be a smooth curve. If you leave it cleared, each pair of points is connected by a straight line.
   - Select **Fill Area** (available for Line type) to fill the area under the curve with the line color. Clear the check box to leave the area under the curve transparent.
   - The **Marker** section is available for Line + Symbol and Scattered types of lines. Specify the shape, size, and style of the marker used for the points. The Style options apply only to geometric shapes (for example, circles, boxes, diamonds, etc.).
   - For any line type, click **Line** to change the width and the style (for example, solid, dotted, dashed, etc.) of the line. For bar graph types, a dialog opens where you can specify the hatching pattern and the width of the bars.
3. Click **OK** to save your changes.

Changing the bar style for the Harmonics Analysis tab

1. Right-click the bar (or on its curve sample in the legend) and select **Curve Properties** to open the **Bar Graph Configuration** dialog.
2. Select the type of bar to use from the Type list. This selection is applied to all bars in the graph. Three bar styles are available:
   - **Group Bars**: Shows bars side-by-side
   - **Deep Bars**: Shows bars one behind the other
   - **Stacked Bars**: Shows bars stacked one on top of the other vertically
3. Select a hatching style for the selected bar from the Hatching list. This selection is applied to the currently selected bar only.
4. Set how wide you want each bar to be in the Width text box. The specified width is applied to all bars in the graph. The default depends upon the number of parameters.
5. Click **OK** to save your changes.

Changing the color of a curve

1. Right-click the graph background to display the menu. Highlight the curve from the menu to reveal the sub-menu. You can also right-click the curve in the diagram or its entry in the legend to access the sub-menu directly.

2. Select **Curve Color** from the sub-menu to open the **Color** dialog.
3. Select the color you want or click **Define Custom Colors** for more options.
4. Click **OK**. The curve changes to the color you selected.

Customizing graph and legend options

After you have plotted data in the Log View Plotter, you can change the color of the graphing area (and the legend) and define a font for the legend.

Changing the color of the graphing area

1. Right-click anywhere in the graph background and select **Background Color** to open the **Color** dialog.
2. Select the color you want or click **Define Custom Colors** for more options.
3. Click **OK**. The graphing area changes to the specified color.

Changing the font used in the legend

1. Right-click the background of the legend to open the **Font** dialog.
2. Specify the font, style, size, effects, and color options that you want to use for the legend text.
3. Click **OK** to save your changes.

Removing graph parameters

After you have plotted data in the Log View Plotter, you can remove a parameter from the graph.

1. Right-click the graph background to display the menu. Highlight the curve you want to remove from the menu to reveal the sub-menu. You can also right-click the curve in the diagram or its entry in the legend to access the sub-menu directly by right-clicking on the curve.
2. Select **Delete Curve** from the sub-menu. The curve is deleted without further prompting.

Overlaying curves in the Log View Plotter

After you plot data in the Log View Plotter, you can overlay a curve onto your graph to help analyze sag/swell data. This applies to devices that measure disturbances in voltage and store the magnitude and duration of these disturbances. When these values are inserted into the ION_Data database, they provide a series of coordinates that can be plotted on a voltage tolerance curve. A voltage tolerance curve is often used to categorize the severity of a voltage disturbance.

NOTE: Most Vista queries are plotted against timestamps (with the timestamp as the x-axis); however, any query that uses the ION Sag/Swell module must be plotted against duration. When plotting sag/swell data, select Duration as the X-parameter of the Log View Plotter.

Vista provides common curves or voltage tolerance envelopes that can be used as overlays in the Log View Plotter:

- **CBEMA/ITIC**: These curves (for CBEMA, described by the IEEE standard 446-1987, and for ITIC, described by the IEEE 1100-1999 standard) define an upper and a lower bound on the types of disturbances that electrical equipment is likely to tolerate. It plots disturbance magnitude against disturbance duration and indicates at what points a voltage disturbance is

likely to disrupt or damage equipment. Points near or outside the voltage tolerance envelope indicate events that could interrupt or damage electrical equipment.

- **SEMI F47-0200**: This specification defines the voltage sag tolerance capability required for semiconductor processing equipment, though it is now used by other industries. According to the specification, equipment must tolerate sags to 50% of nominal voltage for up to 200 milliseconds, sags to 70% of nominal voltage for up to 0.5 seconds, and sags to 80% of nominal voltage for up to 1 second. Points above the voltage tolerance curve indicate disturbances that exceed these specifications.

Overlaying curves on plotted data

To overlay one of the provided curves, you need a data log viewer that contains the magnitude and duration values for the sag/swell disturbances. The Duration column must be set as the X-parameter for the Log View Plotter—it appears in blue in the data log viewer table (See X-parameter for Log View Plotter for more information on setting the X-parameter for Data Log Viewers). The Magnitude values can be in any one of the other columns.

1. In the Data Log Viewer, select a range of cells to be plotted.
2. Select **Edit > Plot Selected Data**. The Log View Plotter window appears with Duration as the x-axis and Magnitude as the y-axis.
3. Right-click the graph and select **Overlay Curve** from the menu to open the **Overlay Curve** dialog.
4. Select the text file containing the curve data that you want to overlay (from the ...\Power Monitoring Expert\config\lvp directory).
5. Click **Open**. The selected curve appears in the graph.

   You can review each point in your data and see where it falls in relation to the curve.

NOTE: This process automatically changes your x-axis scale to logarithmic.

Creating and customizing a user diagram

The following sections describe:

- How to customize an existing user diagram by customizing the appearance and function of a diagram object or diagram window.
- How to create a new user diagram.
- The various types of diagram objects and how to use each type to add function to your user diagram.

NOTE: You must have the appropriate security clearance to edit or create a user diagram. To determine if you can edit a diagram, select **Options > Show Toolbox**. If you can select this option, then you can edit a diagram. Consult your network administrator if you need to change your access privileges.

NOTE: Any changes you make to a default diagram affect all other devices using the same diagram.

Creating a new user diagram

To create a new user diagram, login to Vista and select **File > New**. A new (blank) user diagram appears. You can only create a new user diagram if you have supervisor-level access.

To automatically generate a network diagram based on devices added using Management Console, see Generating a network diagram.

Saving a user diagram

To save changes you made to a user diagram:

1. Select **File > Save** to save a new or existing user diagram, or **File > Save As** to open the **Save New Diagram** dialog.
2. Type a name for the diagram in the **File name** field and click **Save**.

By default, Vista points to the root of the \ud directory when you attempt to save a new diagram. If required, you can create a new folder within that directory to store your customized diagrams, rather than storing them in the \ud folder.

NOTE: This \ud directory should be located on a networked drive where it can provide multiple users with access to saved user diagrams.

NOTE: You should notify users of the Diagrams application in the Web Applications component of the location of the new custom network diagram if they want to use it instead of the automatically generated diagram. Users of the Diagrams application need to update the registry settings on their computer to specify the location of the new custom network diagram. See "Custom network diagram setup" in the Diagrams section of the Web Applications online help.

Editing a user diagram

To edit a user diagram, the Diagram Objects toolbox must be displayed. To open the toolbox, select **Options > Show Toolbox**. If the **Show Toolbox** option is grayed out, your user account does not have sufficient access; contact your system administrator.

The Enable Undo option

The Enable Undo option enables or disables the undo feature in Vista. With this option active, you are allowed to undo or “step backward” up to three times. This feature is enabled by default. If you disable the undo feature, you lose the ability to undo any previous changes. You cannot enable the feature and undo changes made prior to enabling the feature. A check mark appears beside Enable Undo in the Options menu when this option is selected.

NOTE: The **Show Toolbox** option must be selected for the **Enable Undo** option to become active — it remains unselectable otherwise.

Adding a diagram object to a user diagram

You can add a new diagram object to a user diagram by dragging it from the Diagram Objects toolbox.

Types of diagram objects

Diagram objects provide the interface to ION registers in your network. Each diagram object performs a single function. For example, a single numeric object placed in a user diagram displays numeric data from a single source. There are seven types of diagram objects available on the Diagram Objects toolbox:

Grouping Object:

Group a number of related objects within a separate grouping window. Click on a grouping object to open the grouping window and display its contents.

Text Box:

Display independent headings, titles, and comments in a user diagram.

Numeric Object:

Display real-time numeric values such as Volts, Amps or kW.

Status Object:

Display Boolean data (On/Off, Yes/No, 1/0, etc.) or device-dependent conditions to indicate the status of a digital output (relay), digital input (status input) or setpoint. The image can be customized and it can be configured to use animation.

Data Log Viewer:

Display data logs stored in the ION_Data database (including archives from previous versions of the product), show waveform data (waveform capture, waveform recorder) and trends (data recorders) using tables, and provide data for plotting.

Event Log Viewer:

Display event logs stored in the ION_Data database (including archives from previous versions of the product), show event records from devices and other components, and display alarms.

Control Object:

Send commands to a device on your network (for example, clear an energy accumulator, toggle a relay, reset a counter, or adjust the value of an analog output device).

To add a function to a user diagram, choose the type of diagram object you want, drag it into the user diagram then link it to the appropriate register in a node. The following sections explain how to add and link a diagram object.

See Monitoring your system in Vista for more information on the function and basic use of each type of diagram object.

Adding a diagram object to a user diagram

1. Select **Options > Show Toolbox** if the toolbox is not displayed. The toolbox appears in the workspace.
2. Click on the diagram object you want and drag it from the toolbox to the diagram.

   In most cases, the object appears in the window as the icon from the toolbox. However, there are two exceptions:

   - A **text box** appears in the window as a rectangular box that displays the default message: “Your text goes here.”

- A **numeric object** appears in the window as a rectangular box with a colon (:). This indicates that the object is not yet linked to a node.

The object is now ready to be linked to a real-time or logged data source. See Linking a diagram object to a data source for details on linking an object to a source.

NOTE: When a diagram object is placed in a window, it automatically uses the same node as the window. If you want to change this source, either relink each diagram object or change the default window link before placing the objects.

Cutting, copying, and pasting a diagram object

Use the Cut, Copy and Paste commands on the Edit menu to make a copy of a diagram object and paste it into another window or user diagram.

You can paste the copy as many times as you like to create multiple versions of an object. Each copy retains all of the attributes and linkage information of the original.

Cutting or copying a diagram object

1. Select the object(s).
2. Do one of the following:
   - To remove the original, select **Edit > Cut** then click **Yes** to confirm the deletion or **No** to cancel.
   - To retain the original, select **Edit > Copy**. The selection is copied to the Power Monitoring Expert clipboard.

NOTE: The Power Monitoring Expert clipboard is a temporary storage area that holds any information cut or copied from Vista. It should not be confused with the Microsoft Windows Clipboard.

After the object is copied to the clipboard, you can paste it into the active window.

Pasting a diagram object

1. Select the window you want to paste to.
2. Select **Edit > Paste**. The object appears in the active window.

Copying a group of diagram objects to a framework

A Vista framework is a template that you can use to record the layout of a group of diagram objects.

When you select **Edit > Copy to framework**, Vista saves the selection (including the type and location of each diagram object) as a file. You can then use the Paste from framework command to copy the group layout to another diagram or grouping window. This is useful for replicating a single configuration on multiple workstations. You can store a saved framework with its own filename and retrieve it anytime.

Copying a group of diagram objects to a framework

1. Select the group of objects you want to copy.
2. Select **Edit > Copy to framework** to open the **Copy to framework** dialog.
3. Type a name for the framework in the File name box then click **Save**. The framework file extension (.fwu) is added automatically.

   The selection is saved as a framework.

After you save a group of objects as a framework, you can paste it to another window.

Pasting a group of diagram objects from a framework

1. Select the window you want to paste to.
2. Select **Edit > Paste from framework** to open the **Paste from framework** dialog.
3. Navigate to the framework you want to paste and click **Open**. The framework selection appears in the active window.

Adjusting diagram object layout and size

This section describes how to move, align and resize diagram objects.

Moving diagram objects

You can move a single diagram object or a group of diagram objects within a single window or from one window to another.

1. Select the object(s) you want to move.
2. Drag the selected object(s) to the new location.

You can also use the arrow keys on the keyboard to move the selected diagram object(s) one space at a time.

When diagram objects overlap, use the Send to Back command to place one object beneath the others. Select the object then select Edit > Send to Back (or press CTRL+K).

Resizing a single diagram object

You can adjust the size of a diagram object to make it larger or smaller or you can stretch it horizontally or vertically to change its shape.

1. Click on the diagram object to select it.
2. Do one of the following:
   - To make the object larger or smaller, drag a corner handle.
   - To stretch the object horizontally or vertically, drag a middle handle.

Resizing a diagram objects to a standard size

The **Size** tab in the Layout dialog lets you automatically resize a diagram object or group of diagram objects to a set of standard dimensions.

1. Select the diagram objects you want to resize.
2. Select **Edit > Layout** or click  to open the **Layout** dialog.

3. Select the **Size** tab.
4. Edit the horizontal and vertical dimensions of the object(s) as required.
   - Select **No change** to make no changes to that dimension.
   - Select **Shrink to smallest** or **Grow to largest** to adjust the width and/or height to match that of the smallest or largest object in the selected group.
   - Select **Pixels** to enter the exact width or height in pixels.

   You can also combine horizontal and vertical options on a single selection. For example, if you select Shrink to Smallest in the Horizontal section and 30 pixels in the Vertical section, the entire selection is resized to the width of the shortest object and the specified height of 30 pixels.
5. Click **OK** to save your changes.

Aligning diagram objects relative to each other

The **Align** tab of the Layout dialog lets you specify the horizontal and vertical arrangement of the selected objects.

1. Select the diagram objects that you want to align.
2. Select **Edit > Layout** or click to open the **Layout** dialog.
3. Select the **Align** tab to specify the horizontal and vertical alignment of the object(s).

   The options in the Horizontal and Vertical areas determine the criteria by which you can align diagram objects. For example, if you select **Left sides** under Horizontal and **Space evenly** under Vertical, Vista aligns all objects in the selection by their left sides (using the leftmost object for reference) and distributes them evenly along a vertical axis.
4. Select the options you want then click **OK**.

Aligning diagram objects on a grid

The **Grid** tab of the Layout dialog lets you activate and configure an invisible grid. Objects placed onto the grid snap to the nearest gridline to help align and space them evenly.

To activate or deactivate the grid:

1. Select **Edit > Layout** or click to open the **Layout** dialog.
2. Select the **Grid** tab.
3. Select one of the following options:
   - **No grid** turns the grid off.
   - **Grid size in pixels** activates the grid. Type a number in the “Grid size in pixels” box to specify the size of the grid (distance between grid lines).
4. Click **OK** to save your changes.

Customizing a diagram object

After you have placed and linked a diagram object, you can customize it. Right-click a diagram object in edit mode to display the configuration options available for that object type.

Customizing a diagram object

1. Right-click the diagram object to open the **<Object> Configuration** dialog (where <Object> is the type of diagram object selected).
2. Select the appropriate tab and make your changes. Repeat this step for the other tabs until you have made all your desired changes.
3. Click **OK** to save your changes to the diagram object.

The options available vary depending on the tab and the object selected. See the sections below for details on the options available for different tabs and objects.

The Preview pane

Use the Preview pane to view how your proposed changes will appear in the diagram.

For some tabs, you access dialog boxes by right-clicking on the image in the Preview pane (for example, the Display tab of a numeric object). More information is given in the relevant sections that follow.

Available configuration options

The following table lists the various configuration options available for each type of diagram object.

Available Option Tabs	Diagram Objects						
	Grouping Object	Text Box Object	Numeric Object	Status Object	Data Log Viewer	Event Log Viewer	Control Object
Caption	x		x	x	x	x	x
Text		x	x	x			x
Edit Text		x					
Link (or Node)[1]	x		x	x			x
Query Server[2]	x		x	x	x	x	x
Display	x		x	x			x
Action	x		x	x			x
Box		x	x				
Annunciation				x			
Query[3]					x	x	
Alarming						x	

[1] Node is the tab available with Grouping Objects.

[2] Query Server is only available on Grouping, Numeric,Status, and Control objects when the Action is set to something other than none.

[3] See Querying the database for information on configuring this option.

Caption options

To view caption options, right-click the object then select the **Caption** tab.

Use the **Caption** tab to add custom, user-defined text to a diagram object. The Caption tab is available for the following diagram objects: Grouping, Numeric, Status, Data Log Viewer, Event Log Viewer, and Control.

The Caption tab contains three sections: **Caption**, **Font**, and **Position**.

The **Caption** section determines whether a diagram object displays a textual comment along with the diagram object's icon. This section has three options:

- Select **None** to display no caption.
- Select **Use default** to display the default Vista caption (i.e., the device name or data source).
- Select **Use custom** to display the text that you type into the field provided.

The **Font** section allows you to change the font used in a caption. This section has two options:

- Select **Inherit from parent window** to use the default font.
- Select **Custom** to specify a custom font. Click **Font** to open the **Font** dialog and change the font, size, style or color.

The **Position** section has two options:

- Select **Top** to place the caption above the diagram object.
- Select **Bottom** to place the caption below the diagram object.

Text options

Some diagram objects have a text label integrated into the display. To edit the appearance of this label, use the options offered on the Text tab. The Text tab is available for the following diagram objects: Numeric, Status, Control, and Text.

NOTE: You can edit the text displayed in a text label. For a numeric, status or control object, use the **Label** section of the **Link** tab. For a text box object, use the **Edit Text** tab.

To view the Text options, right-click the object then select the **Text** tab. The **Text** tab has two sections: Font and Position.

The **Font** section has two options:

- Select **Inherit from parent window** to use the default font
- Select **Custom** to specify a custom font. Click **Font** to display the **Font** dialog and change the font, size, style or color.

The **Position** section has three options — **Left**, **Center** and **Right** — to define the alignment of the text in relation to the diagram object. Use the Preview area located beside the Text tab to view your proposed changes.

Edit Text options

To view the Edit Text options, right-click the object then select the **Edit Text** tab.

Use the **Edit Text** tab to specify a text message for the text box. The Edit Text tab is available on the text box object only.

The **Edit Text** tab has two options:

- **Use default** displays the window link information (i.e., the node).
- **Use custom** displays your custom text message.

If you select custom, use the text box to enter your text. The text box supports multiple lines of text. If your message appears incomplete or truncated after you enter text and click **OK**, you can adjust the dimensions of the text box object. To resize a text box, select it then drag its handles.

The font used in the text box is based on the default setting specified for the active window. Use the Text tab to specify a different font or position for the text box. Use the Box tab to specify a border style or change the background color.

Link options

To view the link options, right-click the object then select the **Link** tab.

Use the **Link** tab to link a diagram object to a real-time source, and to specify a new text label. The Link tab is available for the following diagram objects: Numeric, Status, and Control.

NOTE: To set a real-time source for a grouping object, use the Node tab.

The Link tab contains two sections: Link and Label.

Use the **Link** section to specify a real-time source for the diagram object. See Linking a numeric, status or control object for more information.

Use the **Label** section to change the object's text label. The Label section has three options:

- Select **None** to display no label.
- Select **Use node label** to display the node's register label. This is the default.
- Select **Custom** to display the label that you type into the text field provided. The custom labels you create are stored in the user diagram and are only available to users of your diagram.

TIP: If you have specified custom labels in your diagram, or custom labels have been applied to an ION meter at the device level, you can display the default labels at any time by selecting **Show Default Labels** from the **Options** menu. This displays the default label of the data source instead of the label assigned in the device or in the user diagram.

Query Server options

Use the Query Server tab to connect a diagram object to a Query Server. The Query Server tab is available on the Data Log Viewer and Event Log Viewer objects. See Linking a Data Log Viewer or Event Log Viewer for more information.

The Query Server tab is also available on grouping objects and any object configured to open a grouping window or user diagram. In this case, use the Query Server tab to specify a default Query Server for the associated grouping window or user diagram. See Query Server: setting a default Query Server for a window for more information.

Display options

Use the **Display** tab to customize the appearance of a diagram object. The Display tab is available for the following diagram objects: Numeric, Status, Control, and Grouping.

The Display tab offers a unique set of options for each type of diagram object. To view the display options, right-click the diagram object then select the Display tab.

Customizing the display of a numeric object

Numeric objects display real-time data in your user diagram. The default numeric object appears as a rectangular alphanumeric display with a single decimal place of resolution and no unit symbol. You can customize the display to change any of these default elements.

NOTE: Vistasupports a maximum of 59 non-alphanumeric numeric objects within a single window. To change the way numbers are displayed (thousands separator and decimal point), use the Regional Settings option of the Windows Control Panel. You can also use this option to customize the time and date styles. (The year/month/day format can be modified, and the clock can be changed from am/pm to 24 hour.)

Setting Display style

The **Display style** box lets you select a new style from the list of available choices. The following styles are available:

- Alphanumeric: Default style. General-use text display.
- Partial Dial: General use voltage, current, harmonic distortion, etc.
- Full Dial: power factor, bi-directional power flow, etc.
- Horizontal Bar: General use.
- Vertical Bar: General use.
- Scrolling Graph display: General use. Displays recent readings on a scrolling graph.
- Arc Meter Display: General use voltage, current, harmonic distortion, etc.
- Timestamped display: Displays the value, and the date and time the value was measured by the device. Useful for min./max. values.
- Timestamp Only: Same as timestamped, but does not display a value. Can be used as a clock.
- PC Timestamped Display: Displays the value, and the date and time the value was received by Vista.

Setting Units and Resolution

Use the **Units** box to type the unit name for the measured value (for example, “Volts” or “Amps”). This name is displayed on the numeric object.

In certain cases, the value is scaled. For example, if the unit name begins with K, M, or G (for example, kV or MVolts), the displayed value is adjusted accordingly. However, if the unit contains certain letters (i.e., kW or kVA), the scaling factor is reduced by 1,000 (for example, if the unit begins with K, the value is not scaled and M is scaled by 1,000). The reason for this is that most devices provide these values already scaled.

Use the **Resolution** box to specify the number of decimal places to be displayed for a numeric object. The default value is 1, but this can be increased to take advantage of any extra resolution available from the data source.

NOTE: Specifying higher resolution does not result in higher accuracy than the specified accuracy of the device.

Setting the Font options

Use the **Ticks Labels Font** section to define font options (such as style, size, and color) for the numeric object. This section has two options:

- Select **Inherit from parent window** to use the default style.
- Select **Custom** to specify a custom style, then click **Font** to open the **Font** dialog and make your changes.

Setting Flags

Use the **Flags** button to display the Normal Operating Range dialog. Use this dialog to set a Low Low Limit, Low Limit, High Limit, and High High Limit, and define a normal operating range to be displayed on the numeric object. After flags have been set, you can use them to quickly determine whether a reading is within the normal range you defined.

The effect of setting these limits depends on the display style you have specified. For example, on the Partial Dial, Full Dial, and Arc Meter displays, flags appear as colored ranges on the dial. On other types of numeric objects, the flag function changes the object's background color whenever a limit is exceeded.

To view or change the default colors, select **Options > Flag Colors**.

NOTE: The flags used in Vista are not linked to setpoints in ION meters. Setpoint activity is automatically logged by the Log Inserter. Setpoint status can be monitored using a status object and/or data log viewer.

Other display options for Vertical or Horizontal Bar graphs

In the Preview section of a vertical or horizontal bar graph Display tab:

- Right-click the axis labels to display the Axis Labels dialog. Select the Format (Decimal, Scientific, or Engineering) and determine the Axis Title (none or custom text).
- Right-click the axis tick marks to display the Vertical or Horizontal Axis dialog. Configure the Range, Ticks and Grid style. Select Logarithmic scale to enable the logarithmic scale option.

Other display options for Partial Dial, Full Dial and Arc Meter displays

To configure meter parameters on partial dial, full dial or arc meter displays, right-click anywhere in the Preview section of the Display tab.

Set the Range, Arc Position, Ticks, and dial Position. For full and partial dial displays, set the label position to inside or outside. Click Line Attributes to set the style and width of the dial.

Other display options for Scrolling graphs

In the Preview section of the Display tab:

- Right-click the vertical or horizontal axis tick marks to open the Vertical and Time Axis dialogs. Set the Range and Ticks, and (for the vertical axis) Grids Style.

- Right-click the vertical axis labels to display the Axis Labels dialog. Select the Format (Decimal, Scientific, or Engineering) and determine the Axis Title (none or custom text).
- Right-click the graph background to display the Scrolling Graph dialog where you can set the Sample Interval and Relative Reset.

  The sample interval determines the resolution of the X-axis in seconds. It should be set between one tenth and one hundredth of the X-axis range; for example, when extending the range to one hour (3600 seconds), the sample interval should be set to approximately 60 seconds.

  The relative reset is a percentage that determines the amount the scrolling graph shifts back upon filling the plotting area. (For example, a relative reset of 0.5 shifts back 50%; a relative reset of 0.99 scrolls the most smoothly.)

Customizing the display of a status object

Status objects display the status of Boolean “on/off” conditions in one of three ways: an indicator light, an alphanumeric field, or a custom image.

To view the display options of a status object, right-click the object then select the **Display** tab.

NOTE: To invert the default color scheme, select “Invert active state” from the Annunciation tab.

The Display tab has three options:

- Select **Default image** to display the default indicator light image, which changes color to indicate various conditions: by default, green indicates an OFF condition, red indicates an ON condition and gray indicates a status object that is not connected or is not receiving information. Device dependent multi conditions (HighHigh, High, Normal, Low, and LowLow) also use colors to indicate the various conditions.
- Select **Custom images** to use custom images for each condition. Custom images can show animation, customized buttons, and so on.

  For each item selected under **Condition** (ON, OFF, and Unconnected), click **Browse** to locate and select the image you want to associate with the condition. To hide the status object in a given state, leave the image field blank.

  Currently, the custom image option supports the following graphic file formats: BMP, animated GIF, transparent GIF and PNG, WMF (Windows Metafile), EMF, JPG, AVI (without audio and uncompressed or compressed using RLE8 compression).

  NOTE: GIF, JPG, and PNG images need to be in `\config\diagrams` under the product's installation location or they will not be shown in the Web-based Diagrams application.

  You can use three different files to represent the three display states (ON, OFF, and Unconnected) of a status object. Each of these files can also be of a different type (for example, BMP, GIF, and JPG), however you cannot mix AVI and animated GIF images within a status object.
- Select **Alphanumeric** to display the Boolean state or multi-condition state labels stored in the device and choose custom colors to visually indicate the corresponding states.

For example, suppose “Running” has been stored in a meter as the label for the Boolean register that stores the ON condition of a motor relay and “Stopped” for the OFF condition. You can show this register label together with the status label using the alphanumeric display style. You can override the meter labels on the Link tab.

Click **ON Color** and **OFF Color** to specify the colors associated with each condition.

You can also have multi conditions if you link the status object to an enumerated register instead of a boolean. You can do this for BCPM devices.

Customizing the display of a grouping object

The grouping object can be displayed as the default image, a custom image, or no image. You can customize the display to change any of these default elements.

To view the display options of a grouping object, right-click the object then select the **Display** tab.

The Display tab has three options:

- Select **Default image** to use the default image for a grouping object that appears in the toolbox.
- Select **Custom image** to display a custom image. Enter the filename of the image you want to use or click **Browse** to locate and select an image. The filename should include the file's extension (.bmp, .jpg, .png, .gif, .emf, .wmf, or .avi).
- Select **None** to hide the grouping object. With no image specified, the grouping object is transparent unless you select it (displaying the handles). If you move the mouse over a transparent object, the status line displays the size and object type (for example, “30x30:Grouping Object” in the status line means the hidden object is a grouping object and its size is 30 pixels by 30 pixels).

  Hiding a grouping object is especially effective when using a custom background image; you can integrate your transparent grouping objects into the image by placing them at the appropriate points on the drawing. Users can display site-specific information by double-clicking on the appropriate spot in the background. See Image: Displaying a background image for information on using a custom background.

Customizing the display of a control object

A control object appears differently depending on the type of register to which it is linked. This same criteria also determines the display options available.

To view the display options of a control object, right-click the object then select the **Display** tab.

The options available depend on the type of control object.

External Numeric

A control object that is linked to an External Numeric module appears as an alphanumeric display box. The Display tab has the following sections: Border and Background Color.

In the **Border** section, select Hide to show no border or select Show to display a border. If you select Show, you can specify the width in pixels and click Color to choose a color for the border.

In the **Background Color** section, select Transparent for no background or select Custom then click **Color** to define a color for the background.

External Pulse

A control object that is linked to an External Pulse module appears as a button icon, by default. The Display tab has three options: Default image, Custom image and None.

Select Default image to display the button icon. Select Custom image and click **Browse** to select a different image. Select None to show no image (the control object is hidden but still functions).

External Boolean

A control object that is linked to an External Boolean module appears as a switch icon, by default. The Display tab has two options: Default image or Custom images.

Select Default image to display the switch icon. Select Custom images then click **Browse** to define custom images for ON, OFF and Unconnected. To hide the control object for a given state, leave the appropriate box blank. Currently, the custom image option supports the following graphic file formats: BMP, JPG, PNG, GIF, EMF, WMF (Windows Metafile), and AVI (without audio and uncompressed or compressed using RLE8 compression).

Note that you cannot mix AVI and animated GIF images within a control object.

Action options

To view the action options, right-click the diagram object then select the **Action** tab.

Use the Action tab to specify the response of a diagram object when it is clicked (in Display mode) or double-clicked (in Edit mode).

The Action tab is available for the following diagram objects: Numeric, Status, Grouping, and Control objects. Depending on the type of diagram object, the Action tab displays one of two sets of options:

- Specify an action for a numeric, status, or grouping object
- Customize the action for a control object

Specifying an action for numeric, status, or grouping objects

NOTE: If you change the action for a grouping object that is already associated with a grouping window, the existing window (and any objects within it) is deleted. Vista displays a message before performing this action.

When you right-click a numeric, status, or grouping object, the **Action** tab displays the available options:

- Select **None** if you do not want the object to support an action. This is the default for numeric, status, and grouping objects.
- Select **Open Grouping Window** to open a grouping window when the object is clicked. You can use this grouping window to display additional information. For example, if a numeric object displays a total value (such as total kW), you can display specific information (such as kW readings for each phase) in an associated grouping window.
- The **Open Diagram for Meter Template** option is used by default each time a network diagram is generated. Each meter icon in the network diagram is set to open the default diagrams that match that meter's configuration.
- Select **Open User Diagram** to open a user diagram when the object is clicked. Type the full path and filename into the field provided or click **Browse** to locate the diagram you want. Using this action, you can choose a diagram object that displays a representative reading from an independent diagram and use it to open the other diagram when clicked.
- Select **Open File** to open a file when the object is clicked. Type the full path and filename into the field provided or click **Browse** to locate the file you want. The file can be a third-party program or some other document; if a document is specified, then the program associated with the file extension is launched and the specified document is loaded into the application.
- Select **Open Web Page** to open a specified webpage in your default web browser when the object is clicked. Type the entire address into the field provided.

NOTE: When you select any action other than None, the Query Server tab is added to the top of the object configuration box. You can use this tab to specify a source of logged data for the new user diagram or grouping window. If you enter only the filename into the field provided (and do not specify a directory), Vista defaults to ...\Power Monitoring Expert\config\diagrams\ud.

Customizing the action for a control object

To view the action options of a control object, right-click the control object and select the **Action** tab.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Do not use the software to control time-critical functions.
- Do not use the software to control remote equipment without proper access control and status feedback.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The Action tab offers three options that you can use to define how the control object responds when clicked:

- Select **No confirmation** to have no confirmation message displayed.
- Select **Message box confirmation** to display a message box when the object is clicked. The message box requires the user to click either **OK** or **Cancel**.
- Select **Password confirmation** to request the user's logon password when an object is clicked.

The **Level to operate** list allows you to specify the access level required to perform the action.

Box options

To view the Box options, right-click the object then select the **Box** tab.

Use the Box tab to add a border or background color to a diagram object. The Box tab is available for the following diagram objects: Numeric, Text Box, and any status object that has been configured as an alphanumeric display

The Box tab has two sections:

- **Border** lets you adjust a border's width and color as well as whether or not it is displayed. Select **Hide** to remove the border or **Show** to display it. If you select Show, click **Color** to define a border color and type a number in the **Width in pixels** field to change the line thickness.
- **Background Color** lets you set the background color of an object. Select **Transparent** to use the background color of the parent window or select **Custom** and click **Color** to select another color.

  NOTE: A Numeric Object uses the diagram background color in Vista when set to **Transparent**, which makes it look transparent. In Diagrams (web application), this same Numeric Object is displayed as truly transparent. Text Box Objects are truly transparent in Vista and Diagrams when set to **Transparent**.

Annunciation options

To view the annunciation options, right-click the Status Object to open the **Status Object Configuration** dialog, then select the **Annunciation** tab.

Use the Annunciation tab to specify how users are notified of a change of status. The Annunciation tab is available only on the Status Object.

NOTE: The Annunciation feature requires that the Status Object's diagram is displayed; if the display is closed or minimized, then the annunciation feature does not work.

The Annunciation tab has three options that set the action that Vista performs when a status object becomes active:

- Select **Command line** to automatically launch another application in the event of a change in status. Type the program's executable (.exe) command into the field provided or click **Browse** to locate the appropriate file.

- Select **Message box** to specify an annunciation message. Type your message into the field provided. The first line of text appears as the title of the message box.
- Select **Invert active state** to change the way the status object reacts to an active state. When this option is selected, the status object treats an active state as inactive and vice-versa. This is useful, for example, in cases when you want to be notified if a function (such as a cooling fan) switches off.

NOTE: If you select the Invert active state check box, this also inverts the default colors of the status object.

Alarming options

Every type of event that occurs in a Power Monitoring Expert network has a prioritized value that identifies its relative significance on a scale of zero to 255. By default, Vista identifies any event with a priority of 128 or greater as an alarm.

To view the Alarming options, right-click the Event Log Viewer then select the **Alarming** tab.

Use the **Alarming** tab to create or delete a priority range, specify the security level required to acknowledge an alarm, or customize the way Vista annunciates an alarm.

The Alarming tab has three main sections:

- **Priority ranges** lists the currently configured alarm ranges. When you select a range in the Priority ranges section (for example “Range 192-255”), the other sections (Level to Acknowledge and Annunciation) display the current settings for that range. You can proceed to modify any of these settings for the specified range. (Your changes affect only the currently selected priority range.)

  Click **New** to add a new priority range. In the **Priority** dialog box, type a number representing the lower limit of the new range then click **OK**. The upper limit of the new range is automatically defined by the lower limit of the existing range. For example, if you have an existing range of 128-191, you can type 100 then click **OK** and the range 100-127 appears. To delete an existing range, select it and click **Delete**.
- The **Level to acknowledge** list specifies the access level required to acknowledge alarms in the selected range.
- **Annunciation** lets you customize the way Vista annunciates an alarm:
  - Select Beep to play a beeping sound.
  - Select Flash to have a flashing display.
  - Select Command line to have Vista to automatically launch another application in the event of an alarm. Type the program's executable (.exe) command into the field provided or click **Browse** to locate the appropriate file. This option can be used to automatically alert other users of specific events through paging systems, fax transmissions, or any other command line capable application.
  - Select Message box to display an annunciation message. When you select this option, type your message into the field provided. The first line of text appears as the title of the message box and the remaining text appears as the content of the message box.

By default, Vista uses a beeping sound to annunciate an event with a priority between 128-191 and a beeping sound combined with a flashing display to annunciate an event with a priority between 192-255.

NOTE: If your computer is equipped with a sound card, you can replace the default alarm sound with a custom sound. Save the sound file you want to use as “alarm.wav” and store it in the ...\Power Monitoring Expert\system\etc directory.

Linking a diagram object to a data source

After placing an object in your user diagram, you need to link the object to a data source. Some types of diagram objects require a real-time data source and others require a logged data source:

- Numeric, status, and control objects require a real-time data source. You can link these diagram objects to a device.
- Event Log Viewers and Data Log Viewers require a logged data source. You can link these diagram objects to any log in your system.

Linking a numeric, status or control object

This section describes how to link a numeric, status, or control object to a node. Numeric, status, and control objects display real-time data. After you have placed one of these objects into a user diagram, you should link it to a real-time data source. An object cannot receive or display information until it is linked.

Specifying a real-time link to a node

1. Right-click the diagram object you want to link to open the **Configuration** dialog.
2. Select the **Link** tab.

   The Link tab contains two sections: **Link** and **Label**. Use the **Label** section to define a label for the diagram object (see Link options for information on the Label section) and use the **Link** section to choose a real-time source.
3. Select one of the following:
   - **Inherit from parent window**: The selected diagram object defaults to the same node used by the parent window (the window in which the object resides). You must specify a real-time register within the node, but the node itself is pre-selected.
   - **Custom**: Allows you to select a new node. Select **ION** to choose a different device than that used by the parent window.
4. Click **Edit Link** to open the **Create Link** dialog.
5. Specify a node, manager, module and output register:
   a. Double-click the node in the Nodes box that contains the data source you want. If you chose Inherit from parent window in step 3, the node is preselected.
   b. Double-click the manager you want (for example, Power Meter modules) from the Managers box.
   c. Double-click the module you want from the Modules box (for example, Power Meter).

d. Double-click the output register you want from the Output Registers box (for example,VII avg).

6. Click **OK** in the **Create Link** dialog to save your changes.

   The **Create Link** dialog closes and the new link information is displayed along the lower edge of the **Configuration** dialog.

7. Click **OK** on the **Configuration** dialog to save your new configuration.

Linking a Data Log Viewer or Event Log Viewer

The Event Log Viewer and Data Log Viewer display logged data. After you have placed an Event Log Viewer or Data Log Viewer object into a user diagram, you need to link it to the ION Query Service.

Linking a diagram object to the ION Query Service

1. Right-click the Event or Data Log Viewer object you want to link.
2. Select the **Query Server** tab in the **Configuration** dialog.

   The **Query Server** tab has two options:

   - Select **Inherit from parent window** to have the selected diagram object default to the same Query Server used by the parent window (the window in which the object resides). If you select this option, click **OK** to exit, skip the following steps, and continue with Querying the database.
   - Select **Custom** Query Server and click **Edit Link** to open a dialog where you can select a new Query Server link.

3. Select **Custom** Query Server and click **Edit Link** to open the **Create Link** dialog.
   - Use this dialog to specify the Query Server, Query Manager, Query module, and Query register.
   - Double-click the Query Server that you want from the Nodes box.
   - Double-click Query Modules from the Managers box.
   - Double-click the Query module that you want from the Modules box.
   - Double-click the Query Register that you want from the Output Registers box.
4. Click **OK** the **Create Link** dialog to save your changes.

   The name of the selected ION Query Service is displayed as the Group Name on the Query Server tab of the **Configuration** dialog.

5. Click **OK** on the **Configuration** dialog to accept your new configuration.

After you have linked a diagram object to a log server, you need to define a query to specify the type (s) of logged data that you want the object to display. See Querying the database for more information.

NOTE: If the Query Server has multiple Query modules that are accessing multiple databases, you need to select the Query module that is connected to the database that contains the data of interest.

Querying the database

The Data Log Viewer and the Event Log Viewer query the database, extract logged data, and display that data in Vista.

A query is a set of instructions that the log viewer uses to request particular data from the database. Each log viewer has its own individual query. Editing this query information changes what data the query retrieves and the way a log viewer displays that data.

Right-click the data or event log viewer object and select the Query tab to view the query options or access the Query Wizard. Use the query options to define the way a viewer displays data and the Query Wizard to edit the actual query.

NOTE: Anytime you place and link a new Data Log Viewer or Event Log Viewer, you need to specify a query for it. You can specify a query using the Query Wizard.

Using the Query options

To define the way a log viewer displays information, configure its query options.

To view the query options for an Event Log Viewer or Data Log Viewer, right-click the viewer object to open the **Configuration** dialog. Select the **Query** tab.

The upper section of the **Query** tab offers two buttons:

- **Edit Query** starts the Query Wizard, a user-friendly interface that helps you edit the query.
- **Edit SQL** accesses the SQL statement via Windows Notepad so you can edit the query directly using SQL, if preferred.

  NOTE: If you edit a query directly (i.e., by editing the SQL statement), your changes may not be accessible to the Query Wizard. This is not a problem unless you intend to use the Query Wizard as well.

The **Options** section of the Query tab offers the following options:

- **Records uploaded at a time**: This option specifies the number of records Vista uploads into active memory (RAM) when you first open a Data or Event Log Viewer. The maximum value is 9999. As you scroll down the list of records, Vista uploads additional records as needed. You may want to change this default value if, for example, you want to select a large number of records for plotting, without scrolling down repeatedly.
- **Update automatically**: This option is disabled (cleared) by default. The Data or Event Log Viewer does not display any new records; rather, the Log Viewer initially uploads the specified number of records (for example 100) and does not update again unless it is closed (and its query results deleted) then reopened.

  With this option selected, the Log Viewer continually receives and displays new records up to a maximum of 1000 records; the Log Viewer checks for new records every 20 seconds. However, the updates can consume a noticeable amount of CPU power, especially if several Log Viewers remain open simultaneously or if Log Viewers are uploading waveform data.
- **Delete query on close**: This option is enabled (selected) by default. The Log Viewer clears its temporary records from active memory (RAM) upon closing so that every time a Log Viewer is

opened, the database is queried again and all available records are displayed. (This option does not affect any original records stored in the database.)

If this option is disabled, Vista caches the record set returned to the Log Viewer, meaning that if the Log Viewer is closed then reopened, the table is populated from memory and not from the database. Any new records inserted into the database during the time the Log Viewer was initially open do not appear.

NOTE: Since it is recommended that **Update automatically** remain disabled in all but the most compelling circumstances, it is important that the **Delete query on close** option remains enabled.

- **Use parent node**: With this option selected, the log viewer uses the same node linkage as the parent window. The node is also pre-selected in the Query Wizard - you should not select this option if you intend to query more than one node.

X-parameter for Log View Plotter

For a Data Log Viewer, the X-parameter for Log View Plotter section is offered at the bottom of the Query tab. Use this section to specify a column to be used on the X-axis of the Log View Plotter. This section offers two options:

- **Timestamp** is selected as the X-parameter by default. In some cases, you may need to specify a different X-parameter. For example, when you are plotting disturbances, you need to plot your data against the Duration column.
- **Use column #** lets you specify a new x-parameter. In the field provided, type the column number that you want to use as the X-parameter (for example, 3). When you click **OK** on the Data Log Viewer Configuration box, the specified column changes to blue.

NOTE: In the Data Log Viewer, the column specified for the X-parameter is colored blue for easy identification.

Using the Query Wizard

The Query Wizard helps you edit an existing query or create a new query for a Data Log Viewer or Event Log Viewer.

1. Right-click the log viewer that you want to configure.
2. Select the **Query** tab in the Configuration box.
3. Click **Edit Query** to open the Query Wizard.

   The Query Wizard consists of four steps designed to guide you through the process of editing a query. These steps are described in more detail in the following sections.

   - Selecting the node(s) to query.
   - Specifying logs within the specified node(s).
   - Specifying columns and specifying filters.
   - Choosing a sort order.

Depending on the type of query (new or existing), you may not need to perform all four steps. When you start the Query Wizard, it automatically opens on the appropriate step in the process.

4. Use the four buttons at the bottom of the Query Wizard to move through or exit the Query Wizard:
   - Use the **Back** and **Next** buttons to navigate through the wizard.
   - Click **Cancel** to quit the Query Wizard and discard your changes.
   - Click **Finish** to quit the Query Wizard and save your changes.
5. When finished, click **OK** to save your changes and close the viewer configuration box.

The following example describes each step in the process of creating a typical query: configuring a Data Log Viewer to display waveforms for three phases (V1, V2, V3).

Step 1: Selecting the nodes

The Available list displays the available nodes (device or software) and the Selected list displays the currently selected nodes.

Select a node (or nodes) for your query. If a node has already been specified or you select Use Parent Node on the Query tab, the Query Wizard proceeds directly to Step 2: Specifying logs.

1. Click **Edit Query** on the **Query** tab of the Log Viewer Configuration dialog to start the Query Wizard.
2. Highlight the name of the node that you want from the Available list and click **Add**. The node appears in the Selected list. Repeat this procedure to add additional nodes for this query, if required.

   If you want to remove a node from the Selected list, highlight the node and click **Remove**. The node disappears from the Selected list.
3. Click **Next** to continue.

NOTE: If you want to view or edit a node's SQL statement directly, highlight the node in the Selected list and click the **SQL** button. The Windows Notepad displays the SQL statement for the specified node.

Step 2: Specifying logs

Specify one or more data logs to query. If a valid query has already been specified, the Query Wizard proceeds directly to Step 3: Specifying columns.

1. The Available list displays the logs available on the specified node. The Selected list displays the currently selected logs.
2. Highlight the name of the log(s) that you want from the Available list and click **Add**. The log(s) appears in the Selected list.

   NOTE: Check for additional tabs. If you selected more than one node in step 1, this box requires you to specify logs for each node. Each tab is labeled “Node 1,” “Node 2,” etc. and is

identified at the top of each tab. Select “Advanced log view” to access any logs whose configuration has changed over time. This check box enables access to old configurations of snapshot logs.

3. Click **Next** to continue.

Step 3: Specifying columns and filters

Use the **Select the columns to appear in the Log Viewer** section to add or remove a column from your log viewer and the **Filter** section to establish a range for your query and to screen out unwanted data.

If you selected multiple logs in step 2, this box contains a tab for each log. Specify the column and filter information for each tab.

Specifying columns to appear in the Log Viewer

The Available list displays the available columns and the Selected list displays the currently selected columns. The Selected list displays the columns in the same order (left to right) that they will appear in the log viewer (top to bottom).

To specify the columns to appear in the Log Viewer:

1. Highlight the name of the column(s) you want then click **Add**. The column(s) appears in the Selected list.

   Select the asterisk (*) at the top of the Available list to select all available columns.

   For example, if you want to select some basic columns for the first waveform log you chose in the last step, you could highlight timestamp, node, and V1 in the Available list.

   NOTE: The * column option shows all inputs connected to a recorder for Data Log Viewers. For example, use the * option if you are using a framework and the configuration of the data log is different for several meters. The * option is not available if more than one table is selected, as in the example.

2. Repeat this procedure for each column that you want (and for each tab).
3. Adjust the order of the items in the Selected column—highlight the column name you want to move in the **Selected (in order)** list then click the up or down arrows to move it. The columns are listed from top to bottom in the order they will appear from left to right.

   For example, if you want the Timestamp column to be the first (leftmost) column in your log viewer, highlight “timestamp” in the Selected (in order) section then click the up arrow to move it to the top of the list.

After you have selected the columns you want, proceed to specify filter settings.

Specifying a filter

Use the Filter section to construct one or more filter statements for your log viewer. Filters are useful for restricting the scope of your query or specifying a priority range for alarms.

To edit an existing filter statement, double-click on it.

For example, if you want to instruct the log viewer to display data for the past month (excluding today), you could use the following procedure:

1. In the first dropdown list on the left, select “timestamp”.
2. In the second dropdown list to the right, select “BETWEEN”.
3. In the third dropdown list to the right, select “last_month_to_date()”.
4. In the fourth dropdown list (on the right), select “today_12AM()”.
5. Click **Insert**.
   The following filter definition appears in the area below the filter controls:
   “timestamp” BETWEEN last_month_to_date() and today_12AM()

If you wanted to instruct an Event Log Viewer to display only unacknowledged alarms, create a filter that only displays alarms that have no acknowledgement time (ack-time).

1. In the first box, select “ack-time”
2. In the second box, select “IS NULL”
3. Click **Insert**.
   The following filter appears in the box below the filter controls:
   “ack_time” IS NULL

As you construct a filter statement, each field offers options based on your selection in the previous field(s). For example, if you select “priority” in the first field, the third field becomes a text field where you can type a numeric value; if you select “timestamp” in the first field, the third field displays time-based options (i.e., now, today 12AM, yesterday, etc.).

The following table lists the time-related functions:

Function	Description
now_()	The current time.
today_12AM()	Today at 00:00:00.
yesterday()	Yesterday at 00:00:00.
last_week()	Seven days ago at 00:00:00.
this_month()	The first day of this month at 00:00:00.
last_month_to_date()	The same date of the month one calendar month ago at 00:00:00.
last_month()	The first day of the last calendar month at 00:00:00.
last_quarter_to_date()	The first day of the month three calendar months ago at 00:00:00.

Note that time-related functions only return one record. To return all of the records for the time period, you also need to specify `< today_12AM()`. For example, specifying a filter of `=yesterday()` returns only one record, but a filter specifying `>=yesterday()` AND `<today_12AM()` returns all of yesterday's records.

The second field offers a standard set of operators.

```
=
>
<
>=
<=
!=
LIKE
BETWEEN
IS NULL
IS NOT NULL
IN
```

Operator-specific data

If you select an operator that requires additional information, Vista displays a dialog where you can specify the required data.

For example, if you select the “node” column in the first field then select the “IN” operator from the second field, a dialog opens requesting that you specify the node you want to use.

If you specify any column other than “node” then select “IN”, a box appears requesting numeric values.

After you have specified a filter, click **Next** to continue.

Step 4: Choosing a sort order

Specify a sort order. The sort order is the order in which records appear in the viewer.

1. Highlight the name of the column to sort by in the Available Columns list then click **Add**. The column appears in the Sort Order list.

   Available Columns displays the columns you chose in step 3.

2. Double-click on the column in the Sort Order list to select either an ascending or descending sort order.

   The Sort Order list displays the column(s) that dictate the order in which the records are sorted.

3. Click **Finish** to save your changes and quit the Query Wizard.
4. Click **OK** in the Configuration box to save your changes.

Customizing a diagram window

You can customize the appearance and configuration of any window within a user diagram. You can customize a window's font or background color, or configure window properties such as background image, real-time and logged data links, double-click action, and stale data settings.

In many cases, Vista uses the properties specified for the parent window as the default settings for any diagram objects or grouping windows contained within. By modifying a setting in the parent window, you automatically modify the same property on all objects inside the window that share this setting. (For example, any object with an option set to Inherit from parent window shares this information.) This can be useful when adding multiple diagram objects that are all linked to the same source.

To access any of these options, right-click anywhere in the background of the user diagram or window that you want to customize.

NOTE: Right-clicking in the background of a window displays a menu of available options; however, right-clicking on any object in the window while in Edit mode (including transparent objects such as text boxes or grouping windows) displays the configuration options for that object.

Default font

The font you select becomes the default setting for all captions and text labels within the window.

Changing the default font

1. Right-click the background of a user diagram and select **Default Font** to open the **Font** dialog.
2. Set the default font, style, size, effects, color, and format that you want.
3. Click **OK** to save your changes.

Background color

The default background color is gray. However, you can display any solid color as a background for any window in your user diagram.

Changing the background color

1. Right-click the background of a user diagram and select **Background Color** to open the **Color** dialog.
2. Select the color that you want or click **Define Custom Colors** for more options.
3. Click **OK** to save your changes.

Configuring window properties

To view the Window Properties Configuration options, right-click the background of any window in your user diagram and select **Properties**.

The Window Properties Configuration dialog opens with five option tabs: **Image**, **Query Server, Node**, **Action** and **Updates**.

Image: Displaying a background image

To view the image options, select the **Image** tab on the **Window Properties Configuration** dialog. Use the **Image** tab to specify a background image for the active diagram or grouping window.

The **Image** tab has two options:

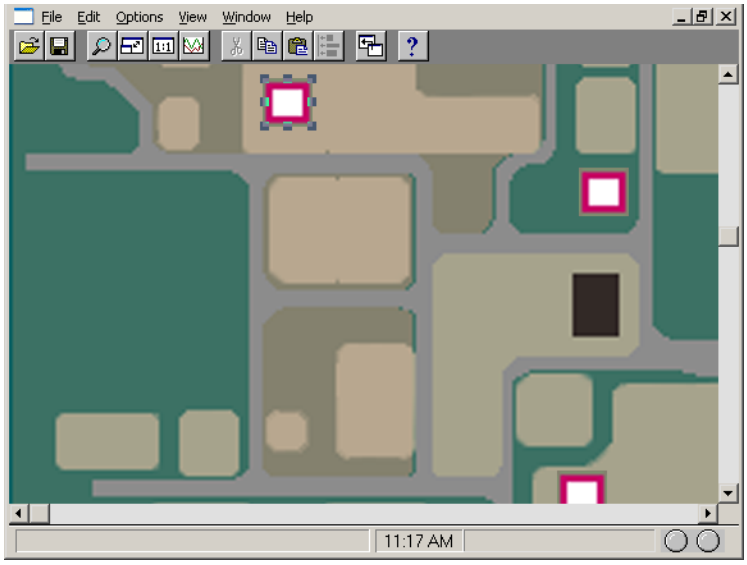
- Select **None** if you do not want to display a background image, or if you prefer to display a single color.

- Select **Custom image** to display a background image. Enter the path and filename of the image you want to display. Vista supports images saved in the following formats: .bmp, .jpeg, .png, .gif, .emf, and .wmf.

You can create your own background image using a scanned photograph or a drawing created within a standard graphics program. Some ideas include:

- An engineering drawing of your installation depicting the power distribution system and the location of critical elements.
- A single line diagram illustrating the power distribution network or the individual components of your facility.
- An aerial photograph of your facility depicting the approximate location of your monitoring equipment.
- A satellite image or geographical map depicting your transmission and distribution network.

The following illustration depicts a sample Vista background with hidden diagram objects (here the object is visible by the handles because it is selected in Edit mode):



You can integrate your diagram objects into the image by placing them at the appropriate points on the drawing. Users then display site-specific information by clicking on the appropriate spot in the background.

Specifying a custom background image

1. Right-click the background of the window you want to customize and select **Properties** to open the **Window Properties Configuration** dialog.
2. Select the **Image** tab.
3. Select Custom image and click **Browse**.
4. Select the image file you want to use and click **Open**.
5. Click **OK** to set this image as the background.

Query Server: setting a default Query Server for a window

Use the Query Server tab to specify a logged data source for any window in a user diagram. The Query Server that you select provides the default source of logged data for all Event Log Viewers, Data Log Viewers and Grouping Objects within the window.

Setting a default Query Server for a window

1. Right-click the background of the window and select **Properties**.
2. Click the Query Server tab in the Window Properties Configuration box.
3. Select either **Inherit from parent icon** or **Custom** Query Server.
   - Select **Inherit from parent icon** for the active window to default to the same Query Server used by the parent icon. (The parent icon is the diagram object that you clicked to open this window.)
   - Select **Custom** Query Server then click **Edit Link** to open a dialog where you can select a new Query Server link.

   When you click the **Edit Link** button, the **Create Link** dialog opens.

Use the **Create Link** dialog to specify a query:

1. Double-click the Query Server that you want from the Nodes box.
2. Double-click Query Modules from the Managers box.
3. Double-click the Query that you want from the Modules box.
4. Double-click the query register that you want from the Output Registers box.
5. Click **OK** to save your changes.

The name of the selected Query Server and register are displayed as the Group Name on the Query Server tab of the Window Properties Configuration dialog.

Node: Setting the default node for a window

Use the Node tab to specify a real-time source for any window (or grouping object) in a user diagram. The node that you select provides the default source of real-time data for all numeric, status, and control objects within the window. It also is the parent node for any Data Log Viewer or Event Log Viewer objects placed in the window.

Setting a default node for a window

1. Right-click anywhere in the background of the window and select **Properties** from the pop-up menu to open the **Window Properties Configuration** dialog.
2. Select the Node tab.
3. Do one of the following:
   - Select **Inherit from parent icon** to use the same node as the parent icon (the diagram object you double-clicked to open the window).

- Select **Custom** to select a different node. Select ION and click **Select** to display the **Select Node** dialog. Select a default real-time source for the window from the nodes available.

4. Click **OK** to save your changes.

Action: Specifying an action for a window

You can specify an action for Vista to perform upon opening or closing a particular window. For example, if you want Vista to automatically engage a modem tool (such as the Connection Manager) every time you open a certain grouping window, you can specify the tool as an action.

Specifying an Open or Close action

1. Right-click the background of the user diagram or grouping window and select **Properties** to open the **Window Properties Configuration** dialog.
2. On the **Action** tab, select Command line on open or Command line on close.
3. Click **Browse** to open the **Browse** dialog, locate the program you want, select the .exe file, and click **Open**.

   The specified file and path name appears in the box below the selected option.
4. Click **OK** to save your changes.

NOTE: To remove an action, clear the check box beside the option.

Updates: Setting the time interval

Data that is not updated is considered stale data. Vista detects stale data as it occurs and identifies it with a colored border around the diagram object (the default color is yellow).

On the **Updates** tab, you can specify the interval of time Vista uses to detect stale data. The **Updates** tab has two sections:

- **Update Period** allows you to specify how often data in that window is refreshed.
- **Stale Data** allows you to specify whether data is highlighted and how old data must be to be considered “stale”.

NOTE: The Update Period and Stale Data settings also apply to Diagrams.

Changing the Update and Stale Data settings

1. Right-click the background of the window and select **Properties** to open the **Window Properties Configuration** dialog.
2. Select the **Update** tab.
3. Enter a numeric value in seconds in the **Update data period** or **Stale data timeout** fields to set the intervals.
4. Select or clear the **Highlight stale data** check box to enable or disable checking for stale data.
5. Click **OK** to save your changes.

To change the color of the stale data border, close the Window Properties Configuration dialog, then select **Options > Flag Colors** to open the Flag Colors dialog. Click **Edit** beside “Stale Flag Color” to open a dialog where you can select a different color.

Web Applications

TIP: Open Web Applications from the EcoStruxure Power Monitoring Expert folder on your desktop, the Schneider Electric folder on the Start Screen, or by entering the PME server URL into your browser Address bar, e.g. `http://srv1.MyCompany.com/Web`

RECOMMENDATION: To reduce the risk of cybersecurity attacks, access Web Applications only from client computers and not from the PME server.

Overview

Web Applications is the main interface for accessing PME power system information. Use Web Applications to view real-time data, alarms, historical trends, key performance indicators, reports, and other information about the power system you are monitoring. Web Applications also provides several configuration settings and tools to configure and customize your PME system.

The following is a list of applications for accessing power system information through Web Applications:

Application	Function
Alarms	View and analyze Incidents, Alarms, and Events; Acknowledge alarms.
Dashboards	View high level, historical and real-time data in dashboards and gadgets.
Diagrams	View low level, historical and real-time data in one-line and graphics diagrams.
Reports	Run reports on demand or scheduled.
Trends	View trends for real-time and historical data.

For a list of configuration tools and settings, see Web Applications settings.

When you open Web Applications, you are prompted to log in with your username and password. The access level assigned to your username determines which applications and which functions are available to you. See Default User Access Level Privileges and Customizing Access Level Privileges for details.

Specifying Which Application to Open First

When you connect to Web Applications through a client computer, the application whose link is on the left of the series of application links opens in the browser. To specify a different application to open first, add one of the following application query parameters into the Web address.

/#Dashboards	/#Alarms
/#Diagrams	/#Reports
/#Trends	

For example, `http://srv1.MyCompany.com/Web/#Trends` opens the Trends application in the browser.

Opening Web Applications Without Banner

You can open any of the Web applications by itself without showing the Web Applications banner and navigation bar. To open a Web application in this way, enter the PME server URL with `/<application name>` in a browser address bar. For example, `http://srv1.MyCompany.com/Trends` opens the Trends application in the browser without the Web Applications UI elements.

Web Applications User Interface

The top right of the banner contains:

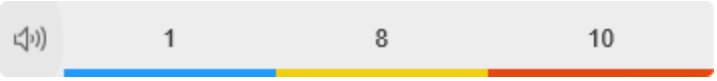
- Your user name: The user name you used to log in.
- **Logout** link: Logs you out of Web Applications and returns you to the log in page.
- **Help** link: Opens the browser-based online help for the Web Applications component and the integrated applications.

Alarm Annunciator

The Alarm Annunciator shows information on the number of active and unacknowledged Alarms. It is displayed in the banner area of the Web Applications and is visible from any of the PME Web apps. The Annunciator alerts you to any new alarms that are occurring in the system. You can configure it to play a sound when certain alarm conditions are met.

When you click on one of the priority colored areas in the Annunciator, from anywhere in Web Applications, it opens the Alarm Viewer and automatically filters the view to show all alarms with that priority. You can customize the behavior of the Annunciator, including the alarm sound, on the Web Applications settings page.

The Annunciator looks like this:



In this example, the Annunciator shows:

- 1 low priority, active and unacknowledged Alarm (blue)
- 8 medium priority, active and unacknowledged Alarms (yellow)
- 10 high priority, active and unacknowledged Alarms (red)

The presence of the speaker icon indicates that it is configured to play a sound when new active and unacknowledged alarms occur. Click the speaker icon to mute or unmute the alarm sound.

NOTE: You must have controller, operator, or supervisor-level access to see the Annunciator. If you have observer or user-level access, it is not displayed.

Library Pane

The library pane contains items and configuration options for the selected application. To show or hide the library pane, click the bar on the right or left side of the display area.

Display Pane

The display pane loads the data visualization selected in the configuration pane.

Time Display in Web Applications

Most of the information displayed in the Web Applications is time based, such as timestamped real-time data and historical data. In a PME system there are 3 reference points for time zones: the monitoring devices/sources, the PME server, the Web client (browser).

PME supports configurations where the devices/sources, the server, and the client are in different time zones. For example, a user in time zone A accesses the PME server which is located in time zone B. The monitoring devices that are providing the data are in time zone C.

The following table shows how the different Web Applications display time with regards to time zone:

Web Application	Time Zone Used for Display
Dashboards	Device/source time zone as configured in Management Console or Device Manager.
Diagrams	Device/source time zone as configured in Management Console or Device Manager.
Trends	Web client (browser) time zone as configured in the client browser.
Alarms	Device/source time zone as configured in Management Console or Device Manager. *
Reports	Time zone can be manually selected. Default is Web client (browser) time zone.

* Alarms has tooltips that show the time in both the device/source time zone, and the Web client (browser) time zone.

NOTE: Web Applications uses Management Console or Device Manager time zone settings for the device/source time zone. The time zone settings in Management Console or Device Manager are set per device and must be configured correctly, for Web Applications to show the correct time. The time zone settings in Management Console or Device Manager are independent of time zone settings on the devices themselves. Web Applications does not use the time zone settings on the devices themselves.

Software Modules

Software modules combine different software features and capabilities to create a specific set of deliverables. Software modules are designed around a particular application. Examples of software modules include the Power Quality Performance Module, the Energy Analysis Reports Module, and the Breaker Performance Module.

This section provides information on how to use the Software Modules in Power Monitoring Expert.

Use the links in the following table to find the module you are looking for:

Module	Application
Backup Power Module operation	Generator and Uninterruptible Power Supply (UPS) performance monitoring and reporting, including battery health.
Breaker Performance Module operation	Circuit breaker aging and breaker settings monitoring.
Capacity Management Module operation	Generator and Uninterruptible Power Supply (UPS) capacity monitoring and reporting. Includes transformer and UPS loss monitoring.
Energy Analysis Dashboard Module operation	Gadgets for identifying consumption patterns and anomalies and for comparing different consumers over time.
Energy Analysis Reports Module operation	Reports for energy consumption monitoring and modeling, including energy usage by process area or by product output.
Energy Billing Module operation	Energy-based billing and reporting, including consumption monitoring and reporting at the branch circuit level.
Event Notification Module operation	Notifications of power system events via email or SMS.
Insulation Monitoring Module operation	Monitoring for isolated power systems, such as the ones found in hospital operating rooms.
Power Quality Performance Module operation	Analysis of power quality events and disturbances and their impact on the monitored system.

Backup Power Module operation

NOTE: This module requires a separate license. See Licensing for more information.

The Backup Power Module provides generator and Uninterruptible Power Supply (UPS) monitoring and reporting. It reports on generator and UPS performance and battery health.

The Generator Test EPSS Report can be configured to conform to the requirements for an Emergency Power Supply System (EPSS) test, including automatic transfer switches (ATS). For example, the report shows the transfer time of the lead ATS and indicates whether the transfer time passes or does not pass the test requirements. See Emergency Power Supply Systems for more information on EPSS.

Use the Backup Power module to:

- Identify generator problems that could prevent a transfer to backup power.
- Automatically record and document the backup generator system test.
- Monitor the generator battery health.
- Report on backup generator run times.
- Monitor the condition of your UPS, including the battery health.

The following reports and diagrams are part of this module:

Type	Reports	Diagrams
Generator Performance	Generator Activity Generator Battery Health Generator Test EPSS Generator Load Summary	EPSS Diagrams
UPS Performance	UPS Auto Test UPS Battery Health	UPS Auto Test diagrams

For information on how use the Backup Power diagrams and reports, see:

- Backup Power Reports
- EPSS diagrams
- UPS Auto Test diagrams

Related topics:

Backup Power Module topics

- Backup Power Module design
- Backup Power Module configuration
- Backup Power Module operation

Other Software Modules

- Breaker Performance Module operation
- Capacity Management Module operation

- Energy Analysis Dashboard Module operation
- Energy Analysis Reports Module operation
- Energy Billing Module operation
- Event Notification Module operation
- Insulation Monitoring Module operation
- Power Quality Performance Module operation

Breaker Performance Module operation

NOTE: This module requires a separate license. See Licensing for more information.

The Breaker Performance Module monitors aging and wear of circuit breakers and reports on breaker protection settings. It provides historical and real-time information for aging and wear related breaker parameters. You can also set up alarming on these parameters.

Use the Breaker Performance module to:

- Monitor circuit breaker health related to wear and aging.
- Increase the MTBF of the main electrical switchboard.
- Support your predictive maintenance action plan and budget.
- Report on breaker protection settings.

The following reports and diagrams are part of this module:

- Breaker Aging Report
- Breaker Settings Report
- Breaker Aging Vista diagrams

For information on how use the Breaker Performance reports and diagrams, see:

- Breaker Performance Reports
- Breaker Aging diagrams

Related topics:

Breaker Performance Module topics

- Breaker Performance Module Design
- Breaker Performance Module configuration
- Breaker Performance Module operation

Other Software Modules

- Backup Power Module operation
- Capacity Management Module operation
- Energy Analysis Dashboard Module operation
- Energy Analysis Reports Module operation
- Energy Billing Module operation
- Event Notification Module operation
- Insulation Monitoring Module operation
- Power Quality Performance Module operation

Capacity Management Module operation

NOTE: This module requires a separate license. See Licensing for more information.

The Capacity Management Module provides generator, Uninterruptible Power Supply (UPS), and general equipment monitoring and reporting. It also includes transformer and UPS loss monitoring and reporting. The losses are reported in terms of energy and cost.

Use the Capacity Management Module to:

- Analyze IT branch circuit power loading.
- Understand remaining capacity at the branch circuit level.
- Understand generator and UPS system power loading.
- Understand if the generator and UPS loading compromises the design redundancy of the backup supply system.

The following reports are part of this module:

- Branch Circuit Power Report
- Equipment Capacity Report
- Generator Capacity Report
- Generator Power Report
- Power Losses Report
- UPS Power Report

For information on how use the Capacity Management Module reports, see Power Capacity Reports

Related topics:

Capacity Management Module topics

- Capacity Management Module Design
- Capacity Management Module configuration
- Capacity Management Module operation

Other Software Modules

- Backup Power Module operation
- Breaker Performance Module operation
- Energy Analysis Dashboard Module operation
- Energy Analysis Reports Module operation
- Energy Billing Module operation
- Event Notification Module operation
- Insulation Monitoring Module operation
- Power Quality Performance Module operation

Energy Analysis Dashboard Module operation

NOTE: This module requires a separate license. See Licensing for more information.

The Energy Analysis Dashboard Module includes dashboard gadgets that help you break down consumption by load type, visualize consumption cost, and do an 80/20 analysis to identify the largest consumers. You can identify consumption patterns and anomalies and compare different consumers over time.

Use the Energy Analysis Dashboard Module to:

- Break down consumption by load type.
- Visualize consumption cost.
- Do an 80/20 analysis to identify the largest consumers.
- Identify consumption patterns and anomalies.
- Compare different consumers over time.

The following gadgets are part of this module:

- Sankey gadget
- Pareto Chart gadget
- Aggregated Pareto Chart gadget
- Heat Map gadget
- Consumption Ranking gadget
- Aggregated Consumption Ranking gadget

See Gadgets for information on how to use these gadgets.

Related topics:

Energy Analysis Dashboard Module topics

- Energy Analysis Dashboard Module design
- Energy Analysis Dashboard Module configuration
- Energy Analysis Dashboard Module operation

Other Software Modules

- Backup Power Module operation
- Breaker Performance Module operation
- Capacity Management Module operation
- Energy Analysis Reports Module operation
- Energy Billing Module operation
- Event Notification Module operation
- Insulation Monitoring Module operation
- Power Quality Performance Module operation

Energy Analysis Reports Module operation

NOTE: This module requires a separate license. See Licensing for more information.

The Energy Analysis Reports Module includes reports that help you understand energy usage patterns to find energy waste, analyze transformer and circuit capacity and assess energy usage by process area or by product output. Use the energy modeling capabilities in this module, to forecast consumption, identify unexpected changes in your consumption, or identify actual savings as a result of energy management measures.

Use the Energy Analysis Reports Module to:

- Understand energy usage patterns and find energy waste.
- Analyze transformer and circuit capacity as configurations change and loads are added.
- Determine what factors contribute most to energy usage.
- Assess energy usage by process area or by product output.
- Track KPIs such as Energy Intensity (kWh/unit) or Coefficient of Performance (COP) Evaluate energy usage in the context of environmental factors or production.
- Create energy usage models and compare actual consumption against expected
- Track and analyze Power Usage Efficiency (PUE)

The following reports are part of this module:

- Create Model Report
- Duration Curve Report
- Energy Modeling Reports
- Energy Regression Analysis Report
- Energy Usage Per State Report
- KPI Report
- Multi Equipment Operation Report
- Power Usage Per State Report
- PUE Summary Report
- Single Equipment Operation Report
- Use Model Report

For information on how to use the Energy Analysis Reports Module reports, see Energy Analysis Reports.

Related topics:

Energy Analysis Reports Module topics

- Energy Analysis Reports Module design
- Energy Analysis Reports Module configuration
- Energy Analysis Reports Module operation

Other Software Modules

- Backup Power Module operation
- Breaker Performance Module operation
- Capacity Management Module operation
- Energy Analysis Dashboard Module operation
- Energy Billing Module operation
- Event Notification Module operation
- Insulation Monitoring Module operation
- Power Quality Performance Module operation

Energy Billing Module operation

NOTE: This module requires a separate license. See Licensing for more information.

The Energy Billing Module is a fully functional energy-based billing reporting system. It also provides load and consumption monitoring and reporting at the branch circuit level, which is typically used in data center applications.

Use the Energy Billing Module to:

- Allocate energy costs to consumers.
- Verify utility bills through shadow billing.
- Avoid demand charges.
- Export energy billing data to accounting and financial systems.
- Allocate branch circuit consumption to customers and IT racks.
- Produce energy threshold reports.
- Bill clients for excess energy consumption.

The following reports are part of this module:

- Billing Report
- Billing Summary Report
- Billing Verification Report
- Energy by IT Customer Report
- Multiple Billing Report
- Multiple Billing Export Report

For information on how use the Billing reports (except Energy by IT Customer Report), see Billing Reports

For information on how use the Energy by IT Customer Report, see IT Billing Reports

Related topics:

Energy Billing Module topics

- Energy Billing Module design
- Energy Billing Module configuration
- Energy Billing Module operation

Other Software Modules

- Backup Power Module operation
- Breaker Performance Module operation
- Capacity Management Module operation
- Energy Analysis Dashboard Module operation

- Energy Analysis Reports Module operation
- Event Notification Module operation
- Insulation Monitoring Module operation
- Power Quality Performance Module operation

Event Notification Module operation

NOTE: This module requires a separate license. See Licensing for more information.

Use the Event Notification Module (ENM) to notify recipients about critical power system events. ENM can send notifications of power system events through email or SMS. ENM uses the Alarms application to detect system events. You can set up notifications for activity in any of the event, alarm, or incident views. The notification details are defined in a notification rule. A notification rule can be enabled or disabled, and you can use a schedule to determine when the rule is applied. You can define more than one notification rule.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Do not rely solely on Event Notification Module use for alarm notification where human or equipment safety relies on the operation of the control action.
- Do not use Event Notification Module to control time-critical functions.
- Do not use the software to control remote equipment without proper access control and status feedback.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

NOTE: Other parts of the overall communication system, such as email servers and cellular phone systems, could fail and result in notifications not being delivered. If notifications are not delivered to recipients, conditions that cause alarming may persist and result in safety critical issues.

Notifications are sent out automatically based on the configuration of the module. See Event Notification Module configuration for information on how to configure notifications. See Event Notification Module Design for prerequisites and design considerations.

Related topics:

Event Notification Module topics

- Event Notification Module Design
- Event Notification Module configuration
- Event Notification Module operation

Other Software Modules

- Backup Power Module operation
- Breaker Performance Module operation
- Capacity Management Module operation
- Energy Analysis Dashboard Module operation

- Energy Analysis Reports Module operation
- Energy Billing Module operation
- Insulation Monitoring Module operation
- Power Quality Performance Module operation

Insulation Monitoring Module operation

NOTE: This module requires a separate license. See Licensing for more information.

The Insulation Monitoring Module provides monitoring for isolated (IT) power systems, such as the ones found in hospital operating rooms. It also helps in locating isolation faults. The module can be configured for applications based on the IEC standard, and for applications based on the ANSI standard.

Use the Insulation Monitoring Module to:

- Monitor the status of the isolated power system.
- Identify situations when the isolation of the system might be compromised.

The following report and diagrams are part of this module:

- Insulation Monitoring Report (ANSI and IEC)
- Vista diagrams for group, area, and area details levels (ANSI and IEC)

For information on how to use the Insulation Monitoring diagrams and reports, see:

- Insulation Monitoring diagrams
- Insulation Monitoring Reports

Related topics:

Insulation Monitoring Module topics

- Insulation Monitoring Module Design
- Insulation Monitoring Module configuration
- Insulation Monitoring Module operation

Other Software Modules

- Backup Power Module operation
- Breaker Performance Module operation
- Capacity Management Module operation
- Energy Analysis Dashboard Module operation
- Energy Analysis Reports Module operation
- Energy Billing Module operation
- Event Notification Module operation
- Power Quality Performance Module operation

Power Quality Performance Module operation

NOTE: This module requires a separate license. See Licensing for more information.

The Power Quality (PQ) Performance Module analyzes power quality event and disturbance data as well as power factor measurements. It determines the potential impacts of power quality on the monitored power system and displays the results in graphical formats, with color coding to highlight problem areas. The module combines standard software features with specialized components to produce its outputs.

Use the Power Quality Performance module to:

- Baseline and monitor PQ in facilities.
- Understand the financial impact of PQ related process disruptions.
- Show the cost of power factor penalties.
- Identify the type and origin (internal vs external) of PQ events.
- Diagnose PQ events and find root causes.

The following reports, diagrams, and Dashboard Gadgets are part of this module:

- Power Quality Impact report
- Power Quality Analysis report
- Power Quality Indicator diagrams
- Standardized Equipment diagrams
- Power Quality Rating gadget
- Power Quality Rating Trend gadget
- Power Quality Incident Breakdown gadget
- Power Quality Incident Impact gadget
- Power Quality Incident Location gadget
- Power Quality Impact gadget
- Power Quality Impact Trend gadget
- Power Factor Impact gadget
- Power Factor Impact Trend gadget

For information on how use the Power Quality Performance gadgets, diagrams, and reports, see:

- Power Quality Impact Report
- Power Quality Analysis Report
- Power Quality Performance diagrams
- Power Quality gadgets

Related topics:

Power Quality Performance Module topics

- Power Quality Performance Module Design
- Power Quality Performance Module configuration
- Power Quality Performance Module operation

Other Software Modules

- Backup Power Module operation
- Breaker Performance Module operation
- Capacity Management Module operation
- Energy Analysis Dashboard Module operation
- Energy Analysis Reports Module operation
- Energy Billing Module operation
- Event Notification Module operation
- Insulation Monitoring Module operation

Troubleshooting

This chapter provides information on how to troubleshoot Power Monitoring Expert (PME) and how to resolve problems and issues.

To troubleshoot issues with PME follow these steps:

1. Search the Schneider Electric Knowledge Base/FAQ for a resolution. Use search keywords including product, version, component and specific issue. See Resources for information on how to access the knowledge base.
2. (EcoXperts and Schneider Electric employees) Search the Exchange Community for a resolution. Use keywords including product, version, component and specific issue. See Resources for information on how to access the Exchange Community.
3. Use the information in this chapter to find a solution to the problem yourself
4. If steps 1-3 don't resolve your problem, contact Technical Support. See Resources for information on how to contact technical support.

When you contact Technical Support, be prepared to provide the following information:

- Problem overview.
- Steps to reproduce the problem.
- Relevant PME system history, for example upgrades, expansions, IT policy changes, and so on.
- Screen captures or videos of the problem.
- Have a recent backup of the PME databases (ION_Data, ION_Network, ApplicationModules and ION_SystemLog).
- Any additional information that can help with the investigation, for example diagnostics outputs, PME system log entries, Windows system log entries, and so on.

NOTE: The more information you can provide, the less time it will take to resolve the issue.

For information on troubleshooting tools, see Tools for troubleshooting.

Tools for troubleshooting

The following tools can help you with troubleshooting:

- Windows Event Viewer
- Web browser developer tools
- PME Diagnostics tool
- PME system log
- PME application modules diagnostics
- Modbus test utility
- Diagnostics Viewer
- Network packet analyzer

Windows Event Viewer

The Windows Event Viewer is a Microsoft tool that is part of the Windows operating system.

Use the Event Viewer to see Windows event logs for Application, Security, Setup, and System. These logs might include messages related to the problem you are trying to solve, for example entries about services shutting down or other unexpected events.

Open Event Viewer in Windows from **Control Panel** > **Administrative Tools**, or search for **Event Viewer** in Windows search.

Web browser developer tools

Web browser developer tools are diagnostic features built into most web browsers.

Use the browser tools to investigate issues that happen in the PME web applications interfaces. When an error happens in the web client, it is not always recorded in the PME or Windows event logs. For example, when a PME user account is deleted from the system, the web application sends a HTML request to the PME application server to delete the user. If, for some reason, this request is not received by the server, it will not be recorded in the PME system log. Web browser developer tools can help troubleshoot these kind of issues. It is also possible to record a web session with the tools. This recorded session (saved as .HAR file) can then be viewed by Technical Support to analyze the web browser activity.

To open the web browser developer tools: Press **F12** on your keyboard while the web browser is open.

PME Diagnostics tool

The Diagnostics tool is a built-in feature of PME.

Use the Diagnostics tool to retrieve diagnostics information from the system databases, files, and libraries. The information collected by the tool is packaged in a way that makes it easy to send it to Technical Support.

To open the Diagnostics Tool: Start `Diagnostics Tool.exe` from `...\Power Monitoring Expert\Diagnostics Tool\`

PME system log

The system log is a built-in feature of PME.

Use the system log to find information on system activities, including warnings or errors.

To view the system log: Open the PME Log Viewer.

PME application modules diagnostics

Application modules diagnostics is a built-in feature of PME.

Use application modules diagnostics to find information on issues related to Web Applications.

To view application module diagnostics: Open the `Diagnostics.LogEvent` table in the Application Modules database in PME.

Modbus test utility

Modbus test utilities are third party tools that are used to diagnose Modbus communications.

Use a Modbus test utility to monitor and troubleshoot communications between devices and the software. For example, a Modbus test utility can help you identify if device communication issues originate outside the software through wiring, incorrect device configuration, or other causes.

To find a Modbus test utility, search the Internet for products that meet your needs.

Diagnostics Viewer

The Diagnostics Viewer is a built-in feature of PME.

NOTE: Diagnostics Viewer and Diagnostics Tool are two different applications in PME.

Use Diagnostics Viewer to find information on the operation of PME services and on device communications. For example, you can view Log Inserter and Siteserver interactions with the devices in the system. See Diagnostics Viewer for more information on this tool.

Open Diagnostics Viewer in PME from **Management Console** > **Tools**> **System** .

Network packet analyzer

Network packet analyzers are third party tools that are used to monitor and log digital network traffic.

Use a packet analyzer for network troubleshooting and analysis. For example, you can monitor the communications between an Ethernet power monitoring device and PME as part of your troubleshooting activities.

To find a packet analyzer, search the Internet for products that meet your needs.

NOTE: Wireshark, an open-source product, and Fiddler, a freeware product, are examples of well known packet analyzers.

Diagnostics Viewer

Diagnostics Viewer is a tool you can use to troubleshoot network communications problems and related network errors.

Starting Diagnostics Viewer

1. Start Management Console and log in.
2. Click **Tools > System > Diagnostics Viewer**.

TIP: For instructions on using filtering, sorting, column selection, and pin/unpin to customize the Diagnostics Viewer display, see Customizing and navigating interface displays.

Navigation pane

Diagnostics information is grouped as follows:

- **Service Diagnostics**: Contains diagnostics information for certain services (ION Network Router Service, ION Site Service and ION Log Inserter Service).
- **Communication Diagnostics**: Contains diagnostics information for the sites, hardware devices, and software nodes.

Select an item in the navigation pane to display its diagnostics information.

If you add a new device to the system while Diagnostics Viewer is open, you can refresh the tree view to display the new device by collapsing then expanding the root node of the tree.

Diagnostics Information pane

The diagnostics information pane displays detailed data about the state of your power monitoring system and devices.

Service Diagnostics

Service Diagnostics records communication problems and similar events occurring with the product's software components.

Communication Server diagnostics

Information about the communications server is arranged in these tabs:

- **Console Messages** lists all ION Network Router Service and ION Site Service console messages for the current session.

  TIP: The blank area below the **Description** column header is a dynamic filter field. Type the wildcard character (*) in front of the text you want to search (for example, to display only messages prefixed with `WARNING`, type ***warning**). The diagnostics information pane automatically displays only those records that match the text you typed in the box.

- **Connection Status** displays the current status of the software components connected to Network Router.
- **Tree States** displays the ION tree status of all nodes (hardware devices and software nodes).

Log Inserter diagnostics

The Log Inserter diagnostics information pane is split into two sections. The top section (Select Nodes pane) contains the available nodes, while the bottom section contains the node details.

Select nodes to display

In the **Select Nodes** pane, select the check box beside a node to display its diagnostics information. Clear the check box to hide that node's diagnostics information.

TIP: If there are many nodes and you want to display only a few of them, right-click the **Select Nodes** area then click **Clear All**. Select only the nodes you want to display. To display all the nodes again, right-click the **Select Nodes** area and click **Select All**.

Node details

The node details are organized in these tabs:

- **Node Information** provides diagnostics associated with the communication status of each selected node. If the Log Inserter is not configured to gather data from a given node, it does not appear in the list in the **Node** column. If the Log Inserter is configured to automatically gather information for a node, but that node has not yet been processed, it does not initially appear in the list. Once information becomes available, the node appears (if it has been selected).
- **Node Performance** provides per-node performance summary information.
- **Log Performance** provides performance information on a per log basis.

The following table summarizes the columns on the **Node Information** tab:

Column	Description
Node	The name of the device, VIP, or Log Inserter.
DeviceType	The device type of the associated node that is returned by the device itself. The Log Inserter uses this to detect device swap outs.
SerialNumber	The serial number of the device that is returned by the device. The Log Inserter uses this to detect device swap outs.
Configured Polling Interval (s)	The requested polling interval in effect. It can be configured either from the log upload control or from the custom Windows Registry value. All of the nodes for which polling is disabled are identified with `Polling Disabled` in this column.

Column	Description
Average Update Interval (s)	A weighted average time between polled results for the device. The most recent interval accounts for 20% of the value, and the previous average accounts for the remainder. If the value deviates from the average by more than 30s, then the old average is discarded and the current interval is used. By default, the expected value for devices that support logs is the Configured Polling Interval (s) value. The expected value for devices that do not support logs is 60 seconds. If the Log Inserter is selected but it is not configured to collect data from its System Log Controller, it appears in the diagnostics and shows 300s for Average Update Interval. Initially this value is `n/a`.
Time Since Update (s)	The time in seconds since the last communication with the node. This time includes polling updates, record uploads, and configuration loads.

Column	Description
CommStatus	Can be one of the following values: • `alive` – The node is communicating. • `late` – If a response to a polling program is not received within 3 minutes, the Log Inserter sends a ping. If the ping does not respond in 10 minutes, the communication status is set to `late` and another ping is sent. The system continues pinging every 10 minutes until a response is received. • `expired` – If a ping returns before the response for any preceding request, the original request was lost. The request is abandoned and the communication status is set to `expired`. A request can be lost if a destination Site Server or VIP is shut down. The state changes from `expired` when the device responds to a request. • `timeout` – A request to the device timed out. The device is not communicating. • `site not connected` – The site is currently not connected. • `cannot send` – An unrecoverable error. The Log Inserter cannot send a program to the communications subsystem. The Log Inserter shuts down if Network Router is not running. Restart the system. • `invalid password` – The password entered for this device in Management Console is invalid. • `password changed` – The password for this device has been changed. Update the password for the device in Management Console. • `site not responding` – The connection is unexpectedly broken during communication with the device. • `device disabled` – The device or its site is not enabled. Note that Log Inserter automatically removes this node from this list if the node had been detected by automatic means. • `does not exist` – The device is not registered in the system. In auto-mode, the device eventually disappears from the list unless it is referenced remotely by a VIP. • `pending` – No responses have been processed. • `nack'd` – The request was not acknowledged. This could mean that the Site Server hosting the device is not running. • `validating` – Treemon reported that the device is not responding. A signal is sent to Treemon to validate the state. This state clears once Treemon (via Validator) establishes communications with the device.

Column	Description
Comments	Under steady-state conditions, this is blank. While the Log Inserter attempts to upload configuration information, this can contain a string value indicating that the `Tree is in use by another client.` This indicates that the Log Inserter cannot process the device until the aforementioned client releases it. If the client is ION Designer, it is not released until the node is closed in Designer or Designer is closed. If the client's name ends with `-not-clean`, the node is currently being evaluated by Treemon/Validator.
AggregateSetupCount	The aggregate setup count of the device. The Log Inserter uses this to detect configuration changes.
RequestedIONs	The number of ION registers, modules, and/or managers that have been requested from the tree. The Log Inserter needs to upload configuration information to determine which logs need to be processed, which labels should be used for measurement mapping and source resolution, and which labels to use for event cause and effects. The Log Inserter retrieves the currently cached tree from Treemon, populating as needed by communicating directly with the device. The tree is locked for the duration of this process, and this prevents Designer from opening the tree. If the value is: • `none` – No configuration information is currently required. This is typical in a steady-state condition. • `cache` – Only the currently cached configuration is required. This is typically seen at startup. • A number – The Log Inserter needs specific information and that number of ION objects has been explicitly requested.

Column	Description
RequestStatus	The status of the tree requests can include one of the following values: • `ready` – The Log Inserter does not require any configuration information. • `requesting` – The Log Inserter requires configuration information and is in the process of gathering it. The value in **Request Update Time** indicates how long it has been processing this request. • `retrying` – A previous tree request was not successful. (See the **Comments** column for the reason.) The request is retried, as shown by the value in **Request Update Time**. The amount of wait time before retrying a request depends on the nature of the unsuccessful tree request: – Tree in use by another node – 10 seconds. – Tree dirty – 10 seconds. – Not responding – 60 seconds. – Tree request timed out after 10 minutes – 5 minutes. – Comm error – 10 seconds. – Other errors – 5 minutes. • `blocked` – The Log Inserter requires configuration information but all available resources are in use. By default, the Log Inserter can simultaneously request only up to 2 trees per site and 6 trees in total. The **Request Update Time** value indicates how long the request has been pending. • `processing` – The Log Inserter has received the requested ION objects and is processing them. The **Request Update Time** value indicates how long this request has been processed, including the time during the "requesting" state. • `abandoned` – This is the same as the `retrying` status but the request of some of the configuration information was not successful following the successful receipt of some information. The Log Inserter recovers when it retries the request.
Request Update Time (s)	The time varies depending on the status of the tree requests described for **RequestStatus**.
pID	The program ID of the program used to poll the current position counters. The Log Inserter now performs its own polling, and as a result, the entry in this column is not used for diagnostic purposes.

The following table summarizes the columns on the **Node Performance** tab:

Column	Description
Node	The name of the device, VIP, or Log Inserter.

Column	Description
Responding	Indicates whether or not the node is responding. For a VIP, this includes all external nodes connected, directly or indirectly, to the input of a Recorder. The responding state is used to determine whether or not the download of the log is caught up.
All Logs Polling Disabled	Indicates if log upload is disabled for all recorders on the device. A `Yes` in the column indicates that log upload is disabled.
TotalLogs	The total number of Data Recorders, Waveform Recorders, Event Log Controllers, and System Log Controllers that the Log Inserter is configured to collect data from a given node. Note that when automatically detecting these modules, this number may change as the Log Inserter gathers configuration information.
PendingRecords	The total number of records that the Log Inserter has requested from the node but has not yet received.
OutstandingRecords	The total number of records not yet uploaded based on the last read position counter on the device and the position of the last uploaded record, taking into account the maximum depth of each log.
ProcessedRecords	The number of records that have been inserted into the database. Note that a record typically corresponds to a number of DataLog entries. The term "record" refers to records at the device level.
Generated Rec. per sec	An estimate of the number of new records being generated per second.
Retrieved Rec. per sec	An estimate of the number of records being uploaded per second.
Avg Retrieval Time (s)	The average round-trip time in seconds taken to retrieve a record from a device.
Avg Processing Time (s)	The average time in seconds necessary to insert a record into the database.
RestoredLogs	The total number of logs that the Log Inserter is configured to gather information for.
ManagedLogs	The total number from the value in **RestoredLogs** that is being monitored by an enabled Log Acquisition Module (LAM).
ConfiguredLogs	The total number from the value in **RestoredLogs** that are Recorders and have source inputs or are Event Log Controllers or System Log Controllers.
ConfirmedLogs	The total number from the value in **RestoredLogs** for which the current configuration is known.
NumCaughtUp	The total number from the value in **RestoredLogs** for which the node is responding and there are no records outstanding or pending.

The following table summarizes the columns on the **Log Performance** tab:

Column	Description
Node	The name of the device, VIP, or Log Inserter in question.
LogHandle	The handle of the Log Register or Event Log Register for this Node.

Column	Description
Responding	Indicates whether or not the node is responding. For a VIP, this includes all external nodes connected, directly or indirectly, to the input of a Recorder. This state is used to determine whether or not it is caught up.
Polling Disabled	Indicates which individual recorders are excluded from polling requests. A `Yes` in the column indicates which recorders are excluded.
PendingRecords	The total number of records that the Log Inserter has requested from the node but has not yet received. This number includes event records that have been uploaded but are cached internally pending configuration information necessary to complete the processing of the cause and/or effect ION objects.
OutstandingRecords	The total number of records not yet uploaded based on the last read position counter on the device and the position of the last uploaded record, taking into account the maximum depth of each log.
ProcessedRecords	The number of records that have been inserted into the database. Note that a record typically corresponds to a number of DataLog entries. In this context, "record" refers to records at the device level.
Generated Rec. per sec	An estimate of the number of new records being generated per second.
Retrieved Rec. per sec	An estimate of the number of records being uploaded per second.
Avg Retrieval Time (s)	The average round-trip time in seconds taken to retrieve a record from a device.
Avg Processing Time (s)	The average time in seconds necessary to insert a record into the database.
Restored	This is always yes. If the log is not "restored", it does not appear in the list.
Managed	A Log Acquisition Module (LAM) is enabled that is monitoring this log.
Configured	The log is a Recorder that has source inputs or it is an Event Log Controller or a System Log Controller.
Confirmed	The latest configuration for the log has been uploaded. For a VIP Recorder that references external devices, directly or indirectly, the configuration information includes information from the external device.
CaughtUp	The node is communicating, the current configuration is known, and there are no outstanding or pending records. For a VIP, any device on which the log depends for information must also be responding.

Alarm Service

Alarm Service provides the status of alarms that you configure and enable in the Software Alarms application.

The information is organized in a grid. The column labels indicate the type of information provided, such as **Rule Name**, **Alarm Name**, **Alarm Status**, and so on. See the *Software Alarms Help* (accessible from the Software Alarms application) for further information about configuring alarms for multiple sources and measurements.

Log Pipeline Service

The Log Pipeline Service diagnostics provides information on the Log Subsystem Data Pipeline. It shows a variety of statistics on log collection and insertion performance.

Starting with PME 2020, Log Inserter writes log data into a message queue instead of writing it to SQL Server directly. Another process (the Log Subsystem Router Service) reads the messages from the queue and writes the data to SQL Server.

Previously, the Log Inserter would wait for database writes to complete before processing the next piece of data. This effectively limited the rate of data insertion to something that SQL Server could handle. Writing to MSMQ is much faster: MSMQ can store messages in the queue faster than Log Inserter can retrieve them from the devices. However the performance of SQL Server has not changed, which means that data can accumulate in the queue faster than it can be inserted into the database. Allowing the message queues to become full (they have a limited storage capacity) results in failure modes that are difficult to handle automatically. To avoid this scenario we monitor the size of the inbound data message queue and prevent writes when it contains more than a set number of bytes. If the message queue reaches a specified capacity, then no future messages will be accepted from LogInserter and the write thread is "put on hold" until the message queue has dropped below a specified capacity. This ensures that LogInserter never considers data written that may be missed in the message queue due to over capacity.

The following table summarizes the columns on the **Pipeline Status** tab:

Column	Description
Name	Identifies the message queue (Primary or Secondary) and the type of data being tracked.
Duration	Total time that the diagnostics have been counted. In practice this value will be identical for all rows.
Message Count	Number of messages that have been processed from this queue since the service was started.
Messages Per Minute	Number of messages that have been processed in the last minute.
Messages Per Minute Average	Average of the messages per minute over the last hour (60 samples).
Messages Per Minute Max	Maximum number of messages per minute over the last hour (60 samples).
Messages Per Second	Number of messages that have been processed in the last second.
Messages Per Second Average	Average of the messages per second over the last minute (60 samples).
Messages Per Second Max	Maximum number of messages per second over the last minute (60 samples).
Processing Time Milliseconds Average	Average time taken to process each message (milliseconds).
Processing Time Milliseconds Max	Maximum message processing time (milliseconds).
Time Since Last	Elapsed time since a message was last processed.
Start Time Utc	Time in UTC at which the service was started.

The following table summarizes the columns on the **Message Queues** tab:

Column	Description
Identity	Identity of the message queue.
Queue Type	Data or Control
Message Count	Number of messages currently in the queue.
Message Kilobytes	Size of messages currently in the queue (kilobytes).
Maximum Kilobytes	Maximum size allowed for the queue. Note that a value of 4294967295.00 (4GB) is the maximum amount of data that the entire MSMQ service can support. This effectively indicates that no queue-specific limit has been defined.

The **Message Queues** tab allows you to inspect messages flowing through the pipeline. Enabling message capture increases the load on the pipeline so this should not be left activated indefinitely.

The controls on the top select which messages are written to the table. This filtering only occurs as the messages arrive at the tab; once a message is displayed in the table it will not be removed when the Message Type or Source Filtering fields are changed. Rows already in the table may be filtered by the fields below the header.

The viewer buffers messages as they arrive to avoid locking up the receiving thread. If the buffer fills (which indicates that messages are arriving faster than the viewer can process them) a message indicating how many messages were missed will be written to the table.

Communications Diagnostics

Communications Diagnostics provides diagnostics information for sites and devices connected to the workstation.

Site overview

Diagnostics information for the sites are contained in these tabs:

- **Device Summary** displays communications statistics for each site.
- **NetUser Status** displays the number of ION programs currently in the ION Network Router Service queue (awaiting processing) and the total number of ION programs already processed.

NOTE: Requests and responses transmitted between the software components are referred to as “ION programs”.

Site/Device Diagnostics

Diagnostics information for sites and devices are summarized in these tabs:

- **Communication Status** displays error rates and connection statistics for the selected site or device. The following information is available from the **Communications Status** tab:

Column	Description
Node	The device (or software node) name.
Requests	The number of communications requests transmitted to the meter.
Responses	The number of successful responses received.

Column	Description
Request Ratio	The number of requests sent to the device to fulfil the last client request. The value is always `1` for ION devices but it varies for Modbus devices.
Total Errors	The total number of communication errors.
Total Err Rate (%)	The ratio of Total Errors to Requests.
Sliding Err Rate (%)	The error rate in the last 100 requests. This can indicate a trend in communications performance.
Time Util (%)	The percentage of the communication channel utilized (serial line or Ethernet) on the site.
Avg Resp Time (s)	Average time in seconds for the meter to respond.
Last Resp Time (s)	The last response time, in seconds.
Timeouts	The number of timeouts. A timeout occurs when no data is received in response to a request.
Bad CRC	The number of bad packets received, that is, those that do not pass the error-detection checksum.
Incompl. Frm	The number of incomplete packets received, that is, those that did not have all the expected bytes.
Broken Conn.	Number of times the connection was lost to the meters on a site.
Bad Frames	The number of received packets that had an internal error.
HW Errors	Number of errors reported by the computer's communication hardware.
Misc Errors	Number of other errors that do not fit any of the above descriptions.

- **Site Status** displays site statistics such as connection status and totals.
- **Polling Status** displays the number of programs currently in the ION Site Service queue (awaiting processing) and the total number of programs already processed.

Communication Status vs. Site Status

This section explains the difference between the statistics provided on the **Communication Status** tab and those on the **Site Status** tab.

"Total Errors" in the **Communication Status** tab is an ION Site Service derived statistic, while "Bad Responses" in the **Site Status** tab is a client derived statistic.

To explain this difference, consider a situation where a direct site is experiencing timeouts. Communications with the device is attempted according to two parameters: **Connect Attempts** (an advanced site property) and **Maximum Attempts Multiple** (an advanced device property). Multiplying the values of these two properties determines the number of attempts made to re-establish communications with the device.

For instance, if **Connect Attempts** is set to 1 and **Maximum Attempts Multiple** is set to 3, the device will go offline after 3 attempts (that is, 1 x 3).

The "Total Errors" statistic increases by one every time ION Site Service detects a timeout. However, the "Bad Responses" statistic only increments every time a response is sent back to a client.

Using the previous example, consider the case where four timeouts occurred and the device went offline. In this case, “Total Errors” increases by four, while “Bad Responses” only increases by one. If only two timeouts occurred, “Total Errors” would increase by two, while “Bad Responses” would not change.

The following information is available from the **Site Status** tab.

Column	Description
Node	The device (or software node) name.
Status	The device communication status.
Current Attempt	The current number of repeated attempts to communicate with the device.
Max Attempts	The maximum number of attempts before flagging the device as offline (Timed-out).
Offline Count	The total number of times the device went offline.
Bad Responses	The total number of errors sent back to the clients, such as to Vista.
Last Response	The time when the last response was received.
Last Attempt	The last time that a request was sent to the device.
RT Data Reqs	The total number of requests to the device sent by the Real Time Data Service.
TreeMon Reqs	The total number of requests to the device sent by the TreeMon service.
VISTA Reqs	The total number of one shot requests to the device sent by a Vista client (control, label requests…).
LogInserter Reqs	The total number of requests to the device sent by the LogInserter service.
IONSERVICE Reqs	The total number of requests to the device sent by ION real-time services.

Note that the last five columns on the **Site Status** tab are dynamic. That is, the columns are only shown when requests were sent to the device from a Power Monitoring Expert service or client.

Additional commands

The following sections describe additional display options and shortcut menus available in Diagnostics Viewer.

Diagnostic Details

In the tabs on the diagnostics information pane, double-click a row to display its **Diagnostic Details** screen. This displays the diagnostic information for the selected item only.

Use the **Previous** and **Next** buttons to view the details of other rows in that tab of the diagnostics information pane.

To copy information to the clipboard, select the rows you want to copy, then press **CTRL+C**.

Diagnostics Information pane shortcut menu options

Right-click the diagnostics information pane to display a shortcut menu. The following table lists all the commands available (though not all panes in Diagnostics Viewer provide all the commands listed):

Right-click Option	Description
Update	Refreshes the information in the diagnostic table.
Reset	Resets the information in the diagnostic table (not available in the Communications Server Diagnostics display).
Copy All	Copies all selected information to the clipboard.
Auto Scroll	Enabled by default, this option is only available in the Console Messages tab of the Communications Server Diagnostics display. This option automatically scrolls and selects the latest console message. Clear this option to disable scrolling (that is., select and view an older console message without jumping to the latest one when Diagnostics Viewer refreshes).
Options	Displays the **Options** dialog where you can change the diagnostics refresh rate. Note that changing the refresh rate frequency can affect the product's performance.

Decommissioning

Decommissioning removes PME files to prevent potential disclosure of sensitive, confidential and proprietary data and software from your system. You risk disclosing your power system data, system configuration, user information, and other sensitive information if you don't decommission. We strongly recommend you decommission your system at the end of its life.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Before decommissioning, verify that the system is not performing critical control actions that may affect human or equipment safety.

Failure to follow these instructions can result in death or serious injury.

⚠ WARNING

INACCURATE DATA RESULTS

Before decommissioning, verify that the system data results are not used for critical decision making that may affect human or equipment safety.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

To decommission PME you have two choices, **Destroy** or **Overwrite.**

Destroy: Choose this if you do not need to use your hard drives for any other software.

Overwrite: Choose this if you still need to use your hard drives for other software. This method uses a commercial tool to put random data in place of PME files on your hard drives.

See Decommissioning Reference for detailed instructions.

Applications

Use the information provided in this chapter to build applications based on Power Monitoring Expert.

Use the links in the following table to find the content you are looking for.

Application	Description
Disturbance Direction Indicators	This application (also known as DDD Indicators), can help you identify power quality disturbances, their type, and the likely location of origin. The disturbance information is shown with visual indicators that are integrated into an electrical one-line diagram.
Thermal Monitoring of Low Voltage (LV) Busways	This application provides continuous monitoring of the thermal conditions of low voltage busways. You can see temperature data in real-time, analyze historical temperature trends, and set up alarming based on temperature thresholds.
Thermal Monitoring of Medium Voltage (MV) Substations	This application provides remote, continuous monitoring of the thermal conditions of MV substations. You can see temperature data in real-time, analyze historical trends, and receive alarms and notifications.

Disturbance Direction Indicators

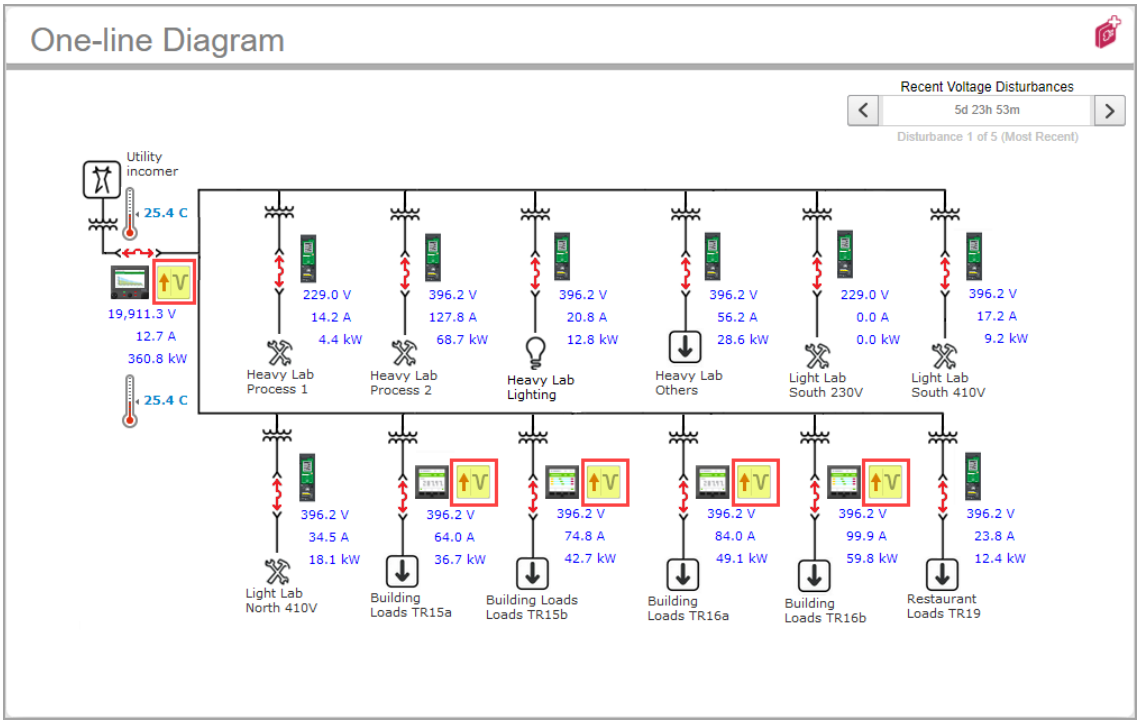
Overview

In this application (also known as DDD Indicators), we add voltage disturbance indicators to an electrical one-line diagram. The indicators are associated with the power monitoring devices that recorded the disturbance. The indicators show the type of voltage disturbance (sag/swell/transient) and the disturbance direction relative to the monitoring device. By combining the information from multiple devices in a network we can then identify where the disturbance originated. Up to 5 voltage disturbance Incidents, going back in time, are displayed.

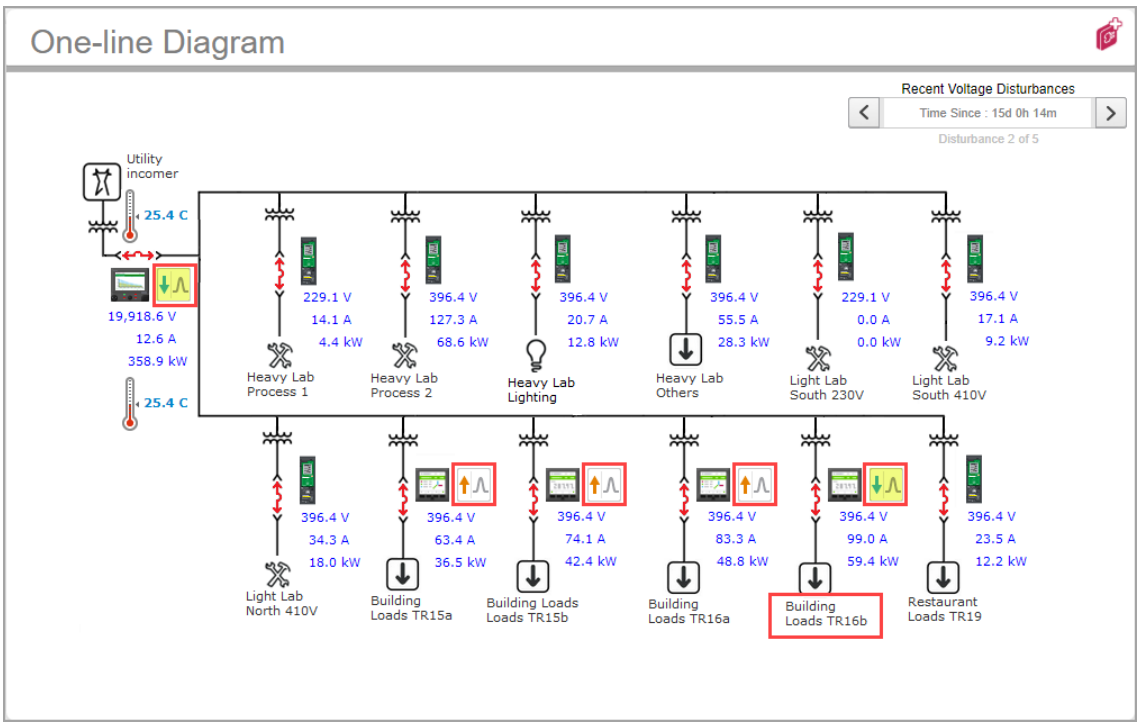
NOTE: The examples and screen captures shown in this application description are for illustration purposes only. They are not intended to give guidance on configuration settings or application details. For guidance on configuration of your system or other application details, consult a qualified professional.

Examples:

Below is an example of a one-line diagram showing a voltage sag that originated outside the network.



This is an example of a one-line diagram showing a voltage swell that originated inside the network, most likely in "Building Loads TR16b".



NOTE: The red frames and yellow highlights were added to the images in this document to highlight the disturbance indicators. The frames and highlights are not displayed in the actual diagram.

Components

The DDD Indicators application is based on the following system components and features:

- Power Monitoring Expert 2020 software.
- Power monitoring devices with Disturbance Direction Detection (DDD) functionality. (See Prerequisites for a list of compatible devices.)
- A one-line diagram of your electrical network.
- A Virtual Processor (VIP) framework.

NOTE: Creating the basic one-line diagram, without indicators, is outside the scope of this application description. For information on how to create diagrams in PME, see Creating and customizing a user diagram .

Prerequisites

The following is required to set up the DDD Indicators application:

- PME must be installed and commissioned.
- Power monitoring devices with DDD functionality must be installed in your electrical network in those locations where you want to monitor for voltage disturbances. The devices must be connected to PME and must be communicating. The following devices are compatible with this application:
  - ION9000
  - PM8000
  - ION7650 (v350 and higher)
  - ION7550 (v350 and higher)
  - ION7400
  - ION8650A/B (v407 and higher)
  - ION8800A/B (v362 and higher)
  - 9410 series
  - 9810 series
  - ACCESS 9610
- The internal clock of the monitoring devices must be time synchronized. The standard synchronization (± 1s) between the PME server and the monitoring devices is good enough. High accuracy (± 1ms) time synchronization (for example, GPS, IRIG-B, or PTP) can also be used, but is not needed for this application.
- Power quality event detection for Sag/Swell and Transients must be enabled in the power monitoring devices for which you want to show the disturbance indicators in the one-line diagram.

- You need a one-line diagram for each electrical network that you want to include in this application. For information on how to create diagrams in PME, see Creating and customizing a user diagram .

Limitations

To create the voltage disturbance indicators for the one-line diagram, we use the DDD Indicator Wizard. This tool has the following limitations:

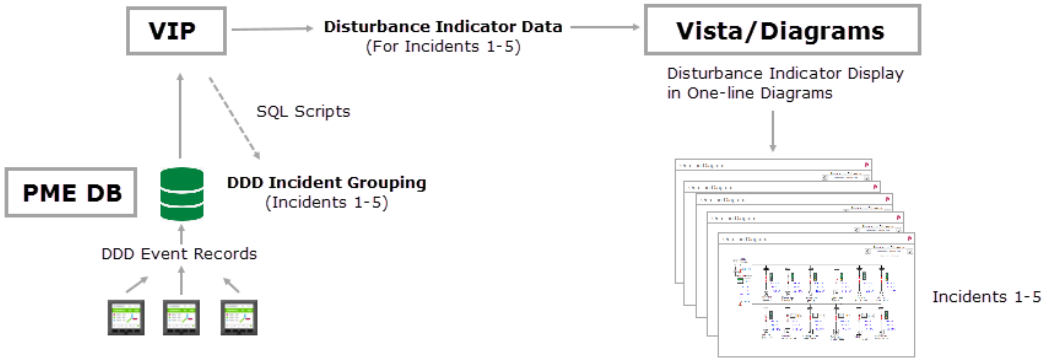
- A maximum of 30 power monitoring devices can be included in this application.

  TIP: For information on how to set up this application to support more than 30 devices, see the **PME 9.0 How do I extend the DDD Indicators Application to support more than 30 devices** application note. See Resources for link information.

- You can create indicators for up to 5 different electrical networks.
- You can display data for the last 5 voltage disturbance Incidents.

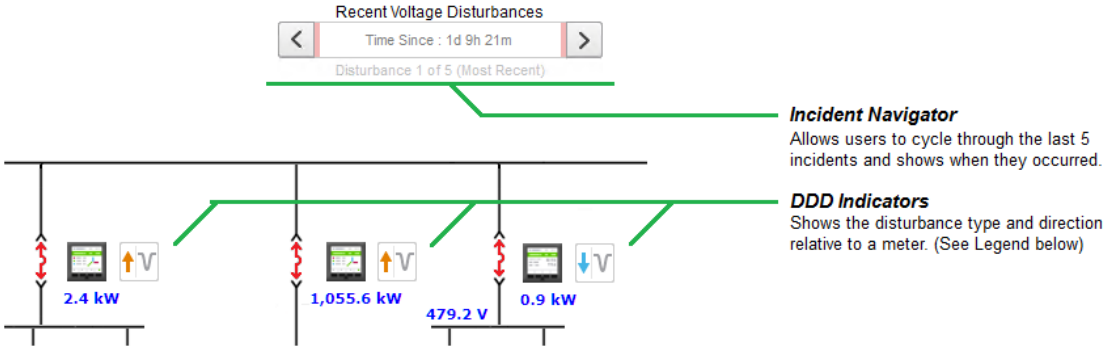
Design

The voltage disturbance indicators in the electrical one-line diagram show the type of the disturbance (sag/swell/transient) and its direction, relative to the monitoring device (upstream/downstream). This information is based on DDD event records that are recorded by the devices and uploaded into the PME database. A VIP framework triggers database scripts that run every 5 minutes and scan the database for DDD event records, going back in time. Events that occurred within a short time interval (< 60s between events) are grouped together into an Incident. The scripts continue to scan for DDD events until 5 Incidents have been found, or the event data is older than 180 days. The DDD information for each of the Incidents is then processed by the VIP for display in the one-line diagram.



We create 5 identical copies of the one-line diagram, one for each disturbance Incident. The diagrams are linked together so you can navigate between them using the Incident Navigator.

Example:



Configuration

Before configuring the DDD Indicators application, confirm that the Prerequisites are in place for your system.

New Application

Configuring the DDD Indicators application for the first time in your PME system, requires the following steps:

- Setting up the DDD Indicator framework in the VIP.
- Running the DDD Indicator Wizard in Vista.

To set up the DDD Indicator framework in the VIP:

1. Open Designer and log in with a supervisor-level user account.
2. Open the **VIP.DDD** node.

   NOTE: The VIP.DDD is part of the default PME install. Only use this VIP for the DDD Iindicators application. Do not use the VIP.DDD for any application other than the DDD Indicator. At this point of the configuration process, the VIP.DDD should only contain the **EventLogCtl 1**, **Diagnostics 1** and **VIP ION** core modules. If there are other modules in the VIP.DDD that are not related to this application, then move these modules to a different VIP, or delete them, before installing the DDD framework. Do not install the DDD framework into the VIP.DDD as long as it contains other, non-core modules. See Upgrade from a pre- 9.0 version of PME, if your PME system was upgraded and contains a VIP configuration for an earlier version of the DDD Indicators application.

3. Click **Edit > Paste from framework**.
4. Navigate to `...\config\fmwk\DDD_Indicator_Wizard` and open `DDD Indicator_Wizard.fwn`.
5. In Paste Summary, select the framework modules for lock paste.

   NOTE: You must lock paste the framework or the DDD Indicator Wizard will not function correctly.

TIP: For information on lock pasting ION modules, see Copying and pasting ION modules.

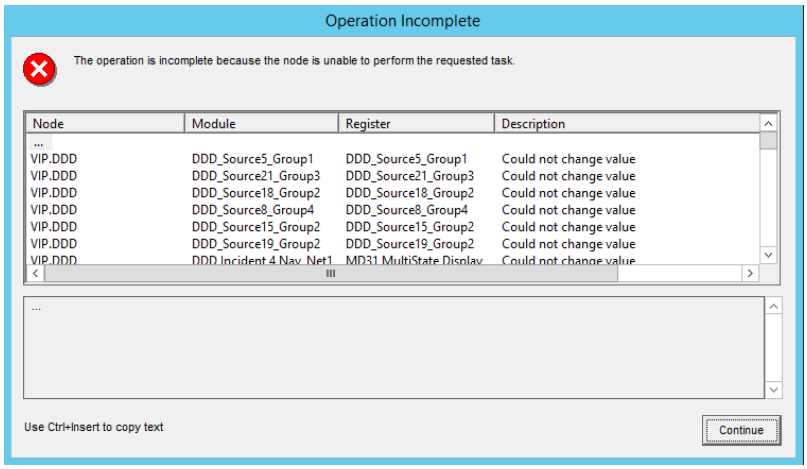
⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Before pasting an ION framework verify that the system is not performing critical control actions that may affect human or equipment safety.
- Do not overwrite an existing ION framework in the VIP using lock paste.
- Verify correct system operation after pasting an ION framework.

Failure to follow these instructions can result in death or serious injury.

6. In Paste Summary, click **OK** to paste the framework.
7. In Designer, **Send & Save** the changes.
8. An **Operation Incomplete** message box is displayed. This is expected. It is caused by the initial state of some of the modules in the ION framework when they are saved the first time. Click **Continue**.



9. In Designer, **Send & Save** the changes again. No message box should appear this time.

   View of the DDD framework after pasting and saving:

10. This completes setting up the DDD Indicator framework. Close the VIP.DDD node in Designer.
11. Close Designer.

To run the DDD Indicator Wizard in Vista:

1. Open Vista and log in with a supervisor-level user account.
2. Click **File > Open**.
3. Navigate to `...\config\diagrams\ud\DDD_Indicator_Wizard` and open `How To Use This Wizard.dgm`.
4. Follow the steps in the DDD Indicator Wizard to complete the configuration.

   TIP: Later, to simplify the copying of the DDD Indicators from the wizard to the one-line diagrams, click **Window > Arrange All** in Vista to show the wizard and the diagrams side-by-side.

Upgrade from a pre- 9.0 version of PME

If you have a PME system that was upgraded from a version of the software older than PME 9.0 and that already has the DDD Indicators configured, then you have the following options:

A. Maintain or extend the application, using the methods that were valid in the older version of PME for which it was first configured.

   See the System Technical Note: "How can I …Indicate a Disturbance's Direction Using a Power Monitoring Expert's One-Line Diagram?" for details.

B. (Recommended) Remove the existing DDD Indicators configuration and rebuild it with the new PME 2020 methods.

To remove the existing DDD Indicators configuration and rebuild it with the new PME 2020 methods:

- Delete the existing (old) DDD Indicators VIP framework.
- Delete the DDD Indicators and the Incident Navigators from the existing one-line diagrams.

  TIP: Make a note of the devices that were used for this application so you can use that information when building the new DDD Indicators.

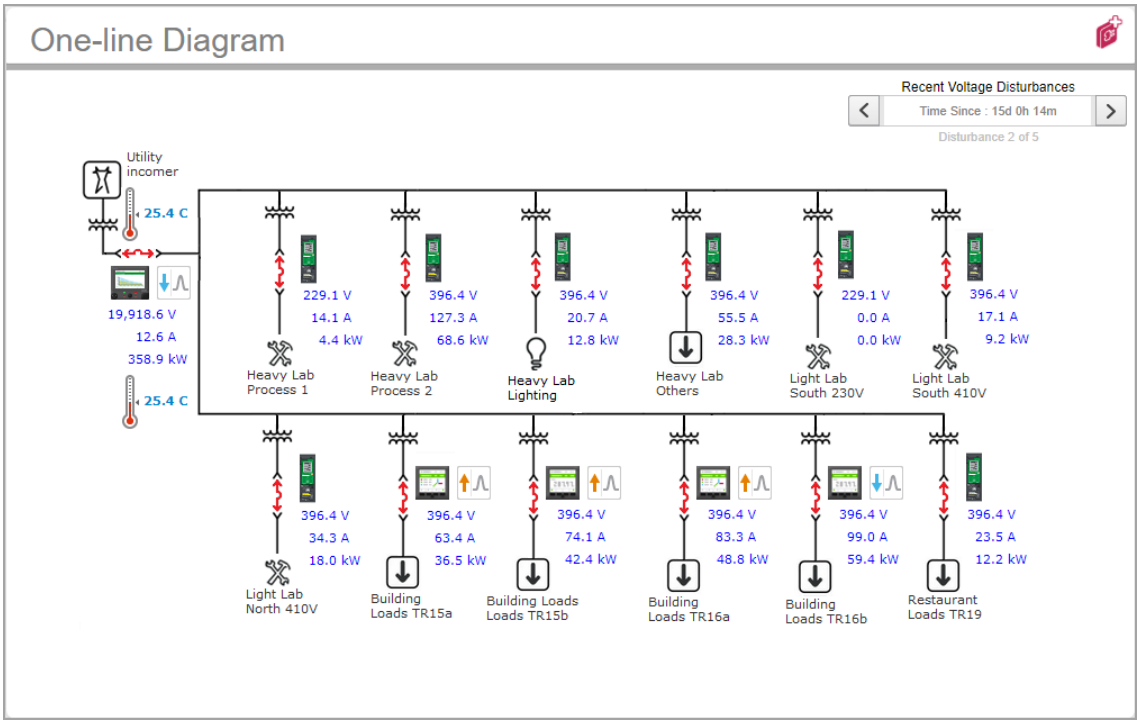
- Disable or remove the automatic DDD database table updates. This was done with an SQL Server Agent job for systems SQL Server Standard, or a task in the Windows Task Scheduler for systems with SQL Server Express. See the System Technical Note: "How can I …Indicate a Disturbance's Direction Using a Power Monitoring Expert's One-Line Diagram?" for details on how this was setup.
- Follow the New Application steps to recreate the previous DDD Indicators application.

NOTE: You cannot mix the old ways of configuring this application with the new DDD Indicator Wizard configuration. The old and the new methods for Incident grouping are not compatible.

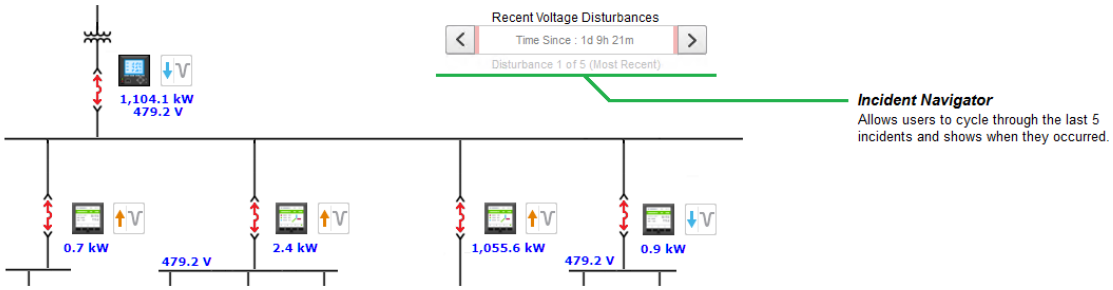
TIP: PME 2020 uses a wizard to configure large portions of the DDD Indicators application. This makes it much easier and faster to implement this application as compared to previous versions. We recommend you recreate existing DDD Indicators applications in PME 2020 instead of maintaining them using the old, manual methods.

Operation

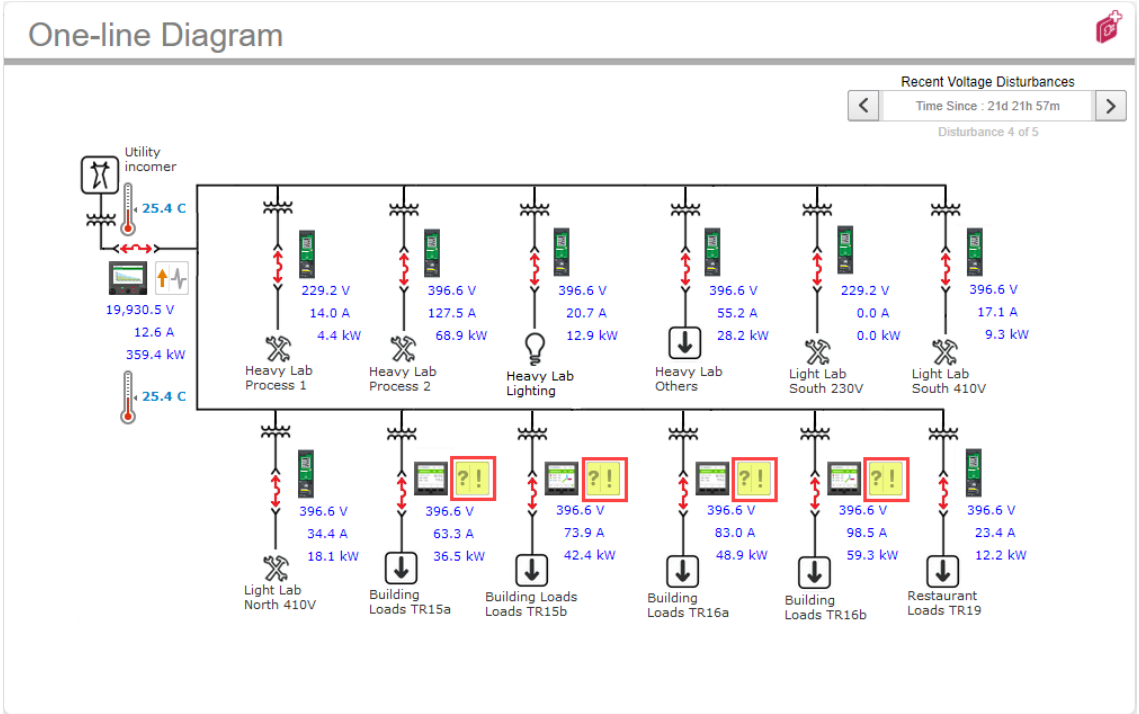
After you have configured the application you can view the voltage disturbance indicators in your one-line diagram:



You can view the last 5 disturbance Instances by using the Incident Navigator:



If your PME database does not have disturbance data for a device for a particular Incident, then the Indeterminate Event icon is shown for that device:



NOTE: The red frames and yellow highlights were added to the images in this document to highlight the disturbance indicators. The frames and highlights are not displayed in the actual diagram.

Below is a list of the different disturbance indicator icons that can be displayed, depending on the type of disturbances and the capabilities of the monitoring devices:

Icon	Name	Description
	Upstream Swell	A disturbance was detected upstream from the meter and identified as a swell
	Upstream Sag	A disturbance was detected upstream from the meter and identified as a sag
	Upstream Transient	A disturbance was detected upstream from the meter (for example, ION9000) and identified as a transient
	Upstream Various	A disturbance was detected upstream from the meter, however the type could not be identified, usually because more than one type of event was logged by the meter during the aggregation period
	Downstream Swell	A disturbance was detected downstream from the meter and identified as a swell
	Downstream Sag	A disturbance was detected downstream from the meter and identified as a sag
	Downstream Transient	A disturbance was detected downstream from the meter (for example, ION9000) and identified as a transient
	Downstream Various	A disturbance was detected downstream from the meter, however the type could not be identified, usually because more than one type of event was logged by the meter during the aggregation period
	Indeterminate Swell	A disturbance was detected by the meter and identified as a swell, however the direction could not confidently be determined.
	Indeterminate Sag	A disturbance was detected by the meter and identified as a sag, however the direction could not confidently be determined.
	Indeterminate Transient	A disturbance was detected by the meter (for example, ION9000) and identified as a transient, however the direction could not confidently be determined
	Indeterminate Event	The meter was unable to determine either the event type or direction for this disturbance

Maintenance

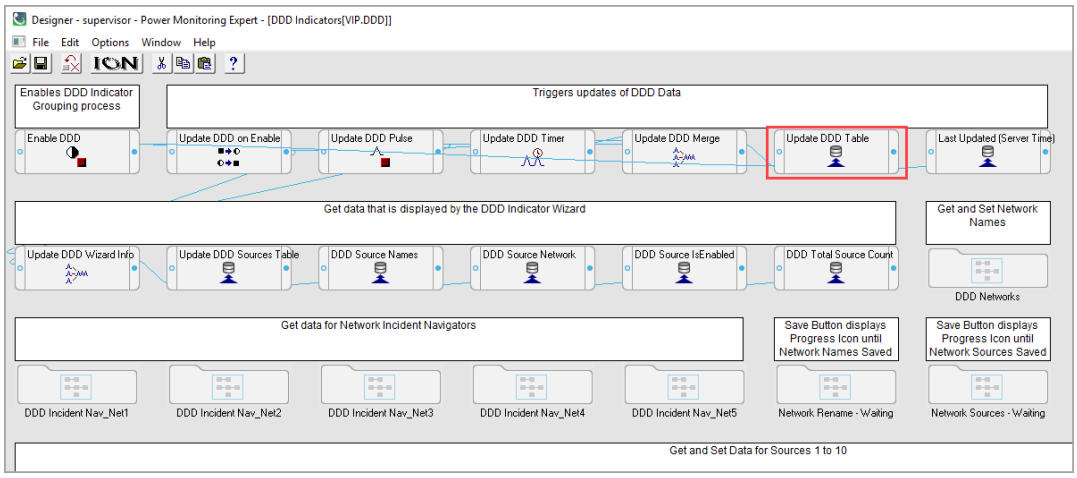
No maintenance is needed for the DDD Indicators application. However, you can customize certain aspects of the application to better meet your specific needs.

Customization: Change the Disturbance Reporting Time Range

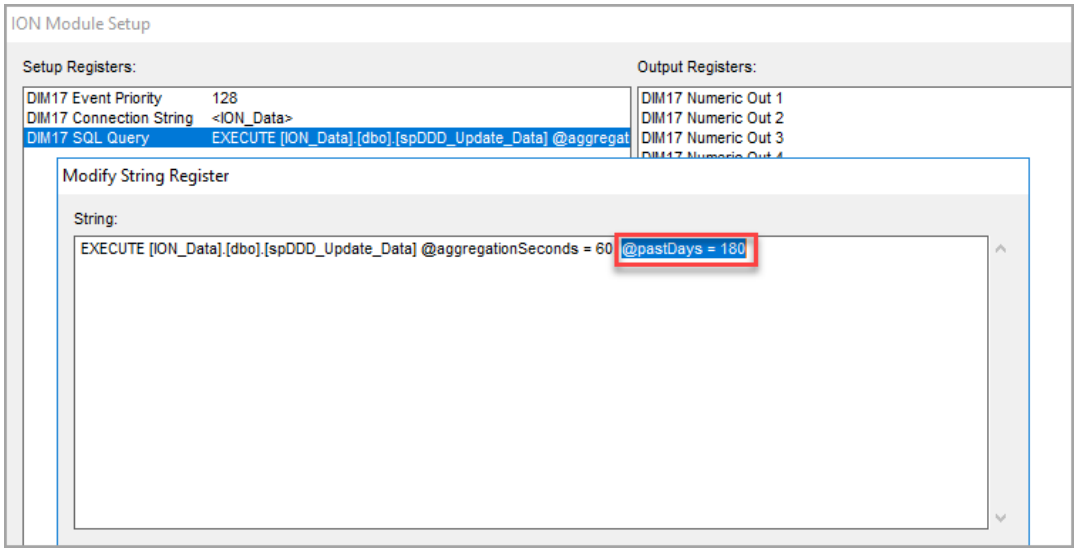
The scripts that search the database for disturbance events and create the Incidents are set to go back in time until they have found 5 Incidents or the data is older than 180 days. If your system did not record any disturbance events in the last 180 days, then there will be no Incidents and the one-line will not show any disturbance data. You can change the query time range to include disturbance data that is older than 180 days.

To change the disturbance reporting time range:

1. Open Designer and log in with a supervisor-level user account.
2. Open the **VIP.DDD** node.
3. Edit the **Update DDD Table** Database Import module that is part of the DDD Indicator framework.



Change the **@pastDays** parameter from a value of 180 to a higher value.



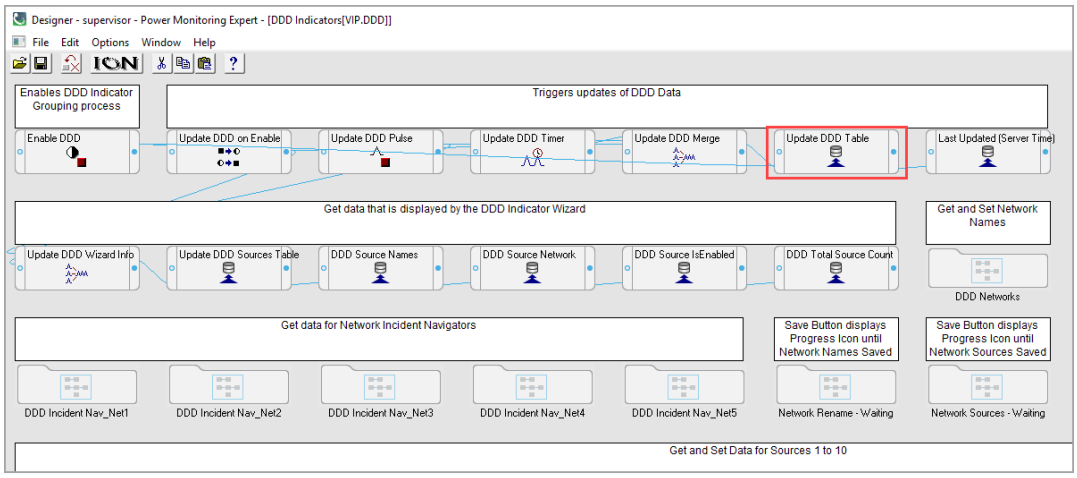
Customization: Change the Incident Grouping Time Interval

The scripts that search the database for disturbance events, group any disturbance event from any device into the same Incident, if the end time of one event and the start time of the next event are less than 60 seconds apart. This is based on the assumption that disturbance events that occur so close in time are related to the same cause. Depending on the application, the 60 second grouping interval might not be best. You can change the Incident grouping interval to shorten or lengthen the Incident boundaries.

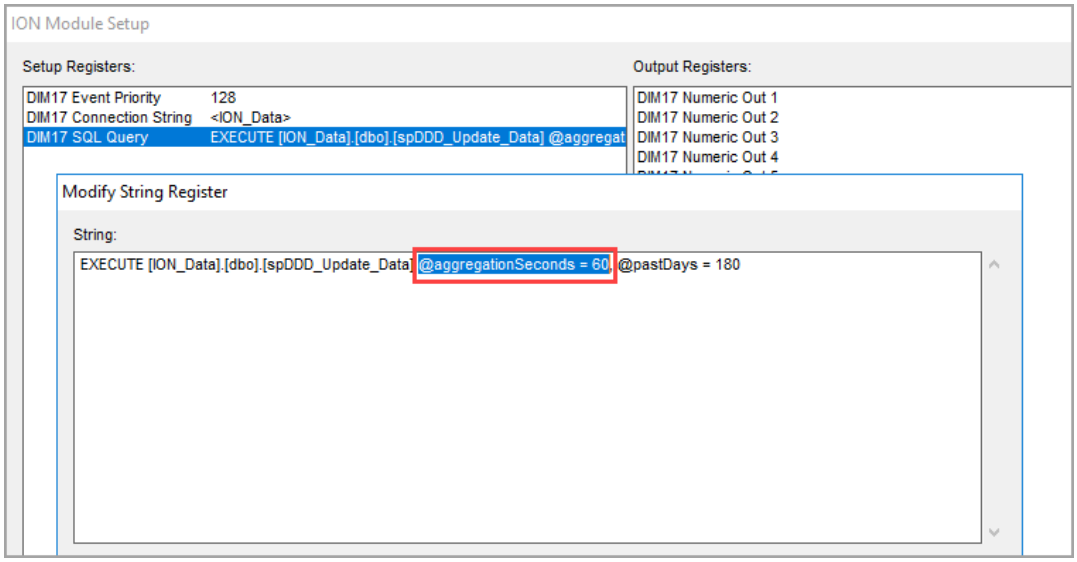
To change the Incident grouping time interval:

1. Open Designer and log in with a supervisor-level user account.
2. Open the **VIP.DDD** node.

3. Edit the **Update DDD Table** Database Import module that is part of the DDD Indicator framework.



Change the **@aggregationSeconds** parameter from a value of 60 to a value of 20, for example, to shorten the Incident Grouping Time Interval.



Thermal Monitoring of Low Voltage (LV) Busways

Overview

This application provides remote, continuous monitoring of the thermal conditions of low voltage busways equipped with Easergy CL110 or TH110 temperature sensors. You can see temperature data in real-time, analyze historical temperature trends, and set up alarming based on temperature thresholds. Any applicable PME power monitoring features are available to be used with the busway temperature data.

⚠ WARNING

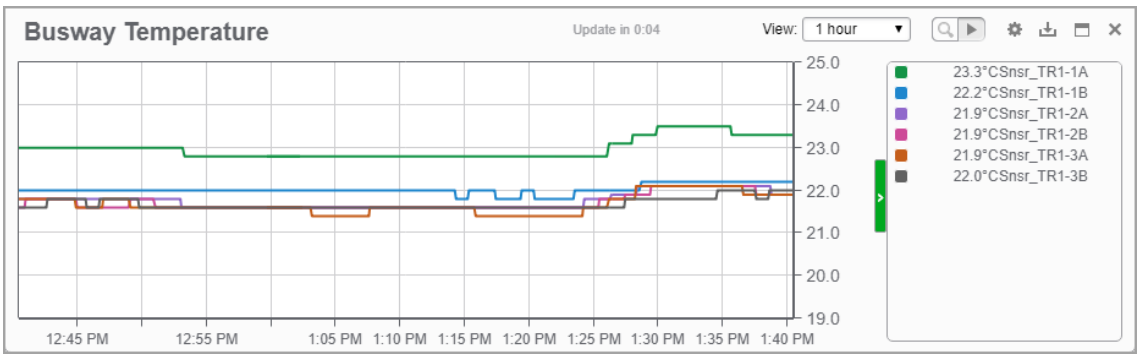
INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

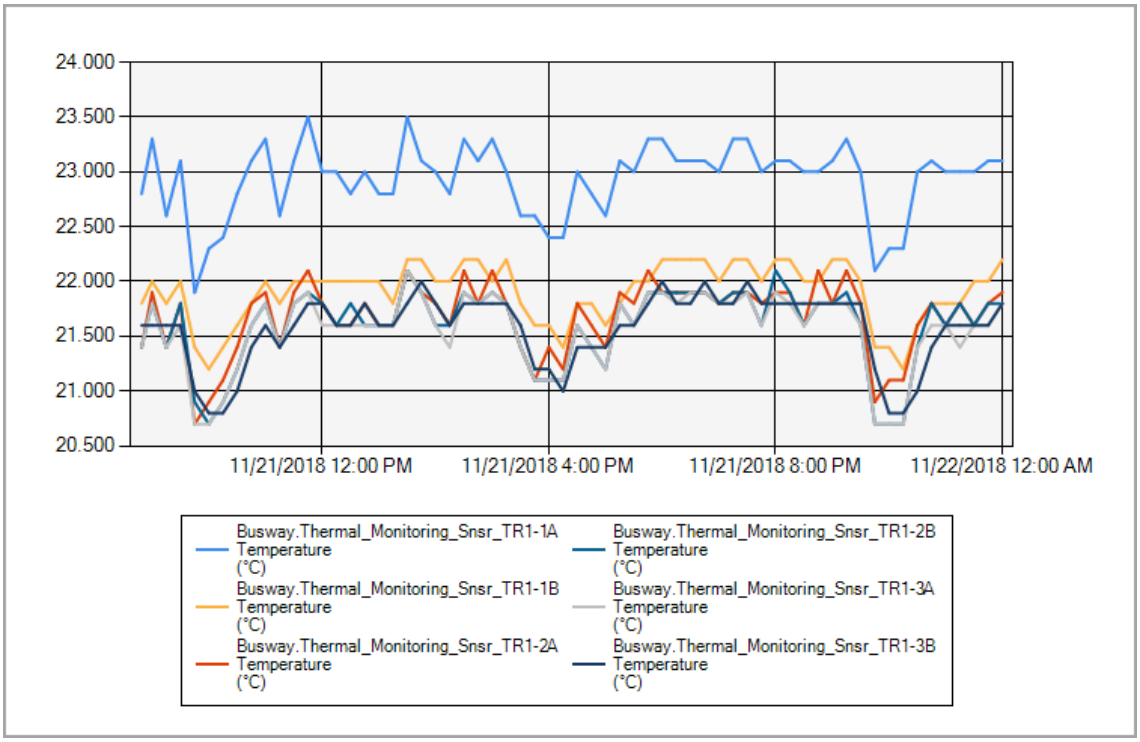
Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

NOTE: The examples and screen captures shown in this application description are for illustration purposes only. They are not intended to give guidance on configuration settings or application details. For guidance on configuration of your system or other application details, consult a qualified professional.

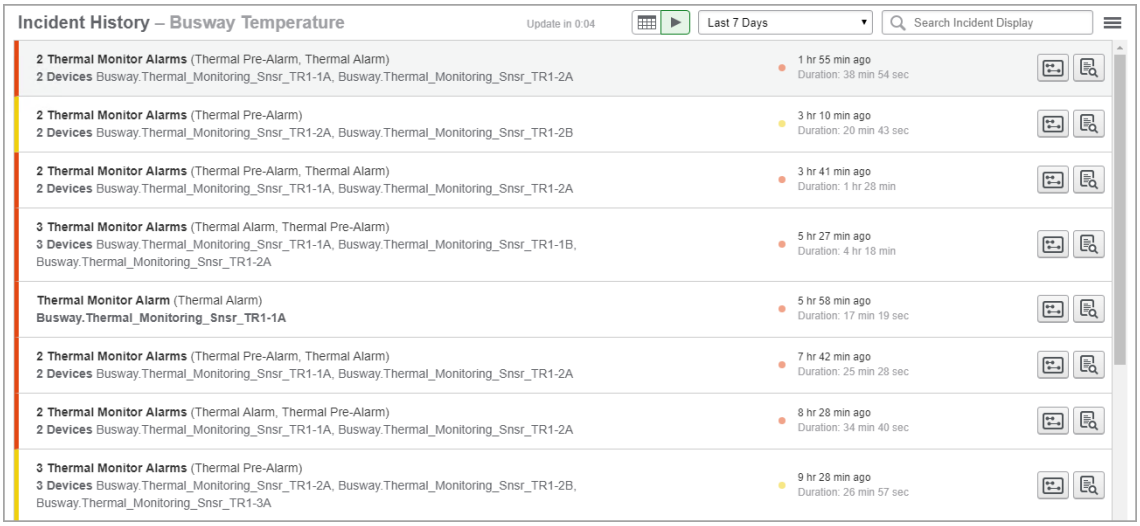
Examples:



The above is an example of a real-time trend showing busway temperature over the last hour.



The above is an example of a trend report showing the busway temperature over the last 24 hours.



The above is an example of an alarm incident history view showing thermal monitoring related incidents.

Components

The Thermal Monitoring of LV Busways application is based on the following system components and features:

- Power Monitoring Expert 2020 software.
- Vista diagrams for setup and diagnostics.

  NOTE: The diagrams include a sample user diagram. This sample diagram is intended as a starting point for the development of end user diagrams. Creating customized end user diagrams is outside the scope of this application description. For information on how to create diagrams in PME, see Creating and customizing a user diagram .

- Ethernet Gateway, such as the Link150.
- Busway with Easergy CL110 or TH110 temperature sensors.

  NOTE: The Easergy CL110 is an environmental sensor that can measure temperature and humidity. For this application we only use the temperature measurements.

Prerequisites

The following is required to set up the Thermal Monitoring of LV Busways application in PME:

- PME must be installed and commissioned.
- The busway temperature sensors must be connected to the ZBRN32 access point and must be communicating.
- The ZBRN32 access point must be connected to an Ethernet Gateway, such as the Link150.
- You must know the Ethernet address of the Gateway.
- You must know the Unit ID of the ZBRN32 access point.

  NOTE: Each ZBRN32 access point needs a mid-range device license in PME.

- You must know the temperature sensor locations on the busway to be able to assign meaningful names to the equivalent sources in PME.

Limitations

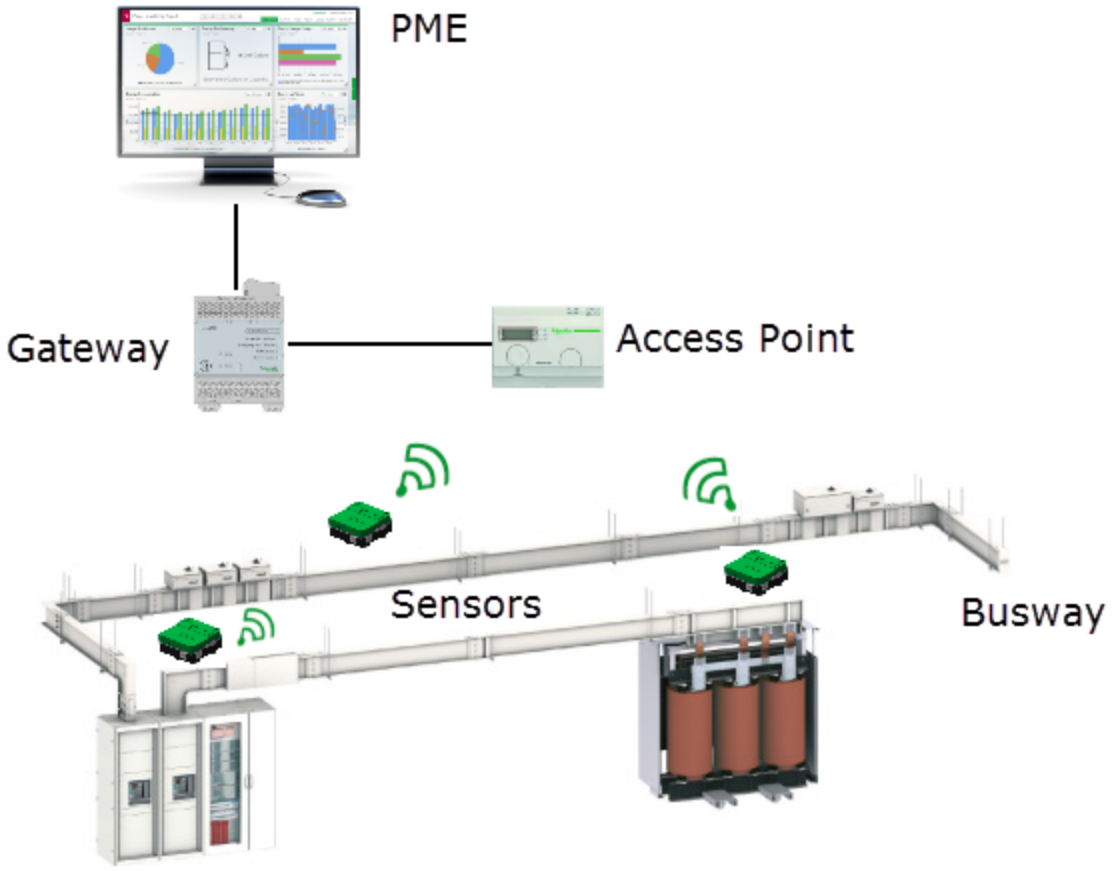
There are no specific, software-based limitations for this application in addition to the general PME performance and scalability limits.

Design

Easergy CL110 or TH110 sensors, attached to the busway, wirelessly transmit real-time temperature measurements to a Harmony ZBRN32 access point. The access point is connected to PME through an Ethernet Gateway, such as the Link150. PME provides support for the access point, through an add-on Harmony ZBRN32 access point device driver.

After the access point has been configured in PME, the driver creates individual sources for each of the sensors that are connected to the access point. The driver also supports software logging of the temperature measurements. This is similar to how branch circuit monitors are handled in PME. One access point can support up to 60 temperature sensors.

The real-time and historical temperature data is available for display and processing in any of the relevant PME applications such as Dashboards, Diagrams, Trends, and Reports.



NOTE: The selection, installation, and configuration of the sensors, access point, and gateway is outside the scope of this application description. See Prerequisites for more information.

Configuration

Before configuring the Thermal Monitoring of LV Busways application, confirm that the Prerequisites are in place for your system.

Configuring this application requires the following steps:

- Adding the Ethernet Gateway and ZBRN32 access point in Management Console or Device Manager.

  NOTE: Each ZBRN32 access point needs a mid-range device license in PME.

- Setting up the temperature sources in Vista.
- Setting up temperature alarms.

- Setting up Dashboards, Diagrams, Trends, Alarms, and Reports for temperature data.
- (Optional) Setting up alarm views for temperature sensor communication alarms.

To add the Ethernet Gateway and ZBRN32 access point in Management Console:

1. Open Management Console and log in with a supervisor-level user account.
2. Under Sites, add a new **Ethernet Gateway Site**.

   Set the Name and IP Address for the gateway. For TCP/IP Port select **ModbusTCP Device|502**.

   Example:

Name	Thermal_Monitoring_Gateway
IP Address or Host Name	10.168.84.183
TCP/IP Port	ModbusTCP Device|502
Computer	EN2K16X64
Time Synch ION Enabled	No
Time Synch 3XXX Enabled	No
Time Synch 3720 Enabled	No
Enabled	Yes
Description	Gateway for busway thermal monitoring.

3. Under Devices, add a new **Serial Device on Ethernet Gateway Site**.

   Set the Group, Name, Unit ID, and Time Zone for the access point. For Device Type select **ZBRN32 (CL110/TH110)**. For Site select the Ethernet Gateway Site added in step 2.

   Example:

Group	Busway
Name	Thermal_Monitoring
Device Type	ZBRN32 (CL110/TH110)
Unit ID	1
Site	Thermal_Monitoring_Gateway
Enabled	Yes
Description	
Time Zone	(UTC-08:00) Pacific Time (US & Canada)

4. Close Management Console

TIP: For information on how to set up sites and devices in Device Manager, see Device Manager.

To set up the temperature sources in Vista:

1. Open Vista and log in with a supervisor-level user account.
2. Generate a network diagram.
3. Open the diagram for the ZBRN32 access point.

   The diagram shows information for 60 possible temperature sensors. Only those sensors that are installed and connected to the ZBRN32 access point show a temperature measurement.

Example:

ZBRN32 Busway.Thermal_Monitoring

Sensor Name	Temperature	Sensor Name	Temperature	Sensor Name	Temperature	Sensor Name	Temperature
!!DeviceName!!_Sensor_00	22.4 °C	!!DeviceName!!_Sensor_15	21.0 °C	!!DeviceName!!_Sensor_30	°C	!!DeviceName!!_Sensor_45	°C
!!DeviceName!!_Sensor_01	°C	!!DeviceName!!_Sensor_16	21.4 °C	!!DeviceName!!_Sensor_31	°C	!!DeviceName!!_Sensor_46	°C
!!DeviceName!!_Sensor_02	°C	!!DeviceName!!_Sensor_17	21.4 °C	!!DeviceName!!_Sensor_32	°C	!!DeviceName!!_Sensor_47	°C
!!DeviceName!!_Sensor_03	21.6 °C	!!DeviceName!!_Sensor_18	21.4 °C	!!DeviceName!!_Sensor_33	°C	!!DeviceName!!_Sensor_48	°C
!!DeviceName!!_Sensor_04	°C	!!DeviceName!!_Sensor_19	°C	!!DeviceName!!_Sensor_34	°C	!!DeviceName!!_Sensor_49	°C
!!DeviceName!!_Sensor_05	°C	!!DeviceName!!_Sensor_20	°C	!!DeviceName!!_Sensor_35	°C	!!DeviceName!!_Sensor_50	°C
!!DeviceName!!_Sensor_06	°C	!!DeviceName!!_Sensor_21	°C	!!DeviceName!!_Sensor_36	°C	!!DeviceName!!_Sensor_51	°C
!!DeviceName!!_Sensor_07	°C	!!DeviceName!!_Sensor_22	°C	!!DeviceName!!_Sensor_37	°C	!!DeviceName!!_Sensor_52	°C
!!DeviceName!!_Sensor_08	°C	!!DeviceName!!_Sensor_23	°C	!!DeviceName!!_Sensor_38	°C	!!DeviceName!!_Sensor_53	°C
!!DeviceName!!_Sensor_09	°C	!!DeviceName!!_Sensor_24	°C	!!DeviceName!!_Sensor_39	°C	!!DeviceName!!_Sensor_54	°C
!!DeviceName!!_Sensor_10	21.2 °C	!!DeviceName!!_Sensor_25	°C	!!DeviceName!!_Sensor_40	°C	!!DeviceName!!_Sensor_55	°C
!!DeviceName!!_Sensor_11	21.2 °C	!!DeviceName!!_Sensor_26	°C	!!DeviceName!!_Sensor_41	°C	!!DeviceName!!_Sensor_56	°C
!!DeviceName!!_Sensor_12	21.2 °C	!!DeviceName!!_Sensor_27	°C	!!DeviceName!!_Sensor_42	°C	!!DeviceName!!_Sensor_57	°C
!!DeviceName!!_Sensor_13	21.2 °C	!!DeviceName!!_Sensor_28	°C	!!DeviceName!!_Sensor_43	°C	!!DeviceName!!_Sensor_58	°C
!!DeviceName!!_Sensor_14	21.2 °C	!!DeviceName!!_Sensor_29	°C	!!DeviceName!!_Sensor_44	°C	!!DeviceName!!_Sensor_59	°C

Diagnostics Setup

4. Click **Setup** in the lower right-hand corner of the diagram to open Setup view.
5. Select **Options > Show Toolbox** from the Vista menu, and then change the names of the installed sensors by double-clicking the name field, editing the default name, and then pressing **Enter** on your keyboard. See Selecting Sensor Names for tips on choosing a sensor name.

   NOTE: Complete the sensor naming before moving to step 6. If you rename the sensors after enabling logging, this will affect the source names under which the data is logged.

6. Enable the Log. The device driver for the ZBRN32 access point in PME will start logging temperature measurements for all installed and connected sensors on a 15 minute interval.
7. Close the Vista diagram.

To set up thermal alarms:

1. Open Software Alarms in **Web Applications > SETTINGS > Alarms**.
2. Add a new alarm rule for the thermal alarm, with the following details:
   - Alarm Template: Select the **Realtime Setpoint** template under the **All** or **Common** category.
   - Measurement: Select the **Temperature (°C)** measurement under the **Environmental** category.
   - Priority: Select a priority that is appropriate for this alarm, for example High.
   - Alarm Status Measurements: Turn on **Enable Realtime Alarm Status Measurements**.

   Enter other alarm information as required. See Adding a new Alarm Rule for information on how to add alarm rules.

3. Add a new alarm rule for a thermal **pre-**alarm. Use the same details as for the thermal alarm, but set the temperature thresholds lower so that the pre-alarm is activated before the main alarm.

   Example of a thermal alarm and pre-alarm:

Rule Name	Alarm Template	Measurements	Sources	Active When	Alarm Name	Schedule Name	Enabled
Busway Thermal Alarm	Realtime Setpoint	1	6	> 23	Thermal Alarm	None	
Busway Thermal Pre-Alarm	Realtime Setpoint	1	6	> 22	Thermal Pre-Alarm	None	

4. Exit Software Alarms.

To set up Dashboards, Diagrams, Trends, Alarms, and Reports:

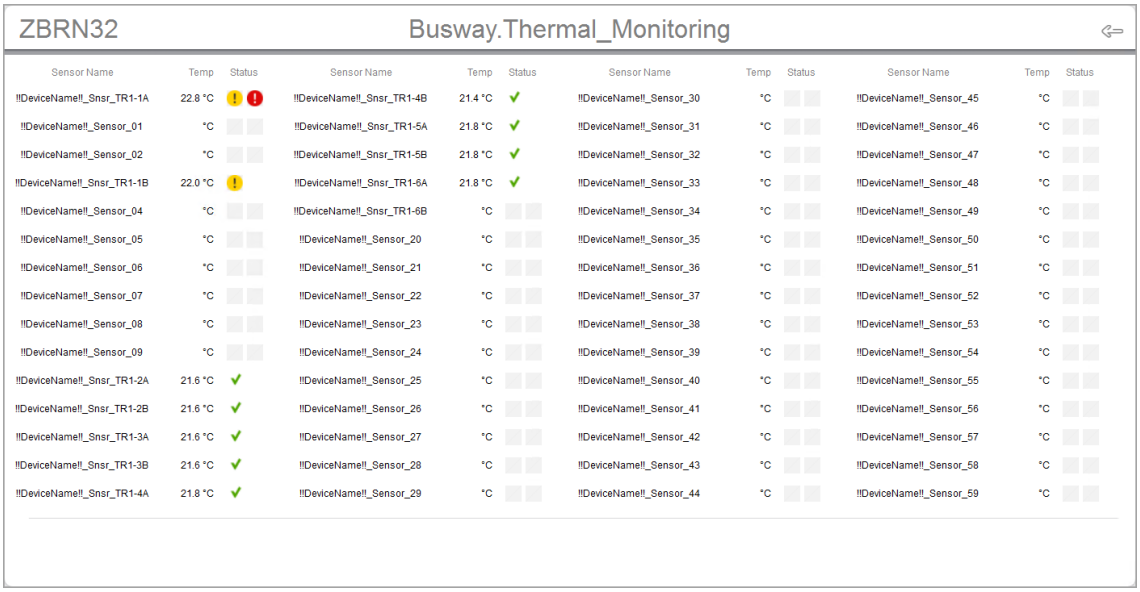
You can set up the Web Applications, or any other relevant data display or processing application to use the busway temperature data. Follow the standard workflow for configuring these applications. For details see:

- Dashboards configuration
- Diagrams configuration
- Trends configuration
- Alarms configuration
- Reports configuration

The ZBRN32 access point device driver includes a sample diagram for the display of temperature sensor real-time measurements and alarm status. You can use this diagram as a starting point for creating custom end-user diagrams. Find the diagram under `...\config\diagrams\ud\default\ZBRN32_CL110_TH110_V1.0.0\zbrn32_cl110_th110_v1.0.0_example.dgm`.

TIP: Save your diagrams under `...\config\diagrams\ud` or a sub-folder of `ud` but not in the `ud\default` folder. This makes it possible to add your diagram to the Diagrams Web application. The `ud\default` folder is not visible in Diagrams.

Below is an example of a partially customized diagram based on the diagram provided with the add-on device driver. The alarm status displays for each sensor have been linked to the pre-alarm and alarm status measurements.



(Optional) Setting up alarm views for temperature sensor communication alarms

The ZBRN32 access point device driver in PME monitors the temperature sensor communication status and generates alarms on communication interruptions. The alarms are categorized as **Asset Monitoring** > **Thermal Monitor**.

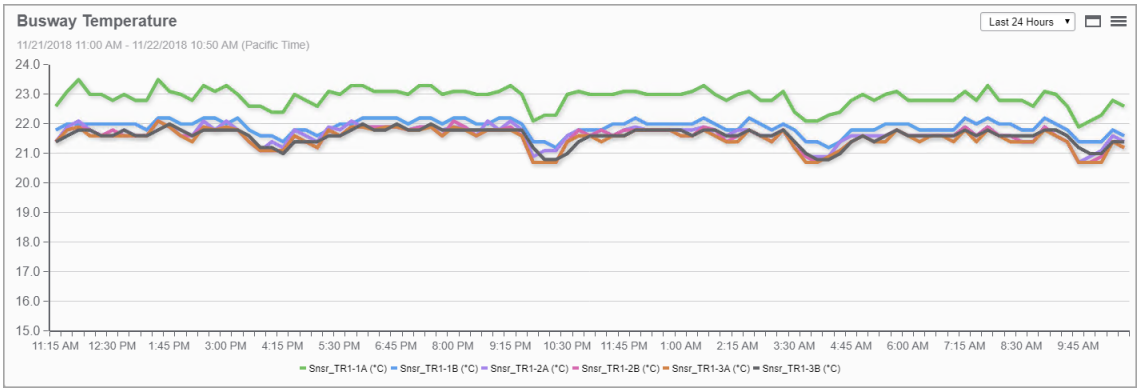
RECOMMENDATION: Configure an alarm view for Asset Monitoring > Thermal Monitor to track and monitor temperature sensor communication issues. See Alarms configuration for information on how to setup alarm views.

NOTE: The thermal monitoring data registers (temperature, humidity, and so on) display "NA" values when communication with the sensor is interrupted.

Operation

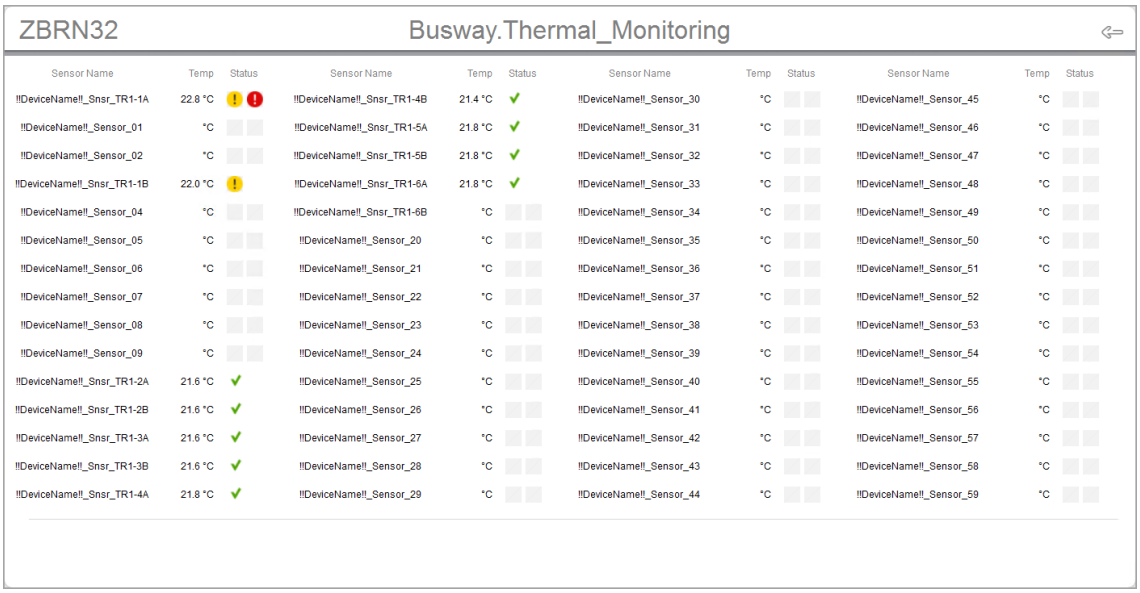
After you have configured the application and created views in the Web Applications, you can monitor the busway temperature. The following are examples of temperature data displayed in the different Web Applications.

Dashboards:



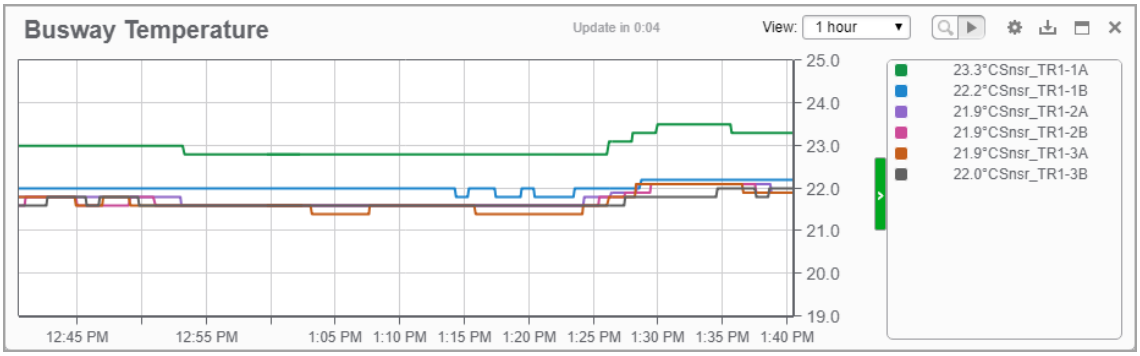
The above is an example of a dashboard showing busway temperature measurements for the last 24 hours.

Diagrams:



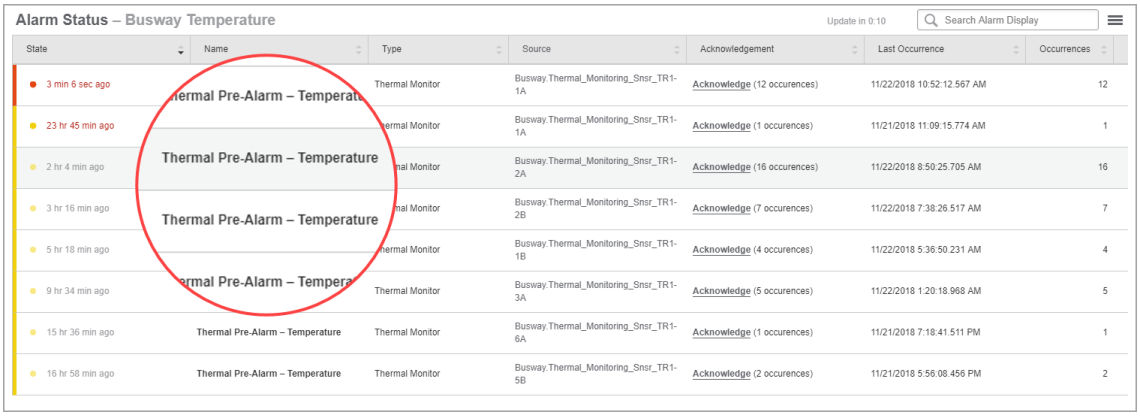
The above is an example of a diagram showing sensor data for a ZBRN32 access point.

Trends:

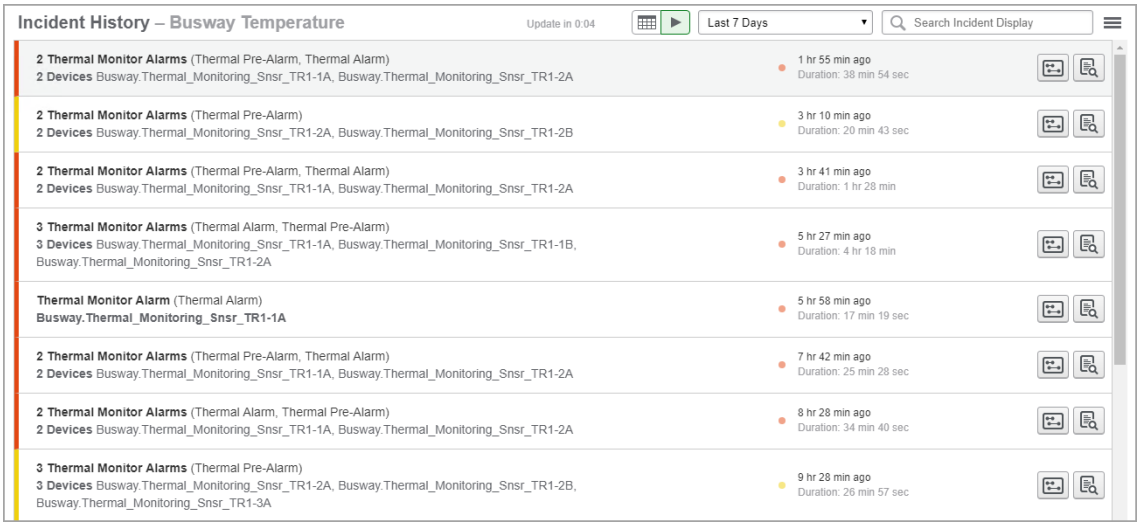


The above is an example of a real-time trend showing busway temperature over the last hour.

Alarms:

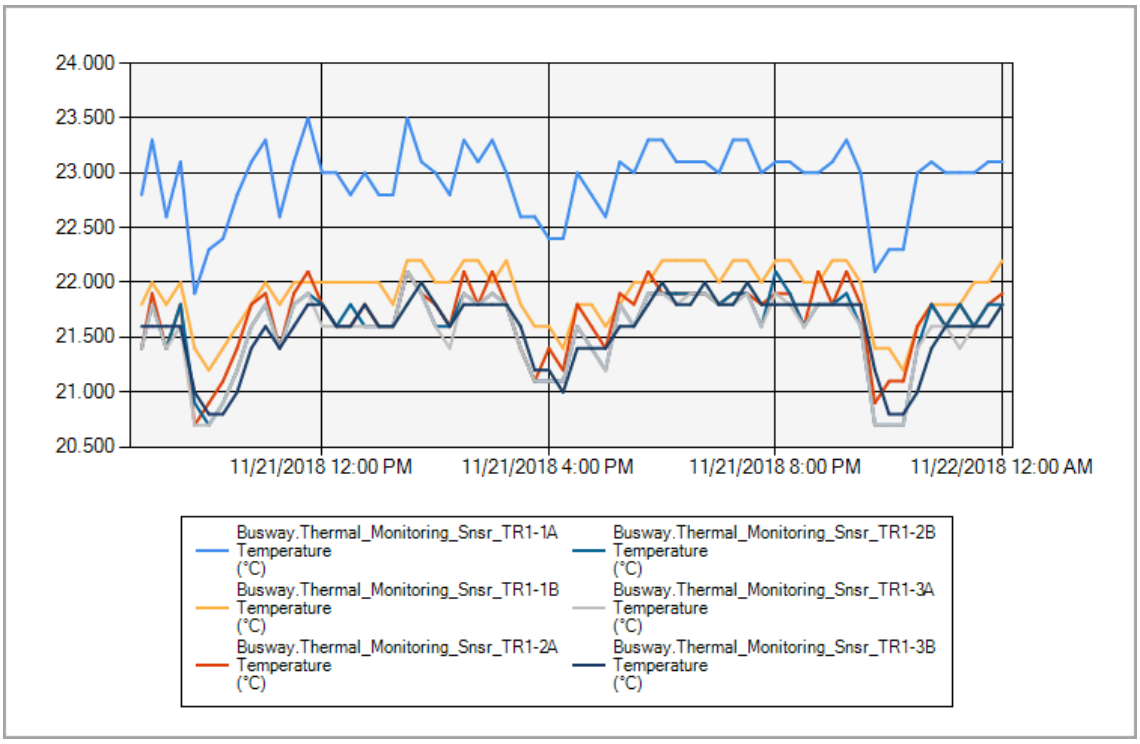


The above is an example of an alarm status view showing thermal monitoring related alarms.



The above is an example of an alarm incident view showing thermal monitoring related incidents.

Reports:



The above is an example of a trend report showing the busway temperature over the last 24 hours.

Maintenance

No maintenance is needed for the Thermal Monitoring of LV Busways application. However, the ZBRN32 access point device driver includes a diagnostics diagram that shows the sensor battery voltage (only for CL110 sensors, TH110 sensors are self-powered) and the signal strength. You can use this diagram to monitor the health of the sensor network.

To open the diagnostics diagram in Vista:

1. Open Vista.
2. Generate or open the network diagram.
3. Open the diagram for the ZBRN32 access point device.
4. Click **Diagnostics** in the lower right-hand corner of the diagram to open Diagnostics view.

   Example Diagnostics diagram:

ZBRN32 Diagnostics Busway.Thermal_Monitoring

Sensor Name	Battery	Signal	Sensor Name	Battery	Signal	Sensor Name	Battery	Signal	Sensor Name	Battery	Signal
!!DeviceName!!_Snsr_TR1-1A	2.8 V	-25.0 dBm	!!DeviceName!!_Snsr_TR1-4B	V	-45.0 dBm	!!DeviceName!!_Sensor_30	V	dBm	!!DeviceName!!_Sensor_45	V	dBm
!!DeviceName!!_Sensor_01	V	dBm	!!DeviceName!!_Snsr_TR1-5A	V	-39.0 dBm	!!DeviceName!!_Sensor_31	V	dBm	!!DeviceName!!_Sensor_46	V	dBm
!!DeviceName!!_Sensor_02	V	dBm	!!DeviceName!!_Snsr_TR1-5B	V	-43.0 dBm	!!DeviceName!!_Sensor_32	V	dBm	!!DeviceName!!_Sensor_47	V	dBm
!!DeviceName!!_Snsr_TR1-1B	V	-46.0 dBm	!!DeviceName!!_Snsr_TR1-6A	V	-51.0 dBm	!!DeviceName!!_Sensor_33	V	dBm	!!DeviceName!!_Sensor_48	V	dBm
!!DeviceName!!_Sensor_04	V	dBm	!!DeviceName!!_Snsr_TR1-6B	V	dBm	!!DeviceName!!_Sensor_34	V	dBm	!!DeviceName!!_Sensor_49	V	dBm
!!DeviceName!!_Sensor_05	V	dBm	!!DeviceName!!_Sensor_20	V	dBm	!!DeviceName!!_Sensor_35	V	dBm	!!DeviceName!!_Sensor_50	V	dBm
!!DeviceName!!_Sensor_06	V	dBm	!!DeviceName!!_Sensor_21	V	dBm	!!DeviceName!!_Sensor_36	V	dBm	!!DeviceName!!_Sensor_51	V	dBm
!!DeviceName!!_Sensor_07	V	dBm	!!DeviceName!!_Sensor_22	V	dBm	!!DeviceName!!_Sensor_37	V	dBm	!!DeviceName!!_Sensor_52	V	dBm
!!DeviceName!!_Sensor_08	V	dBm	!!DeviceName!!_Sensor_23	V	dBm	!!DeviceName!!_Sensor_38	V	dBm	!!DeviceName!!_Sensor_53	V	dBm
!!DeviceName!!_Sensor_09	V	dBm	!!DeviceName!!_Sensor_24	V	dBm	!!DeviceName!!_Sensor_39	V	dBm	!!DeviceName!!_Sensor_54	V	dBm
!!DeviceName!!_Snsr_TR1-2A	2.8 V	-43.0 dBm	!!DeviceName!!_Sensor_25	V	dBm	!!DeviceName!!_Sensor_40	V	dBm	!!DeviceName!!_Sensor_55	V	dBm
!!DeviceName!!_Snsr_TR1-2B	2.8 V	-34.0 dBm	!!DeviceName!!_Sensor_26	V	dBm	!!DeviceName!!_Sensor_41	V	dBm	!!DeviceName!!_Sensor_56	V	dBm
!!DeviceName!!_Snsr_TR1-3A	2.8 V	-40.0 dBm	!!DeviceName!!_Sensor_27	V	dBm	!!DeviceName!!_Sensor_42	V	dBm	!!DeviceName!!_Sensor_57	V	dBm
!!DeviceName!!_Snsr_TR1-3B	V	-43.0 dBm	!!DeviceName!!_Sensor_28	V	dBm	!!DeviceName!!_Sensor_43	V	dBm	!!DeviceName!!_Sensor_58	V	dBm
!!DeviceName!!_Snsr_TR1-4A	V	-43.0 dBm	!!DeviceName!!_Sensor_29	V	dBm	!!DeviceName!!_Sensor_44	V	dBm	!!DeviceName!!_Sensor_59	V	dBm

Thermal Monitoring of Medium Voltage (MV) Substations

Overview

This application provides remote, continuous monitoring of the thermal conditions of MV substations equipped with Easergy TH110 temperature sensors and Easergy CL110 environmental sensors. Thermal monitoring can help you find exceptional conditions in the substation equipment, such as overloads or faulty power connections of cables, busbars, circuit breakers, or transformers. In addition, this application can monitor the environmental conditions, ambient temperature and humidity, inside the substation and switchgear cubicles. You can see temperature data in real-time, analyze historical trends, and receive alarms and notifications. Any applicable PME power monitoring features can be used with the substation monitoring data.

For more information on the value of Continuous Thermal Monitoring see the EcoStruxure Power Digital Applications for Large Buildings & Critical Facilities Design Guide. See Resources for download information.

⚠ WARNING

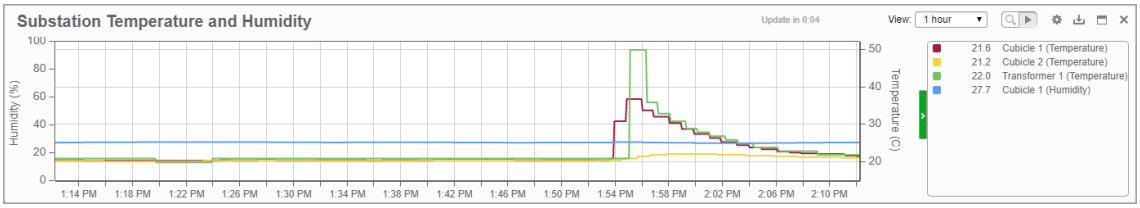
INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

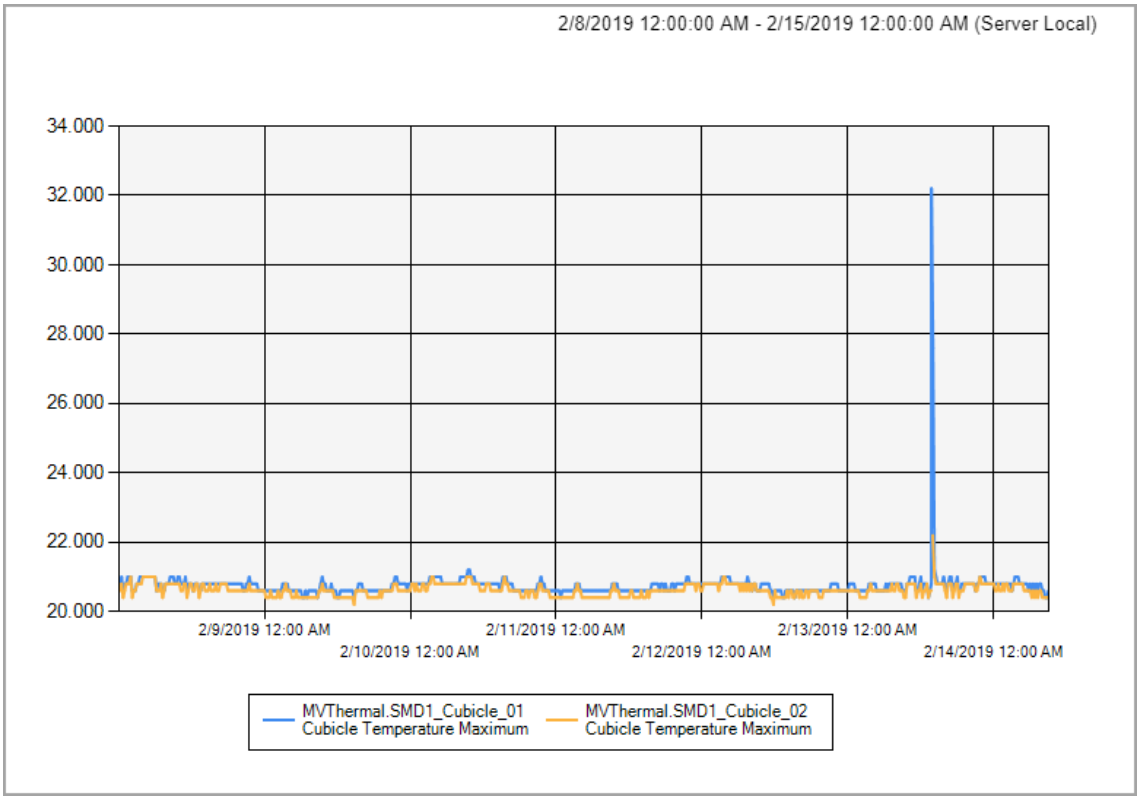
Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

NOTE: The examples and screen captures shown in this application description are for illustration purposes only. They are not intended to give guidance on configuration settings or application details. For guidance on configuration of your system or other application details, consult a qualified professional.

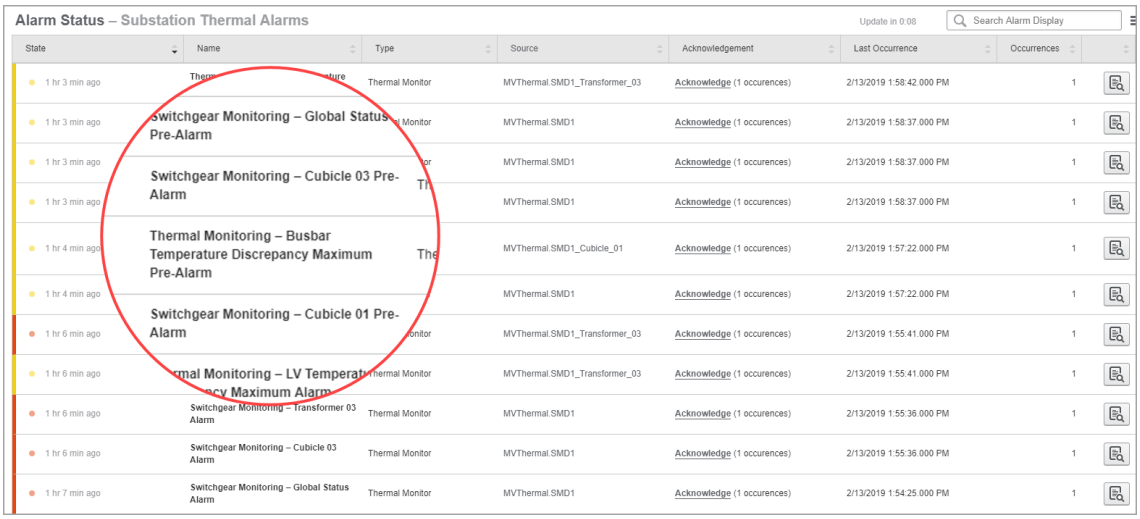
Examples:



The above is an example of a real-time trend showing cubicle and transformer temperature and humidity measurements over the last hour.



The above is an example of a trend report showing a 1-week cubicle temperature trend.



The above is an example of an alarm status view showing thermal monitoring related alarms.

Components

The Thermal Monitoring of MV Substations application is based on the following system components and features:

- Power Monitoring Expert 2020 software.
- Substation with Substation Monitoring Devices (SMDs), Harmony ZBRN32 access points, Easergy TH110 thermal sensors and Easergy CL110 environmental sensors

NOTE: The device type for the SMD is called **Switchgear Monitoring Device** in PME.

Prerequisites

The following is required to set up the Thermal Monitoring of MV Substations application in PME:

- PME 2020 must be installed and commissioned.
- The TH110 and CL110 sensors, the ZBRN32 access points, and the SMDs in the substation must be configured, connected, and communicating.

  NOTE: This application supports SMD v4.0 and v3.0. SMD v2.0 is not supported.

- The SMDs must be accessible from the PME server by Ethernet.
- You must know the IP address of the SMDs.

  NOTE: Each SMD needs a mid-range device license in PME.

Limitations

There are no specific, software-based limitations for this application in addition to the general PME performance and scalability limits.

The SMDs and ZBRN32 access points have the following limitations:

- Each SMD can support up to three ZBRN32 access points.
- Each ZBRN32 access point can support up to 60 sensors.
- Each SMD can support up to 16 cubicles and 16 transformers
  - For each cubicle, the SMD can support sensors for 1 busbar, 2 circuit breakers, 2 cables, and a set of environmental measurements.
  - For each transformer, the SMD can support sensors for MV taps, LV taps, windings, and tapping links.

NOTE: Only those cubicles, transformers, and sensor locations that are configured in the SMD are shown in PME (non-configured ones are hidden in the diagrams).

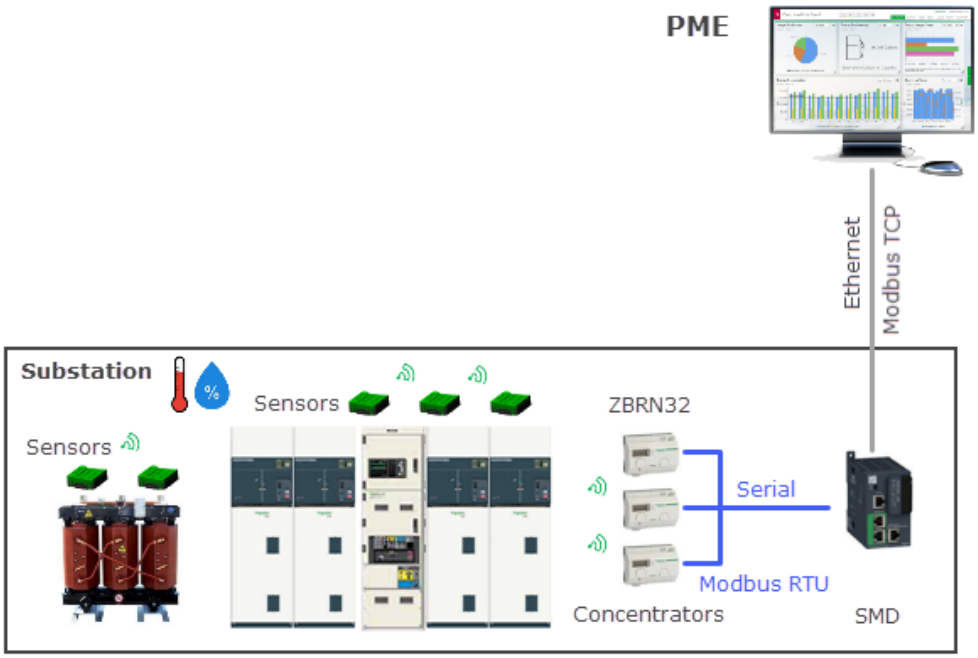
NOTE: The selection, installation, and configuration of the sensors, ZBRN32 access points, and SMDs is outside the scope of this application description. See Prerequisites for more information.

NOTE: This application description only covers certain measurements available from the SMD. Consult the SMD documentation for information on additional measurements and functions.

Design

Easergy CL110 and TH110 sensors are installed in the substation. The sensors wirelessly send measurement data to the ZBRN32 access points. The access points are connected to SMDs through Modbus serial communications. The SMDs are connected to PME through an Ethernet connection.

PME has a pre-configured device driver for the SMD. This driver creates individual sources in PME for the SMD parent device and for each of its configured cubicles and transformers. You can access thermal and environmental measurements, pre-alarms, and alarms. The driver also logs data from the SMD and creates event log records. This is done through driver-based Setpoint modules. The real-time and historical data is available for display and processing in any of the relevant PME applications such as Dashboards, Diagrams, Trends, and Reports.



NOTE: The selection, installation, and configuration of the sensors, ZBRN32 access points, and SMDs is outside the scope of this application description. See Prerequisites for more information.

NOTE: This application can also be used with a PME and Power SCADA Operation (PSO) integrated system, known as **PSO with Advanced Reporting and Dashboards**. See the *PSO System Guide* for details. See Resources for link information.

Configuration

Before configuring the Thermal Monitoring of MV Substations application, confirm that the Prerequisites are in place for your system.

Configuring this application requires the following steps:

- Adding the SMDs in Management Console or Device Manager.

  NOTE: Each SMD needs a mid-range device license in PME.

- Setting up the SMD diagrams.
- Setting up Dashboards, Diagrams, Trends, Alarms, and Reports for the thermal monitoring data.
- (Optional for systems with multiple SMDs) Creating a SMD summary diagram that shows all the SMDs in the substation with high level status information.
- (Optional) Setting up alarm views for temperature sensor communication alarms.

To add the SMDs in Management Console:

1. Open Management Console and log in with a supervisor-level user account.
2. Under Devices, add a new Ethernet Device.

   Set the Group, Name, IP Address, and Time Zone for the SMD device. For Device Type select **Switchgear Monitoring Device**.

   Example:

Group	MVThermal
Name	SMD1
Device Type	Switchgear Monitoring Device
IP Address or Host Name	10.168.85.12
Computer	EN2K16X64
Enabled	Yes
Description	SMD for substation 1.
Time Zone	(UTC-08:00) Pacific Time (US & Canada)

   NOTE: The date and time are set manually in the SMD. You cannot set the time in the SMD through PME.

3. Close Management Console.

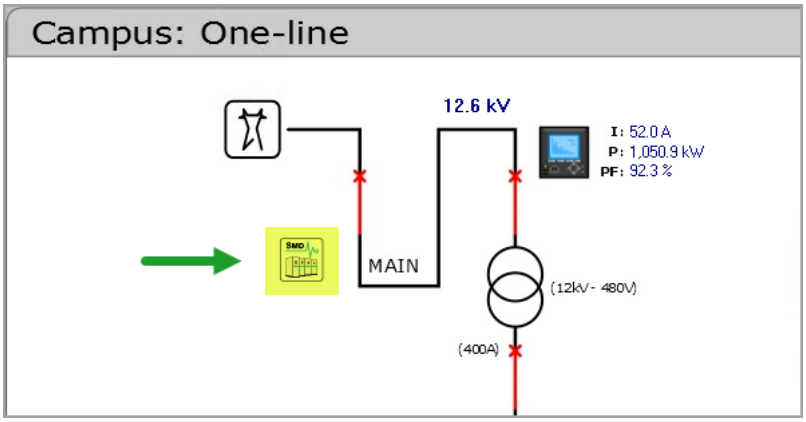
TIP: For information on how to set up sites and devices in Device Manager, see Device Manager.

To set up the SMD diagrams in Vista:

1. Open Vista and log in with a supervisor-level user account.
2. a) If you want to add a SMD diagram link to an existing Vista diagram:
   - Open the Vista diagram to which you want to add the link.
   - Add a grouping object and set the following parameters:
     - Node = The SMD you want to link to
     - Action = **Open Diagram for Meter Template**

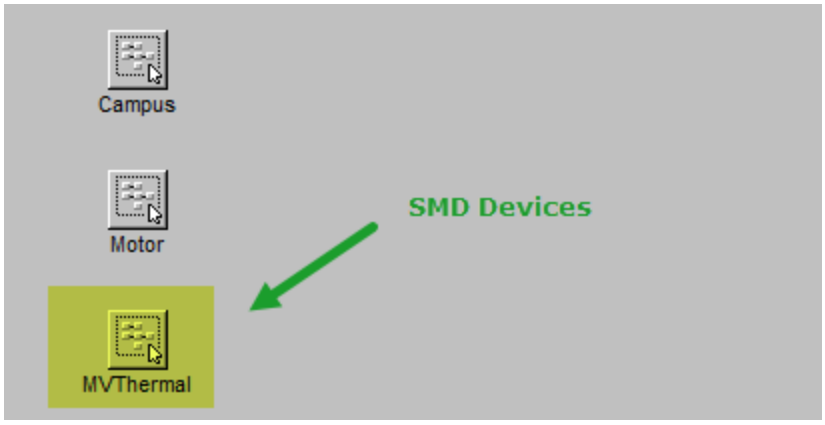
- (Optional) Display = The default SMD icon (`...\config\diagrams\images\default\_SwitchgearMonitoringDevice.bmp`) or any custom image you want to display.

Example:



b) If you want to use a generic Vista Network Diagram to access the SMD information, go to **File** > **Generate Network Diagram**.

Example:



NOTE: When you save the generated network diagram, it will overwrite any existing network diagram. If the existing network diagram was customized, then these customizations will get lost.

3. Click the SMD grouping object in the Vista diagram to open the SMD device diagrams.

4. (Optional) Customize the sensor display labels. Click the Setup icon in the SMD device diagram to edit the display labels for the sensor names.

NOTE: The sensor names for the thermal monitoring points, for example Cubicle 01, Cubicle 02, Transformer 01, and so on, are fixed in PME. These names match the names used in the SMD for local display. If necessary, you can define custom labels for the sensors in Vista and Diagrams. These custom labels only appear in Vista and Diagrams. Other PME applications will continue to display the default names.

To set up Dashboards, Diagrams, Trends, Alarms, and Reports:

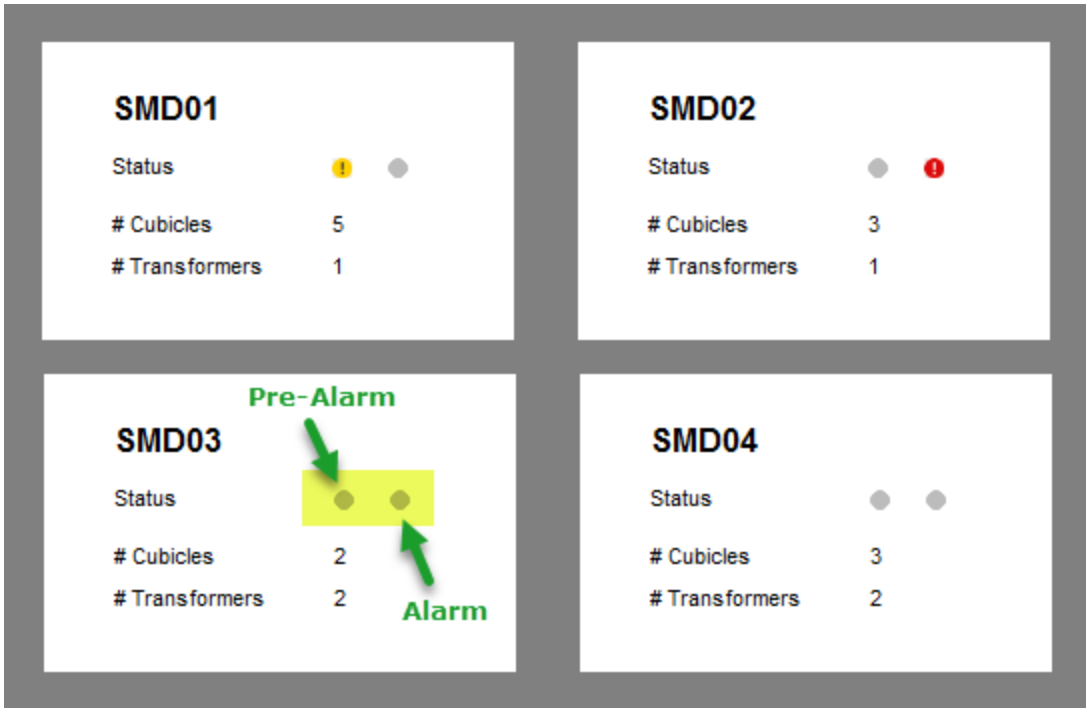
You can set up the Web Applications, or any other relevant data display or processing application to use the substation temperature and environmental data. Follow the standard workflow for configuring these applications. For details see:

- Dashboards configuration
- Diagrams configuration
- Trends configuration
- Alarms configuration
- Reports configuration

NOTE: Thermal measurement related functions and settings are configured in the SMD. PME reads the measurements from the SMD and displays them as they are, including max values and alarm/pre-alarm statuses.
The configuration of the SMD determines which measurements are available. Only configured cubicles and transformers are shown in PME.

(Optional) To create a SMD summary diagram:

1. Open Vista and log in with a supervisor-level user account.
2. Create a new diagram. Add labels and status indicators for each SMD as shown in the following example:



Use status objects to show the pre-alarm and alarm statuses. Link the pre-alarm indicator to **Substation > Global Substation Alarm > Global Status Pre-Alarm** in the SMD node. Link the alarm indicator to **Substation > Global Substation Alarm > Global Status Alarm** in the SMD node.

Use text boxes to hard-code the cubicle and transformer numbers. Overlay the SMD name text boxes with transparent grouping objects linked to the SMD diagrams.

3. Save the diagram.

TIP: Save your diagrams under `...\config\diagrams\ud` or a sub-folder of `ud` but not in the `ud\default` folder. This makes it possible to add your diagram to the Diagrams Web application. The `ud\default` folder is not visible in Diagrams.

(Optional) Setting up alarm views for sensor communication alarms

The SMD device driver in PME monitors the sensor communication status and generates alarms on communication interruptions. The alarms are categorized as **Asset Monitoring** > **Thermal Monitor**.

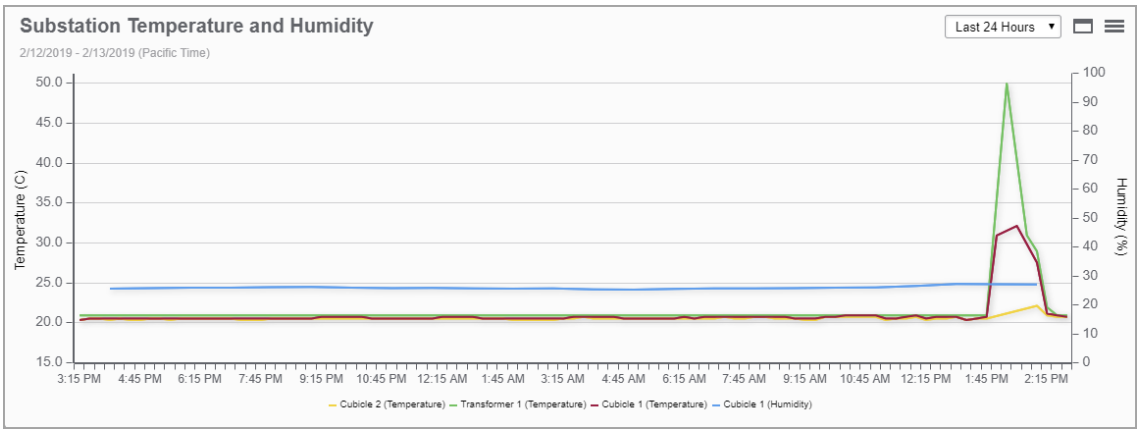
RECOMMENDATION: Configure an alarm view for Asset Monitoring > Thermal Monitor to track and monitor sensor communication issues. See Alarms configuration for information on how to setup alarm views.

NOTE: The thermal monitoring data registers (temperature, humidity, and so on) display "NA" values when communication with the sensor is interrupted.

Operation

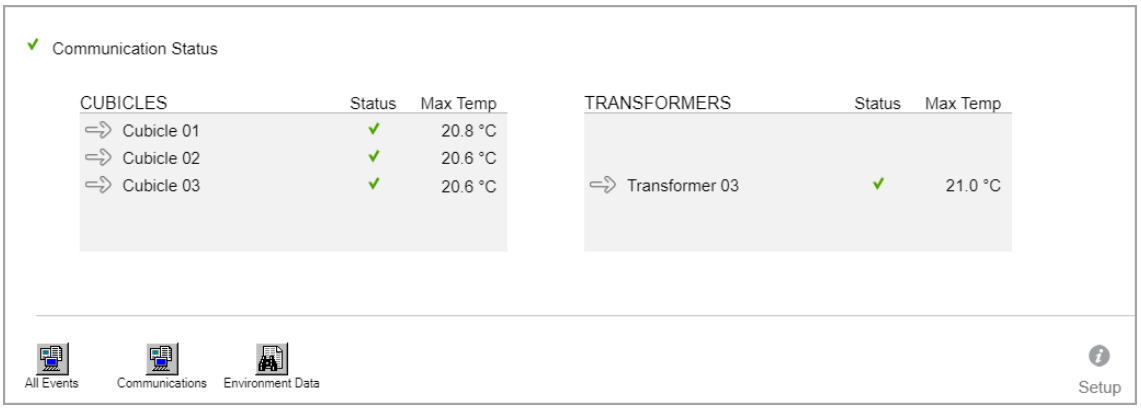
After you have configured the application and created views in the Web Applications, you can monitor the Substation conditions. The following are examples of temperature and environmental data displayed in the different Web Applications.

Dashboards



The above is an example of a dashboard showing cubicle and transformer temperature and humidity measurements for the last 24 hours.

Diagrams

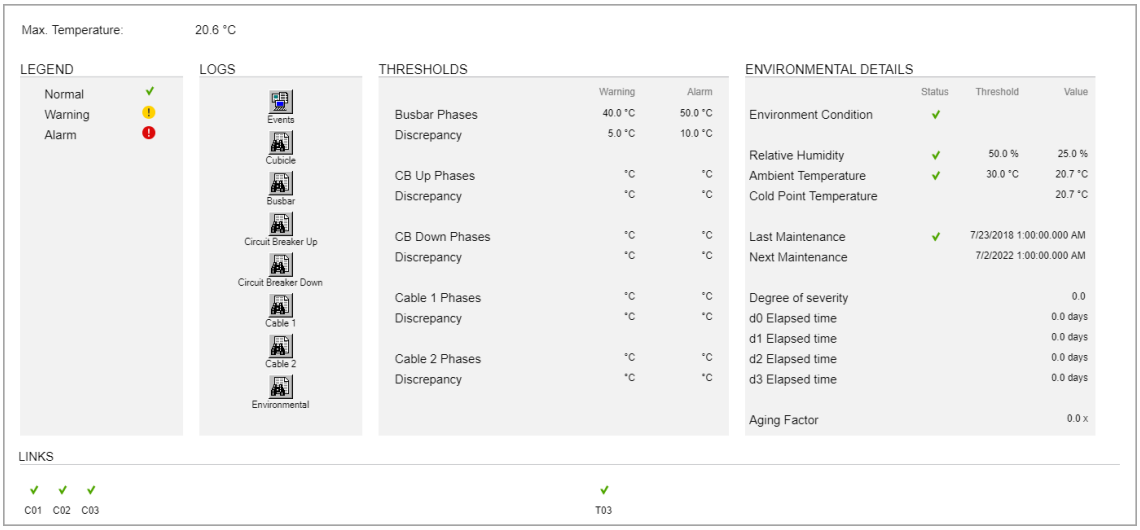


The above is an example of a top-level diagram for a SMD which has Cubicle 1-3 and Transformer 3 configured.

The diagram includes the following elements:

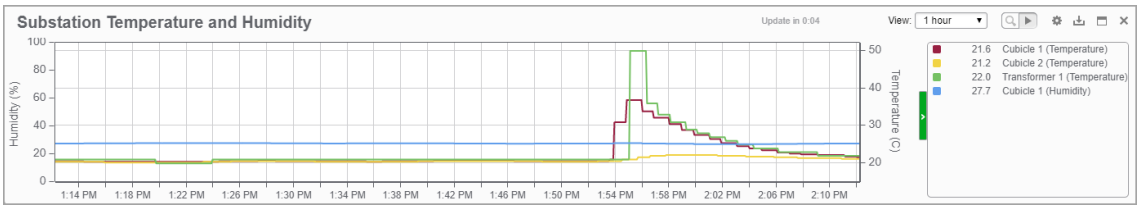
- SMD communication status indicator showing: Normal - ✓ or Not Normal- !.
- Cubicle and transformer overall status indicators showing: Normal - ✓, Pre-Alarm - !, or Alarm - !.
- Cubicle and transformer highest instantaneous temperature measured by any of its sensors.
- Event and Data log icons providing access to alarm and communication events, and logged temperature and humidity measurements.

The above is an example of a cubicle diagram. Only those components that are configured in the SMD, display data in the diagram. In this example, only the busbar and environmental sensors are configured.



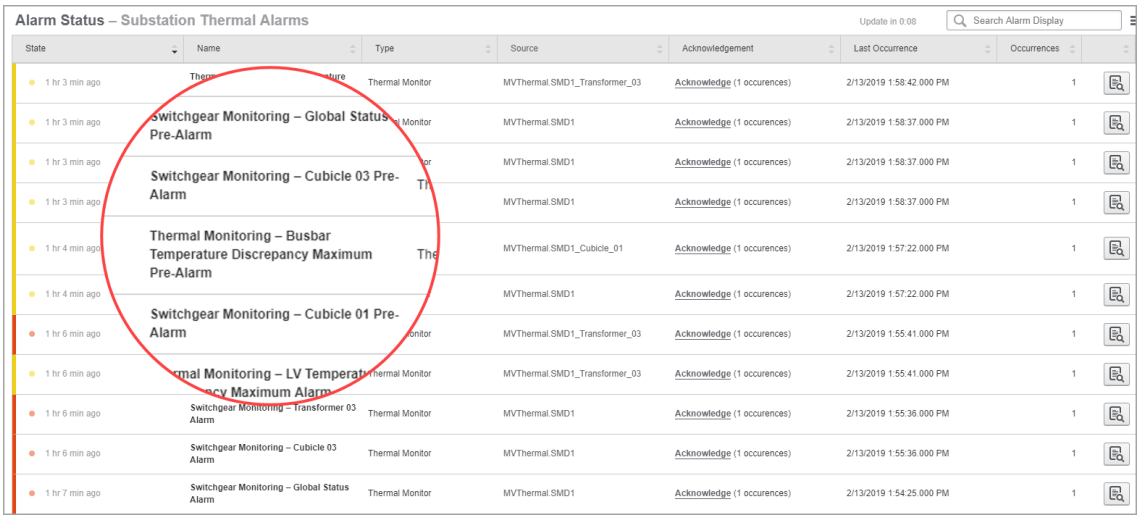
The above is an example of a cubicle details diagram for a SMD which has busbar and environmental sensors configured.

Trends

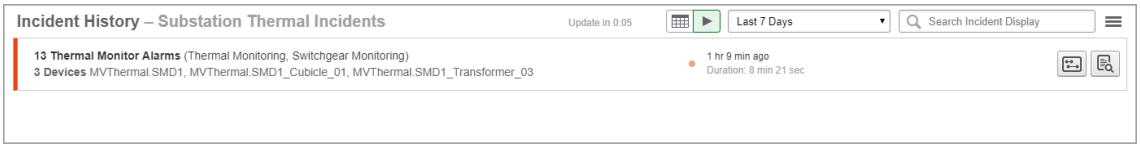


The above is an example of a real-time trend showing cubicle and transformer temperature and humidity measurements over the last hour.

Alarms

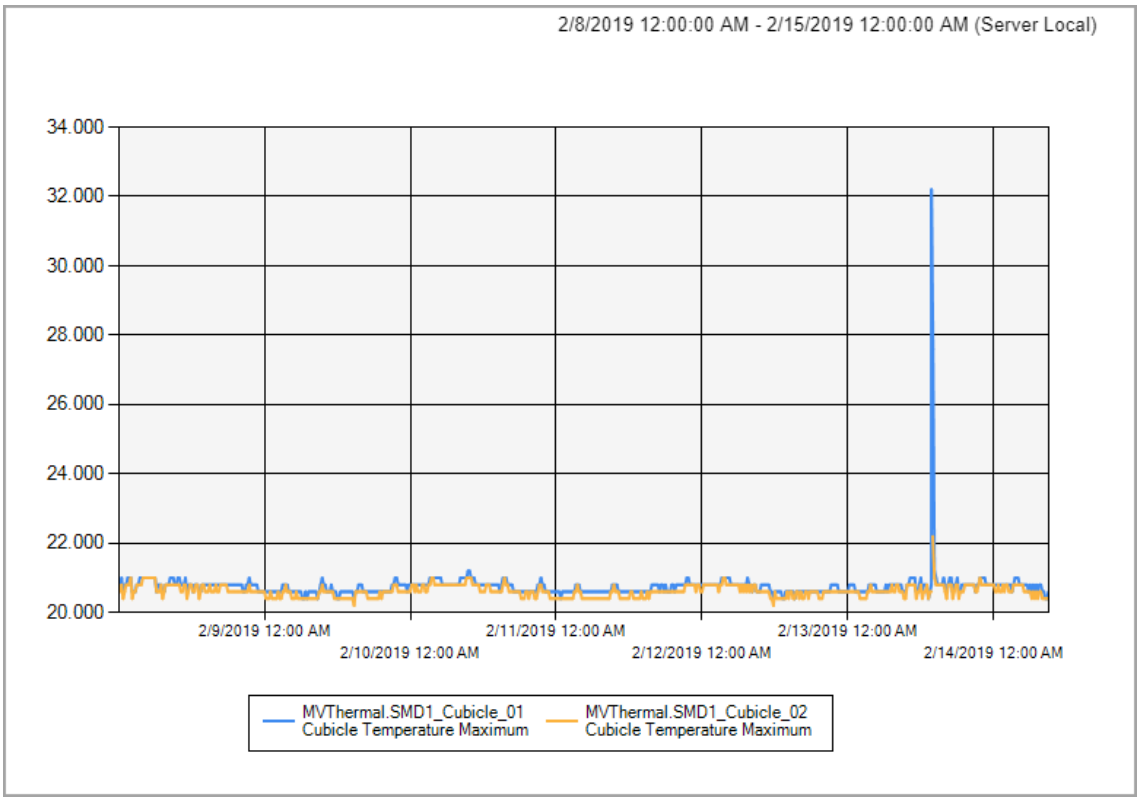


The above is an example of an alarm status view showing thermal monitoring related alarms.



The above is an example of an alarm incident view showing a thermal monitoring related incident.

Reports



The above is an example of a trend report showing a 1-week cubicle temperature trend.

Maintenance

No maintenance is needed for the Thermal Monitoring of MV Substations application in PME. For maintenance of the devices installed in the substation, follow any maintenance procedures outlined in the documentation for SMD, ZBRN32, and sensors.

Reference

This chapter contains reference information related to planning, deploying, and using PME.

Use the following links to find the content you are looking for:

Cybersecurity Reference

This section contains reference information related to cybersecurity.

Data encryption

At Rest

PME encrypts the passwords of its user accounts, as well as the Windows and SQL Server accounts using SHA-512 and AES-256 cryptography. PME uses a unique encryption key for each installation. The key is generated during the installation of PME. The PME installer offers functionality for exporting/importing encryption keys for the installation of PME clients or system upgrades.

The power monitoring data that is collected by PME, and system configuration data are not encrypted.

In Transit

PME uses Transport Layer Security (TLS) 1.2 for an encrypted, authenticated connection using HTTPS between the server and the web clients. Both self-signed and authority issued certificates are supported. PME is installed with a self-signed certificate and a self-signed certificate is configured automatically. We recommend that you replace this with a security certificates from a Certificate Authority (CA).

The communication between PME and connected monitoring devices is not encrypted.

PME accounts

The following types of accounts are required for a PME system:

PME Users

A user account in PME provides access to the system. There are 3 different types of users - standard users, Windows users, and Windows groups. Each user has an access level, which determines the actions the user is allowed to perform in PME. There are no pre-configured user accounts or user groups in the system. One supervisor account is created with a user defined password during the installation of the software. Additional user accounts and groups must be created manually after installation. Users are created and managed through User Manager. PME supports Windows Active Directory integration for Windows users and groups.

TIP: Use Windows users and groups to take advantage of Windows account security features such as maximum login attempts or minimum password requirements.

Windows accounts used by PME

PME uses Windows accounts for report subscriptions and database maintenance. The accounts are created automatically during the installation of the software. The accounts share the same password, which is set at install time and can be changed at any time through the installer.

If PME is configured to use Windows Integrated Authentication, then an additional Windows account is required for database access. This Windows account is also used to run the PME services and the IIS Application Pools. This account must be created manually and account details must be provided during the installation of the software.

See Windows accounts for more information.

SQL Database server accounts

If PME is configured to use SQL Server Authentication, then SQL server accounts are required for database access. The accounts are created automatically during the installation of the software. The accounts share the same password, which is set at install time and can be changed at any time through the installer.

If SQL Server Express is installed with SQL Server Authentication, through the PME installer, a sa account with a unique, default password is created automatically during install. The password can be changed at any time through SQL Server Management Studio.

See SQL Server accounts for more information.

EcoStruxure Web Services account

If EcoStruxure™ Web Services (EWS) are used, data exchange credentials must be defined. The credentials consist of a single username and password. The EWS credentials are set manually in the **Web Applications** > **SETTINGS** > **Security** > **EWS Login** area of the software.

PME Services

PME uses a number of services to perform the background server tasks. The services use the Local Service and NT AUTHORITY\System accounts, or the Windows account used for Windows Integrated Authentication, if that is configured.

See PME Windows services for more information.

Network shares

PME Engineering Clients and Secondary servers require that the **Power Monitoring Expert** folder on the PME server is shared with change and read permissions. This file share must be manually set up before installing Engineering clients or Secondary servers. See Create a file share for Engineering clients and Secondary servers for more information.

Session timeout

PME automatically times out inactive client sessions. Web Applications clients are logged out and Windows application clients (Vista, Designer, Management Console) are locked after a period of inactivity. The timeout period is configurable, it is set to 20 minutes by default. See Web Applications settings for details on how to set the timeout.

To restart or unlock the session you must enter the login credentials. A session is considered inactive, if none of the following actions are detected:

- Mouse movement
- Mouse click
- Keyboard activity
- Touch screen activity

NOTE: If custom content links are added to the Web Applications framework, then the custom content must either implement the idle detection, or activity on that content is not registered and the web client session can time out unexpectedly. See Adding idle detection to custom Web Application links for details.

System integration security

Specify which third-party web resources are allowed to either embed (frame) the PME web applications, or to which the PME web applications can redirect requests. This is configurable in the PME Web Applications settings. See Web Applications settings for details on how to set authorized hosts.

Verifying file integrity and authenticity

Verify the file integrity and authenticity for software updates and other components before installing them in the system. Do not install files for which the integrity and authenticity cannot be confirmed.

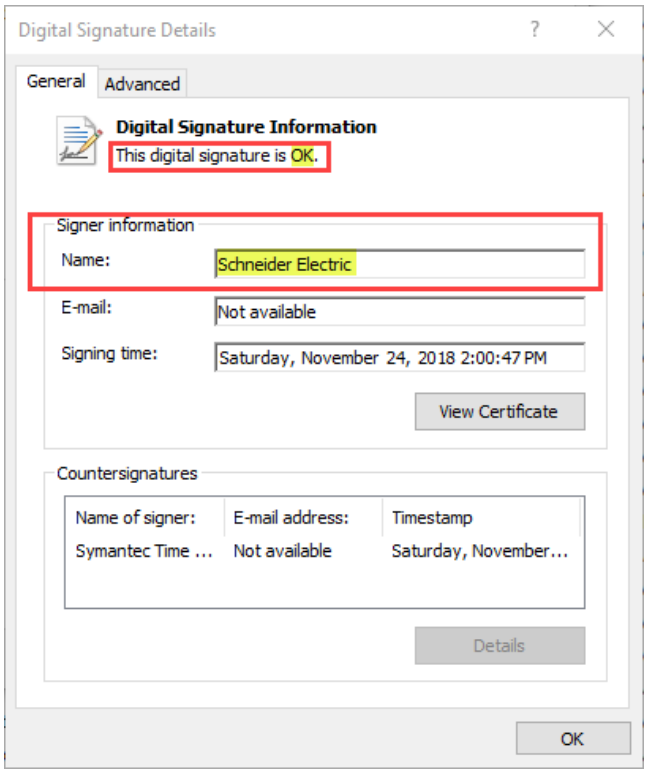
To verify the file integrity and authenticity:

1. Right-click the file and select **Properties**. This opens the Properties dialog.
2. In the Properties dialog, select the **Digital Signatures** tab.
3. In the Signature list, highlight the Name of signer. Click **Details**.

   NOTE: Only Schneider Electric should be shown in the Signature list.

4. Verify that the digital signature is OK and that the signer name shows **Schneider Electric**.

   Example:



5. Close the properties dialog.

Planning references

This section contains reference information related to the content in the Planning chapter of this guide.

Use the following links to find the item you are looking for:

Accessing the ION Database with 3rd-party applications

The following example uses Microsoft Excel 2007 to retrieve data from the ION_Data database.

NOTE: The database uses Universal Coordinated Time (UTC) time. When you import data into Excel, the Clock module's Time Zone Offset register for the meter is applied.

1. To create a database query in Excel, click **Data > From Other Sources > From Microsoft Query**.
2. To create a new data source, select <New Data Source> from the list and click **OK**.
3. Type the name you want to give the data source. Once you type a name, the list of drivers for the database type becomes available. Select <SQL Server> from the list. Click **Connect**.
4. Choose your server from the list. Provide your LoginID and Password and click **OK**. Select a default table for your data source (optional). Click **OK** to continue.
5. Select the source name you created and click **OK**.
6. After you have selected the data you want to view, the **Query Wizard** opens. Use this to filter and sort the data.
7. Follow the steps in the **Query Wizard** to add data to the spreadsheet.

Database growth calculations

Factory default measurement logging

A measurement record in the database uses approximately **75 bytes** of disk space. Based on the factory default data logging configurations, we can calculate the database growth for data logged from different device types.

Example

Device Type	Daily Growth Rate (kB)	Number of Devices	Total Daily Growth (MB)	Total Annual Growth (GB)
ION7650	780	10	7.62	2.72
PM8000	950	20	19.00	6.94
PM3200	85	70	5.81	2.07
TOTAL	-	100	32.43 MB	11.84 GB

NOTE: Use the Database Growth Calculator tool to estimate the database growth for your system. The tool is available through the Exchange Community. See Resources for link information.

Custom measurement logging

Custom measurement logging can be configured in the monitoring devices and, as software based logging, in PME. A measurement record in the database uses approximately **75 bytes** of disk space.

The following shows the database growth estimate for logging of a single measurement every 15 minutes:

$$Single\ Measurement\ (MB) = \frac{365\ \frac{Days}{Year} * 24\ \frac{Hours}{Day} * 4\ \frac{Measurement}{Hour} * 75\ \frac{bytes}{Measurement}}{1{,}048{,}576\ \frac{bytes}{MB}}$$

$$= 2.51\ MB\ /\ YR$$

NOTE: Use the Database Growth Calculator tool to estimate the database growth for your system. The tool is available through the Exchange Community. See Resources for link information.

Power quality event logging

Power quality (PQ) events and waveform capture recording is event driven, which makes it impossible to accurately predict their impact on database growth. In our experience, power quality data accounts for approximately 10% - 20% of the total database size.

NOTE: Use the Database Growth Calculator tool to estimate the database growth for your system. The tool is available through the Exchange Community. See Resources for link information.

Default device type support

The following tables list the pre-configured device types in PME 2020 and the license that is required for each type:

NOTE: The license types (E, M, S) are for locales (countries other than the US, Canada, and India) where individual licenses are sold. For locales (the US, Canada, India) where license bundles are sold, a device license is valid for any device type.

NOTE: Drivers created with the Device Type Editor require mid-range (M) type device licenses.

E = Entry-Range Device License
M = Mid-Range Device License
S = High-End Device License

Device Type	License
9410	S
9810	S
3300 ACM	E
3710 ACM	S
3720 ACM	S
3800 RTU	M
ACCESS 9200	E
ACCESS 9200 (MODBUS)	E
ACCESS 9300	E
ACCESS 9330	M
ACCESS 9340	M
ACCESS 9350	M
ACCESS 9360	M
ACCESS 9500	M
ACCESS 9500 RTU	M
ACCESS 9510	M
ACCESS 9510 RTU	M
ACCESS 9600	S
ACCESS 9610	S
ACCESS 9700	S
AccuSine PCS	S
AccuSine PCS Plus	S
AccuSine PCSn	S

Device Type	License
AccuSine PFV Plus	S
Acti 9 Smartlink	E
Acti 9 Smartlink Ethernet	E
Altivar 61	E
ASCO 7000/4000 (CE)	M
ASCO 7000/4000 (SE)	S
BCPM	E
BCPM Flex Cct [license multiplier = 0.5] (*)	M
CM100-200	E
CM2000 Series	M
CM3000 Series	M
CM4000 Series	S
CMS460	M
ComX (WAGES)	E
DM2000	E
DM6200	E
DM6200 H	E
DM6300	E
EDS151	E
EDS461	E
EM1000 Series	E
iEM2000	E
EM3460	E
EM3550	E
EM3555	E
EM4200	E
EM4300 Series	E
EM4800-08 Delta	M
EM4800-08 Wye	M
EM4800-12	M
EM4800-24	M
EM4900	M

Device Type	License
EM4900 Logical Meter [license multiplier = 0.01] (*)	S
EM5600	M
EM6400	E
EM6400 NG	E
EM6430	E
EM6433	E
EM6433_36_38 H	E
EM6434	E
EM6436	E
EM6436 Dual	E
EM6438	E
EM6459	E
EM6459 H	E
EM7000 Series	E
Enercept Meter	E
EnerSure BCPM 2.0	S
EnerSure BCPM xD	M
EnerSure Enkapsis	S
EnerSure iBCPM Enkapsis	S
EnerSure iBCPM xD	M
Exertherm ARM XL	M
Galaxy VM	E
Galaxy VX	E
iEM2050/2055/2250	E
iEM2150/2155	E
iEM3x50 Series	E
iEM3x55 Series	E
IG6	E
ION 6200	E
ION 6200 (MODBUS)	E
ION 7300	E
ION 7330	M
ION 7350	M

Device Type	License
ION 7400	S
ION 7500	M
ION 7500 RTU	M
ION 7550	M
ION 7550 RTU	M
ION 7600	S
ION 7650	S
ION 7700	S
ION 8300	M
ION 8400	S
ION 8500	S
ION 8600	S
ION 8600C	M
ION 8650	S
ION 8650C	M
ION 8800	S
ION 8800C	M
ION 9000	S
LVSMC	E
MGE Galaxy 5000 Series	E
MGE-UPS	E
Micrologic 2.0/3.0/5.0/6.0/7.0 X	M
Micrologic 2.0/5.0/6.0 E	E
Micrologic 2.0/5.0/6.0 E IFE_IFM	E
Micrologic 2.0/5.0/6.0/7.0 A	E
Micrologic 2.0/5.0/6.0/7.0 A IFE_IFM	E
Micrologic 5.0/6.0/7.0 H	M
Micrologic 5.0/6.0/7.0 H IFE_IFM	M
Micrologic 5.0/6.0/7.0 P	E
Micrologic 5.0/6.0/7.0 P IFE_IFM	E

Device Type	License
Micrologic 5.2/6.2/5.3/6.3 A	E
Micrologic 5.2/6.2/5.3/6.3/7.2/7.3 E	E
Momentum PLC A8 (WAGES)	M
Momentum PLC D10 (WAGES)	M
Momentum PLC D16 (EPSS)	M
PM1120_30 H	E
PM1200	E
PM200 Series	E
PM2000 Series	E
PM3250	E
PM3255	E
PM5100 Series	E
PM5300 Series	M
PM5350	E
PM5350 IB/PB	E
PM5500 Series	M
PM600 Series	E
PM700 Series	E
PM800 Series	M
PM8000	S
PM810 LE	E
PM9C	E
PowerTag [license multiplier = 0.05] (*)	M
PowerTag NSX	E
Sepam Series 10	E
Sepam Series 20	E
Sepam Series 40	M
Sepam Series 48	M
Sepam Series 60	S
Sepam Series 80	S

Device Type	License
SER 2408	M
SER 3200	M
Switchgear Monitoring Device	M
Symmetra	M
SymmetraMW	M
Tesys T	E
Twido Modular PLC (WAGES) D12/28/44	E
Varlogic_NRC_12	E
VarPlus Logic	E
Veeder Root	M
Vigilohm IFL12	E
Vigilohm IM20H	E
WT4000 Series	E
ZBRN32 (CL110/TH110)	M

(*) The license multiplier indicates the fraction of a license each device of this type uses. For example, a multiplier of 0.01 means that 100 devices of this type can share one full license.

NOTE: PME assigns a higher range license to a device, if an appropriate lower range license is not available. For example, if a system has a PM8000 device, which requires a Mid-Range license, PME will assign a free High-End license to this device, if a Mid-Level license is not available.

IIS Application Pools

The Power Monitoring Expert installer enables and configures IIS to host the different Web applications. The following table lists the application pools and applications:

Application Pool	Identity	Application
Application Modules App Pool	NetworkService *	Dashboards EWS (EcoStruxure Web Services) Slideshow System Data Service Web
ION App Pool	NetworkService *	ION ION Report Data Service Web Services
Web Reporter App Pool	NetworkService *	ModelingConfig reporter

* When PME is installed with Windows Integrated Authentication, then the Windows account that is used to access the database, is also used to run the IIS Application Pools, instead of the **Local System** account.

NOTE: The .NET Trust Level for PME web applications and Default Web Site must be set to **Full (internal)**, in IIS Manager.

Insulation Monitoring Design for ANSI

The following provides information on the design and architecture for an application of the Insulation Monitoring Module in the ANSI market in Canada and United States.

Hardware devices

The following insulation monitoring components are available for all ANSI markets:

Isolated Power Panel

The isolated power panel provides isolated power to electrical systems in critical areas. Panel configurations include a standard single, dual-voltage, and duplex. The single isolated power panel comes with one Iso-Gard™ IG6 line isolation monitor (LIM-IG6) and one power transformer. Dual-voltage panels include two LIM-IG6 devices and one transformer. Duplex panels include two LIM-IG6 devices and two transformers. Other optional devices, including TCP gateways, are available.

Single Isolated Power Panel

The single isolated power panel is a single-voltage, single-system panel. There is no provision for receptacles, ground jacks, or circuit control. This panel contains one LIM-IG6 and one transformer. A TCP gateway and other optional devices are available.

Single Panel with Receptacles and Ground Jacks

The single isolated power panel can be configured with power receptacles and ground jacks on the faceplate of the panel. This panel configuration is suited for areas that require a central location for receptacles and ground jacks.

Dual-Voltage Isolated Power Panel

The dual-voltage isolated power panel provides two different output voltages simultaneously from one isolation transformer. The typical configuration contains the following output voltages:

- One side configured for 208 V or 240 V fixed at 15 kVA.
- Second side configured for 120 V at 5.0, 7.5, or 10 kVA.

This panel type contains two LIM-IG6 monitors, one for each power supply side. Additional components of the dual-voltage panel include:

- 2 reference ground buses
- 1 primary circuit breaker
- 1 secondary main circuit breaker for 120 V side
- 8 branch circuit breakers for 120 V side, field-convertible up to 16
- 1 secondary main circuit breaker for 208 V or 240 V side
- Provision for two 2-pole branch circuit breakers for 208 V or 240 V side.

Duplex Isolated Power Panel

Duplex isolated power panels provide two separate voltage outputs from two isolation transformers. This system is equivalent to two independent single isolated power panels in one enclosure. The duplex panel contains the following:

- 2 single-phase isolation transformers
- 2 LIM-IG6 monitors
- 2 reference ground buses
- 2 primary circuit breakers
- 8 branch circuit breakers for 120 V side, field-convertible up to 16.

Line Isolation Monitor

The LIM-IG6 monitors the impedance to ground of the entire isolated power system. This value is used to calculate the Total Hazard Current (THC), measured in milliamperes (mA). The standard THC alarm value set for line isolation monitors is 5 mA. The value may be switched to 2 mA to meet Canadian Standards Association (CSA) requirements. The LIM-IG6 detects the following information:

- Resistive and Capacitive fault
- Under voltage and over voltage
- Temperature status, when the optional sensor is installed
- Transformer load percentage, when the optional CT is installed

Isolation Power Transformer

To match the requirements for the room branch circuits, the isolation power transformer can be configured with a specific rating and different single-phase primary voltages. A single isolated power panel includes one transformer. A dual-voltage transformer and duplex transformer includes two transformers. See the following table for power rating and primary voltage options.

kVA	Primary Voltage	Secondary Voltage	Primary Circuit Breaker	Secondary Circuit Breaker[1, 2]
3	120 208 240 277	120	30A 20A 20A 15A	8-20 A
5	120 208 240 277 480		60A 30A 30A 25A 15A	
6.5	120 208 240 277 480		80A 45A 40A 35A 20A	
7.5	120 208 240 277 480		80A 45A 40A 35A 20A	
10	120 208 240 277 480		100A 60A 60A 45A 30A	

See the isolation power transformer documentation for wiring diagrams, installation, and other information about the transformer.

IGC Gateway

The IGC gateway, formerly known as COM460IP, can be included in the isolated power panel for data communications. The IGC gateway converts data from the Bender serial BMS protocol to Modbus TCP so the data can be recorded and stored by PME. See the IGC gateway documentation for more information about the gateway.

Branch Circuit Breakers

The isolated power panel includes eight branch circuit breakers for the 120 V side, field-convertible up to 16. Each branch circuit can have up to four single receptacles, so the panel supports up to 64 receptacles. An EDS151 circuit fault monitor can be installed on each branch circuit.

Insulation Fault Locator

The EDS151 insulation fault locator works in conjunction with the LIM-IG6 to detect insulation faults for specific branch circuits in the unearthed power supplies, such as for IT systems. The software can display information about insulation faults when this device is installed.

Circuit Transformers

The SWT3 or SWT4 circuit transformer can be installed for performing load monitoring from the LIMIG6. The software can display information about the transformer load when this device is installed.

- STW3 type current transformers monitor up to 100 A load current.
- STW4 type current transformers monitor up to 200 A load current.

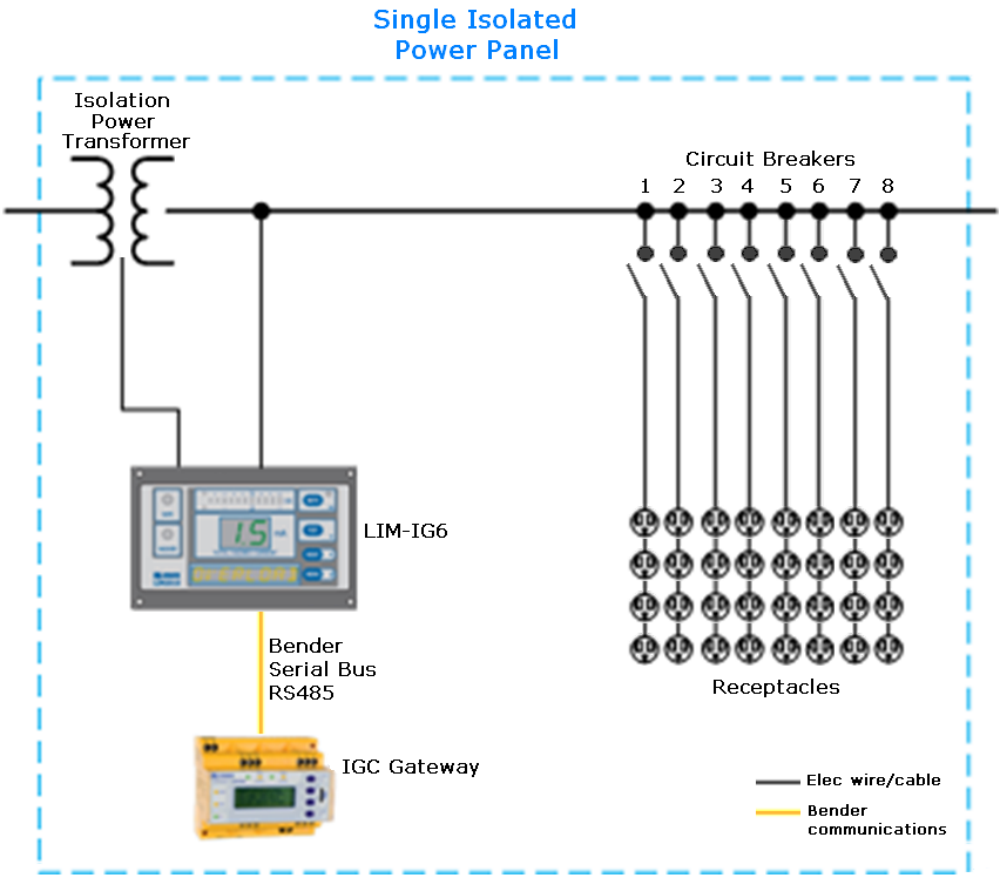
See the SWT3 or SWT4 documentation for more information about the circuit transformers.

Temperature Sensor

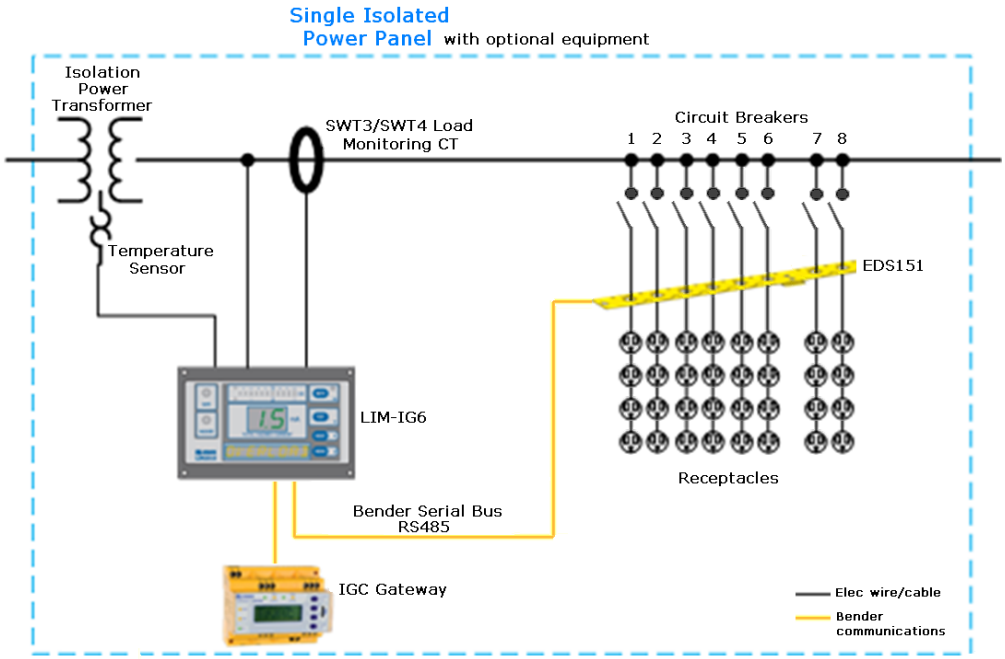
A temperature sensor can be installed to monitor the temperature of the isolation power panel. The temperature sensor must be connected to the digital input of the LIM-IG6. The software can display temperature information when this device is installed. See the temperature sensor documentation for more information about the temperature sensor.

Electrical diagrams

This section provides details for electrical connections of the components in the isolated power panel and the hardware configurations that could be commissioned on site. The following figure shows the typical configuration for a single isolated power panel with one 120V isolation transformer, one LIM-IG6 and TCP gateway.



Each isolated power panel can have optional transformer load monitoring, temperature monitoring, and EDS151 or EDS460 circuit fault locators as shown next.



In order to have the transformer load monitoring and circuit fault location, the panel requires these components:

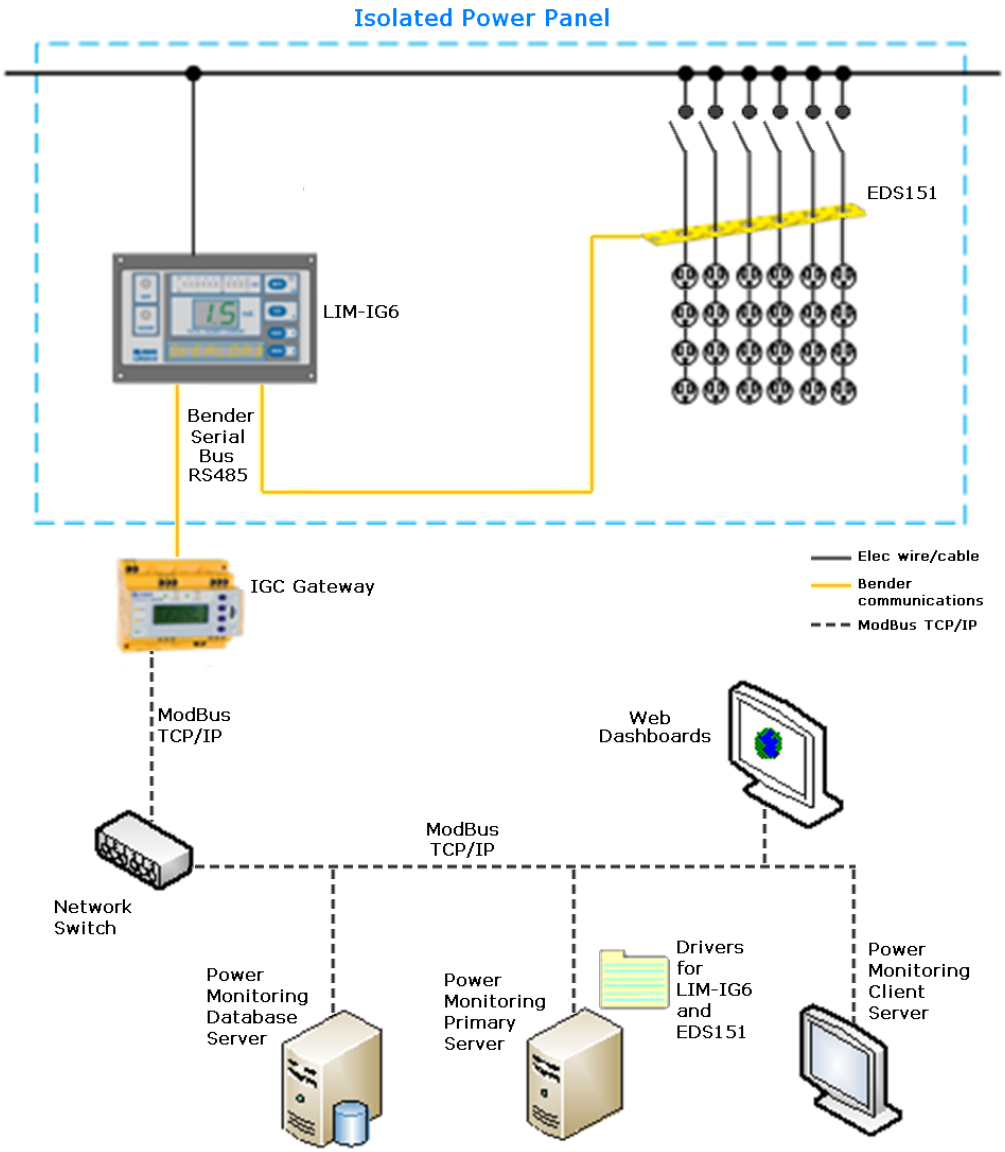
- SWT or SWT4 current transformers. These devices perform transformer load monitoring and are connected to the LIM-IG6 connector plate input 1S1 and 1S2. See the LIM-IG6 documentation for connection details.
- EDS 151 circuit fault locators: Each circuit can have one EDS151 to detect the presence of insulation faults. See the EDS151 documentation for more information.

In the Insulation Monitoring Module, one area can have a maximum of six LIM-IG6 monitors. This enables the following panel combinations:

- 6 single isolated power panels. Each panel has 1 LIM-IG6.
- 3 dual-voltage isolated power panels. Each panel has 2 LIM-IG6.
- 3 duplex isolated power panels. Each panel has 2 LIM-IG6.

Network communication

This section shows a network diagram and describes the network communication between the devices in the isolated power panel and the power monitoring system.



This network diagram shows a distributed power monitoring system: the databases are on different servers from the primary server. The system could also have a client server, where users can view their system and generate reports. Other client PCs with dashboards can be included in the system.

The LIM-IG6 is connected to other Bender devices in the isolation power panel using RS485 serial cable. The LIM-IG6 communicates with other Bender devices, such as the EDS151, through the propriety Bender serial bus protocol.

The IGC gateway converts the Bender protocol to Modbus TCP. PME communicates with the IGC gateway through port 502, the standard Modbus TCP/IP port. The software can also connect to the IGC gateway through the Silverlight port 4530. Up to three Silverlight ports can be used simultaneously. See documentation for the IGC gateway for more details.

The LIM-IG6 continuously measures the leakage impedance between isolated line and ground and calculates the Total Hazard Current (THC). When the THC increases to a hazardous level of 5 mA (USA) or 2 mA (Canada), the LIM-IG6 activates alarms internally and on remote devices if available. If an EDS151 is connected to the LIM-IG6, the EDS151 is activated automatically after an alarm is generated by the LIM-IG6. A test signal is sent to the EDS151. The signal flows through the location

of the ground fault. Current transformers placed around each sub feeder or load will pick up on this test signal. The EDS151 device will then evaluate the results. The location of the fault is displayed on the EDS151 via an LED bar graph.

All the information above is also available through Modbus TCP protocol. PME gets the real-time data and the event log through Modbus TCP. The software performs software logging every 5 minutes for the following measurements:

- Total hazard current
- Line voltage
- Leakage resistance
- Leakage impedance
- Transformer load monitoring (optional, if SWT3 or SWT4 CT is installed)
- Temperature (optional, if temperature sensor is installed)

When PME is installed on the system, drivers for the LIM-IG6 and EDS151 are installed on the primary server. The Insulation Monitoring Configuration Tool is also installed.

IP Ports

The following table lists the ports used by PME for the communication between its components and the connected devices:

Port	Protocol	Location	Function	Configurable
20/21	FTP	Power Meter	Power meter access	No
23	Telnet	Power Meter	Power meter access	No
25	SMTP	Power Meter	Power meter access	No
69	TFTP	Power Meter	Power meter access	No
80	HTTP	(1) PME Server (2) Power Meter	(1) IIS server, EWS (2) Power meter access	(1) Yes (2) No
135	OPC	PME Server	OPC client	No
139/445	NetBIOS/SMB	PME Server	Engineering client (File and Printer Sharing)	No
443	HTTPS	(1) PME Server (2) Power Meter	(1) IIS Server, EWS, Cloud Agent (2) Power meter access	No
502	Modbus TCP	Power Meter	Power meter communication	No
1433	TCP	Database Server	SQL Server instance	No
1434	UDP	Database Server	SQL Server Browser	No
3721	PML	Power Meter	Power meter communication	No
6000-6099	TCP	PME Server	Log Inserter	No
7176	TCP	PME Server	Diagnostics Viewer (LogSubsystem.Service.exe)	No
7700	ION	Power Meter	Power meter communication	No
7701	Modbus RTU	Power Meter	Power meter communications	No
7800	Modbus/ION/PML	Gateway	Ethergate (All meter COM ports)	No
7801	Modbus/ION/PML	Gateway	Ethergate (Meter COM1)	No
7802	Modbus/ION/PML	Gateway	Ethergate (Meter COM2 and COM 4)	No
7803	Modbus/ION/PML	Gateway	Ethergate (Meter COM3)	No
8090	TCP	PME Server	Web client browser	Yes
8523	TCP	PME Server	Logical devices (LogicalDevice.AutoConfig.ServiceHost.exe)	Yes
13666	TCP	PME Server	PMLNetman.exe	No
13667	TCP	PME Server	Diagnostics Viewer (Server access from client machine)	No
13668	TCP	PME Server	Secondary server	No
13666 13670 13671	TCP	PME Server	Services (Vista and Designer access from client machines)	No
23102	TCP	PME Server	Application Modules web services	No
27010	TCP	PME Server	Licensing (Vendor Daemon)	Yes
27011	TCP	PME Server	Licensing (License server)	Yes

Port	Protocol	Location	Function	Configurable
57777	TCP	PME Server	(1) Real-time data service (to send data to clients) (2) SQL Server (for default instance)	Yes
57778	TCP	PME Server	DataProcessorService.exe	Yes
57779	TCP	PME Server	Diagnostics Viewer (Alarm Service)	Yes
57780	TCP	PME Server	Diagnostics Viewer (Log Subsystem)	Yes
57781	TCP	PME Server	Diagnostics Viewer (Cloud Agent)	Yes

Licensing resources

Use the following links and contacts to find additional information and tools related to licensing.

Item	Link/Contact	Description
Licensing Portal	https://pme-licensing.schneider-electric.com	This is an online tool. Use the licensing portal to create a license Bill of Materials (BOM), to activate or renew a service plan, and to generate licenses.
Licensing Overview	https://community.exchange.se.com/t5/EcoStruxure-Power-Monitoring/PME-Summary-Licensing-9-0-UPDATES-PENDING/td-p/147740	This is a summary post on the Exchange community. This post provides links to documentation and videos with details on licensing.
Purchasing PMELicenses	For US orders only: VUSS@se.com For non-US orders: VOS@se.com	Submit your purchase orders for PMElicenses to these email addresses.
Software Licensing Support	https://www.schneider-electric.com/sites/corporate/en/support/software-licensing/software-licensing-na.page	This is an online Web Portal used for offline activations and returns.
PMEOrder Support	PME-ordersupport@se.com	Send a request to this email address if you need an extension of the trial license period.
Software Registration Center	https://www.schneider-electric.com/sites/corporate/en/support/software-licensing/contact-na.page Regions / Hours of Operation / Spoken Languages / Email / Phone Europe / Monday to Friday 8:30am to 5:00pm (CET) / English, German / src-eeurope@schneider-electric.com / +420 281 088 696 North and Central America / Monday to Friday 8:00am to 5:00pm (EST) / English / src-americas@schneider-electric.com / +1 888 266 8705 (US/Canada) +1 978 975 9755 (other countries) South America / Monday to Friday 8:30am to 5:00pm (CET) / English / src-southamerica@schneider-electric.com / +420 281 088 696 Asia and Pacific / Monday to Friday 9:00am to 5:00pm (AEST) / English / src.asiapacific@schneider-electric.com / +61 2 9125 8531 France / Monday to Friday 8:00am to 6:00pm (CET) / French / global-src-france@schneider-electric.com / 08 25 012 999 (France) +33 492 088 268 (other countries) Italy / Monday to Friday 8:00am to 6:00pm (CET) / Italian / it-registrazione-software@schneider-electric.com / +39 011 4073333	This is a global network of support centers. Contact a Software Registration Center (SRC) if you exceed the license return limit, or if a license has become untrusted. Do not contact a SRC for license troubleshooting or to get new licenses.

PME Databases

Power Monitoring Expert uses four databases to store device communication parameters, system configuration settings, and logged historical data.

ION_Network database

Sometimes called the NOM (Network Object Model), the ION_Network database stores device information, such as, device name, device type and connection address (for example, IP address and TCP/IP port or device/Modbus ID). It also contains information about the optional Application Module settings, other ION Servers, Sites, Dial Out Modems, and Connection Schedules. There is only one ION_Network per system.

ION_Data database

The ION_Data database contains the historical data, events and waveforms from devices connected to the system. This includes: onboard logging configured on devices; and, PC-based logging configured in the device translators and the Virtual Processors.

Application Modules database

The Application_Modules database contains configuration settings (for example, layouts, colors, application events, and so on) and cached historical data for some of the Web Applications (for example, Dashboards and Trends).

ION_System log database

The ION_SystemLog database holds system events and their timestamps, which is accessible to view in Management Console. Event priorities can range from 0-255 and are grouped into Diagnostic (0 - 5), Information (6 - 20), Warning (21 - 63), Error (64 - 191), and Critical (192 - 255) categories. System events can include:

- ION Service stopped or is starting or user connection to an ION Service is lost.
- Device has been declared offline / online.
- ION Site Service connected, disconnected or failed to connect to a Site.
- ION User logs on / off Vista or Designer.
- ION User saves a Vista or Designer node diagram.
- Plus many other Warnings and Errors relating to PME system functions.

PME Windows services

All PME applications without a user interface run as Windows services. The following table lists all PME services:

Service Name	Startup Type	Log On Account	Description
ION Application Modules Alarm Services Host	Manual	NT AUTHORITY\System *	Allows the Event Notification Module (ENM) to read alarms directly from the ION_Data database. Starts on demand from other services (for example, from the Event Notification Module).
ION Application Modules Core Services Host	Automatic	NT AUTHORITY\System *	Hosts common web services used by the Web Applications component.
ION Application Modules Data Services Host	Automatic	NT AUTHORITY\System *	Hosts web services that provide low-level access to system data (that is, real-time, historical, alarming, and authentication) for the Web Applications component.
ION Application Modules Provider Engine Host	Automatic	NT AUTHORITY\System *	Hosts web services that provide data processing for the Web Applications component.
ION Cloud Agent Service	Automatic	NT AUTHORITY\System *	Manages interaction with cloud services.
ION Component Identifier Service	Manual	Local Service *	Locates local and remote product components. Starts shortly after startup by request of ION Connection Management Service.

Service Name	Startup Type	Log On Account	Description
ION Connection Management Service	Manual	NT AUTHORITY\System *	Determines the connection status of sites and devices in the system, and handles allocation of resources such as modems. This service manages the state of site and device connectivity for the system. In order to establish the most appropriate state for the system, each connection and disconnection request is evaluated against the overall state of the system and availability of communications channels. Starts shortly after startup by request of ION Network Router Service.
ION Diagnostics and Usage Service	Automatic	Local Service *	Collects basic, non-identifying information from the Power Monitoring Expert system and uploads it to a secure location on the cloud for data mining by Schneider Electric. Customers can opt-in or opt-out at any time.
ION Event Watcher Service	Automatic	Local Service *	Monitors system events for conditions specified in Event Watcher Manager.
ION Log Inserter Service	Automatic	NT AUTHORITY\System *	Provides historical data collection for the power monitoring system (that is, devices and Virtual Processor), and stores it in the ION_Data database.
ION Log Subsystem Router Service	Automatic (Delayed Start)	NT AUTHORITY\System *	Transfers data received from power monitoring devices to storage and processing.
ION Managed Circuit Service	Automatic	Local Service *	This service is used to create individual real-time and historical data sources for multi-circuit meters.

Service Name	Startup Type	Log On Account	Description
ION Network Router Service	Automatic	NT AUTHORITY\System *	Routes all ION requests between the software components, such as client workstations, the Real Time Data Service, Log Inserter, and the Query Server. The service dynamically detects changes to the network configuration, including the addition of new servers. It can also recognize new software nodes, such as Vista, that are added to an existing server.
ION OPC Data Access Server	Manual	NT AUTHORITY\System *	Serves real-time OPC data (OPC DA) to OPC client applications. Starts on an OPC client request for data, if the Data Exchange Module license has been activated.
ION PQDIF Exporter Service	Manual	Local Service *	Translates power quality data from the ION_Data database into PQDIF file format and manages scheduled PQDIF exports.
ION Query Service	Automatic	NT AUTHORITY\System *	Provides historical data retrieval from the ION_Data database for client applications (for example, Vista and Diagrams).
ION Real Time Data Service	Automatic	Local Service *	Manages and provides access to real-time data for all client applications (Vista, Diagrams, Trends, and so on).
ION Report Subscription Service	Automatic (Delayed Start)	Local Service *	Runs Reports subscriptions according to user-defined schedules. Starts several minutes after the server starts.
ION Site Service	Automatic	NT AUTHORITY\System *	Manages communication links to and from the product. ION Site Service is responsible for handling packet communications to system devices and controlling direct device communications. The service reacts to changes in network configuration: for example, changes to certain channels, configuration parameters, ports, or device parameters can often interrupt a connection.

Service Name	Startup Type	Log On Account	Description
ION Software Data Processing Service	Automatic (Delayed Start)	Local Service *	Performs evaluations based on real time data from the power monitoring system.
ION Software Modbus Gateway Service	Manual	Local Service *	Enables software data services via ModbusTCP/IP, and is treated like a device in the system. For example, the Circuit Breaker Aging Service uses this service.
ION Virtual Processor Service - NVIP.DEFAULT	Automatic	Local Service *	Provides aggregation, control, and mathematical analysis of power monitoring system data.
ION Virtual Processor Service – NVIP.PQADVISOR	Automatic	Local Service *	Serves up data for the Power Quality Performance diagrams. Functions only when the Power Quality Performance module is licensed and configured.
ION Virtual Processor Service – NVIP.DDD	Automatic	Local Service *	Serves up data for the Disturbance Direction Indicators application. Functions only when the Disturbance Direction Indicators application is configured.
ION XML Subscription Service	Automatic	Local Service *	Manages subscriptions to XML data for Vista user diagrams. This service is used only by the Diagrams application. When you open a Vista user diagram in a web browser, the ION XML Subscription Service creates a subscription and delivers the real-time data in XML format.
ION XML Subscription Store Service	Automatic	Local Service *	Stores XML data subscriptions for the power monitoring devices on the network. This service is used only by the Diagrams application.
ImadminSchneider	Automatic	Local Service	This service runs the FlexNet Publisher License Server Manager.
SQL Server (ION)	Automatic	Local System	Provides storage, processing and controlled access of data, and rapid transaction processing for the ION_ Data, ION_Network, ION_SystemLog, and the ApplicationModules databases.

* When PME is installed with Windows Integrated Authentication, the Windows account that is used to access the database is also used to run the PME services.
** This service only exists on systems with SQL Server, not SQL Server Express.

SQL Server accounts

The database server hosts several databases for Power Monitoring Expert (PME). The following tables lists the SQL Server logins and permissions created for PME:

For installations with SQL Server Authentication:

Login	Authentication	Server Role	Database	Membership
AMUser	SQL	Public	ApplicationModules	AMApplicationRole
ION	SQL	Public	ApplicationModules	db_owner
			ION_Data	db_owner
			ION_Network	db_owner
			ION_SystemLog	db_owner
ionedsd	SQL	Public	ION_Data	ION_DSD_Reader
			ION_Network	NOM_DSD_Reader
IONMaintenance*	Windows	Public	ApplicationModules	db_backupoperator, db_ddladmin, Maintenance
			ION_Data	db_backupoperator, db_ddladmin, Maintenance
			ION_Network	db_backupoperator, db_ddladmin, Maintenance
			ION_SystemLog	db_backupoperator, db_ddladmin, Maintenance

* This account is only created on standalone servers where the SQL Server software and PME are installed on the same computer.

For installations with Windows Integrated Authentication:

Login	Authentication	Server Role	Database	Membership
Account used for Windows Integrated Authentication	Windows	Public	ApplicationModules	db_owner
			ION_Data	db_owner
			ION_Network	db_owner
			ION_SystemLog	db_owner

IONMaintenance *	Windows	Public	ApplicationModules	db_backupoperator, db_ddladmin, Maintenance
			ION_Data	db_backupoperator, db_ddladmin, Maintenance
			ION_Networks	db_backupoperator, db_ddladmin, Maintenance
			ION_SystemLog	db_backupoperator, db_ddladmin, Maintenance

* This account is only created on standalone servers where the SQL Server software and PME are installed on the same computer.

NOTE: When PME is installed with Windows Integrated Authentication, the Windows account that is used to access the database is also used to run the PME services and the IIS Application Pools.

Other

PME must have access to the master and tempdb System Databases.

The PME Database Manager tool requires that the Windows account that is used to run it has sysadmin permissions on the PME SQL Server instance. The Database Manager is an optional tool, used for managing the PME databases.

Windows accounts

The following tables provide information on the Windows accounts used by Power Monitoring Expert (PME):

User Account	Role/Group/Permissions	Notes
IONUser (account)	- No group membership. - Has List/Read/Write/Execute permissions on the PME share folder.	- Automatically created during the installation of PME. - Used to run report subscriptions. - Needs access to the folder where subscriptions are saved.
IONMaintenance (account)*	Member of Users group	- Automatically created during the installation of PME. - Used to run database maintenance jobs in Windows Task Scheduler.
Login used to run the PME installer	Needs to be a member of local Administrators group	- Manually created by the user. - Used to log into Windows to run the PME installer - If possible, the local Administrator account should be used.
Login used to access PME applications	Needs to be a member of Users group	- Manually created by the user. - Used to log into Windows to run the PME Web Applications or Engineering Client applications.
Login to run application engineering tools	Needs to be a member of local Administrators group	- Manually created by the user. - Used to log into Windows to run PME application engineering tools. An example is the Configuration Manager Tool, used for system upgrades.
Login to run the Database Manager tool	Needs sysadmin permissions on SQL database instance.	- Manually created by the user. - Used to log into Windows to run the PME Database Manager tool. - This Windows account needs to be added to the SQL server database.
SQL Server Database Engine service	NT AUTHORITY\SYSTEM	Must have access to the database folder(s) and the Temp folder of the installer user during installation. Permissions can be lowered after PME is installed.

* This account is only created on standalone servers where the SQL Server software and PME are installed on the same computer.

NOTE: For information on which accounts are used to run the PME Windows services, see PME Windows services and IIS Application Pools.

For installations using Windows Integrated Authentication, the following additional accounts and permissions are required:

User Account	Role/Group/Permissions	Notes
Account used for Windows Integrated Authentication	- Needs to be a member of local Administrators group - Needs 'Log on as a service' privilege on application server	- Manually created by the user. - Used by PME to access the SQL server databases.
Login used to access PME Engineering Client applications	Needs sysadmin server role for the PME databases.	This is not an additional user account. It is just an added requirement for the Logins used to access the Engineering Client applications (Vista, Designer, Management Console, Management Console tools). The PME databases are: ApplicationModules, ION_Data, ION_Network, ION_Systemlog.

NOTE: When PME is installed with Windows Integrated Authentication, the Windows account that is used to access the database is also used to run the PME services and the IIS Application Pools.

Installation and Upgrade references

This section contains reference information related to the content in the Installing and Upgrading chapter of this guide.

Use the following links to find the content you are looking for:

Setting SQL Server memory options

Note the following recommendations for setting SQLServer memory options on the server where you install SQL Server:

- Do not set the SQL Server maximum memory to less than 1GB.
- Where only SQL Server is running on the host server, set the SQL Server maximum memory at the system physical memory less at least 2GB for the Windows operating system. For example, if your server has 8GB of memory, set the SQL Server maximum memory to no more than 6GB. This leaves at least 2GB for the operating system.
- Where the SQL Server is sharing the host server with other server processes, including Internet Information Services (IIS) and ION services, set the SQL Server maximum memory to no more than half the physical memory on the server. For example, if your server has 8GB of memory, set the SQL Server memory to no more than 4GB. This leaves at least 4GB for the operating system and all other server processes.

In addition to setting the maximum memory option, consult with your site administrator to determine whether or not to enable the **Lock pages in memory** permission setting in Windows for the SQL service account on all SQL Server instances.

NOTICE

LOSS OF DATA

Back up or archive any SQL Server database data before adjusting any database memory options.

Failure to follow these instructions can result in irreversible database changes.

Only personnel with advanced knowledge of SQL Server databases should make database parameter changes.

To set the maximum memory setting for your SQL Server:

1. Start **SQL Server Management Studio** and log in to your SQL Server instance.
2. Right-click the SQL Server name and click **Properties** in the menu to open the **Server Properties** dialog.
3. Select **Memory** in the left pane and adjust the value in the **Maximum server memory** field.
4. Click **OK** to apply the changes and close the dialog.
5. Close **SQL Server Management Studio**.

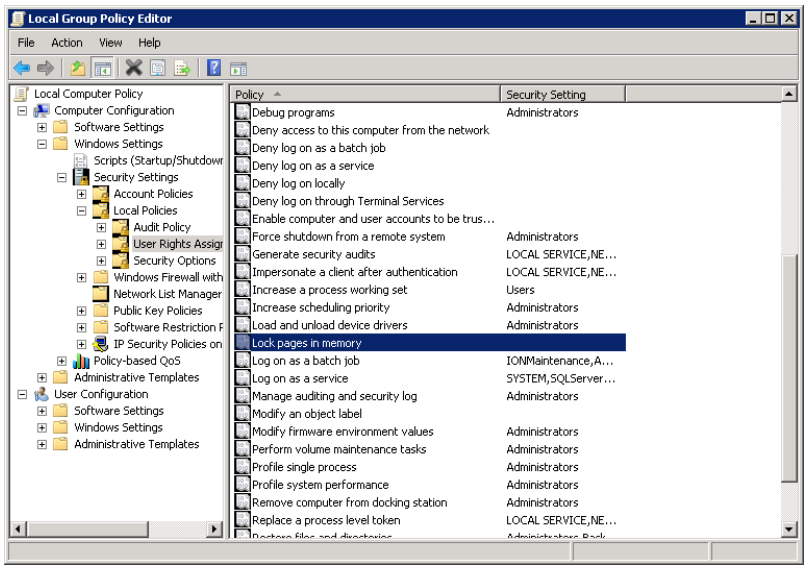
   A server reboot or a restart of the SQL Server service is not required.

To enable the lock pages in memory option:

1. Click **Start > Run** and type `gpedit.msc` in the **Run** dialog to open the **Local Group Policy Editor**.

2. In the left pane, navigate to **Computer Configuration > Windows Settings > Security Settings > Local Policies**.
3. Expand **Local Policies** and select **User Rights Assignment**.

   The policies are listed in the right pane.



4. Locate **Lock pages in memory** in the list and then double click the policy name to open the **Lock pages in memory Properties** dialog.
5. Click **Add User or Group** on the **Local Security Setting** tab.
6. Add an account with the privileges to run sqlserver.exe and then click **OK** to close the dialog.
7. Click **OK** to close the **Local Group Policy Editor**.

   A server reboot or a restart of the SQL Server service is not required.

Setup Types and applicable Installer pages

The following table lists the pages in the Installer associated with each setup type. Because Secondary Server installations are not common, the Secondary Server setup type is excluded from the table. The "Y" indicates that the Installer page appears during the installation of that setup type, and the "n/a" indicates that the page is not applicable to that setup type and does not appear during the installation.

Installer Pages	Setup Types		
	Standalone	Application Server	Engineering Client
Application Language	Y for all setup types		
Welcome	Y for all setup types		
License Agreement	Y for all setup types		
Setup Type	Y for all setup types		
System Key	Y	Y	n/a
Import System Key	n/a	n/a	Y
Export System Key	Y	Y	n/a
User Information	Y for all setup types		
Web Application	Y	Y	n/a
Application Server	n/a	n/a	Y
Diagnostic and Usage / Connected Services	Y	Y	n/a
File Destination	Y for all setup types		
Supervisor Account	Y	Y	n/a
Windows Accounts	Y	Y	n/a
Database Accounts	Y	Y	n/a
Database Software	Y	Y	n/a
Database Files Destination	Y	Y	n/a
Check System	Y for all setup types		
Ready to Configure	Y for all setup types		
Copy Files	Y for all setup types		
Configure System	Y for all setup types		
Complete	Y for all setup types		

Upgrade tools and resources

Tools

The following tools exist to help with PME upgrades:

PME Installer

The PME installer is the installer of the new PME version. It automatically performs an In-Place upgrade if it detects an existing, supported PME installation on the server. The PME installer is part of the `.iso` install file or DVD for PME.

Upgrade Map

The Upgrade Map is a Microsoft Excel based tool that shows the supported upgrade paths and prerequisites for In-Place and SBS upgrades. The Upgrade Map also shows which tool to use for the upgrade.

Configuration Manager

The Configuration Manager is a standalone tool that is used for Side-by-Side (SBS) upgrades of PME. It reads the configuration of the old PME system and copies it to a new PME system. Some manual steps are needed to complete the upgrade when using the Configuration Manager. The tool comes with instructions for the manual SBS upgrade steps.

PME Service Packs

The In-Place and SBS upgrade tools require the latest service pack versions of the older PME systems to be installed before the upgrade.

See Resources for information on where to get the tools and resources.

Estimated task time for SBS upgrades

Section	Estimated Time
Introduction	20 minutes
Step 1 – Prepare both systems	45 minutes (+ possible troubleshooting time)
Step 2 – Transfer the Configuration	30 minutes + 12 min/GB database size (ION_Data, ION_Network, ApplicationModules, Archives)
Steps 3 to 5 – Manually Complete the Upgrade	90 minutes (+ possible troubleshooting time)
Step 6 – Perform a Post-upgrade System Check	60 minutes (+ possible troubleshooting time)
Step 7 – License the new system	15 minutes (+ possible troubleshooting time)
Total upgrade time =	**260 minutes using Configuration Manager***

* Does not include database transfer or possible troubleshooting time.

NOTE: Time estimates are for engineers who are experienced in deploying and customizing PME.

Network communication test

Use Ping to test the communication between computers on an Internet Protocol (IP) network.

To perform a ping test, open a command prompt on each computer and type `ping` <*computer_name*>, where <*computer_name*> is the name of the other computer you want to contact.

A successful response shows 4 attempts to contact the computer, lists the IP Address, indicates `Packets: Sent = 4. Received = 4, Lost = 0 (0% loss)`, plus timing data. If this is not the case, it indicates that the computers cannot communicate and that you need to resolve the connectivity situation.

NOTE: The ping utility requires that Internet Control Message Protocol (ICMP) is enabled on your network.

Enabling TCP/IP protocol in SQL Server Express

To enable the TCP/IP protocol:

1. Click **Start > All Programs > Microsoft SQL Server 20xx > Configuration Tools > SQL Server Configuration Manager**, where 20xx is the SQL Server version.
2. Expand **SQL Server Network Configuration** in the left pane and click **Protocols for ION**.
3. If the TCP/IP protocol status is **Disabled**, right-click **TCP/IP**, and:
   a. Select **Enable** in the menu,

      or,

   b. Click **Properties** to open the **TCP/IP Properties** dialog, select **Yes** for **Enabled**, and click **OK**.

      When you enable the TCP/IP protocol, an informational message indicates that you need to restart the service before the change takes effect.
4. Click **SQL Server Services** in the left pane under **SQL Server Configuration Manager**.
5. Click **SQL Server (ION)** to select it and then click the **Restart service** icon in the toolbar to stop the service and restart it.
6. Close SQL Server Configuration Manager.

Installing and binding security certificates

The certificate authority may provide root certificates and intermediate certificates in addition to the actual server certificate. To install the certificates on the PME server, follow the instructions provided by the certificate authority, or follow the steps below.

Installing a root certificate

To install a root certificate:

1. Open Microsoft Management Console (MMC) by running mmc.exe on the PME server.
2. Under **File > Add/Remove Snap-in...** add the **Certificates** Snap-in. In the Certificates snap-in dialog,
   a. Select **Computer Account**. Click **Next**.
   b. Select **Local computer**. Click **Finish**.
3. Click **OK** to close the **Add or Remove Snap-ins** dialog window.
4. In the left pane of the Console 1 window, expand the Certificates folder.
5. Right-click **the Trusted Root Certification Authorities** folder and select **All Tasks > Import...**. In the **Certificate Import Wizard**, click **Next**, enter
   a. File name: (Select your root certificate.) Click **Next**.
   b. Certificate store: (Select Trusted Root Certification Authorities.)
   c. Click **Next**. Click **Finish**.
6. Repeat step 5 to install additional root certificates if required.
7. Close the MMC.

Installing an intermediate certificate

To install an intermediate certificate:

1. Open Microsoft Management Console (MMC) by running `mmc.exe` on the PME server.
2. Under **File > Add/Remove Snap-in...** add the **Certificates** Snap-in. In the **Certificates snap-in** dialog,
   a. Select **Computer Account**. Click **Next**.
   b. Select **Local computer**. Click **Finish**.
3. Click **OK** to close the **Add or Remove Snap-ins** dialog window.
4. In the left pane of the Console 1 window, expand the Certificates folder.
5. Right-click the **Intermediate Certification Authorities** folder and select **All Tasks > Import...**. In the Certificate Import Wizard, click **Next**, enter
   a. File name: (Select your intermediate certificate.) Click **Next**.
   b. Certificate store: (Select Intermediate Certification Authorities.)
   c. Click Next. Click **Finish**.
6. Repeat step 5 to install additional intermediate certificates if required.
7. Close the MMC.

Installing the server certificate

To install a server certificate:

1. Open Internet Information Services (IIS) Manager on the PME server.
2. In the **Connections** pane (left pane) select the server.
3. In the **Home** pane (middle pane),
   a. Select **Features View** at the bottom of the window.
   b. In the **IIS** section, open **Server Certificates**.
4. In the **Actions** pane (right pane) click **Complete Certificate Request...**
5. In the **Complete Certificate Request** dialog, enter
   a. File name: *(Select your server certificate.)*
   b. Friendly name: *(Enter the name under which the certificate will be displayed in Windows menus and UIs, example: Power Monitoring Expert Certificate.)*
   c. Certificate store: *(Select a certificate store. Choose Personal if in doubt.)*
   d. Click **OK** to close the Certificate wizard.
6. Close IIS Manager

Creating a HTTPS binding

Web site bindings define the protocols (HTTP or HTTPS) that are used to access the Web sites.

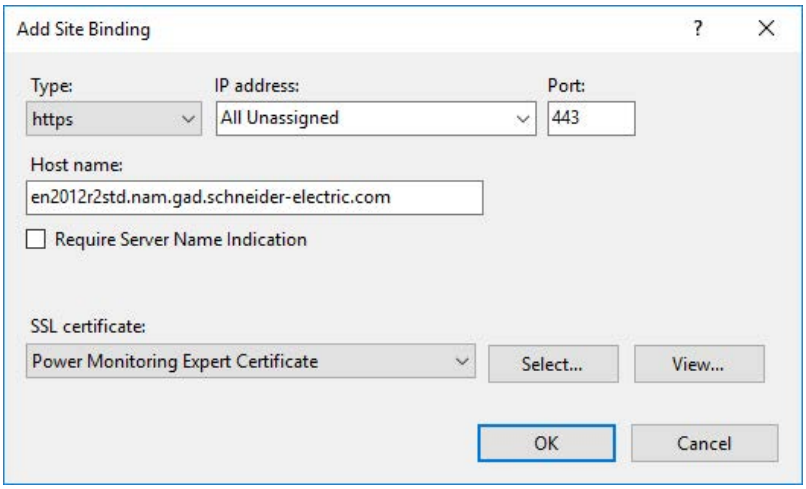
To create a HTTPS binding for the PME Web sites:

1. Open Internet Information Services (IIS) Manager on the PME server.
2. In the **Connections** pane (left pane) expand server name > **Sites > Default Web Site**. Right-click **Default Web Site** and select **Edit Bindings...** from the context menu.
3. In the **Site Bindings** dialog click **Add…** to add a new binding
4. In the **Add Site Binding** dialog:
   a. Set **Type** to https.
   b. Set **IP address** to All Unassigned
   c. Set **Port** to 443.
   d. Set **Host name** to the name shown in the "Issued To" property of the security certificate.

      TIP: To find the “Issued To” name of the certificate, click **View**, after selecting the certificate in the drop down (step f).

   e. Leave the **Require Server Name Indication** box unchecked.

f. Set **SSL certificate** to the security certificate you want to use with PME.



g. Click **OK** to close the **Add Site Binding** dialog.

5. In the **Site Bindings** dialog remove any existing http binding. Close the dialog.
6. Select **Default Web Site** in the **Connections** pane (left pane).
7. In the **Home** pane (middle pane):
   a. Select **Features View** at the bottom of the window.
   b. In the **IIS** section open **SSL Settings**.
8. In the SSL Settings window (middle pane):
   a. Check the box for **Require SSL**
   b. Set **Client certificates** to Ignore
   c. In the Actions pane (right pane) click **Apply**.
9. Close IIS Manager.

Enabling HTTP connections for PME

By default, PME uses HTTPS between the server and the Web clients. Any HTTP connection requests are automatically redirected to HTTPS. To allow both, HTTP connections and HTTPS connections, turn off the automatic redirect. To only allow HTTP connections, enable HTTP and disable HTTPS.

RECOMMENDATION: To increase the cyber resilience of your system, we strongly recommend that you use HTTPS connections with an authority issued certificate.

Allowing HTTP and HTTPS connections

To disable the automatic redirect and allowing both HTTP and HTTPS connections:

1. Open SQL Server Management Studio (SSMS) and connect to the PME SQL server.
2. Copy the following SQL script into a query window In SSMS:

```
UPDATE ApplicationModules.Configuration.ConfigurationSettings
SET Value = 'False'
WHERE [key] = 'IsSecureConnectionRequired'
```

3. Execute the script.
4. Close SSMS
5. Restart Internet Information Services (IIS) on the PME application server.
6. Close all PME Web client browser instances to remove any caching of previous HTTPS connection information.

NOTE: To enable the automatic redirect, follow the same instructions as above but set the value for the **IsSecureConnectionRequired** key in the script to **True**.

Allowing HTTP connections only

To enable HTTP connections and disable HTTPS connections:

A - Configure Internet Information Services (IIS)

To remove the HTTPS binding:

1. Open IIS Manager on the PME server.
2. In the **Connections** pane (left pane) expand server name > **Sites > Default Web Site**. Right-click **Default Web Site** and select **Edit Bindings...** from the context menu.
3. In the **Site Bindings** dialog remove any bindings to port 443 (https).
4. Click **Close**.

B - Configure PME for HTTP

Application Modules Database update

1. Open SQL Server Management Studio and connect to the PME SQL server.
2. Navigate to Databases -> **ApplicationModules** -> Views
3. Right-click on **Configuration.ConfigurationSettings** and selectEdit Top 200 Rows

4. Find the entry in the result set with the following values:
   a. ItemType = *Web Framework*
   b. Item = *Server*
   c. Key = *LocalServerAddress*
5. Update the Value column to `http://localhost/`.
6. Find the entry in the result set with the following values:
   a. ItemType = *Web Framework*
   b. Item = *Server*
   c. Key = *IsSecureConnectionRequired*
7. Update the Value column to be False.

ION_Network Database update

1. Open SQL Server Management Studio and connect to the PME SQL server.
2. Navigate to Databases -> **ION_Network** -> Views
3. Right-click on **dbo.vCFG_ConfigItems** and select **Edit Top 200 Rows**
4. Find the entry in the result set with the following values:
   a. Module = *Reporting*
   b. Category = *General Settings*
   c. Item = *WebServiceUrl*
5. Update the Value column to `http://localhost/ionreportdataservice/ReportDataService.asmx`.
6. Open a windows Command window (cmd.exe) and run `iisreset`.
7. Open the windows Services console, and restart the following service: **ION Application Modules Core Services Host**. Click **Yes** when asked to restart the ION Application Modules services.

Default Web Application link update

1. Open a Windows explorer window and navigate to: Desktop -> **Power Monitoring Expert**
2. Right-click on **Web Applications** and select **Properties**
3. Update the **URL** value with the updated url.

   Example: the correct value would be: `http://localhost/Web`

C - Reset IIS

1. Open a windows Command window (`cmd.exe`) and run `iisreset`

Configuring first time Alarms processing

After a system upgrade, the Alarms Web application processes existing Events and Power Quality data the first time it starts up. You can control how much of the existing Power Quality data is processed by defining how far back in time you want the data to be processed.

The setting that controls the historical Power Quality data range to be processed is stored in the database. This setting defines the start date from which on the data is processed. The default start date is set to 1980-01-01 (yyyy-mm-dd).

NOTICE
INOPERABLE DATABASE Back up the database before executing SQL scripts. **Failure to follow these instructions can result in an inoperable database and loss of data.**

To change the start date for the Alarms data processing:

1. On the PME server, open the Windows Services panel. Find the ION Log Subsystem Router Service and stop this service.
2. On the PME database server, open SQL Server Management Studio (SSMS).
3. Copy the following SQL script into a query window In SSMS:

```
SELECT *
FROM [ApplicationModules].[Configuration].[ConfigurationSettings]
WHERE [Item] = 'Alarm Service Processing' ORDER BY [Key]
```

4. Execute the script on the ApplicationModules database. This returns the settings for the Alarm Service Processing.
5. Find the `OldestConsideredPQEventTimeUtc` setting in the `Key` column and check the date it is set to.
6. Open a new query window in SSMS and copy in the following SQL script:

```
UPDATE [ApplicationModules].[Configuration].
[ConfigurationSettings]
SET Value = 'Enter the start date in the format yyyy-mm-dd'
 WHERE [key]= 'OldestConsideredPQEventTimeUtc'
```

7. Replace the `Enter the start date in the format yyyy-mm-dd` text with the start date for the data processing and then execute the script.
8. Repeat steps 3-5 to review the updated start date.
9. Close SSMS.
10. Open the Windows Services panel. Find the ION Log Subsystem Router Service and start this service.

When you open the Alarms Web application for the first time, it will start processing existing power quality events starting with the date you set above.

Installing PME with manual installation of the databases

NOTE: The procedures described below, for the manual installation of the database, can only be used for Distributed Database architectures. Do not use the procedures for Standalone architectures where the database and the application server are on the same computer.

NOTE: To use this procedure you must use Mixed Mode Authentication for the SQL Server. This procedure does not work if you use SQL Integrated (Windows) Authentication for the SQL Server.

The following describes how you can install PME without having to provide SQL Server account credentials with sysadmin privileges in the PME installer. This involves using the software installer and performing manual configuration steps on the database server.

NOTE: The user account that is used on the database server to run the SQL scripts that are part of this procedure, must have sysadmin privileges on the SQL Server. However, you do not have to enter information for this account in the PME installer.

Overview

Installing PME with manual installation of the databases consists of the following steps:

1. Running the PME installer to install and configure the application files.
2. Manually running scripts on the database server to create the databases and setup the database accounts.

See details below.

Prerequisites

- You need the PME install DVD or ISO file.
- You will need to set a password for the three SQL accounts (`ION, ionedsd, AMUser`) that PME uses to access the database. This password must comply with the password policies of the Windows server and the SQL server.
- You need the following SQL server accounts on the database server:
  - An account that can connect to the SQL server instance. This account does not require sysadmin privileges. This account is used for the installation of PME and future password resets.
  - An account that has sysadmin privileges on the SQL Server. This account is used to run the SQL scripts to create the databases and setup the database accounts.
- You need a folder on the database server for the database files. This folder must exist before you start the PME installation.
- You need access to SQL Server Management Studio on the database server.

Installation

Run the PME installer on the application server and follow the regular install process, with the modifications shown below:

1. On the **Setup Type** installer page, choose **Application Server** setup type. Continue with the installer workflow.
2. On the **Database Accounts** installer page, choose **Use SQL Server Authentication** and provide your own password by clicking **Change Password**. Continue with the installer workflow.

   NOTE: Do not use the installer generate password since it cannot be copied. You will need access to this password in step 18 below, when editing a script file.

   NOTE: If you change the password, the password you are providing must comply with the password policies of the Windows server and the SQL server.
   The software installer cannot validate the password at the time you enter it.
   If the password is not valid, the installation will not be successful. In that case, complete the installation, skipping any unsuccessful steps. See Unsuccessful installation due to invalid account passwords for information on how to repair the unsuccessful install.

   ⚠ WARNING

   POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

   Use cybersecurity best practices for password creation and management.

   Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

   Cybersecurity policies that govern user accounts and access - such as least privilege, separation of duties - vary from site to site. Work with the facility IT System Administrator to ensure that user access adheres to the site-specific cybersecurity policies.

3. On the **SQL Server** installer page, choose **SQL Server Authentication** and provide SQL account information for a low privilege account. This account only needs to be able to connect to the SQL Server instance. Continue with the installer workflow.

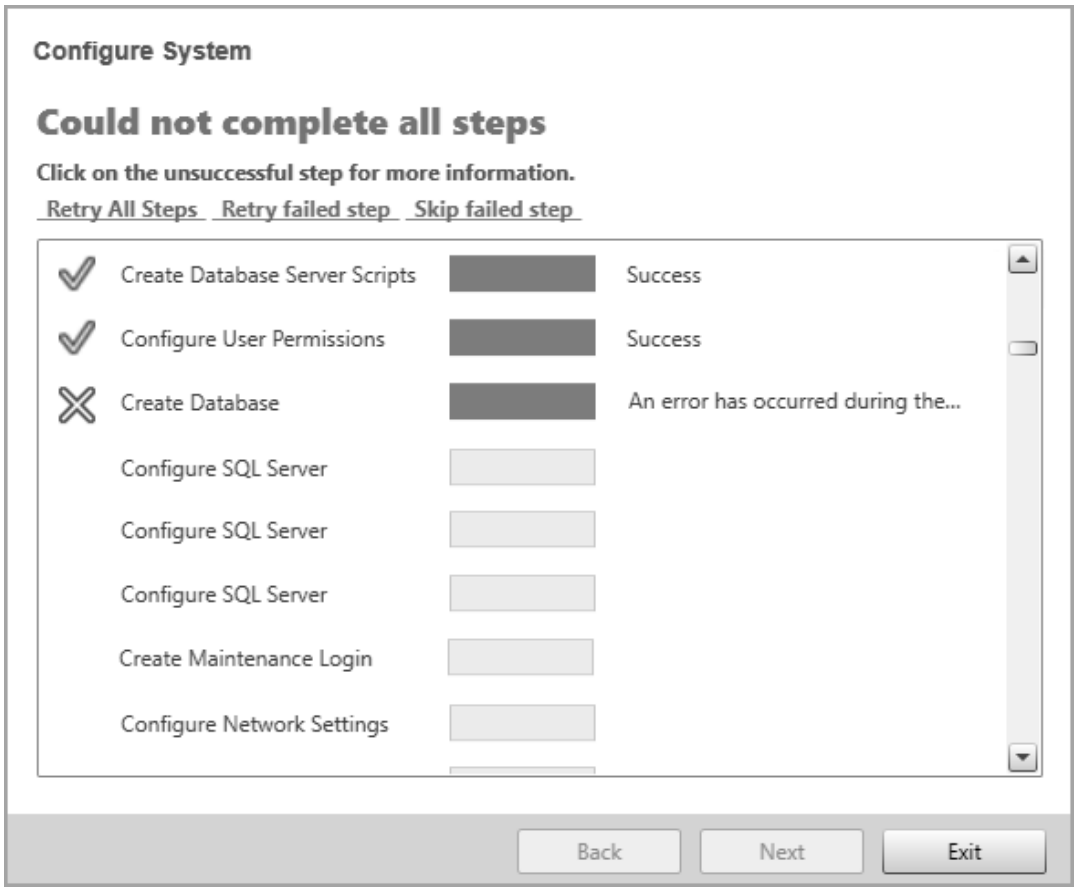
   TIP: Make a note of the account username. You will need this username in step 9 and 16 below, when editing a script file.

4. On the **Database Files Destination** installer page, provide the path to the folder on the database server, where the database files will be installed. Continue with the installer workflow.

   NOTE: The folder on the database server must exist. The PME installer cannot create a folder or verify the existence of a folder on the database server. This is because the SQL account you specified in the previous step has low privileges.

5. After copying files and completing many configuration steps, the installer will stop on the **Create Database** step and display an error message. This is because the installer could not create the databases.

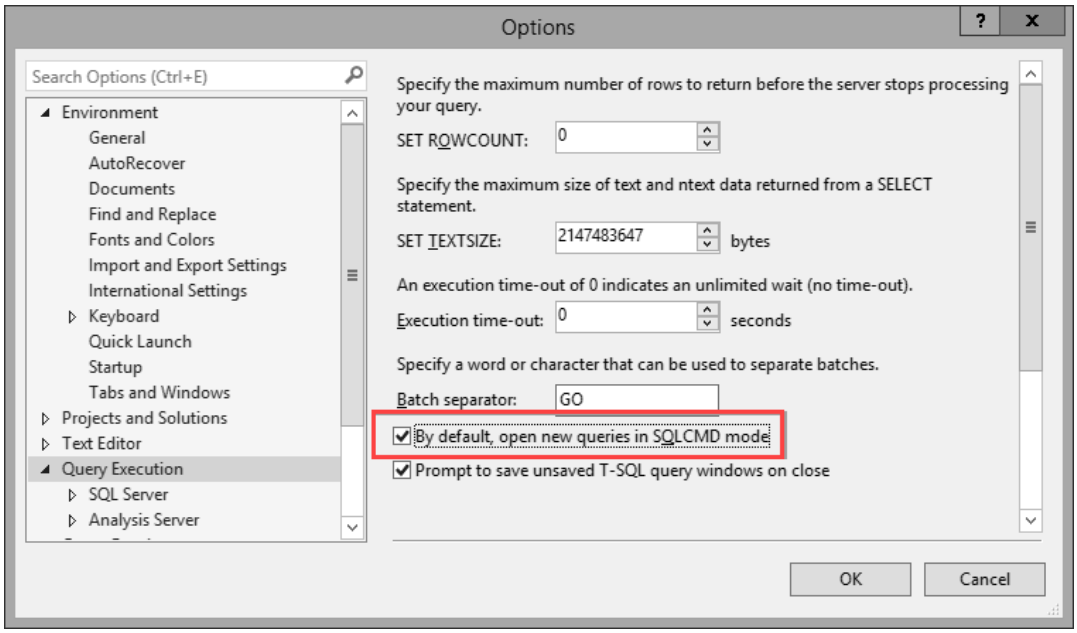
Example:



Leave the installer open in this state. On the PME application server, browse to `...\Power Monitoring Expert\Database\Diagnostic` and copy the following files from there, to a temporary location on the database server: `ION_Data.sql`, `ION_Network.sql`, and `ION_SystemLog.sql`.

6. On the database server, open SQL Server Management Studio (SSMS) and enable SQL CMD by going to **Tools** > **Options**, clicking on **Query Execution** and checking the box **By default, open new queries in SQL CMD mode**.

Example:



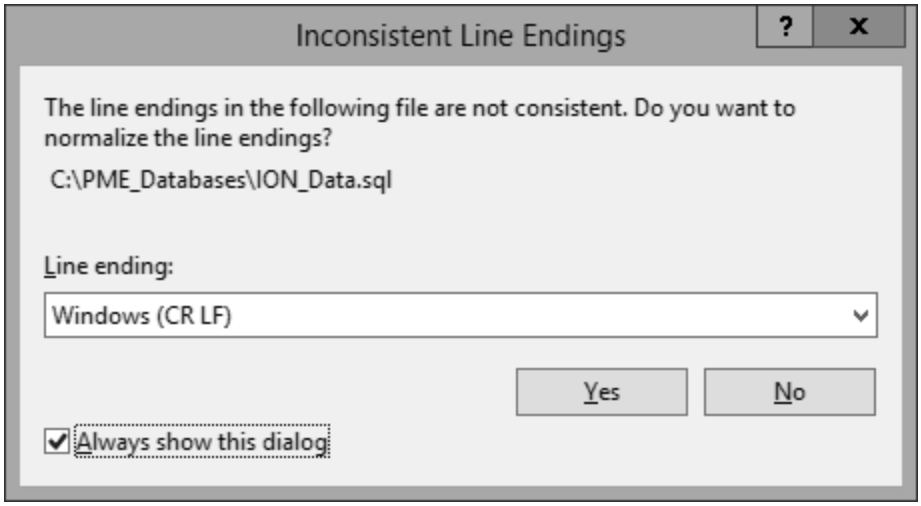
7. On the database server, open and execute the three scripts files (`ION_Data.sql`, `ION_Network.sql`, and `ION_SystemLog.sql`) in SSMS. If an **Inconsistent Line Endings** dialog box is displayed, click **Yes** to continue.

NOTE: The account you use to log into the database server must have sysadmin privileges on the SQL Server.

NOTE: The order in which you run the scripts is not important.

NOTE: The script files create three of the four PME databases - `ION_Data, ION_Network, and ION_SystemLog`. The `ApplicationModules` database will be created in a later step.

Example of Inconsistent Line Endings dialog box:



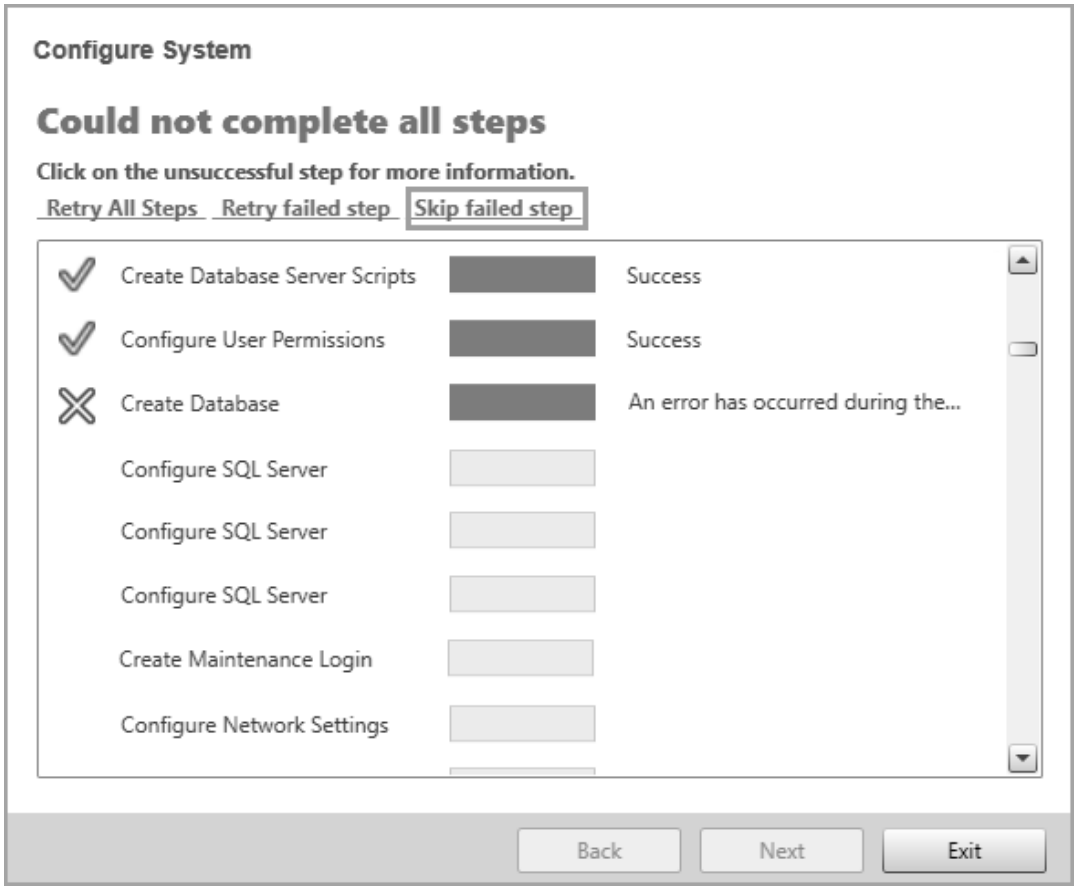
8. On the PME install DVD or ISO file, browse to `root\ManualInstall\` and copy the following script file from there, to a temporary location on the database server: `ManualDBInstall_Script1-Make_DBOwner-DataNtwrkSystm.sql`.
9. On the database server, open `ManualDBInstall_Script1-Make_DBOwner-DataNtwrkSystm.sql` in SSMS. Edit the script by replacing **PM_Login** with the SQL account username you entered in the **Database Software** installer page (step 3). Execute the script.

   Script part where you must set the username:

   ```
   DECLARE @PM_SQL_User_Account NVARCHAR(MAX) = 'PM_Login';
   ```

   NOTE: This will add the account to the db_owner role in the databases.
10. Go back to the PME installer on the application server. It still shows the **Configure System** page with the unsuccessful **Create Database** step. Click **Skip failed step** to skip the failed Create Database step.

    Example:



11. The installer will stop on the **Create Database** step and display an error message. This is because the installer could not create the `ApplicationsModules` database. Leave the installer open in this state.
12. On the PME application server, browse to `...\Power Monitoring Expert\Database\Diagnostic` and copy the `ApplicationsModules.sql` file from there, to a temporary location on the database server.

13. On the database server, open and execute the `ApplicationsModules.sql` script files in SSMS. This will create the `ApplicationsModules` database.
14. On the PME install DVD or ISO file, browse to `root\ManualInstall\` and copy the following script file from there, to a temporary location on the database server: `ManualDBInstall_Script2-Make_DBOwner-AppMods.sql`.
15. On the database server, open `ManualDBInstall_Script2-Make_DBOwner-AppMods.sql` in SSMS. Edit the script by replacing **PM_Login** with the SQL account username you entered in the **SQL Server** installer page (step 3). Execute the script.

    Script part where you must set the username:

    ```
    DECLARE @PM_SQL_User_Account NVARCHAR(MAX) = 'PM_Login';
    ```

    NOTE: This will add the account to the db_owner role in the database.
16. On the PME install DVD or ISO file, browse to `root\ManualInstall\` and copy the following script file from there, to a temporary location on the database server: `ManualDBInstall_Script3-CreateMap_Logins.sql`.
17. On the database server, open `ManualDBInstall_Script3-CreateMap_Logins.sql` in SSMS. Edit the script as shown below. Execute the script.

    To edit the script:

    a. Uncomment the following two statements: `DECLARE @IsIntegratedSQLAuthUsed BIT = 0` and `DECLARE @PM_SQL_Account NVARCHAR(MAX) = '<DOMAIN\USERNAME>'`.

    b. Set the `@PM_SQL_Password` variable in the following statement, `DECLARE @PM_SQL_Password NVARCHAR(MAX) = '<enter password here>'`, to the database accounts password that you chose in step 2 above.

    NOTE: This will create the PME database accounts that are used by the software to connect to the databases.
18. Go back to the PME installer on the application server. It still shows the **Configure System** page with the unsuccessful **Check Applications Database** step. Click **Skip failed step** to skip the failed Check Applications Database step. Continue with the installer workflow.
19. The installer will stop on the **Configure SQL Server** step and display an error message. Click **Yes** to continue with the rest of the installation.
20. Click **Exit**, after the installation is complete.

NOTE: The installer will display a **Could not complete all steps** message when it finishes. Ignore this message. The steps that did not complete are the ones that were done manually as per instructions above, and then skipped.

Final notes

- Delete the low privilege SQL account created for step 3. It is no longer needed.

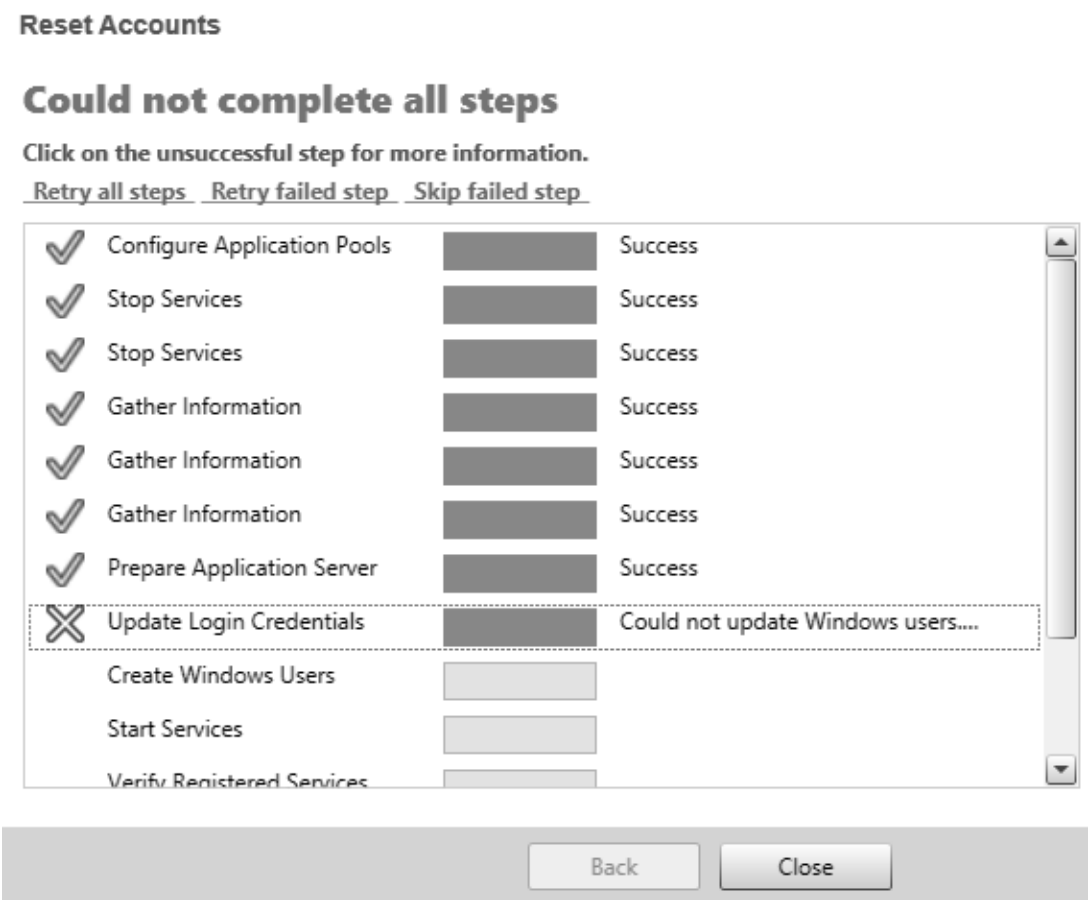
- Delete the copy of the `ManualDBInstall_Script3-CreateMap_Logins.sql` script with the entered password (see step 18) or keep it in a secure location to prevent unauthorized access to the password.
- You can disable SQL CMD in SSMS on the database server. This option was enabled in step 6 above.
- If, at a later point, you want to change the password used by PME to connect to the databases, first manually change the password for the three PME logins (`ION, ionedsd, AMUser`) on the database server using SQL Server Management Studio.

NOTE: Note that all three logins need to use the same password.

Then run the PME installer on the application server and select **Reset Accounts**. In Reset Accounts, change the password for the Database Accounts to match the one you manually set in SSMS. You can use the low privilege SQL account created for step 3 for the password reset in the installer.

NOTE: If you use an SQL account without sysadmin level SQL credentials for the password reset in the installer, you will see an error at the **Update Login Credentials** step. Ignore the message and skip this unsuccessful step. The password reset will still be successful.

Reset Accounts error on Update Credentials step:



PME 2020 Install notes

The following is a list of release notes related to PME 2020 installs.

- Install path length limitation
- 32-bit version of SQL Server Express is not included with the PME installer
- Install a security certificate for TLS 1.2

Install path length limitation

The installation path for installing PME on your computer is limited to 100 characters. This is done to ensure that the path length of PME system files, after the installation, does not exceed the maximum allowable path length of 260 characters. This maximum path length is a limitation on some of the older supported Windows operating system versions.

32-bit version of SQL Server Express is not included with the PME installer

32-bit versions of SQL Server Express are still supported, but they are not included with the installer. If you want to use a 32-bit version, you need to install it on the PME server before installing the software.

The 64-bit version of SQL Server Express is included with the installer and can be installed as part of the PME installation workflow.

Install a security certificate for TLS 1.2

See Install a security certificate for TLS 1.2 in the Install section of this guide for details.

PME 2020 Cumulative Update 1 - Release Notes

File Name:	PME 2020 Cumulative Update 1.exe
Release Date:	March 31, 2020
Download Link:	https://schneider-electric.box.com/s/ojfclsrluewa17fd2f738a5u9crj0y5z

About this document

This document is intended for Application Engineers, System Integrators, or other qualified personnel who are responsible for designing, installing, configuring, maintaining, and using EcoStruxure™ Power Monitoring Expert (PME) software.

This document is not a tutorial, it was written with the assumption that you have been trained in the deployment and use of PME.

SUMMARY

This cumulative update (CU) includes several quality and cybersecurity improvements. It also includes some new functionality. We highly recommend you install this update on compatible PME systems.

DETAILS

New items

Feature/Application	Description
Alarms	Added support for Arc Flash alarms.
Reports	Added the new Power Load Demand & Capacity report template.

Cybersecurity

This update addresses the following publicly disclosed cybersecurity vulnerabilities:

- OpenSSL 1.1.0j: `CVE-2018-0732, CVE-2018-0734, CVE-2018-0735, CVE-2018-0737, CVE-2018-5407`
- Apache httpd 2.4.39: `CVE-2018-11763, CVE-2018-17189, CVE-2018-17199`
- libxml2 V2.9.9: `CVE-2018-14404`

Fixed items

Feature/Application	Description
Alarms	Fixed an issue where some alarms and incidents for Enersure BCPM devices were not categorized correctly.
Alarms	Fixed an issue where the Refresh link in the first-time alarm processing dialog was not working correctly.
Alarms	Corrected an alarm view label that was translated incorrectly for systems with Czech localization.
Alarms	Fixed an issue where the time for the alarm state was displayed incorrectly for systems with Czech localization.

Feature/Application	Description
Alarms	Fixed an issue where high-speed transient capture (HSTC) data was missing from alarm views.
Connected Services	Moved the Connected Services Enable/Disable control into Settings > Registration. Some customer or service provider information must now be provided before enabling the services.
Connected Services	Made changes to the type of data that is available to connected services.
Dashboards	Fixed an issue that caused the Sankey gadget to incorrectly display data from hierarchy nodes.
Data Logging Subsystem	Fixed and issue that could lead to a blocking of data log insertions into the database.
Device Driver	Added missing event mapping definitions for the Vigilohm IM20H device driver.
Device Support	Updated device support in preparation for a planned device security changes in Advanced Range and Utility ION meters.
Diagnostics Viewer	Fixed an issue that caused the Tree States for the Communication Server to be displayed incorrectly (as Bad).
Diagrams	Fixed an issue with the date range selection in the data log viewer that prevented custom date queries.
Diagrams	Fixed an issue that caused numeric objects with custom action settings to be displayed with blue font color.
Diagrams	Fixed an issue that prevented the Open in New Window function in the Diagrams context menu to work as expected.
Diagrams	Fixed an issue that prevented repeated plotting of historical data logs in Internet Explorer 11.
Diagrams	Fixed an issue that prevented viewing of waveforms in Diagrams if the Vista waveform query included a WHERE clause.
Hierarchies	Fixed an issue where the Hierarchy Properties dialog box did not display scroll bars when the content exceeded the size of the box.
Licensing	Replaced existing licensing component (2.3.1) with updated version (2.4.0) to remove potential vulnerabilities and provide TLS 1.2 support for the license server connection.
Management Console	Improved the description in an error dialog box. This dialog box is displayed when Management Console is started while ION Application Modules Services are not running.
Reports	Updated a component to remove a potential vulnerability.
Reports	Fixed the Report help link, in the report template selector, where it was not working.
Reports	Fixed an issue where report input parameters, for any of the reports, specified as floating point numbers were rounded to an integer by the report.

Feature/Application	Description
Reports: Breaker Settings Report	Fixed an issue that could lead to the creation of breaker definitions for historical (deleted) devices in the Breaker Configuration Tool.
Reports: EN50160:2010 Report	Fixed an issue that prevented the report from being generated correctly.
Reports: Generator Test EPSS Report	Fixed an issue that prevented the transfer time from being calculated when EPSS group and PME server timezone settings were different.
Report Subscriptions	Fixed an issue where disabling Standard user logins (in Settings > Login Options) prevented Report subscriptions from being delivered successfully.
Report Subscriptions	Fixed an issue that could prevent a user from saving subscription changes after using the Test Now function.
Software Alarms	Improved source selector performance in the alarm rule editor when many sources are selected.
System Log	Restored the logging of connection and disconnection events for sites and devices.
Trends	Fixed an issue where the graph color indication was not shown in the trend legend.
VIP	Fixed an issue where certain setpoint module output label formats prevented the setpoint alarms from being shown in Alarms.
Vista	Fixed an issue that could cause the numeric object display in Vista to flicker on and off.

Removed items

No functionality or feature has been removed.

PME 2020 Upgrade notes

The following is a list of release notes related to upgrading older versions of the software to PME 2020.

For upgrades from all supported versions:

- VIP Modbus Master functionality removed during upgrade
- VIP Modbus Slave functionality now requires a Data Exchange Module license
- Upgrading systems with Event Notification Module configurations

For upgrades from versions older than PME 9.0:

- Upgrades from PME 7.2.2
- Reporter (RepGen) database login removed during upgrade
- Tables not migrated to new table gadget in Dashboards
- PQ Advisor has changed to PQ Performance and needs some manual post upgrade steps
- Install a security certificate for TLS 1.2

Upgrades from all supported versions

VIP Modbus Master functionality removed during upgrade

The Modbus Master feature in the VIP has been removed from new installations, starting with PME 2020. As a result, Modbus Import and Modbus Export modules are no longer available in the VIP, starting with PME 2020.

If your existing system contains VIP frameworks with Modbus Import or Modbus Export modules, then these modules will be removed automatically during the upgrade. At the same time, information on configuration settings of these modules and links to other ION modules in the framework is captured. You can use this information to configure replacement functionality in the new, upgraded system. For details on the removal of this feature during upgrade and the information captured, see knowledge base article **FA382887**.

NOTE: Only the Modbus Import and Modbus Export modules are removed from VIP frameworks during upgrade. Other modules in the framework remain unchanged.

NOTE: ION modules that have input or setup registers linked to the Modbus Import and Modbus Export modules will not be functional after the removal of these modules on upgrade. You need to review the configuration and links of these modules, after the upgrade, and manually put them back online.

NOTE: Any links from an affected VIP framework to other parts of the system, for example links to another VIP, remain unchanged during the module deletion process. That means the functionality provided by those other parts might no longer work as expected. You need to review any linked functionality, after the upgrade, and make manual updates as required.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Before installing the upgrade, verify that the system is not performing critical control actions that may affect human or equipment safety.
- Verify correct system operation after the upgrade.

Failure to follow these instructions can result in death or serious injury.

⚠ WARNING

INACCURATE DATA RESULTS

- Before installing the upgrade, verify that the system data results are not used for critical decision making that may affect human or equipment safety.
- Verify correct system data results after the upgrade.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

NOTE: After the upgrade and before putting the system into service, review any VIP frameworks that might have had Modbus Import or Modbus Export modules removed during upgrade. Consider any automated system controls or third-party interactions that might be affected by the module removal. Make any configuration changes necessary for your system to operate as expected. Do not put your PME system back into service until you have confirmed its correct operation.

VIP Modbus Slave functionality now requires a Data Exchange Module license

Starting with PME 2020, the Modbus Slave functionality in the VIP requires a valid Data Exchange Module license to be functional. You must activate this license in PME before you can use the Modbus Slave functionality.

NOTE: On system upgrade, the Modbus Slave functionality will be disabled, if this license has not been activated. In that case, PME will periodically log high priority events to the system log as a reminder that the Modbus Slave functionality is disabled due to insufficient licensing.

Upgrading systems with Event Notification Module configurations

The Event Notification Module (ENM) has been completely redesigned in PME 2020. It is now seamlessly integrated with PME. Notifications are triggered based on alarm views. The module supports SMS and email notification and you can schedule notification activities.

When you upgrade a pre-PME 2020 system with an existing ENM configuration, this configuration will continue to work after the upgrade. In addition, the new ENM functionality will also be available after the upgrade.

For upgrades from versions older than PME 9.0:

Upgrades from PME 7.2.2

PME 7.2.2 systems cannot be upgraded using the PME 2020 installer. To upgrade a PME 7.2.2 system, use the Configuration Manager 2020 tool.

High level upgrade steps:

1. Use Configuration Manager 2020 to archive the configuration of the existing PME 7.2.2 system.
2. Uninstall PME 7.2.2.
3. Install PME 2020.

   NOTE: Install PME 2020 in a different path than PME 7.2.2 to avoid potential conflicts with leftover files from the 7.2.2 install.

4. Use Configuration Manager 2020 to write the archived configuration of the old system to the new PME 2020.

See Configuration Manager for information on this tool. Download the Configuration Manager 2020 from the Schneider Electric Exchange. See Resources for link information. See Upgrade version support for general upgrade support information.

Reporter (RepGen) database login removed during upgrade

NOTE: Only for upgrades from versions older than PME 9.0.

Reporter, the Excel based reporting feature, was removed in PME 9.0.

For In-Place upgrades of older PME versions, which included Reporter, the Reporter functionality is left in place during the upgrade, but the SQL login account used by Reporter to access data in the database, is removed. This is done for security reasons.

If you want to continue to use Reporter on an upgraded PME 2020 system, you need to create a new SQL login account for Reporter and then update the reports with the new account information.

To enable Reporter for an upgraded system:

1. Open Microsoft SQL Server Management Studio (SSMS) on the PME database server computer.
2. Create a new login with the Login name `Report` and SQL Server Authentication.

   ⚠ WARNING

   POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

   Use cybersecurity best practices for password creation and management.

   Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

   Cybersecurity policies that govern user accounts and access - such as least privilege, separation of duties - vary from site to site. Work with the facility IT System Administrator to ensure that user access adheres to the site-specific cybersecurity policies.
3. Run the following SQL scripts on the ION_Data and ION_Networks databases:

   ```
   EXEC sp_change_users_login 'Auto_Fix', 'Report'
   ```

   This re-attaches the login with the users.
4. Update the password information in the Excel reports:
   a. On the PME Application server, navigate to `...Power Monitoring Expert\config\reports` and backup the Excel reports that are in this folder and that you want to update the password for.
   b. For each report in the `...Power Monitoring Expert\config\reports` folder,
      - Open the file.
      - Right-click a sheet tab and click **Unhide** in the context menu.
      - In the Unhide sheet box, select **|PRIVATE|Datasheets** and then click **OK**.
      - Scroll to the right of the file and update the PASSWORD value to match that of the Report SQL Server account.
      - Verify that the server name (column Y) and the database instance name (column Z) are correct.
      - Right-click the PRIVATE|Datasheets tab and click **Hide** in the context menu.
      - Save and close the Excel report file.

⚠ WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

Use cybersecurity best practices to help prevent unauthorized access to the software.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

Work with facility IT System Administrators to ensure that the system adheres to the site-specific cybersecurity policies.

Tables not migrated to new table gadget in Dashboards

NOTE: Only for upgrades from versions older than PME 9.0.

The Tables Web application was removed in PME9.0. Use the table gadget in Dashboards instead, to setup real-time data displays.

Saved Tables are not migrated to the new table gadgets automatically during the upgrade. You need to manually recreate the tables in Dashboards, using the table gadget, after the upgrade.

PQ Advisor has changed to PQ Performance and needs some manual post upgrade steps

NOTE: Only for upgrades from versions older than PME 9.0.

The PQ Advisor software module was renamed to PQ Performance in PME9.0. As part of this name change, the VIP framework for PQ Performance was updated. If you are using the PQ Performance module, then we recommend that you update the framework on your system after the PME upgrade. To do this, delete the existing PQ Advisor framework in the VIP, paste in the new framework, and check the Vista diagram links to the VIP framework. See Configure Power Quality Indicator Diagrams for information on pasting the framework.

If you created a custom tab in the Web Applications of the old system for PQ Advisor, you need to recreate this tab manually in the new system. The procedure for creating custom tabs changed in PME 9.0. See (Optional) Create a Power Quality Performance link in the Web Applications for details.

NOTE: The PQ Performance VIP still uses the old VIP.PQADVISOR name.

Install a security certificate for TLS 1.2

NOTE: Only for upgrades from versions older than PME 9.0.

See Install a security certificate for TLS 1.2 in the Install section of this guide for details.

PME release history

The following table lists the major releases of PME. Service pack and hot fix releases are not included in this list.

PME Name and Version	Year of release
Power Monitoring Expert 2020	2019
Power Monitoring Expert 9.0	2018
Power Monitoring Expert 8.0	2015
Power Monitoring Expert 7.2	2013
StruxureWare Power Monitoring 7.0	2012
ION Enterprise 6.0	2009
ION Enterprise 5.6	2007
ION Enterprise 5.5	2004
ION Enterprise 5.0	2003
ION Enterprise 4.5	2002
ION Enterprise 4.0	2002
ION Enterprise 3.0	2001

The following table shows the support status for recent PME releases.

Release	Release Date	Lifecycle Phase	Support
PME 2020	November 2019	Full Support	(*) Full Support will end on December 31, 2022 (**) Limited Support will end on December 31, 2024
PME 9.0	September 2018	Full Support	Full Support will end on December 31, 2021 Limited Support will end on December 31, 2023
PME 8.2	April 2017	Full Support	Full Support will end on December 31, 2020 Limited Support will end on December 31, 2022
PME 8.1	April 2016	Limited Support	Full Support will end on December 31, 2019 Limited Support will end on December 31, 2021
PME 8.0	June 2015	Limited Support	Full Support ended on December 31, 2018 Limited Support will end on December 31, 2020
PME 7.2	September 2013	Retired	
PME 7.0	March 2012	Retired	

(*) Full Support:

- Technical investigation and assistance for customer issues, including creation of critical hotfixes where deemed necessary by the factory.

(**) Limited Support:

- Answering technical questions.
- Providing workarounds an fixes for known problems, when possible. No hotfixes for new issues.
- Providing information on migration to a newer product release with Full Support.

Configuration Manager

This section contains reference information related to the Configuration Manager tool.

TIP: See Resources for information on where to get the Configuration Manager tool.

Use the links below to find the content you are looking for:

About

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Configuration Manager
Version 2020
Language: English
Release date: November 2019

Version History

The following information lists the changes that were introduced in each tool release:

Release 5

Release name: Power Monitoring Expert - Configuration Manager 9.0

Release date: Aug 2018

NOTE: Archived configurations saved with an earlier version of the Configuration Manager are not compatible with this release of the tool.
(Exception: PME 8.1 archives created with Configuration Manager 2.0.1 can be loaded and written.)

System support

Server or Machine	Version
Source	PME 7.2.2 PME 8.2 PME 9.0
Target	PME 9.0

NOTE: Only upgrades and migrations within the same architecture are supported (Standalone -> Standalone, Distributed Database -> Distributed Database)

New features

- Support for all PME Editions.
- Support for all localized versions of PME.

Release 4

Release name: Power Monitoring Expert - Configuration Manager 2.1.0

Release date: April 2017

NOTE: Archived configurations saved with an earlier version of the Configuration Manager are not compatible with this release of the tool.

System support

Server or Machine	Version
Source	ION Enterprise 6.0.1 PME 7.2.2 PME 8.2
Target	PME 8.2

NOTE: Only Standalone system architectures are supported, except for ION Enterprise 6.0.1 Distributed Database systems, which can be upgraded to PME 8.2 Distributed Database.

Release 3

Release name: Power Monitoring Expert - Configuration Manager 2.0.0

Release date: August 2016

NOTE: Archived configurations saved with an earlier version of the Configuration Manager are not compatible with this release of the tool.

System support

Server or Machine	Version
Source	ION Enterprise 6.0.1 PME 7.2.2 PME 8.1
Target	PME 8.1

NOTE: Only Standalone system architectures are supported.

New features

- Support for migrating historical data.
- Support for more configurable items.

Release 2

Release name: Power Monitoring Expert - Configuration Manager 1.1.0

Release date: April 2015

NOTE: Archived configurations saved with an earlier version of the Configuration Manager are not compatible with this release of the tool.

System support

Server or Machine	Version
Source	PME 7.2.2
Target	PME 7.2.2

NOTE: Only Standalone system architectures are supported.

New features

- Adding Notes to a Configuration.
- Adding Attachments to a Configuration.
- Save to Archive warns you when free disc space is low.

Improvements

General

- Archive file path and name length can be any length; it is no longer restricted to 256 characters.
- Improved error messaging.
- ETL sources are read, saved, and written as historical sources.

- WebReach Start-up diagrams and Vista start-up diagrams are now supported.
- A hierarchy is always written to the target system, even if it contains broken device references.

User Interface

- Improved messaging and workflows to indicate when services are stopped and restarted.
- Renamed the 'Diagrams' configuration component to 'Customized Diagrams' to better convey that the tool reads and writes new and edited diagrams only.
- Improved tool workflows when operations are completed or canceled.
- The Configuration Manager now displays the Report Subscription's description field:
- Log pane – Added more detail to log messages and improved log message wording.
- Log pane – Changed the default initial sort to show newest log messages first.

Reports

- Reports that were deleted from Custom Report Packs are no longer imported into the target system.
- Default report sharing is supported.

Release 1

Initial release.

Release name: Power Monitoring Expert - Configuration Manager 1.0.0

Release date: November 2014

System support

Server or Machine	Version
Source	PME 7.2.2
Target	PME 7.2.2

NOTE: Only Standalone system architectures are supported.

Glossary

The following is an alphabetical list of terms and definitions that are commonly used within the context of using Configuration Manager.

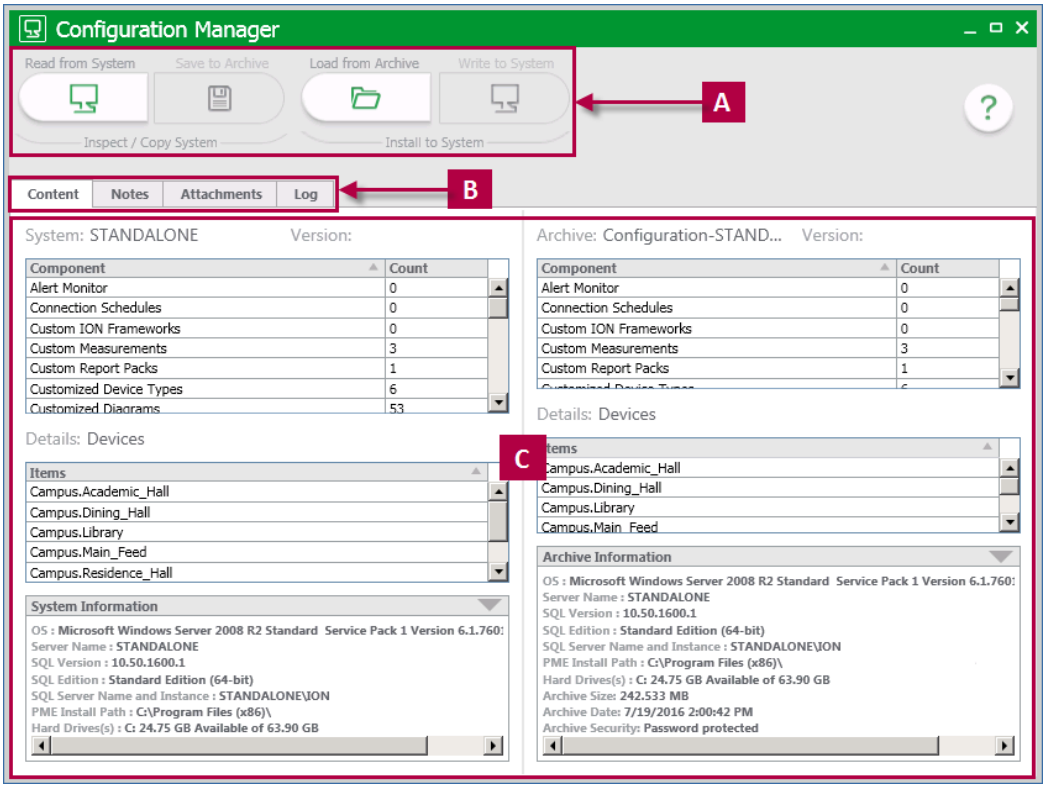
Term	Definition
Application Server	A computer in a distributed PME system that is running all of the PME applications and services. See Distributed System for more details.
Component	A portion of a configuration. For example: Components vary from version to version.

Term	Definition
Configuration	See "PME configuration."
Database Server	Computer in a distributed PME system that is running the SQL database server software and the PME databases. See “Distributed System” for more details.
DB	SQL Server Database System
Device	A meter or a point of data collection.
Distributed System	PME installation where parts of the system are installed on different computers. Different combinations are possible but the most common is the separation of the PME applications and the Database server onto different computers. For example, a simple distributed install would have all the PME relevant programs and services installed on one computer and SQL Server with the PME databases installed on a second computer. In this case, the computer running the applications is called “Application Server” and the computer running SQL Server is called “Database Server.” A distributed system can also have “Web Client” computers that are running web browsers to view the PME web applications like Dashboard, Alarm Viewer, and Reporter inside the Web framework.
DC	Data Center
ENM	Event Notification Module
Factory installed system	A default PME system that contains no customizations.
HC	Healthcare
HDD	Hard disk drive
ION data	Historical, timestamped measurement and alarm or event information that is logged in the database. This information is gathered during the operation of the system, for example by monitoring devices. Examples include 15 interval logs of Volts/Amps/Power, waveform recordings, and event log entries. This information is domain-specific and independent from PME.
IIS	Internet Information Services
OS	Operating System

Term	Definition
PME configuration	Information that determines the behavior of a PME system as well as its look and feel. This information is stored in the software in various places such as the database, the Windows registry, the file system, and configuration files. Configuration information is part of the factory install and can be modified or added to during the commissioning phase and throughout the lifetime of the software. Configuration information includes settings that are persistent and determine the state of the software. For example, enable or disable, boundary conditions, and so on.
Off-site configuration	A configuration scenario where a field engineer configures a PME system on a physical computer or Virtual Machine in their office. After the system has been completely deployed, the configuration is exported to a portable archive using the Configuration Manager. The field engineer then visits the customer site and - using the same tool - imports the configuration from the archive into the target PME system that was installed at the client site.
RESL	Knowledge base Article - referenced by its RESL number
SSDT	SQL Server Data Tools
SSMS	SQL Server Management Studio
Standalone Server	Single computer running all parts of a PME system. See “Standalone System” for more details.
Standalone System	PME installation where all parts of the system are installed on the same computer, that is all PME applications and services, the SQL database server, and the PME databases are on a single computer. This single computer is then referred to as “Standalone Server”. A standalone system can also have “Web Client” computers which are running web browsers to view the PME web applications like Dashboard, Alarms, and Web Applications component.
VM	Virtual Machine (as compared to a physical computer).
Web Client	Computer in a PME system that is running a Web browser to view the Web-based Dashboards, applications like Dashboard, Alarm Viewer, and Reporter in the Web framework.

Configuration Manager User Interface

The topics in this section describe the controls and options available in the Configuration Manager user interface.



The topics in this section describe the controls and options available in the Configuration Manager user interface.

A	Operation toolbar: **Read from System** – Reads a PME configuration. **Save to Archive** – Saves a read configuration to an archive file. **Load from Archive** – Loads an archive of a previously saved configuration. **Write to System** – Replaces the system configuration with the archived configuration.
B	Configuration and operation information tabs: **Content** – Displays configurations. **Notes** – Displays configuration notes. **Attachments** – Displays configuration attachments. **Log** – Displays messages that are generated by the Configuration Manager when it performs an operation.
C	Information pane: Displays the detailed configuration information. Content displayed varies depending on the information tab that is clicked.

Writing to a Customized PME System

Performing a Write to System (WtS) on a PME system that was previously customized could negatively impact the system configuration.

Review the following information to understand how customized components are effected.

Component	Tool Behavior	Effect on System
Billing Rates	Custom and modified default rate files are not updated on the target system	The billing rates in the rate library can be different from the default install and different from the latest WtS archive.
Device Types	Additions to or customizations of the registry related to device type support remain on the target system	Device type mappings to Vista diagrams can be different from the default install (effects the Generate Network Diagram feature). Additional device type mappings to Vista diagrams can exist that do not exist in a default install.
EWS	Custom and modified default EWS files remain on the target system	EWS server remains configured and active on the target system if it was configured before. The configuration can be different from the latest WtS archive.
ION Frameworks	Custom and modified default framework files remain on the target system	The framework files can be different from the default install and different from the latest WtS archive.
Log Inserter	The `LogAquisitionControl` file, if it exists, will remain on the target system. Any modifications to the loginserter configuration file that were done manually on the target system will remain on the target system.	The loginserter configuration can be different from the default install and different from the latest WtS archive.
Management Console Options	MC configuration files remain on the target system	It is possible that certain user preferences for specific user accounts are retained in these files. The effect is that some user accounts might see UX behavior in Management Console that is different from the default install and different from the latest WtS archive.
Node Diagrams	Node diagram files remain on the target system	The node diagram files on the target system can be different from the latest WtS archive.
OPC Server	Custom and modified default OPC files remain on the target system	OPC server remains configured on the target system if it was configured before. The configuration can be different from the latest WtS archive.

Component	Tool Behavior	Effect on System
PQDIF Exporter	Custom and modified PQDIF configuration and template files remain on the target system	The PQDIF files can be different from the default install.
Query Server	The query server configuration remains on the target system	The query server configuration can be different from the default install, if they were manually edited after a prior WtS.
Registry	The registry settings remain on the target system	The registry settings can be different from the default install, if they were manually edited after a prior WtS.
Scheduled Tasks	The scheduled tasks remain on the target system	The scheduled tasks can be different from the default install, if they were manually edited after a prior WtS.
VIP	Custom VIPs are not removed from the target system	VIPs can be present that are not part of the default install or the configuration archive that is written to the system.
Vista (Diagrams)	Custom and modified default diagram and image files remain on the target system	The diagram and image files on the target system can be different from the default install and different from the latest WtS archive.
Vista (Settings)	Vista configuration files remain on the target system	It is possible that certain user preferences for specific user accounts are retained in these files. The effect is that some user accounts might see UX behavior in Vista that is different from the default install and different from the latest WtS archive.
Web Reporting (Custom Report Packs)	Custom report packs remain on the target system	Reports can be present in the system that are not in PME by default. The reports can be non-functional if the latest WtS included an ApplicationModules db.
Web Reporting (Custom Report Templates)	Custom report templates remain on the target system	Reports can be present in the system that are not in PME by default. The reports can be non-functional if the latest WtS included an ApplicationModules db.
Web Reporting (Date Ranges)	Custom date range definitions remain on the target system	The date range definitions on the target system can be different from the default install.

Component	Tool Behavior	Effect on System
Web Reporting (Other)	The customized `Report-Logo.jpg` file remains on the target system	The `Report-Logo.jpg` file on the target system can be different from the default install.
Web Reporting (Subscriptions)	Subscriptions are not removed from the target system	Subscriptions can be present that are not part of the default install or the configuration archive that is written to the system.
Historical Database	ION_Data is not replaced if it is not present in the source archive or if the user chooses to exclude it in the WtS	Historical data can be left over from previous WtS or from system operation. The data might be visible in queries if the latest WtS includes devices with names that match previous names with historical data.
Historical Database Archives	Database archives are not removed from the target system	Database archives can be present that are not part of the default install or the configuration archive that is written to the system.

Reconfigure fails after Write to System

Issue: The PME installer displays a "Could not complete all steps" message and indicates a fail on the Secure User Passwords step.

Likely cause: The system key that was provided to the Configuration Manager during Write to System is not the correct key for the source system archive.

Resolution: To correct this situation:

1. Exit the incomplete Reconfigure step.
2. Run the PME installer again and choose **Export System Key**. Save the system key in a secure location. This key will be needed in step 4 below.
3. Run the PME installer again and choose **Import System Key**. Provide the correct source system key. The installer will automatically run a reconfigure after importing the new key.
4. Run the PME installer a third time and choose **Import System Key**. Provide the original key for this system from step 2 above. This will ensure that the target system has a unique key that is different from the source system key.

Save to archive fails because of insufficient SQL Server service account permissions

Issue: Configuration Manager does not save a configuration to archive and logs an error message in the tool log. The message says that SQL Server has insufficient write permissions to the destination folder.

Likely cause: As part of the save to archive, SQL Server creates backups of the PME databases. The database backup files are saved to the destination folder under the security context of the SQL Server service account. If SQL Server does not have write access to the destination folder, the save to archive is not successful.

Resolution: Try saving the archive to a different location or edit the SQL Server service account permissions and try saving to the same location again.

Configuration Manager 2020 release notes

The following information is specific to the 2020 release of the tool.

No release specific notes available.

Configuration References

This section contains reference information related to the content in the Configuring chapter of this guide.

Use the following links to find the content you are looking for:

Topic	Reference Links
Software Alarms	Software Alarms UI
	Add Alarm Rule UI
	Schedules Configuration UI
Backup Power Module	Emergency Power Supply Systems
	EPSS test
	EPSS Transfer Time alarm
	ION device frameworks for EPSS monitoring
	Remote control of ATS Test mode
	Supported measurements and devices
Breaker Performance Module	Supported devices
Capacity Management Module	Supported measurements and devices (Branch Circuit Power)
	Supported Measurements and Devices (Other)
Dashboards	Styling a dashboard
	Configuring Gadgets
Database Maintenance	Considerations for trimming archived data from ION_Data
	Database maintenance task definitions
	Default maintenance task settings
	Using IONMaintenance for database maintenance tasks
	Database maintenance account requirements
	Setting up the ION_Data archive task for Distributed PME systems
Device Manager	Device Manager user interface
Device Type Editor	Device Type Editor User Interface
	Configuring Logging and Calculation User Interface
	Modbus Data Formats
	Modbus Register Properties
	Measurement Tree
	OPC Tags
Energy Analysis Reports Module	Supported measurements and devices
	Terms and Definitions
	PUE Summary Report Calculations
Energy Billing Module	Supported measurements and devices

Event Notification Module	Notification Manager user interface
	Add Rule UI
	Add Recipient UI
	Add Template UI
	Notification delay example
General	Customizing the Web Applications links
	Adding idle detection to custom Web Application links
	Configure database connection encryption
Insulation Monitoring Module	Supported measurements and devices
Manual Data Editor	Manual Data Editor user interface
OPC	Tunneling of OPC data
Power Quality Performance Module	Device Selection for Power Quality Performance monitoring
	Supported Devices for Power Quality Performance monitoring
	Power Factor Rate File Calculation
	Required measurements for Power Quality Performance monitoring
Reports	UPS Battery Health Report calculations
System Integration - PME/EBO	Add-on device drivers for PME
	Advanced ETL Configuration References
	Configuring the PME EWS server for HTTPS
	Deploying and configuring a Multi-input Setpoint Display Bar graphic component
	Deploying and configuring a Single-input Thermometer graphic component
	Exposing custom device driver measurements through EWS
	Manual integration steps without using the Integration Utility
	Terms and definitions
	Web security changes
Trends	Configuring a trend
User Manager	User Manager user interface
	Default User Access Level Privileges
VIP Setup	VIP Modbus Slave port settings
Web Applications Settings	System and personal localization settings

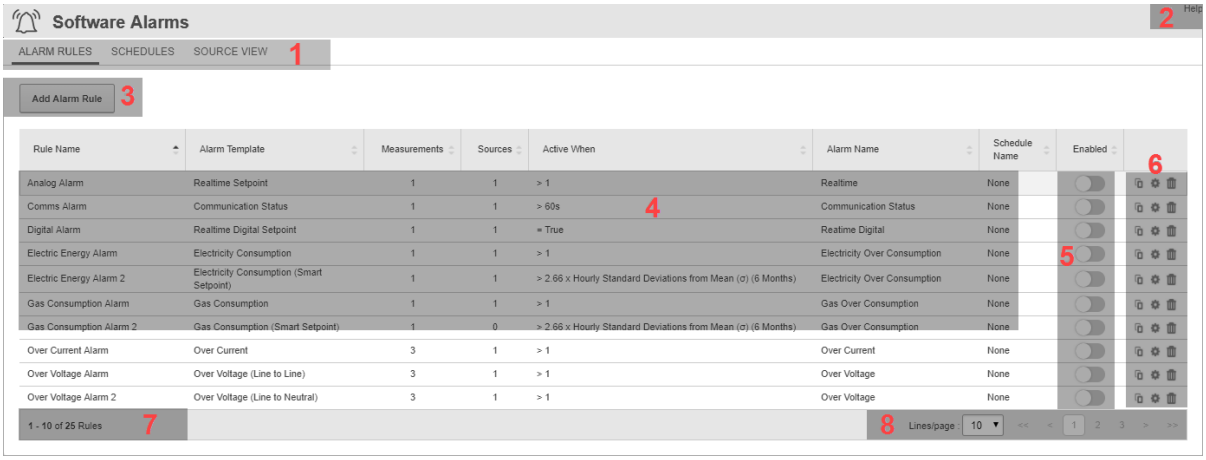
Software Alarms references

This section contains reference information related to Software Alarms.

Use the links below to find the content you are looking for:

Software Alarms UI

Main UI and Alarm Rules tab



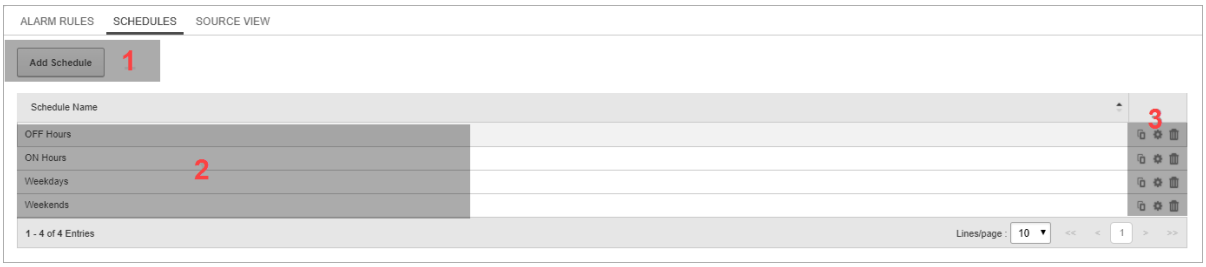
Main UI

1	**Selection tabs** Select a tab to see information related to Alarm Rules, Schedules, or Source View.
2	**Help** Click Help to open the Software Alarms online help.
7	**Number of displayed items** Shows the number of items visible on this page, and the total number in this View.
8	**Page selector** Use the page selector to navigate between pages. Set the number of items that are displayed on a page.

Alarm Rules tab

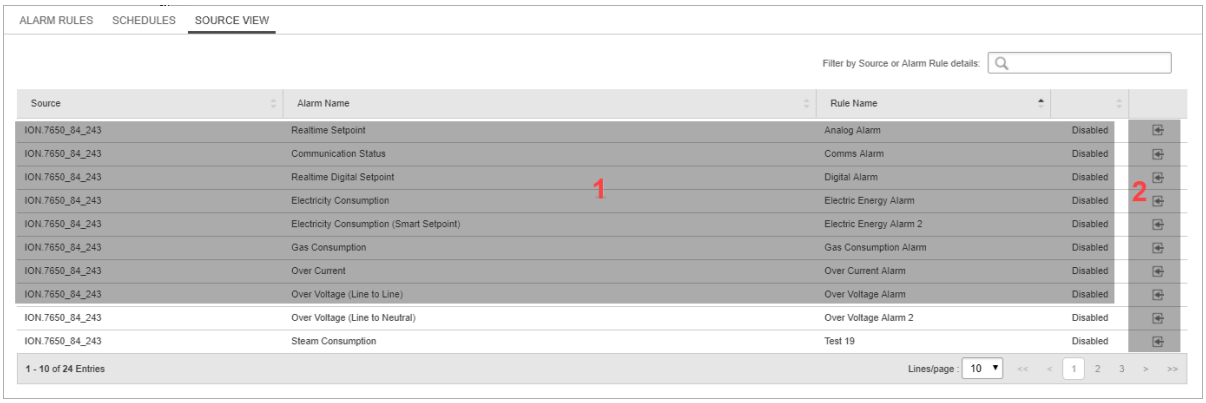
3	**Add Alarm Rule** Use Add Alarm Rule to create a new Alarm Rule.
4	**Alarm Rules table** The Alarm Rules table shows all the Alarm Rules that are configured in the system.
5	**Enable Alarm Rule** Each Alarm Rule can be enabled or disabled separately. The Enable Alarm Rule slider shows the enable state of the Alarm Rules. Click the slider for an Alarm Rule to enable or disable this Rule.
6	**Alarm Rules options** Use Alarm Rules options to duplicate, edit, or delete Alarm Rules.

Schedules UI



1	**Add Schedule** Use Add Schedule to create a new Schedule.
2	**Schedules table** The Schedules table shows all the Schedules that are configured in the system.
3	**Schedules options** Use Schedules options to duplicate, edit, or delete Schedules.

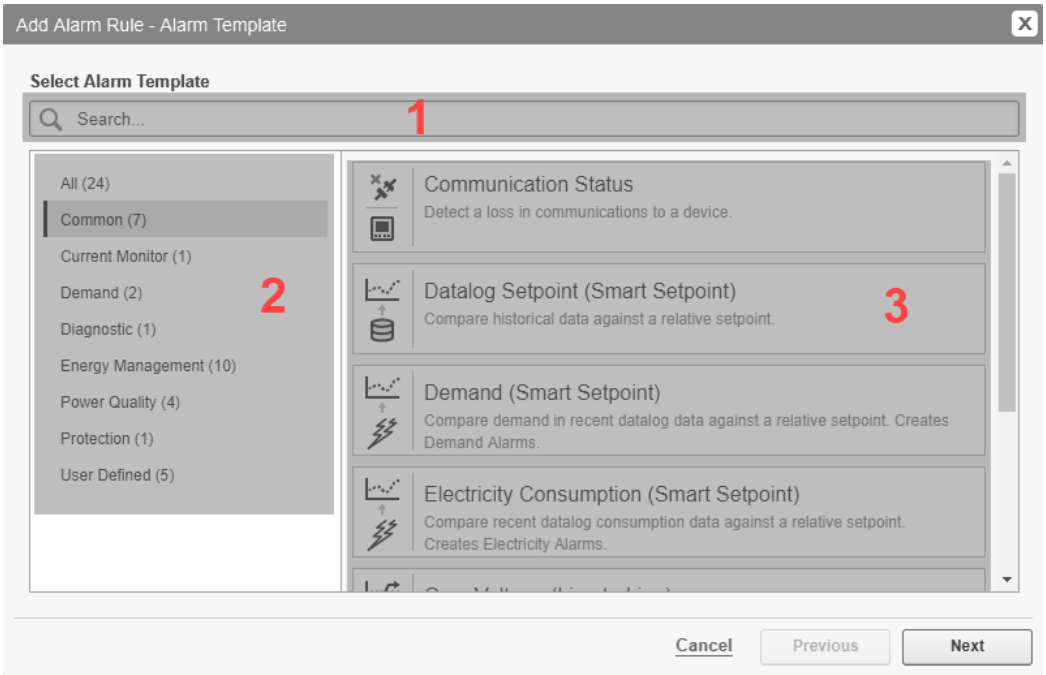
Source View UI



1	**Source View Alarm Rules table** The table shows an alternate view of the Alarm Rules. Use this view to see which Alarms are configured for which sources.
2	**Show Alarm Rule** When you click Show Alarm Rule for a row in the Source View table, the Alarm Rules tab opens with the specific Alarm Rule highlighted.

Add Alarm Rule UI

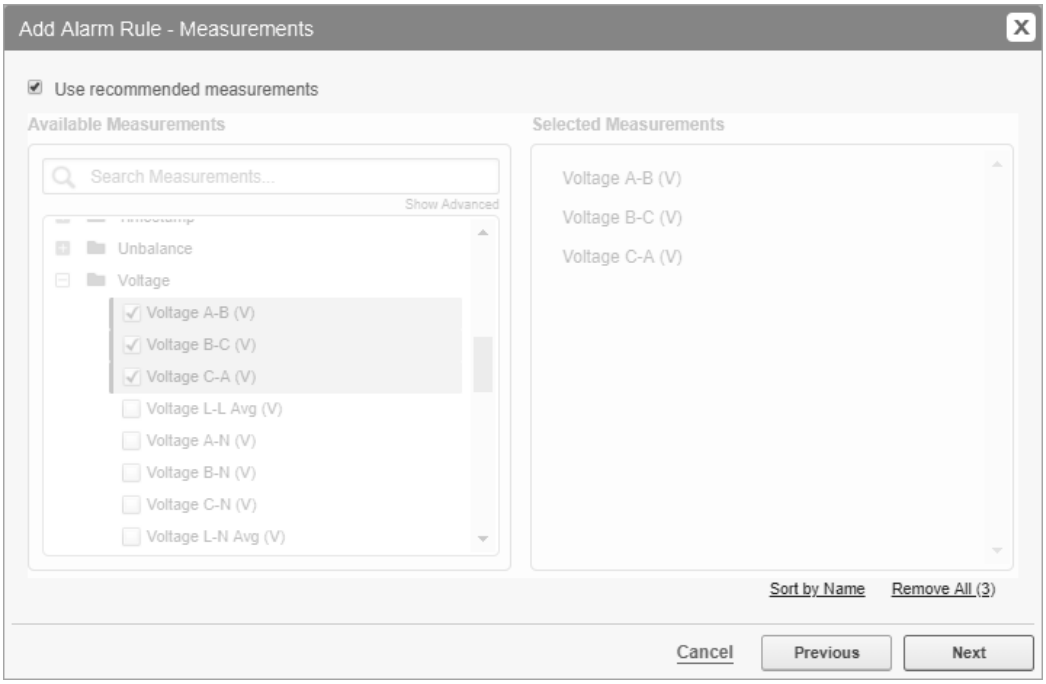
Alarm Templates



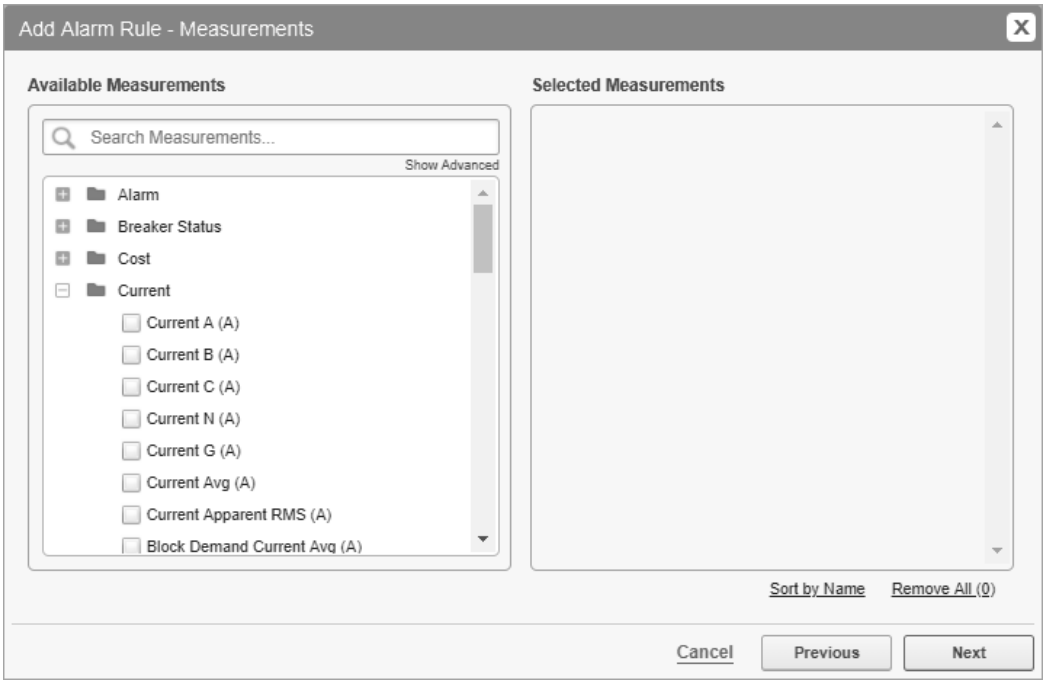
1	**Alarm Template Search** Type a search string into the search box to find the alarm template you are looking for.
2	**Alarm Template groups** The available alarm templates are grouped by application.
3	**Alarm Template list** A list of alarm templates that are available in the selected group.

Measurement Selection UI

Measurement Selection with recommended measurements

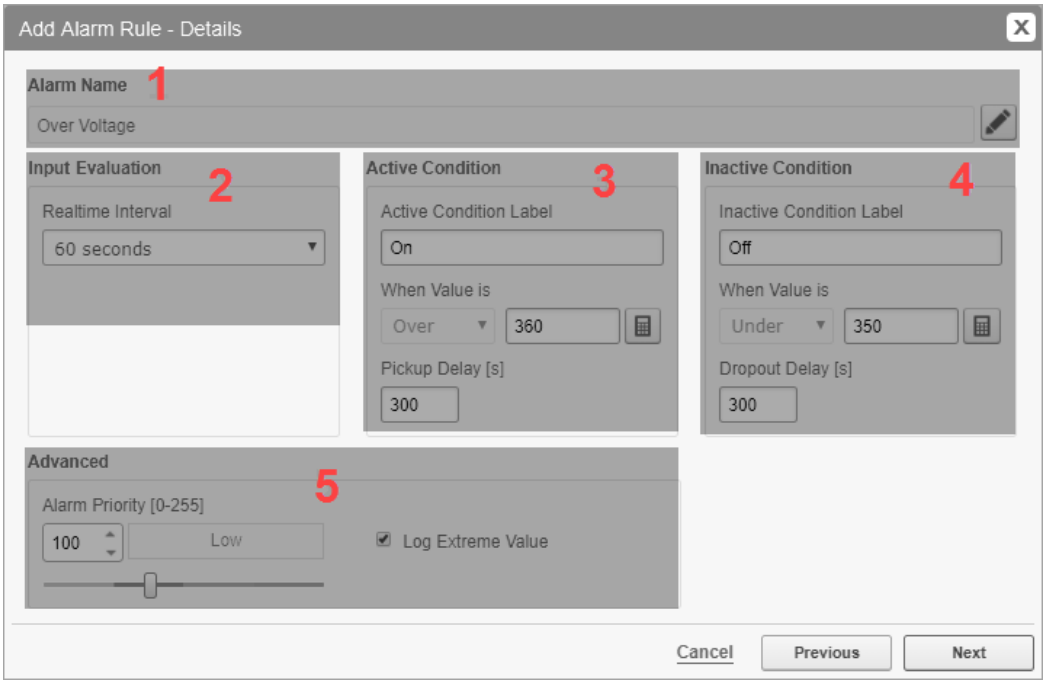


Measurement Selection without recommended measurements



Alarm Rule Details UI

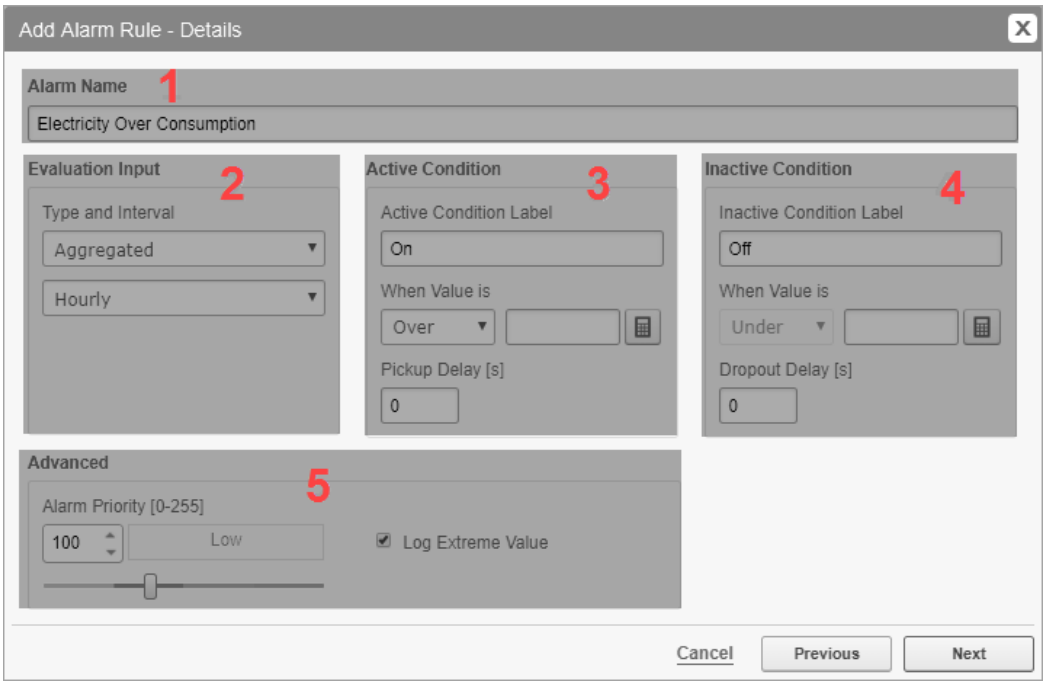
Real-time Alarms UI



(The above is one example of a Real-time Alarm. The configuration options may vary for other Real-time Alarms.)

1	**Alarm Name** The Alarm Name is the identifier for this alarm in the system. It is used as a reference by other applications.
2	**Input Evaluation** The Input Evaluation setting determines how often the Alarm evaluates the input measurement value.
3	**Active Condition** The Active Condition settings determine when the Alarm goes into an Active state.
4	**Inactive Condition** The Inactive Condition settings determine when the Alarm goes into an Inactive state.
5	**Advanced Settings** The Advanced Settings determine which priority value is assigned to the Alarm and if the extreme measurement value that occurs during the Alarm active state is logged.

Logged Data Alarms UI (Fixed Setpoint)

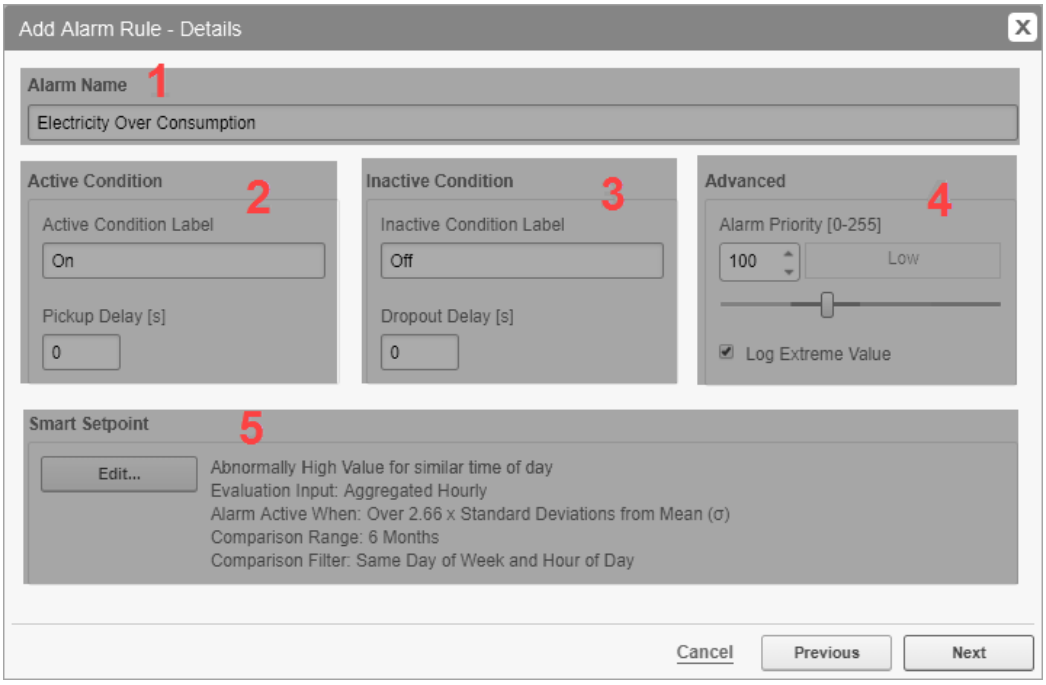


(The above is one example of a fixed setpoint logged data Alarm. The configuration options may vary for other fixed setpoint logged data Alarms)

<table>
<tr><td>1</td><td>Alarm Name
The Alarm Name is the identifier for the Alarm in the system. It is used by as a reference by other applications.</td></tr>
<tr><td>2</td><td>Input Evaluation
The Input Evaluation setting determines how the Alarm evaluates the input measurement value. The following options are available:
<table>
<tr><td>Datalog</td><td>1 minute
5 minutes
10 minutes
15 minutes
30 minutes
1hr</td><td>In this configuration, the Alarm evaluates the logged measurement value as it was logged at the specified time intervals.</td></tr>
<tr><td>Aggregated</td><td>Hourly
Daily</td><td>In this configuration, the Alarm evaluates the logged measurements as rolled up values. The interval is either Hourly or Daily. The roll up method is defined by the measurement type. For example, energy measurements are accumulated and demand measurements are averaged.</td></tr>
</table></td></tr>
<tr><td>3</td><td>Active Condition
The Active Condition settings determine when the Alarm goes into an Active state.</td></tr>
<tr><td>4</td><td>Inactive Condition
The Inactive Condition settings determine when the Alarm goes into an Inactive state.</td></tr>
</table>

5	**Advanced Settings** The Advanced Settings determine which priority value is assigned to the Alarm and if the extreme measurement value that occurs during the Alarm active state is logged.

Logged Data Alarms UI (Smart Setpoint)

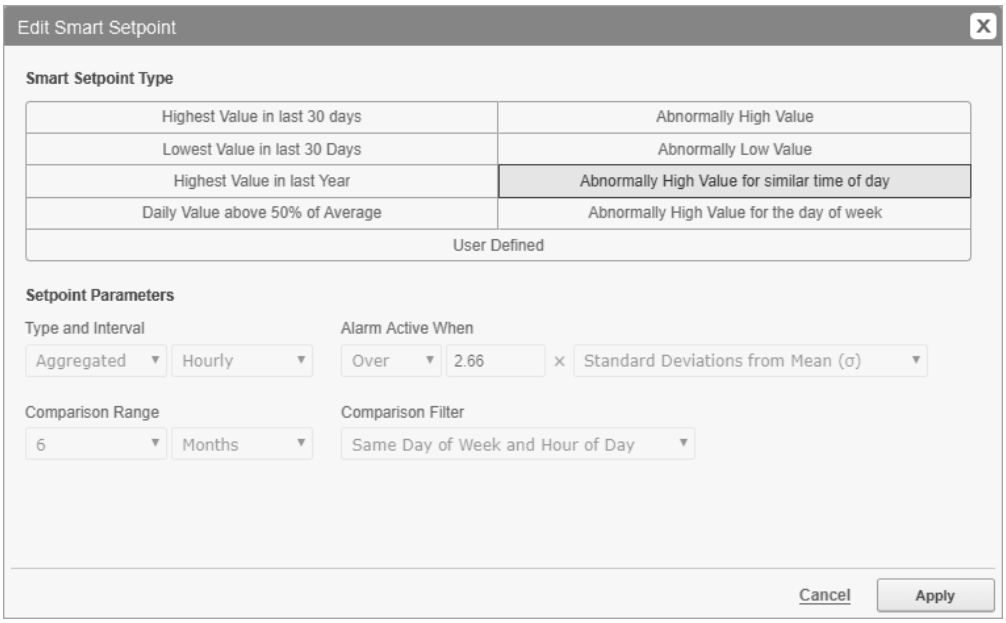


(The above is one example of a smart setpoint logged data Alarm. The configuration options may vary for other smart setpoint logged data Alarms)

1	**Alarm Name** The Alarm Name is the identifier for the Alarm in the system. It is used by as a reference by other applications.
2	**Active Condition** The Active Condition settings determine when the Alarm goes into an Active state.
3	**Inactive Condition** The Inactive Condition settings determine when the Alarm goes into an Inactive state.
4	**Advanced Settings** The Advanced Settings determine which priority value is assigned to the Alarm and if the extreme measurement value that occurs during the Alarm active state is logged.

5

Smart Setpoint

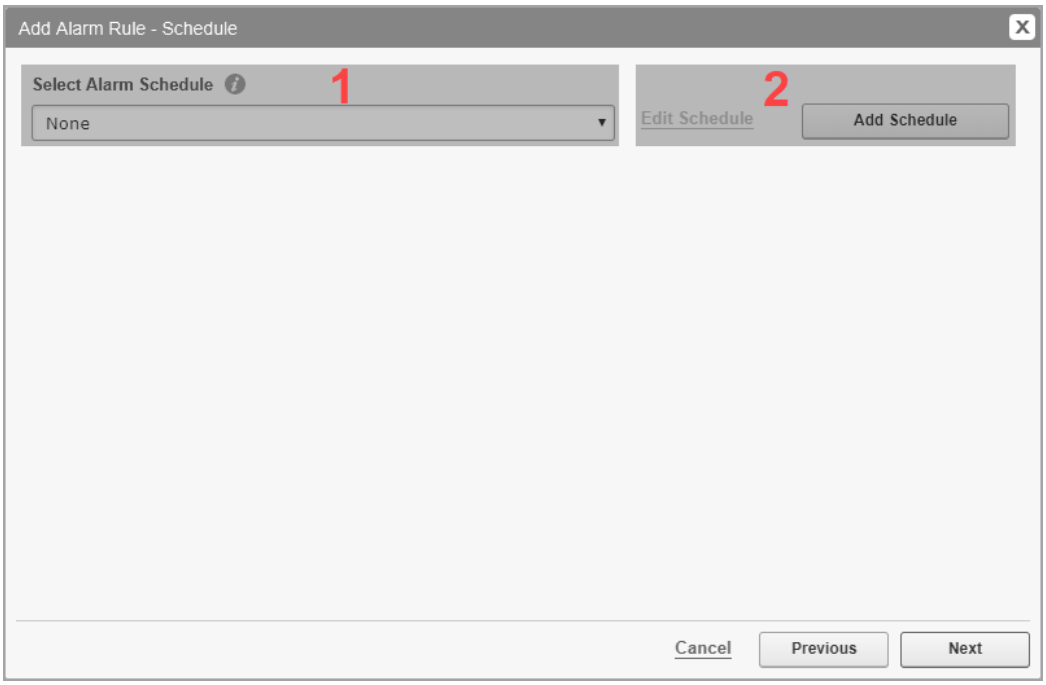


A Smart Setpoint evaluates the input measurement against statistical and historical behavior of that same input measurement. The following pre-defined settings are available:

Highest Value in last 30 days	Abnormally High Value
Lowest Value in last 30 Days	Abnormally Low Value
Highest Value in last Year	Abnormally High Value for similar time of day
Daily Value above 50% of Average	Abnormally High Value for the day of week

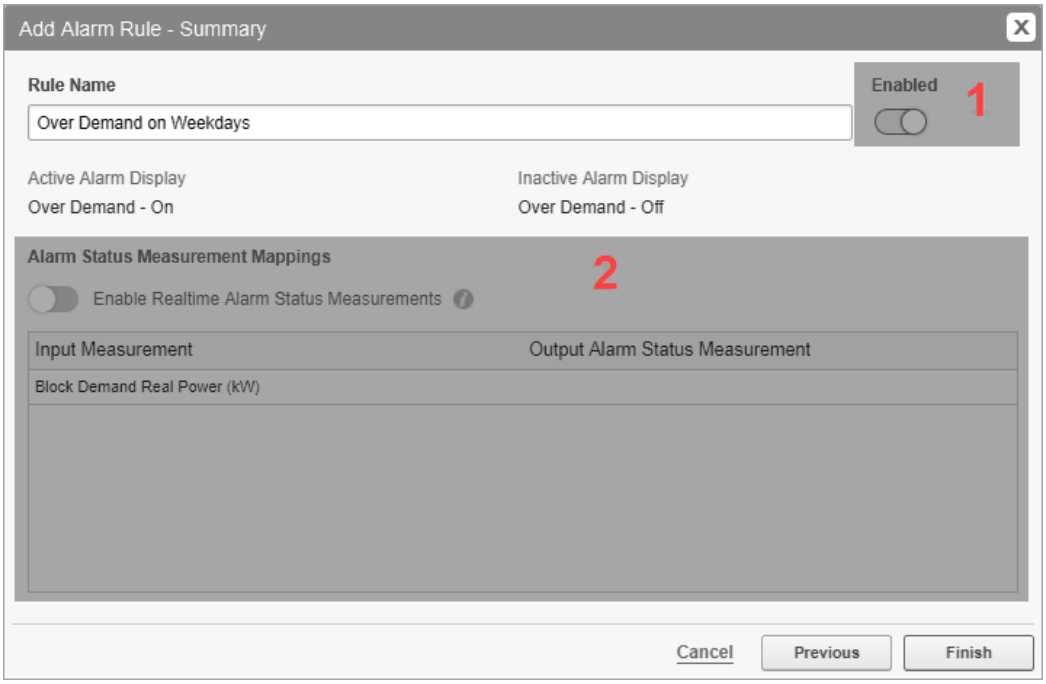
You can also define a custom rule for evaluating the input based on the options provided in the Smart Setpoint configuration window.

Schedule Selection UI



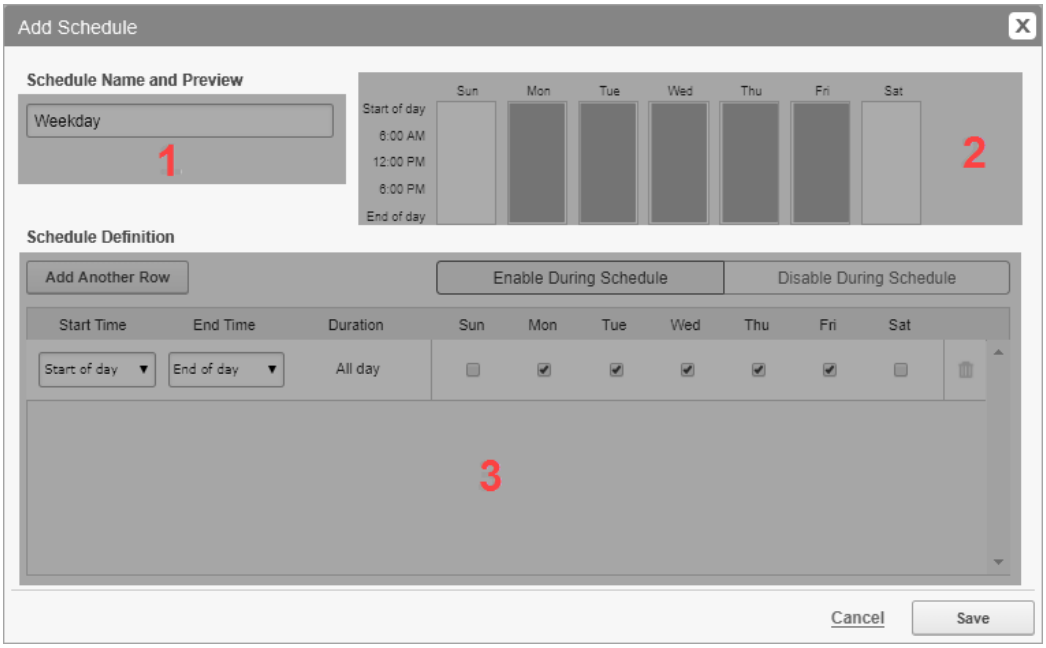
1	**Schedule Selector** Select which Schedule you want to use for this Alarm Rule. Using a Schedule is optional. Select **None** if you don't want to use a Schedule.
2	**Schedule Options** Use these options to edit a selected Schedule or to Add a new Schedule.

Summary UI



1	**Enable Alarm Rule** The Enable Alarm Rule slider shows the enable state of the Alarm Rule. Click the slider to enable or disable this Rule.
2	**Alarm Status Measurement Mappings** By default, real-time Alarm Status measurements are disabled, which means that information about the state of the Alarm is only available through the Alarms application. Enable real-time Alarm Status measurements if you want to access Alarm state information in Diagrams, Trends, or other real-time applications in PME. **NOTE**: These status measurements are not currently available in the VIP/Designer.

Schedules Configuration UI



1	**Schedule Name** Provide a name for the schedule.
2	**Schedule Preview** The graphic shows the time periods for which the schedule will be active and inactive.
3	**Schedule Configuration** Add rows to define the Start Times, End Times, and days of the week when the schedule is active. Define if the schedule enables or disables the function that is controlled by it.

Backup Power Module references

This section contains reference information related to configuring the Backup Power Module.

Use the links below to find the content you are looking for:

Emergency Power Supply Systems

An Emergency Power Supply System (EPSS) in an arrangement of generators and automatic transfer switches, designed to provide backup power in case of a utility power interruption. The EPSS provides emergency electrical power to any facilities requiring continuous power, uninterrupted power, such as hospitals and medical centers.

In many jurisdictions, hospitals and medical centers need to test their EPSS on a regular basis and keep records of such tests. Hospitals and medical centers in the USA, for example, must meet the standards specified by the Joint Commission on Accreditation of Hospital Organizations (JCAHO) to operate their facilities. These standards include the testing of generator systems. These JCAHO standards are derived from both National Fire Protection Association (NFPA) and National Electrical Code (NEC) requirements.

Use the Backup Power Module to generate reports for government and organizational inspectors to help determine if an EPSS is in an adequate state to generate electrical power during a utility outage. These reports can demonstrate compliance not only with the JCAHO standards, but also with the standards mandated by many other geographies, such as:

- National Electric Code Article 220.87 for the United States of America.
- HTM 0601 for the United Kingdom.
- AS/NZS 3009 for Australia and New Zealand.
- 60364-7-710 for Europe.
- CSA Z32 for Canada.

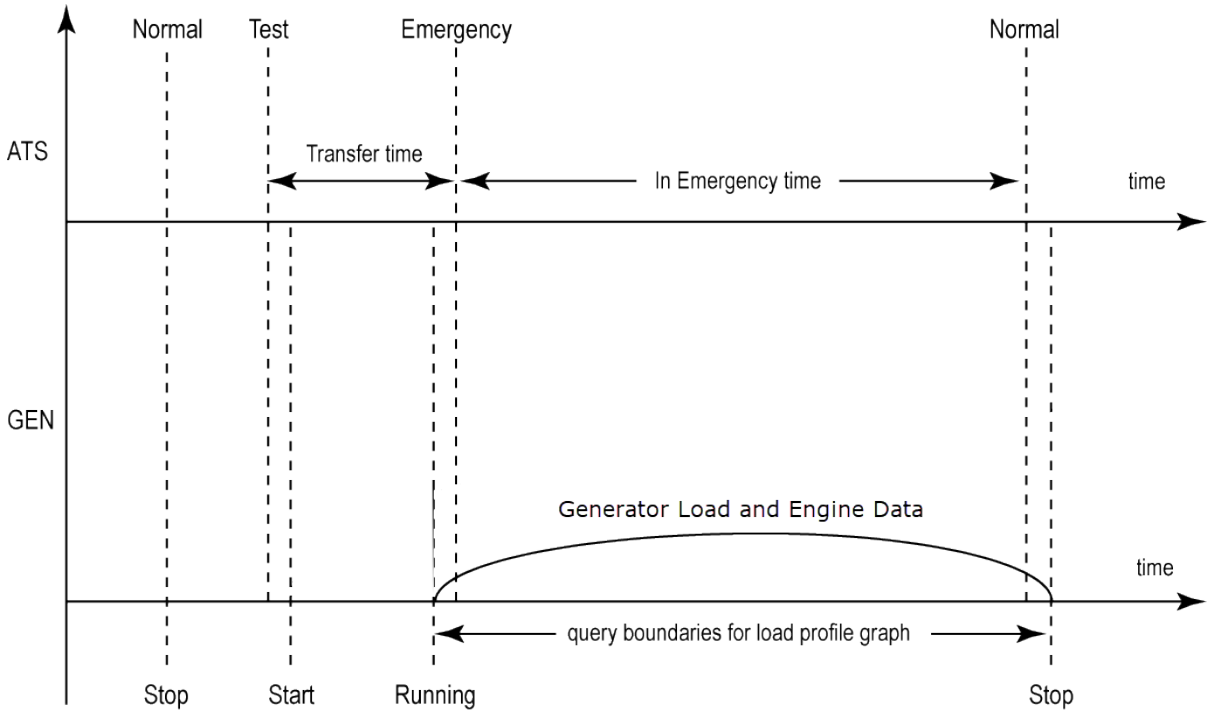
EPSS test

The goal of an EPSS test is to confirm that the EPSS system can transfer the load from normal supply to emergency supply in the specified amount of time. Normal supply could be utility power, while emergency supply could be backup generator power.

To start a test, the Automatic Transfer Switch (ATS) is set into Test mode. This triggers a sequence of events that start the generators and transfers the load to emergency supply. To end the test, the ATS is set to Normal mode, which transfers the load back to normal supply and stops the generators.

EPSS test performance is evaluated based on the time it takes to successfully transfer the load after the start of the ATS test mode. Different standards define different acceptable transfer times for EPSS systems. See Emergency Power Supply Systems for more information on standard compliance.

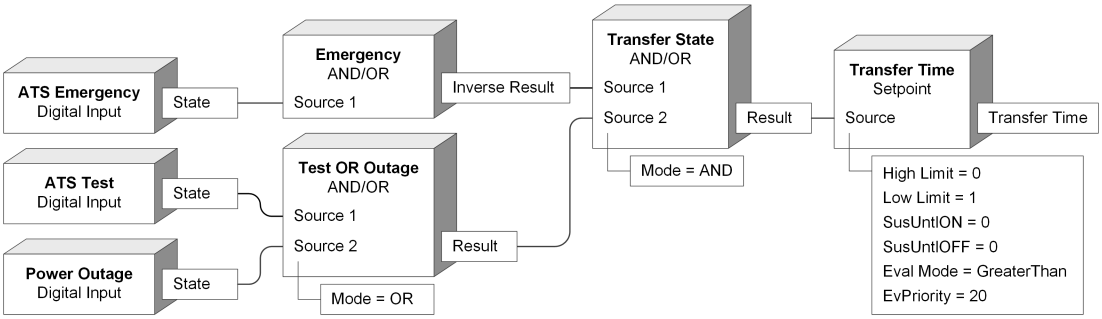
The following diagram shows the test sequence of events. It shows the ATS status (Normal, Test, Emergency), the generator status (Stop, Start, Running), and the status transitions that control the logging of generator electrical (load) and engine data for EPSS reporting.



EPSS Transfer Time alarm

The ATS and generator status changes trigger general Backup Power Asset Monitoring alarms in PME, if the correct status labels are used. See Configure Generator Test EPSS for details. You can also configure the system to show a Transfer Time Asset Monitoring alarm, including EPSS transfer time details, for a test run or a real backup power supply incident. To set up such an alarm, you need to create a setpoint on the device monitoring the ATS status that is triggered by the Test, Power Outage, and Emergency status signals. The setpoint must use the label: **Transfer Time** for the module name and the setpoint status output register.

The following shows an example ION framework to create a Transfer Time alarm in PME:



ION device frameworks for EPSS monitoring

PME includes ION device framework templates for EPSS monitoring. These frameworks can be used as a starting point for configuring ION devices to monitor EPSS generator and automatic transfer switch (ATS) data. The frameworks are available in the PME install folder under `...\Power Monitoring Expert\config\fmwk\EPSS`.

ATS monitoring framework

The ATS monitoring framework template, `EPSS ATS.fwn`, includes 3 digital input modules and a data log module to monitor and record the Normal, Test, and Emergency ATS statuses.

Paste this framework into a compatible ION device and complete its configuration using the information provided in Configure Generator Test EPSS. Extend the framework as needed, to add additional, optional inputs such as ATS Power Outage.

NOTE: Use lock paste for all the digital input modules in the framework, and do not select **Maintain external inputs**. See Pasting ION modules from the clipboard or a framework for information on ION framework paste options.

NOTICE

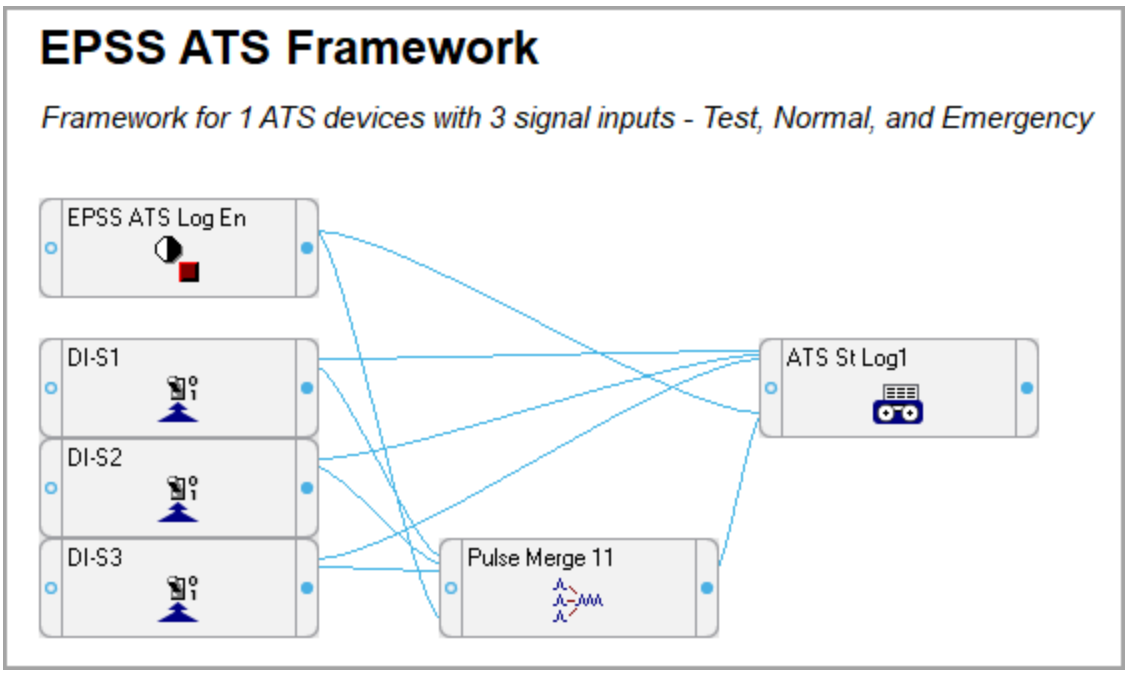
UNINTENDED DEVICE OPERATION

Do not use the lock paste option to overwrite existing destination modules.

Failure to follow these instructions can result in operational differences in required modules.

Only use the lock paste option if you are an advanced user familiar with ION architecture.

The framework creates a new folder on the ION device with the following modules:



Generator monitoring framework

The generator monitoring framework template, `EPSS GEN.fwn`, includes 3 digital input modules, 3 analog input modules, and 3 data log modules to monitor and record:

- The Stopped, Running, Starting generator statuses.
- The Engine Temperature, Exhaust Gas Temp Left/Right analog signals.
- The generator electrical data.

Paste this framework into a compatible ION device and complete its configuration using the information provided in the framework and in Configure Generator Test EPSS. Extend the framework as needed, to add additional, optional inputs such as the Emergency Power Source Available signal, or Engine Oil Pressure measurements.

NOTE: Use lock paste for all the digital input and analog input modules in the framework, and do not select **Maintain external inputs**. See Pasting ION modules from the clipboard or a framework for information on ION framework paste options.

NOTICE

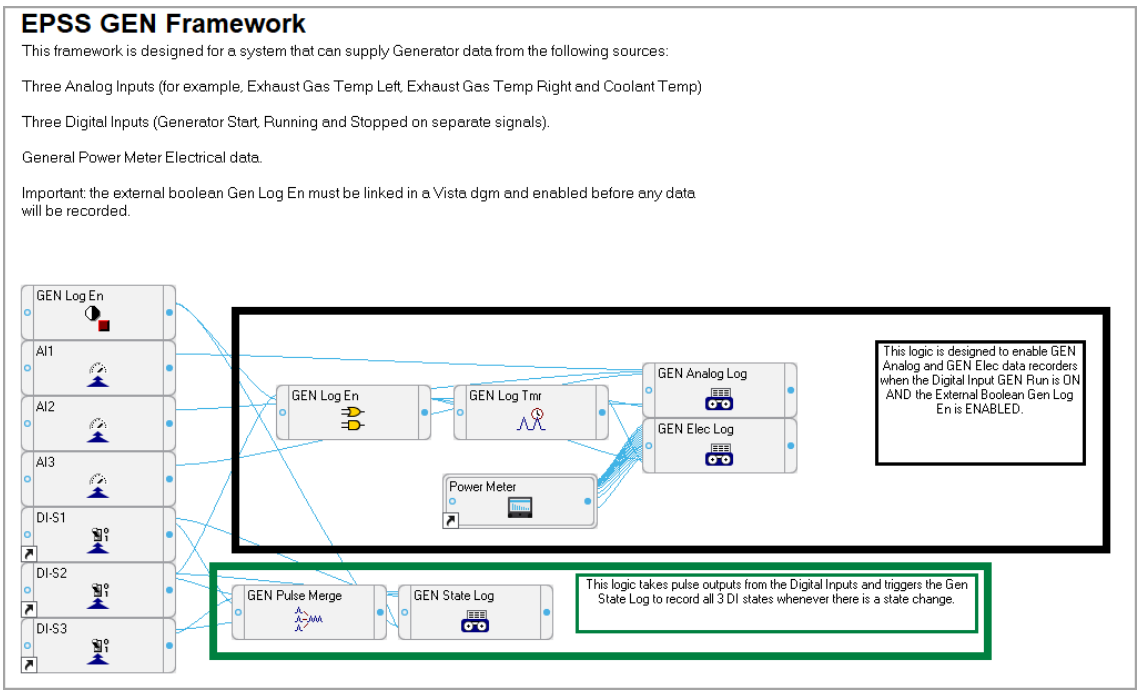
UNINTENDED DEVICE OPERATION

Do not use the lock paste option to overwrite existing destination modules.

Failure to follow these instructions can result in operational differences in required modules.

Only use the lock paste option if you are an advanced user familiar with ION architecture.

The framework creates a new folder on the ION device with the following modules:



Remote control of ATS Test mode

To be able to remotely switch the ATS into Test mode, configure the monitoring device and PME as follows:

Device configuration

Connect a device digital output to the ATS Test mode digital input. Configure the digital output on the device for control by a Control Object in PME Vista.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Do not use the software or devices for critical control or protection applications where human or equipment safety relies on the operation of the control action.
- Do not use the software to control time-critical functions.
- Do not use the software to control remote equipment without proper access control and status feedback.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

PME Vista configuration

To setup remote control of the ATS Test mode:

1. In a Vista diagram, create a Vista Control Object and configure it to control the status of the ATS Test mode digital output on the device.
2. Set the user access level on the Control Object to a level appropriate for your operations, for example **Operator (4)**. This is to prevent unauthorized users from triggering the Control Object.
3. Set the **Double-Click Action** for the Control Object to **Password confirmation**. This is to reduce the risk of accidental triggering of the Control Object.

   ⚠ WARNING

   POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

   Use cybersecurity best practices to help prevent unauthorized access to the software.

   Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

   Work with facility IT System Administrators to ensure that the system adheres to the site-specific cybersecurity policies.
4. In the Vista diagram with the Control Object, create a Status Object and link it to the ATS status monitored by the device. This is to show the ATS status before and after triggering the ATS Test mode Control Object in Vista.

Supported measurements and devices

The reports in the Backup Power Module support the measurements and devices listed in the following table". For Generator Test EPPS Report related measurement and device information see Generator Test EPSS Report measurements and devices (below).

Reports	Input Measurements	Suitable Devices
Generator Activity Report	- Generator Status Indicators:** Stopped, Running - Transfer Switch Status Indicators: Normal, Test, Emergency	Any device that can provide digital input measurements.
Generator Battery Health Report/Export	- Generator Status Indicators:** Stopped, Running - Battery Voltage Signature (voltage signature is measured as V4 waveform capture)* - Digital signal from the generator crank relay to trigger the waveform capture	ION9000/7650/7550
Generator Load Summary Report	- Generator Status Indicators:** Stopped, Running - Generator Electrical Measurements: Vln avg; Vll avg; I avg; kW tot, kVA tot, PF sign tot, Freq	ION9000/7650/7550, PM8000
UPS Auto Test Report	- **Critical Operation** status reading from the UPS	MGE Galaxy 5500 UPS Galaxy VM UPS Galaxy VX UPS
UPS Battery Health Report	- Battery Voltage Signature (voltage signature is measured as V4 waveform capture)* - Vln a of the UPS output, to trigger the waveform capture	ION9000/7650/7550

* A V4 input is required on the monitoring device.
** The monitoring devices must have digital inputs to measure these parameters.

Generator Test EPSS Report measurements and devices

The Generator Test EPSS Report requires specific generator and ATS data. Depending on the EPSS configuration and type of equipment used, this data can be provided by one or more monitoring devices, and the ATS itself.

The following table shows the monitoring device input requirements, per ATS and generator:

NOTE: ATS measurements are only required for EPSS reporting. For general generator test reporting, ATS measurements are not required.

Measurement	Type	Channels/Msrmnts	Comments
ATS Status	Digital Input(*)	3-4	Three inputs for required statuses (Normal, Test, Emergency). One input for optional status (Power Outage). **NOTE:** When one of the ATS statuses changes, all the ATS statuses must be logged by the same device, with the same timestamp.
Generator Status	Digital Input	2-4	Two inputs for required statuses (Stopped, Running). Two inputs for optional status (Starting, EPA). **NOTE:** When one of the generator statuses changes, all the generator statuses must be logged by the same device, with the same timestamp.

Measurement	Type	Channels/Msrmnts	Comments
Generator Engine Data	Analog Input	2 or more	Two inputs for required measurements (Engine Temp, Exhaust Temp). (**) One or more inputs for optional measurements (Oil Pressure, Battery Voltage). **NOTE:** Engine data must be logged with a 1-minute logging interval. Use the generator Run signal to start the logging and the Stop signal to end the data logging.
ATS Load Data	3-Phase Power System Measurements(*)	kW tot or kVA tot	One power monitoring device per ATS. **NOTE:** Load data must be logged with a 1-minute logging interval. Use the ATS Test and Emergency signals to start the logging and the Normal signal to end the data logging.
Generator Electrical Data	3-Phase Power System Measurements	Vln a,b,c,avg; Vll ab, bc,ca,avg I a,b,c,avg; kW tot; kVA tot; PF sign tot; Frequency	One power monitoring device per generator. **NOTE:** Electrical data must be logged with a 1-minute logging interval. Use the generator Run signal to start the logging and the Stop signal to end the data logging.

(*) The ASCO 4000 and ASCO 7000 ATS can provide logging of ATS status and load measurements. These ATS types are natively supported in PME. Depending on the ATS configuration, no external ATS status and load measurements might be required if these ATS types are used.
(**) Generators with dual exhaust systems require 3 inputs (Engine Temp, Exhaust Gas Left, Exhaust Gas Right).

You can use any monitoring device for this application that meets the measurement requirements and that is supported in PME.

Below is a list of recommended devices:

- ION9000/7650/7550, PM8000 (for electrical, status, and analog measurements)
- ION7550RTU, SER-2408, SER-3200 (for status measurements only)

- ASCO 4000/7000 ATS (as automatic transfer switch)

NOTE: The ASCO 4000 and ASCO 7000 ATS can provide logging of ATS status and load measurements. These ATS types are natively supported in PME. Depending on the ATS configuration, no external ATS status and load measurements might be required if these ATS types are used.

Breaker Performance Module references

This section contains reference information related to configuring the Breaker Performance Module.

Use the links below to find the content you are looking for:

Supported devices

Supported devices

The Breaker Performance reports automatically read the required measurements from the breaker control units. No measurement selection or configuration is required. Not all control unit types support all the measurements shown in the report. Unsupported measurement data is shown as "N/A" in the report.

The Breaker Aging Report supports the following device types:

Standard / Country	Circuit Breaker Range	Control Unit Range
IEC	• Masterpact MTZ 1/2/3 • Masterpact NT • Masterpact NW • Compact NS630b-3200	• Micrologic 2 A/E/X • Micrologic 3 X • Micrologic 5 A/E/P/H/X • Micrologic 6 A/E/P/H/X • Micrologic 7 A/P/H/X • Micrologic 5.2/6.2/5.3/6.3 A/E (Compact NSx)
China	• Masterpact MTZ 1/2/3 • Masterpact MT • Compact NS630b-1600 • PowerPact H-, J-, and D-Frame	• Micrologic 2 A/X • Micrologic 5 A/E/D/P/H/X • Micrologic 6 A/E/D/P/H/X • Micrologic 7 A/P/H/X
USA	• Masterpact MTZ 1/2/3 • Masterpact NT for IEC, UL, and ANSI standards • Masterpact NW for IEC, UL, and ANSI standards • Compact NS630b-3200 • PowerPact H-, J-, D-, and L-Frame	• Micrologic 2 A/E/X • Micrologic 3 X • Micrologic 5 A/E/P/H/X • Micrologic 6 A/E/P/H/X • Micrologic 7 A/P/H/X • Micrologic 5.2/6.2/5.3/6.3 A/E (Compact NSx)

The Breaker Settings Report supports the following device types:

- Micrologic 2 A/E/X
- Micrologic 3 X
- Micrologic 5 A/E/P/H/X
- Micrologic 6 A/E/P/H/X
- Micrologic 7 A/P/H/X
- Micrologic 5.2 A/E (Compact NSx)
- Micrologic 6.2 A/E (Compact NSx)

- Micrologic 5.3 A/E (Compact NSx)
- Micrologic 6.3 A/E (Compact NSx)

NOTE: The IFE/IFM versions of the above device types are supported as well.

Capacity Management Module references

This section contains reference information related to configuring the Capacity Management Module.

Use the links below to find the content you are looking for:

Supported measurements and devices (Branch Circuit Power Report)
Supported Measurements and Devices (Other Reports)

Supported measurements and devices

The Branch Circuit Power Report needs branch circuit level measurements. It supports the measurements listed in the tables below. Only one measurement of each type (Demand, Current) is required. If multiple types of the same measurement exist in the system, then a look-up method is used to determine which one to use. The tables list the supported types in order of look-up priority.

NOTE: You can edit this list of measurements in the PME database.

Demand/Power

Measurement	Unit	ION Name	ION Label
Block Demand Active Power	kW	Active Power Sliding Window Demand Delivered-Received	Demand Real Power
Block Demand Active Power Into The Load	kW	Active Power Sliding Window Demand Delivered	kW sd del
Active Power Mean	kW	Active Power Mean	kW tot mean
Active Power	kW	Active Power	kW tot

Current

Measurement	Unit	ION Name	ION Label
Current Average Mean	A	Current Phase Average Mean	I avg mean
Block Demand Current Avg Into the Load	A	Current Phase Average Sliding Window Demand Delivered	Amps Avg Dmd
Current Avg	A	Current Phase Average	Current Avg

The following devices can provide the measurements required for this report:

- BCPM-E
- PM5350 (multi-circuit mode)

Supported Measurements and Devices

The reports in the Capacity Management Module support the measurements and devices listed in the tables below.

Reports	Input Measurements	Suitable Devices	Notes
Equipment Capacity Report	Active Power, Apparent Power, or Current	ION9000/7650/7550, PM8000	
Generator Capacity Report	Active Power or Apparent Power	ION9000/7650/7550, PM8000	The meter must monitor the generator output.
Generator Power Report	Power (See details below)	ION9000/7650	The meter must monitor the load the generator is expected to supply.
Power Losses Report	Energy and Power (see details below)	Transformers: PM8000, Micrologic P, PM5320 UPS: - APC Symmetra MW (*) - APC MGE UPS Galaxy 5000, - Galaxy VM UPS (*), - Galaxy VX UPS (*) Or external metering	
UPS Power Report	Power (see details below)	APC Symmetra MW	

* If these UPS devices are used, the energy must be calculated and logged in the VIP. Most UPSs measure both input and output power from which energy can be calculated in the VIP.

Power and Energy measurements

If multiple types of power and energy measurements exist in the system, then a look-up method is used to determine which one to use. The following tables list the supported types in order of look-up priority.

NOTE: You can edit this list of measurements in the PME database.

Power

Measurement	Unit	ION Name	ID	ION Labels
Block Demand Active Power Into The Load	kW	Active Power Sliding Window Demand Delivered	116	kW demand, kW sd del, kW tot SD
Block Demand Active Power	kW	Active Power Sliding Window Demand Delivered-Received	107	Demand Real Power – Sliding, Demand Real Power, Panel-Main Demand Real Power, kW sd del-rec, kW swd, kW tot swd, kW Dmd del-rec
Active Power Mean	kW	Active Power Mean	128	Real Power Total mean, Active Power Total mean, kW tot mean
Active Power	kW	Active Power	193	kW tot, kW total, Real Power Total, Panel-Main Real Power Total

NOTE: If you need to create a new device type for the UPS with the Device Type Editor, use the ION Labels listed in the table for the measurement definitions. This ensures that the correct measurements will be logged in the database.

Energy

Measurement	Unit	ION Name	ION Label
Active Energy Into the Load	kWh	Active Energy Delivered	Active Energy Delivered
Active Energy	kWh	Active Energy Delivered – Received	kWh del-rec

Dashboards references

This section contains reference information related to configuring Dashboards.

Use the links below to find the content you are looking for:

Styling a dashboard

To add an image to a dashboard, change its background color, or modify the opacity setting for gadgets on the dashboard:

1. Click **Styling** to open the Dashboard Styling dialog.
2. To use an image for the background of the dashboard:
   a. Under Background Image, click **Select...** to open the **Image Library**.
   b. Select an image in the **Image Library** and click **OK**.

      You can add your own image to the **Image Library** by clicking **Upload Image...** to open the Upload New Files dialog. Then either drag an image file to the area indicated in the dialog or click **Choose Files...** and navigate to an image on your system. Click **Finish** to add the image to the **Image Library** and then click **OK** after you select the image for the background.
   c. Choose how you want the image to fit from the drop-down list.
3. To use a background color for the dashboard:
   a. Select **Background Color** to enable the color palette.
   b. Click the down arrow to open the palette and select a predefined color or click the color gradient to select a color.
4. To change the opacity setting for the gadgets on the dashboard:
   a. Select one of the opacity percentages in the list under **Gadget Style**.

      An opacity setting of 100% indicates that the gadget is not transparent – the background color or image is not visible through the gadget. A setting of less than 100% results in the gadget being partially transparent – the background color or image is partially visible in the gadget.
5. Click **OK** to close the dialog and apply the settings.

Configuring Gadgets

The following table shows the different gadget types that are available in Power Monitoring Expert (PME). Some of the gadgets are included in the base license, others require additional licensing.

Gadget Type	Category	Data Type	Licensing
Gadget Type	Category	Data Type	Licensing
Bar Chart	Comparison	Historical	Base License
Energy Equivalency	Comparison	Historical	Base License
Table	Comparison	Real-time	Base License
Pie Chart	Comparison	Historical	Base License
Period over Period	Trend over Time	Historical	Base License
Trend Chart	Trend over Time	Historical	Base License
Web Viewer	Web	Historical	Base License
Sankey	Usage Analysis	Historical	Energy Analysis Dashboards Module License
Pareto Chart	Usage Analysis	Historical	Energy Analysis Dashboards Module License
Aggregated Pareto Chart	Usage Analysis	Historical	Energy Analysis Dashboards Module License
Heat Map	Usage Analysis	Historical	Energy Analysis Dashboards Module License
Consumption Ranking	Usage Analysis	Historical	Energy Analysis Dashboards Module License
Aggregated Consumption Ranking	Usage Analysis	Historical	Energy Analysis Dashboards Module License
Blank Space *	Layout	n/a	Base License
Power Quality Incident Breakdown	Power Quality Details	Historical	PQ Performance Module License
Power Quality Incident Impact	Power Quality Details	Historical	PQ Performance Module License
Power Quality Incident Location	Power Quality Details	Historical	PQ Performance Module License
Power Factor Impact	Power Quality Overview	Historical	PQ Performance Module License

Gadget Type	Category	Data Type	Licensing
Power Factor Impact Trend	Power Quality Overview	Historical	PQ Performance Module License
Power Quality Impact	Power Quality Overview	Historical	PQ Performance Module License
Power Quality Impact Trend	Power Quality Overview	Historical	PQ Performance Module License
Power Quality Rating	Power Quality Overview	Historical	PQ Performance Module License
Power Quality Rating Trend	Power Quality Overview	Historical	PQ Performance Module License

* The Blank Space gadget does not display any data and requires no configuration. The Blank Space gadget is only visible during the dashboard Edit. By sizing and positioning this blank gadget, you can change the location of the other gadgets to get the layout you want.

For information on the functionality of the different gadget types, see Gadgets. For information on licensing, contact your Schneider Electric representative.

Prerequisites

The data for the gadgets must be available. Gadgets that depend on historical data need the correct logged data in the database. Gadgets that depend on real-time data need the devices that provide the data to be online and communicating.

The power quality gadgets are part of the Power Quality Performance module. Before you can use these gadgets in a dashboard, you must first configure the Power Quality Performance module.

The following table shows the configuration that is required before you can use a power quality gadget type:

Gadget Type	Requirements
Power Factor Impact Power Factor Impact Trend	A rate must be defined in the Power Factor Impact Rate file. A hierarchy view or a virtual meter must be configured.
Power Quality Incident Breakdown Power Quality Incident Impact Power Quality Incident Location Power Quality Rating Power Quality Rating Trend	Which devices to include/exclude for each type of power quality event must be configured.
Power Quality Impact Power Quality Impact Trend	An hourly rate for use in your production environment must be included in the Power Quality Group configuration file.

Configuring

The Gadget Setup dialog opens each time you select a gadget to add to a dashboard. The dialog leads you through a series of gadget configuration pages. The pages and the options are specific to each gadget. For example, some gadgets require a data series consisting of sources and measurements, while other gadgets have no such requirement. The exception is the Blank Space gadget, which does not require any configuration. Its purpose is to help you position gadgets on the dashboard by inserting a resizable transparent blank area.

Note that each page of the Gadget Setup dialog is represented by labeled tabs when you edit the settings for an existing gadget. (See Editing a gadget for more information.)

The following tables indicates the gadget configuration pages that apply to each gadget, where "Y" indicates that the page applies to that gadget, and "-" indicates that the page is not applicable.

Gadget Name	Gadget Configuration Pages					
	General Settings	Content	Data Series	Equivalency	Image	Viewing Period
Bar Chart	Y	-	-	-	-	Y
Energy Equivalency	Y	-	Y	Y	Y	Y
Pie Chart	Y	-	Y	-	-	Y
Web Viewer	Y	Y	-	-	-	-

	General Settings	Measurements	Sources	Table Settings
Table	Y	Y	Y	Y

	General Settings	Data Series	Viewing Period	Axes	Target Lines
Period over Period	Y	Y	Y	Y	Y
Trend Chart	Y	Y	Y	Y	Y

	General Settings	Data Series	Viewing Period	Sankey Chart Setup	Pareto Chart Setup
Sankey	Y	Y	Y	Y	-
Pareto Chart	Y	Y	Y	-	Y
Aggregated Pareto Chart	Y	Y	Y	-	Y

	General Settings	Data Series	Viewing Period	Heat Map Setup	Consumption Ranking Setup
Heat Map	Y	Y	Y	Y	-
Consumption Ranking	Y	Y	Y	-	Y
Aggregated Consumption Ranking	Y	Y	Y	-	Y

	General Settings	Source Selection	PQ Group	Viewing Period
Power Factor Impact	Y	Y	-	Y
Power Factor Impact Trend	Y	Y	-	Y
Power Quality Incident Breakdown	Y	-	-	Y
Power Quality Incident Impact	Y	-	-	Y
Power Quality Incident Location	Y	-	-	Y
Power Quality Impact	Y	-	Y	Y
Power Quality Impact Trend	Y	-	Y	Y
Power Quality Rating	Y	-	-	Y
Power Quality Rating Trend	Y	-	-	Y

Configuration options

Axes

Complete the options on this page as follows:

1. Enter a label for the axes in the **Title** field under **Left Axis** or **Right Axis**. (**Right Axis** is not applicable to the Period Over Period gadget.)

   Axis titles only appear in the gadget if you have configured at least one measurement series for the gadget.

2. For the **Max Value** for each axis, select **Auto** or **Fixed** for the data in the gadget. **Auto** is the default for the maximum value, which is dependent on available data for the selected measurement. If you select **Fixed**, enter the maximum value for the axis.

3. For **Min Value** for each axis, select **Auto** or **Fixed** for the data in the gadget. **Fixed** is the default value of zero (0). You can enter a different minimum value. If you select **Auto**, the

minimum value is dependent on available data for the selected measurement and the minimum value is automatically adjusted.

4. For **Chart Type** for each axis, select a type from the dropdown list. The default is **Column** for the left axis, and **Line with Markers** for the right axis.

Consumption Ranking Setup

Complete the option on this page as follows:

1. Select **Horizontal Bars** to display a horizontal bar chart. Clear the check mark for **Horizontal Bars** to display a vertical column chart.
2. Select **Sort Ascending** to show the ranked columns in an ascending order from left to right. The bars are displayed in an ascending order from top to bottom. Clear the check mark for **Sort Ascending** to show the data in descending order.
3. Select **Show Total** to display the aggregated total consumption value of all sources above the chart. Clear the check mark for **Show Total** to hide the display of the total value.
4. (Only for Consumption Ranking) (Optional) Enter a **Legend Name**. The legend name is displayed below the chart.

Content

Complete the options on this page as follows:

1. Use the **Source** field to enter the URL for the website that you want to display.

   The URL should start with **http** or **https**.

   ⚠ WARNING

   POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

   Use cybersecurity best practices to help prevent unauthorized access to the software.

   Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

   NOTE: When you configure the Web Viewer gadget to access a website, you should be careful that the website does not include hidden malware, viruses, or content that could compromise your web client computers. It is recommended that the target site specified in the gadget be secured with the SSL or TLS protocol (accessed via HTTPS).

2. Use the **Refresh Interval** to indicate how often to refresh the content. The default of `None` indicates that the web site is shown in real time.
3. The **Width** value indicates the display area within the gadget. The default width is 1,000 pixels (px).

4. **Display** provides 2 display options for the gadget:
   a. Select **Scroll the content** to enable scrolling for content that exceeds the width or height of the display area in the gadget.
   b. Select **Crop/Zoom the content** to display a cropped region of the website. Adjust the **Offset X**, **Width**, **Offset Y**, and **Height** for the crop values.

      The default position is set to the top left corner of the gadget, as indicated by 0 for both the Offset X and Offset Y positions. The default width is 1,000 pixels and the default height is 848 pixels.

      It is recommended that the total of the pixel values for Offset X and Width do not exceed the display width (1000 pixels).
5. Click **Preview** to view how the image will appear in the gadget.

Data Series

Complete the options on this page as follows:

1. Click **Add** to open the sources and measurements dialog.
2. Click a source name in the **Sources** area to select it.

   By default, the sources are listed in alphabetical order. You can use the **Search** field to find sources by name.

   NOTE: For large systems with many sources, it takes longer to choose a source from the source selector if you change the **Grouping** setting from its default value.

   NOTE: For a Sankey Gadget select a hierarchy source. The gadget does not display data if you select a source from the Devices list.
3. For a selected source, expand a measurement category, for example **Energy**, and click the specific measurement you want to include, for example **Real Energy Into the Load (kWh)**.

   The measurements are listed in alphabetical order by measurement category. You can use the **Search Measurements** field to find a specific measurement category or measurement.

   Click **Show Advanced** to open options for filtering the measurements.

   Select **Display only Measurements with historical data** to narrow the measurement choices for the selected source.

   NOTE: Smart Measurements are not available for gadget configuration.
4. Select **Display Name** to enter a name of your choice for gadget data purposes. (This is recommended.) By default, the name is a combination of the source and the measurement. For example, for a device `main_7650`, group `BldgA`, and measurement `Real Energy Into the Load` the display name appears as `BldgA.main_7650 Real Energy Into the Load`.
5. Similarly, you can select **Display Units** and enter a unit of your choice.

6. You can modify the following settings for each source measurement:
   - **Series Style**: select the color, line thickness, and how data is represented from the available choices in the dropdown menus.
   - **Axis**: select **Right Axis** or **Left Axis** to chart the data series against the scale for the selected measurement.
   - **Multiplier**: change the multiplier value to convert the data from its original unit to the specified display unit. For example, convert the measurement unit from kWh to MWh by using a multiplier of 0.001.
7. Click **OK** to close the dialog.

Equivalency

Complete the options on this page as follows:

1. Click **Select Predefined Equivalency** to open the Predefined Equivalencies dialog.
2. Select an item from the list of predefined equivalencies.

   Default values are automatically entered in the fields on the **Equivalency** page.
3. You can change the default values as follows:
   a. Enter the **Multiplier from Wh** value to convert from the watt-hour values into the equivalent measurement.
   b. Select the **Decimal Places** to display for the equivalent value.
   c. Enter the **Unit** for the equivalency. For example, "miles", "kilometers", "lbs", "kg", and so on.
   d. Select **Display After Value** or **Display Before Value** to specify the position of the **Unit** label.
   e. Enter the **Energy Equivalency Description** to be displayed in the gadget.

General Settings

Complete the options on this page as follows:

1. Type a title for the gadget.
2. For **Opacity**, you can:
   a. Leave the default option **Use Dashboard Opacity** selected.

      The default opacity setting is controlled in the Dashboard Styling dialog and applies to all gadgets included on the dashboard. This is the recommended setting.
   b. Clear the check box for **Use Dashboard Opacity** to enable the settings for the gadget and select one of the available percentages.

   An opacity setting of 100% indicates that the gadget is not transparent – the background color or image is not visible through the gadget. A setting of less than 100% results in the gadget being partially transparent – the background color or image is partially visible in the gadget. The effect of the setting varies depending on the gadget and the background image.

Heat Map Setup

Complete the option on this page as follows:

1. Select **Auto Color** to let the gadget assign colors for the heat map automatically. If you clear the **Auto Color** check box, you can manually define the color gradients by entering values into the boxes. Enter values based on the maximum expected consumption value per interval.
2. Select **Clear last log after a data gap** to exclude large interval values, that are the result of data gaps, from the displayed data set.
3. Select **Remove Outliers** to exclude data values that exceed the **Max Threshold** or fall below the **Min Threshold**. Define the threshold values by entering limit values into the boxes.
4. Select **Show Total** to include a Total value at the top of the Heat Map chart

Image

Complete the options on this page as follows:

1. Select an image to display on the gadget from the available images in the **Image Library**.
2. (Optional) Add an image to the **Image Library** by clicking **Upload Image** to open the Upload New Files dialog. Then either drag an image file to the area indicated in the dialog or click **Choose Files** and navigate to an image on your system. Click **Finish** to add the image to the **Image Library** and then select it.

Measurements

Select specific measurements from the **Measurement List** or select a template of pre-defined measurements.

Select specific measurements

1. Select one or more measurements in the **Available Measurements** area. The measurements are added to the **Selected Measurements** list.

   (Optional) Click **Show Advanced** to filter the measurements list by **Type** or popularity (**Show**).

Select predefined measurements

1. Click **Select From Template** to open the Predefined Measurements Templates dialog.

   The dialog lists various templates that include specific measurements. The number of measurements is identified in parentheses for each template name.
2. Select a template and click **OK** to add the measurements associated with the template to the **Selected Measurements** area.

Pareto Chart Setup

Complete the option on this page as follows:

1. Set the level of the marker line on a scale of 0-100% by entering the **Marker Position**. For example, for a marker line at 80%, enter a value of 80.
2. Select **Show Total** to include a Total value at the top of the Pareto chart.
3. Specify a **Legend Name**. This name will be shown as an axis label for the left y-axis in the chart.

PQ Group

Depending on the scope of the data that you want to display in the gadget, select **All Groups** (if there is more than one group in the list), or a specific group in the list. The group names that are listed in the dialog are defined in the Power Quality Group configuration file, which is configured during Power Quality Performance commissioning.

Sankey Chart Setup

Complete the option on this page as follows:

1. Set the depth of the Sankey diagram by entering the **Max Level**.

   The depth is defined from the selected top node. Each bar in the diagram represents a level and by reducing this number you can create diagrams focusing on the higher levels. There is no limit to how many levels can be displayed.
2. (Optional) Select to **View Only Last Log**.

   Selecting this option overrides the Viewing Period selection. Instead of displaying data for the selected viewing period, only the last available data log value for each node in the hierarchy structure is used. This is useful for viewing the current state of the system, e.g. Power, Voltage, Current.

Sources

Select the sources that you want to include in the table:

1. Select one or more sources in the **Available Sources** area. The sources are added to the **Selected Sources** list.

   (Optional) Use the **Search Sources...** field to find sources, click **Show Advanced** to filter the source list by **Type**, or click **Add All** to select all sources.
2. Click a source in the **Selected Sources** area to remove it as selected.

   (Optional) Click **Remove All** to remove all sources from the **Selected Sources** area.

Source Selection

Complete the option on this page as follows:

1. Click **Select Source** to open the Source Selection dialog.

   The sources listed are dependent on the views and virtual meters you create in Hierarchy Manager.
2. Enter a source name in the **Search Sources** field or expand the tree to locate the source that

you want to use.

3. Click the source name and then click **OK** to add your selection as the source for the gadget.

Table Settings

1. Choose **Sources** or **Measurements** for the column headings in the table.
2. Set the **Minimum Column Width** for the columns in the table.
3. Set the **Update Interval** for the data refresh in the table.
4. (Optional) Enable **Simple Rendering** to improve the display of large tables.

Target Lines

Complete the options on this page as follows:

1. Click **Add Target Line** to add target line input fields to the page.

   Add additional target line input fields by clicking **Add Target Line** again.
2. Select **Fixed Target** or **Per Day Target** for **Type** to specify how the target line is applied.
   a. **Fixed Number** is a value that applies in all date ranges.
   b. **Per Day Target** is a value that is prorated for the time range that you specify. For example, a per day target of 100 displays the target line at 100 if viewing **By Day**, at 3000 if viewing **By Month**, and at 700 if viewing **By Week**.
3. Enter a label to display in the chart for the target line and select the axis for the target line in the respective fields.
4. Use the **Color Selector** to choose the color of the target line.
5. Click the **Remove Target** Line icon to delete it.

Viewing Period

Complete the options on this page as follows:

1. Select the time range for the data that is to be displayed in the gadget.
2. If aggregation options are available, select one of the available options.

The time range and aggregation settings are specific to the gadget that you select.

NOTE: For all Power Quality gadgets, except the Trend gadgets, the recommended viewing period is **This Month** (for monitoring current data) or **Last Month** (for monitoring historical data). For the Trend gadgets, the recommended viewing period is **Last 12 Months** with a **By Month** aggregation period.

Database maintenance references

This section contains reference information related to database maintenance.

Use the following links to find the content you are looking for:

Database maintenance task definitions

The following are high level definitions of PME relevant database maintenance tasks.

Archive

Database archiving copies older data from the operational database into a separate, new database. The goal of archiving is to keep data safe for future reference. Data is typically archived based on calendar time intervals, for example by month or by year.

The PME archive task creates a new archive database each time the task is run. Each new archive database is attached to SQL server and is available to be accessed by PME.

NOTE: The PME archive task does not trim data from the operational database; it only makes a copy of the archived data, leaving the original data in the operational database. See Considerations for trimming archived data from ION_Data for important information on this topic.

Backup

Backing up a database creates a copy of the operational database. The goal of a backup is to have an identical duplicate of the operational database that can be used to restore the system in case the operational database becomes nonfunctional. Database backups should be created on a regular basis, for example daily or weekly.

Maintenance

The PME database Maintenance task defragments the database and updates the database statistics. The goal of these activities is to maintain database performance. Maintenance tasks should be run on a regular basis, for example daily.

Size Notification

The size notification task is used to monitor the size of the database and to notify users when a certain size threshold is reached. When the size threshold is reached, the task logs a system log event message and triggers a Critical alarm in PME every time the task runs.

NOTE: The Size Notification task is only configured for systems using SQL Server Express, which has a maximum database size limitation of 10 GB.

Trim

Trimming a database deletes data from the database. The goal of trimming is to prevent the database from growing to a size that could affect system performance. Databases should be trimmed on a regular basis, for example daily or weekly. For PME only the system log databases are trimmed.

Considerations for trimming archived data from ION_Data

When archiving and then trimming data from the ION_Data database, you are moving this data from the operational database into an archive store for long-term retention. This data is then no longer available in the ION_Data database for analysis in PME. PME has very limited access to archived data.

We recommend that you only trim archived data from the ION_Data operational database, when:

- It approaches its size limit, for example 10 GB for a SQL Server Express database.
- It reaches a size that impacts query performance.
- The database drive is low on available free space and you cannot switch to a larger drive.

When you trim data from an SQL database, the database file size remains unchanged. After the trim, the database will first fill the new free space before growing the database file size again. To reduce the database file size after trimming, Shrink the database, using standard SQL Server tools.

NOTE: The PME archive task does not trim the database; it only copies data to the archive.

Archive data access in PME:

Application	Archive Data Access
Vista	Yes
Reports	Can access either data from the operational database or from an archive database but not both at the same time.
Dashboards	No
Diagrams	Yes
Trends	No
Alarms	No

Default maintenance task settings

The default PME database maintenance tasks are defined as Windows PowerShell scripts, and scheduled and executed using Task Scheduler in Windows. The following table shows the different configuration settings for these tasks, their defaults, and where they are configured:

Setting	Location	Default Value	Comments
Windows account used to run the task	Task Scheduler	User account that is creating the task.	Use IONMaintenance for Standalone systems. Create a new, dedicated account for Distributed systems. See create a Windows user account to run the maintenance tasks for more details.
Task trigger times	Task Scheduler	See default task schedules.	The default schedules are configured automatically for Standalone systems. The schedules for Distributed systems must be configured manually.
Task enabling or disabling	Task Scheduler	See default task schedules.	n/a
Backup folder location	PowerShell script : Configuration.ps1 Variable: $locationForBackupFiles	...\Power Monitoring Expert \Database\Backup*	Sets the folder to which the database backups are saved. The backup script will create the following subfolders in this location: ...\Data for ION_Data ...\Network for ION_Network ...\SystemLog for ION_SystemLog ...\Applications for ApplicationModules
Archive folder location	PowerShell script : Configuration.ps1 Variable: $locationForArchiveDBFiles	...\Power Monitoring Expert \Database\Archive*	Sets the folder to which the database archives are saved.
Data to keep when trimming	PowerShell script : Configuration.ps1 Variable: $diagnosticsDaysToKeep	30	Sets how many days' worth of data is left in the database after trimming.
Database size (max)**	PowerShell script : Configuration.ps1 Variable: $maximumDatabaseSizeIn Gigabytes	9	Sets the maximum database size. This value is used by the size notification task to assess what percentage of database space has been used. The maximum size for a SQL Express database is 10GB. The maximum size in the script is set to 9GB to allow for a 1GB warning buffer before the database stops logging data.
Database size notification limit**	PowerShell script : Configuration.ps1 Variable: $databaseSizeNotification ThresholdPercentage	85	Sets the threshold for when a database size notification will be issued.

* Default setting for Standalone systems.

** The database size notification is only configured for systems with SQL Server Express databases.

Using IONMaintenance for database maintenance tasks

IONMaintenance is a Windows user account that is created automatically when PME is installed in a Standalone architecture. This account is used to run the pre-configured PME database maintenance tasks in Task Scheduler in Windows. To make changes to the task schedules in Task Scheduler, you need to enter the password for the IONMaintenance account. By default, the password for the account is generated automatically by the installer and cannot be retrieved. To have access to the password, you need to set a custom password for this account.

To set a custom password for IONMaintenance, run the PME installer in maintenance mode and select **Reset Accounts** to start the account password reset procedure. Follow the installer instructions to reset the password. See Installer system maintenance tasks for more information.

NOTE: If you set a custom password for the Windows Accounts during the installation of PME, then this is the password used by IONMaintenance and you can use this password to make changes to the task schedules in Task Scheduler.

NOTE: IONMaintenance shares the same password with IONUser, another account that is generated automatically by the installer and which is used for report subscriptions.

NOTE: If you change the password for the Windows accounts, the password you are providing must comply with the password policies of the Windows server and the SQL server. The software installer cannot validate the password at the time you enter it. If the password is not valid, the password reset and reconfiguration will not be successful. In that case, complete the reconfiguration, skipping any unsuccessful steps. See Unsuccessful installation due to invalid account passwords for information on how to repair the unsuccessful reset.

Database maintenance account requirements

PME uses Task Scheduler in Windows for the scheduling and execution of database maintenance tasks. Task Scheduler requires a Windows account to run the tasks. In Standalone PME systems, an account, **IONMaintenance**, is created by the installer and automatically assigned to the Task Manager tasks. In Distributed PME systems you need to create an account manually. This account must meet the following minimum requirements:

In Windows on the computer where the database server is installed, the account:

- must be a member of the Users group.
- must have the following Windows policy settings: **Log on as a batch**; **Deny log on locally**.

In SQL Server, the account:

- must have a **public** server role
- (for archive task only) must have a **sysadmin** server role
- must have the following role memberships for the PME databases (ION_Data, ION_Network, ION_SystemLog, ApplicationModules):
  - db_backupoperator
  - db_ddladmin
  - Maintenance
  - public

NOTE: You will need the password for this account during the initial task setup, and later if you want to edit the tasks in Task Manager in the future.

Setting up the ION_Data archive task for Distributed PME systems

Setting up the archive task for ION_Data is similar to setting up other database maintenance tasks but requires some additional steps.

NOTE: It is best to automate the archive task, but you can also run it manually on demand using Database Manager.

To set up the scheduled archive task for ION_Data:

1. Complete Steps 1 - 3 described in Setting up database maintenance tasks for Distributed PME systems.

   NOTE: You can use the same Windows user account (created in Step 1) that is used for other scheduled PME database maintenance tasks to run the archive task. You can also create a new account that is only used for the archive task, because only this task requires sysadmin role privileges on the database server (see next step).

2. On the database server, open SQL Server Management Studio and add the **sysadmin** server role to the Windows user account created in Step 1. This account is used to run the archive task; it needs sysadmin permissions to create new archive databases.

3. On the database server, in the folder created in Step 3, create a subfolder called **etc** and inside this folder a subfolder called **Database**, for example `C:\PME_Database_Maintenance\etc\Database`.

4. Copy the **Data** folder from `...\Power Monitoring Expert\system\etc\Database\`, on the PME application server, into the new **Database** folder on the database server.

5. On the database server, open Task Scheduler in Windows.

6. (Optional) In the Task Scheduler Library, create a new folder for the PME database maintenance tasks, if it does not already exist. For example, Task Scheduler Library > Power Monitoring Expert.

7. Create the scheduled archive task for ION_Data:

   Name: **[ION_Data] - ARCHIVE - Job**
   Security options: Set the Windows user account created in Step 1 to run the task.
   Security options: Select **Run whether user is logged on or not**.
   Trigger: **Monthly at 01:00 (1:00 AM) on January 3rd**
   Action: Select **Start a program**.
   Action: Program/script:
   C:\Windows\syswow64\WindowsPowerShell\v1.0\powershell.exe
   Action: Arguments: **-noninteractive -nologo -file "<*Folder Path*>\DbScheduledTasks\ArchiveDB.ps1" -DatabaseIdentifier ION**

   NOTE: The "<Folder Path>\DbScheduledTasks\ArchiveDB.ps1" path must be an absolute path, not a relative path.

   NOTE: The task name and trigger time shown above are recommendations. You can choose a different name or trigger if necessary.

8. (Optional) Manually run the archive task to verify its correct operation.
9. Close Task Scheduler.

To change the archive location, open the `Configuration.ps1` script file, as described in Step 3 in Setting up database maintenance tasks for Distributed PME systems and change the value of the variable:

Setting	Variable	Default Value	Comments
Archive folder location	$locationForArchiveDBFiles	As defined in the script file; see Step 3-7.	Sets the folder to which the database archives are saved. NOTE: The Windows user account used to run the archive task needs Read and Write permissions on this folder.

Device Manager references

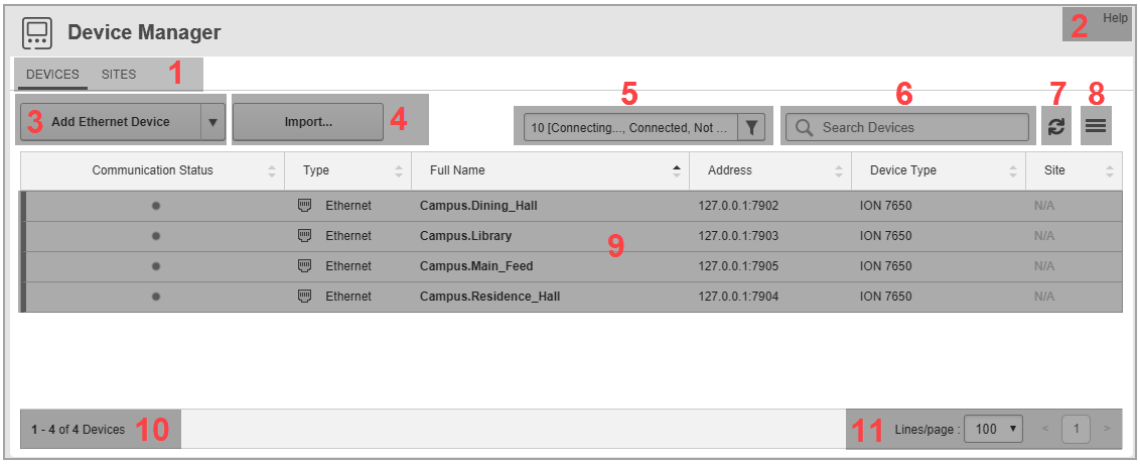
This section contains reference information related to Device Manager.

Use the links below to find the content you are looking for:

Device Manager user interface

Device Manager user interface

Main user interface (UI) and Devices tab



Main UI

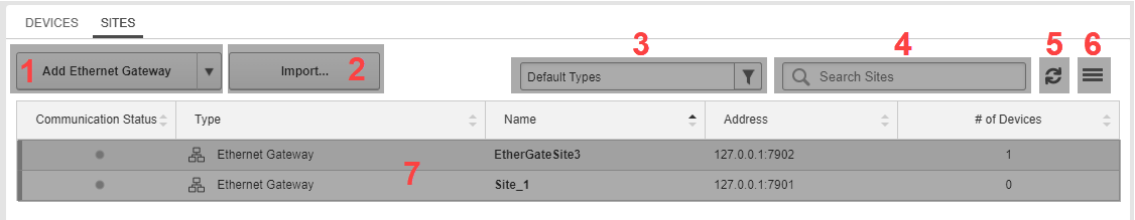
1	**Selection tabs** Select a tab to see information related to Devices or Sites.
2	**Help** Click Help to open the Device Manager online help.
10	**Number of displayed items** Shows the number of items visible on this page, and the total number in the system.
11	**Page selector** Use the page selector to navigate between pages of information. Set the number of items that are displayed on a page.

Devices tab

3	**Add Ethernet Device** Use Add Ethernet Device to add a new Ethernet device to the system. To add a Serial Device, connected through an Ethernet gateway, or an OPC device, click the down arrow and select the appropriate option from the drop-down menu. **NOTE**: To add serial devices that are directly connected to the system, for example through a RS485 converter, or to add Logical Devices, use Management Console.
4	**Import** Use the import wizard to import device or site configuration into the system. You can import configuration from a different system, from configuration tools, or edited configuration from the same system. See Importing network configuration from a different system and Editing a device, Editing a site for more details.
5	**Devices filter** Use the devices filter to customize which devices are displayed in the devices table. You can filter by Communication Status, Type, and Enabled State.

6	**Search Devices box.** Enter a search string to find devices in the devices table.
7	**Refresh** Click Refresh to update the table content and show changes to the device configuration that might have been done through Management Console. **NOTE**: The Communication Status indicator in the table is updated automatically every 10 seconds. To update the configuration information use Refresh.
8	**Options menu** The Options menu contains the following options: - Show/Hide Columns - Clear Filter - View Device Licenses - Export Devices Configuration for Editing - Export Network Configuration for Use in a Different System - Refresh
9	**Devices table** The devices table shows devices that are configured in the system. Which devices are displayed in the table is controlled by the devices filter, see **5** above.

Sites tab



1	**Add Ethernet Gateway** Use Add Ethernet Gateway to add a new Ethernet Gateway site to the system. To add an OPC site, click the down arrow and select the appropriate option from the drop-down menu.
2	**Import** Use the import wizard to import device or site configuration into the system. You can import configuration from a different system, from configuration tools, or edited configuration from the same system. See Importing network configuration from a different system and Editing a device, Editing a site for more details.
3	**Sites filter** Use the sites filter to customize which sites are displayed in the sites table. You can filter by Communication Status, Type, and Enabled State.
4	**Search Sites box.** Enter a search string to find sites in the sites table.

5	**Refresh** Click Refresh to update the table content and show changes to the site configuration that might have been done through Management Console. **NOTE**: The Communication Status indicator in the table is updated automatically every 10 seconds. To update the configuration information use Refresh.
6	**Options menu** The Options menu contains the following options: - Show/Hide Columns - Clear Filter - Export Sites Configuration for Editing - Export Network Configuration for Use in a Different System - Refresh
7	**Sites table** The sites table shows sites that are configured in the system. Which sites are displayed in the table is controlled by the sites filter, see **3** above.

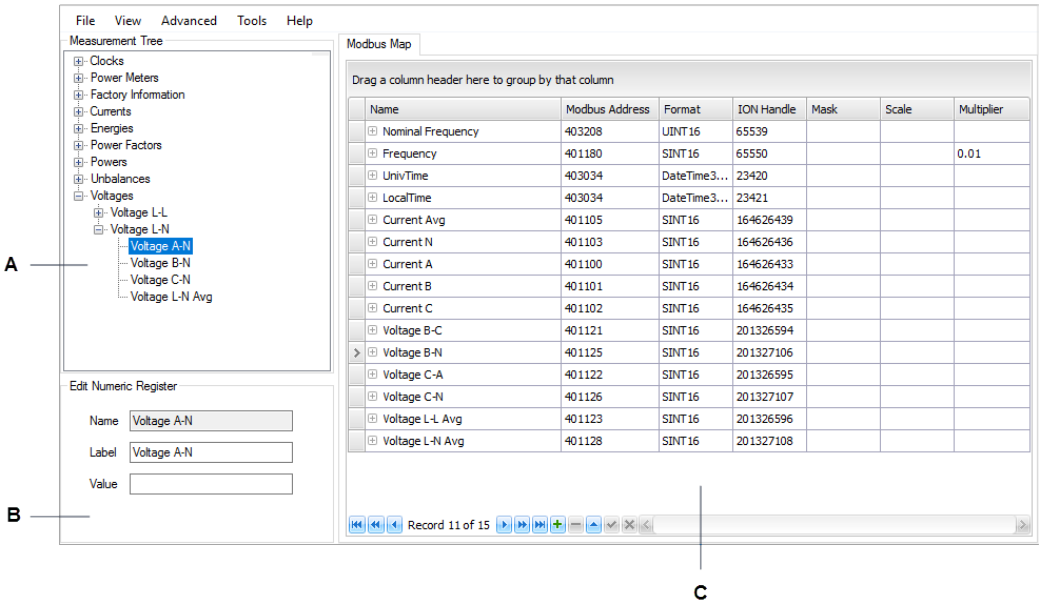
Device Type Editor references

This section contains reference information related to Device Type Editor.

Use the following links to find the content you are looking for:

Device Type Editor User Interface

Main user interface



A	Measurement Tree pane	B	String Register Details pane	C	Modbus/OPC Map pane

Menu bar

Menu	Options
File	**New**: Create a new Modbus or OPC device type. **Open**: Open an existing device type. **Save**: Save the current device type. **Save As**: Save the current device type to a different location. **Export**: Export the current device type as text file in csv format **Exit**: Close the Device Type Editor.

View	**Measurement Tree**: Show or hide the Measurement Tree display pane **Register Detail**: Show or hide the String Register Details display pane **Register Map**: Show or hide the Modbus Register Map display pane. Show or hide the Enumerations, Address Blocks, Invalid Addresses, and Device Info tabs.
Advanced	Show or hide the Handle Exclusions, Transaction Configuration, Time Sync Info, and Plugin Info tabs.
Tools	**Configure Software Logging**: Open the Configure Logging and Calculation tool **Expose OPC Measurements**: Update the OPC measurement definition in the system **Clean Measurement Tree**: Remove any unused managers, modules, registers from the tree **Install Device Type**: Open the Device Type Installer
Help	**Device Type Editor Help**: Open the Device Type Editor help file.

Context Menus

Right-click on a manager, module, or register in the ION Tree to open a context menu. The context menu provides access to the actions you can perform on the Measurement Tree, such as adding and editing managers, modules, and registers.

Right-click anywhere inside the Modbus/OPC Map table to open a context menu. The context menu provides access to the actions you can perform on the Map , such as inserting or deleting rows.

Right-click anywhere inside the Map table header row to open a context menu. The context menu provides access to actions related to the table format, such as sorting of the table content or showing or hiding table columns.

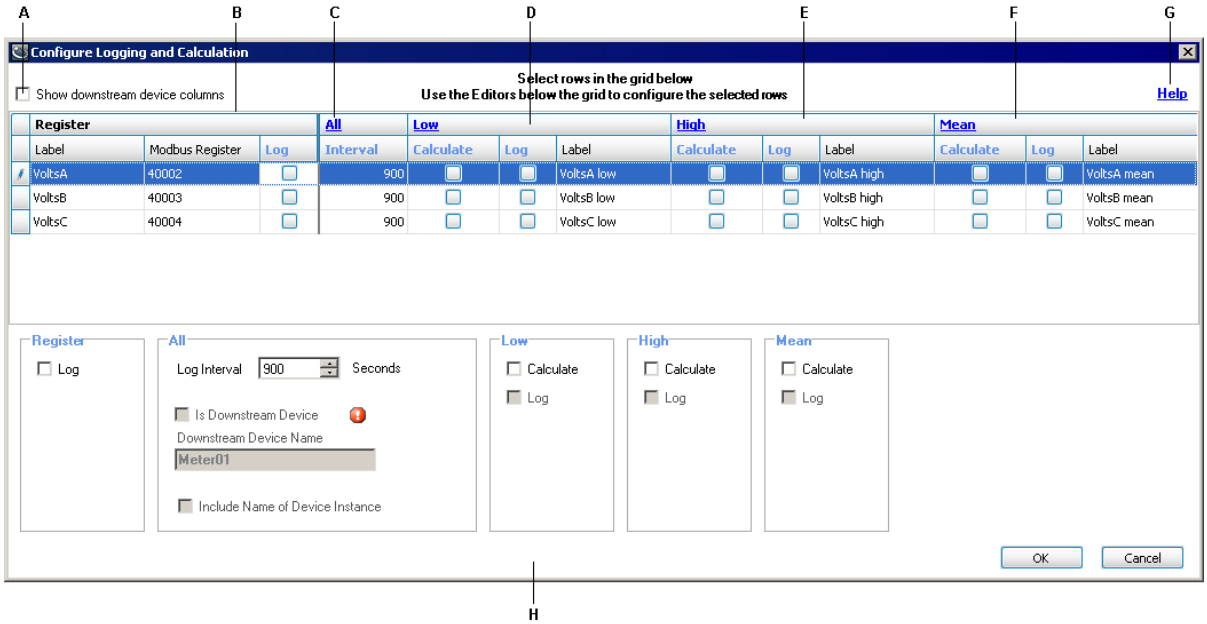
Configuring Logging and Calculation User Interface

Use the **Configure Logging and Calculation** utility to:

- Enable register logging, including setting log frequency.
- Enable low (minimum), high (maximum) and mean (average) calculations and logging.
- Configure stale data settings.
- Append downstream device information to labels.

NOTE: Only numeric output registers can be calculated and logged. All other types of registers (for example, enumerated) do not appear on the Configure Logging and Calculation screen.

Screen overview



A	Select this check box to make the downstream device columns appear				
B	Register area	C	Stale data link	D	Low area
E	High area	F	Mean area	G	Help link
H	Global register edit area. Use this area to globally edit all rows selected in the upper pane.				

All the register information from the device type in the Device Type Editor is pre-populated in this table when you open the application.

Show downstream device columns: Select this to show all the columns for selecting and setting the downstream device properties for registers.

Register area: Use this area to individually configure registers.

Low area: Use this area to enable calculation and set logging of low values.

High area: Use this area to enable calculation and set logging of high values.

Mean area: Use this area to enable calculation and set logging of mean values.

Global register edit area: Use the bottom half of the screen to edit individual registers or multiple registers, after selecting them in the list.

Help link: Click this link to open the Device Type Editor online help.

Stale data link (All): Click this link to open the Configure Stale Data Settings dialog.

Configuring register logging

To edit registers on an **individual** basis, select the row of the register and edit the cells in the row or use the editing tools in the Global area.

To edit **more than one** register, select the rows you want to configure similarly and use the editing tools in the Global area.

Log: Select to enable logging of the register.

Interval: This value determines the logging frequency for the register. Note that this value also controls the reset interval for the min, max and averaging modules, even if these calculations are not being logged. The valid range is 1 to 4,000,000 seconds.

Configuring Low, High and Mean Calculation and Logging

To edit the suffix used for Low, High and Mean, click on the applicable link. For example, if you change the suffix to Maximum, VoltsA **High** becomes VoltsA **Maximum**.

Low

Select **Calculate** to enable calculation of low (minimum) values for this register. Select **Log** to enable logging of this value. Note how the label is appended to reflect that this is the low value.

High

Select **Calculate** to enable calculation of high (maximum) values for this register. Select **Log** to enable logging of this value. Note how the label is appended to reflect that this is the high value.

Mean

Select **Calculate** to enable calculation of mean (average) values for this register. Select **Log** to enable logging of this value. Note how the label is appended to reflect that this is the mean value.

Configuring Stale Data settings

The “staleness” of data is measured from time data was last read from a physical device until the current time.

Click the **All** (Stale Data) link to open the **Configure Stale Data Settings** dialog.

Mark data stale after: Enter the time you want to elapse before data from this register is marked stale in the data recorder. The valid range is 0 to 7200 seconds.

When data is stale: Select how you want stale data values logged. The setting “log an empty row” logs an empty row in the data recorder, while “use last known value” logs the last non-stale value in the data recorder until the end of the current interval.

NOTE: Stale data settings are global (they apply to all registers) for a device type.

Configuring downstream device functionality

You must select the **Show downstream device columns** check box in the **Configure Logging and Calculation** window before you can edit downstream device functionality.

Show downstream device columns: Select this check box to make the downstream device columns appear.

Is Downstream Device: Select this checkbox to indicate the register belongs to a downstream device.

Downstream Device Name: Enter the name of the downstream device in this field. The register label is appended with this name. For example, if the device name is Meter01, the register label becomes VoltsA@Meter01.

NOTE: Using this option **without** also using the Include Name of Device Instance option causes multiple devices to appear as a single device in your energy management system. Do not use this option on its own unless only a single instance of this device is present in your system.

Include Name of Device Instance: Select this check box to append the actual device instance name to the register label. The placeholder !!DeviceName!! is then added to the label — the name of the actual device instance gets inserted when it is created.

For example, if the device instance is named Device01:

VoltsA@**!!DeviceName!!**Meter01

is replaced with

VoltsA@**Device01**Meter01

This allows for the creation of unique names within Power Monitoring Expert, as well as enabling each device instance to appear in the product as multiple virtual devices.

For more information on downstream devices and naming conventions, see Downstream Device Assistant

Saving and exiting

To exit the Configure Logging and Calculation screen:

- Click **OK** to save your settings.
- Click **Cancel** to exit without saving.

You are returned to the main Device Type Editor console screen.

Modbus Data Formats

Power Monitoring Expert supports the following data formats:

Format Type	Description
SINT16	A 16-bit signed value in 2-1 (or big ENDIAN) format. The high order byte is first, the low-order byte second.
UINT16	A 16-bit unsigned value in 2-1 (or big ENDIAN) format. The high order byte is first, the low-order byte second.
SINT32 or S32-4321	A 32-bit signed value returned in two consecutive 16-bit registers. The high-order word is returned in the first register, the low order word in the second. In effect, the 4 bytes are returned in 4-3-2-1 (or big ENDIAN) format.
UINT32 or U32-4321	A 32-bit unsigned value returned in two consecutive 16-bit registers. The high-order word is returned in the first register, the low-order word in the second. In effect, the 4 bytes are returned in 4-3-2-1 (or big ENDIAN) format.

Format Type	Description
S32-2143	A 32-bit signed value returned in two consecutive 16-bit registers. Contrary to S32_4321, the high-order word is returned in the second register, the high-order word in the first. In effect, the 4 bytes are returned in 2-1-4-3 format.
U32-2143	A 32-bit unsigned value returned in two consecutive 16-bit registers. Contrary to U32_4321, the high-order word is returned in the second register, the low-order word in the first. In effect, the 4 bytes are returned in 2-1-4-3 format.
S32-MFP or S32-M10k-4321	A 32-bit signed value returned in two consecutive 16-bit registers. The word stored in the first 16-bit register is multiplied by 10000 and added to the word stored in the second 16-bit register. Also known as ‘signed Modulo 10000’.
U32-MFP or U32-M10k-4321	A 32-bit unsigned value returned in two consecutive 16-bit registers. The word stored in the first 16-bit register is multiplied by 10000 and added to the word stored in the second 16-bit register. Also known as ‘unsigned Modulo 10000’ or mod-10K.
S32-M10k-2143	A 32-bit signed value returned in two consecutive 16-bit registers. Contrary to S32_M10k_4321, the word stored in the second 16-bit register is multiplied by 10000 and added to the word stored in the first 16-bit register.
U32-M10k-2143	A 32-bit unsigned value returned in two consecutive 16-bit registers. Contrary to U32_M10k_4321, the word stored in the second 16-bit register is multiplied by 10000 and added to the word stored in the first 16-bit register.
S48-M10k-21-65	A 48-bit signed value returned in three consecutive 16-bit registers. R3*10,000^2 + R2*10,000 + R1, where R3 is the last register and R1 is the first register. Each registers range is -9,999 to +9,999
U48-M10k-21-65	A 48-bit unsigned value returned in three consecutive 16-bit registers. R3*10,000^2 + R2*10,000 + R1, where R3 is the last register and R1 is the first register. Each registers range is 0 to +9,999
S64-M10k-21-87	A 64-bit signed value returned in four consecutive 16-bit registers. R4*10,000^3 + R3*10,000^2 + R2*10,000 + R1, where R4 is the last register and R1 is the first register. Each registers range is -9,999 to +9,999
U64-M10k-21-87	A 64-bit unsigned value returned in four consecutive 16-bit registers. R4*10,000^3 + R3*10,000^2 + R2*10,000 + R1, where R4 is the last register and R1 is the first register. Each registers range is 0 to +9,999

Format Type	Description
S64-87-21	A 64-bit signed value returned in four consecutive 16-bit registers. The highest order word is returned in the first register, the lowest order word in the fourth. In effect, the 8 bytes are returned in 8-7-6-5-4-3-2-1 (or big ENDIAN) format.
U64-87-21	A 64-bit unsigned value returned in four consecutive 16-bit registers. The highest order word is returned in the first register, the lowest order word in the fourth. In effect, the 8 bytes are returned in 8-7-6-5-4-3-2-1 (or big ENDIAN) format.
S64-21-87	A 64-bit signed value returned in four consecutive 16-bit registers. The highest order word is returned in the fourth register, the lowest order word in the first. In effect, the 8 bytes are returned in 2-1-4-3-6-5-8-7 (or little ENDIAN) format.
U64-21-87	A 64-bit unsigned value returned in four consecutive 16-bit registers. The highest order word is returned in the fourth register, the lowest order word in the first. In effect, the 8 bytes are returned in 2-1-4-3-6-5-8-7 (or little ENDIAN) format.
S16-1-15	A 16-bit signed value. Bits 1 to 15 bits are unsigned data. If bit 16 is 0, the value is positive, if bit 16 is 1, the value is negative.
IEEEFloat or F32-4321	A 32-bit IEEE floating point value returned in two consecutive 16-bit registers. The high-order word is returned in the first register and the low order word in the second. In effect, the 4 bytes are returned in 4-3-2-1 format.
SwappedFloat or F32-2143	A 32-bit IEEE floating point value returned in two consecutive 16-bit registers. Contrary to F32_4321, the high-order word is returned in the second register and the low order word in the first. In effect, the 4 bytes are returned in 2-1-4-3 format.
MaskedBool or PackedBool	A 16-bit value that is interpreted according to the bit pattern described by the Mask attribute. Bits exposed by the mask can be read or written without affecting the value of other bits. Unmasked bits are interpreted as 0 on a read and are unaffected on a write. Undeclared bits of a mask are interpreted as unmasked (i.e., mask="0x7F" is interpreted as 0x007F). The value that is read or written is determined by using enumeration ordinals, described below. If used for read-only Boolean data, enumerations are not required. If no mask is specified, all bits are relevant.
PF-Nexus	A 16-bit unsigned value, range 0 to 3999, representing 3 decimal places of accuracy.
BCD (Binary Coded Decimal)	A number is expressed as a sequence of decimal digits and then each decimal digit is encoded as an 8-bit binary number. For example, decimal 92 is encoded as 00001001 00000010.

Format Type	Description
The following data types can have their length specified by the "Number of Registers to Request" setting.	
Packed BCD	A number is expressed as a sequence of decimal digits and then each decimal digit is encoded as a 4-bit binary number (nibble) For example, decimal 92 is encoded as 1001 0010.
ASCII	A sequence of bytes representing the ASCII character set. Each word stores two ASCII characters. Trailing spaces are removed.
ASCII-Reverse	Same as ASCII except every second character is in the reverse order.

Additional supported formats: U16-21, S16-21, U16-12, S16-12, U64-M10k-87-21, S64-M10k-87-21, U48-M10k-65-21, S48-M10k-65-21, U48-65-21, S48-65-21, U48-21-65, S48-21-65, InvertedMaskedBool, F64-87-21, F64-12-78, PF32, PF_ALT, U16-21-ARRAY, U16-12-ARRAY, DateTime4_UTC, DateTime4_LOCAL, DateTime4, DateTime3_UTC, DateTime3_LOCAL, DateTime3, DateTime_YMDhms_UTC, DateTime_YMDhms_LOCAL, DateTime_YMDhms, DateTime_IEC870_UTC, DateTime_IEC870_LOCAL, DateTime_IEC870, DateTime3_IEC870_UTC, DateTime3_IEC870_LOCAL, DateTime3_IEC870, DateTime3_MDYhms_UTC, DateTime3_MDYhms_LOCAL, DateTime3_MDYhms, DateTime4_MDYhms_UTC, DateTime4_MDYhms_LOCAL, DateTime4_MDYhms, DateTime2_s2000, DateTime3_s2000, DateTime4_shmMDY, DateTime6_smhDMY, DateTime7_YMDhms, DateTime8_MDYdowhmsc, DateTime6_MDYhmms, DateTime_NSX2_UTC, DateTime_NSX2_LOCAL, DateTime_NSX3_UTC, DateTime_NSX3_LOCAL, S64-M1K-87-21, U64-M1K-87-21.

Modbus Register Properties

The following register properties can be configured:

Name

The Modbus register name is an identifier for the register. It is used internally, but not displayed in the measurement selector user interfaces. The ION register label, to which the Modbus register is mapped, is used for display. If no ION register label is defined, then the ION register name is used for display.

For multi-circuit devices, such as the BCPM, the Modbus register name is used to identify the different circuits, with a special naming convention (example: `Real Energy@!!DeviceName!!_1PH_Ch1`). These special register names are then used for the creation of managed circuits, if that feature is configured for the device type in the Management Console.

NOTE: The register name has a **maximum character limit of 50**, including spaces. This is important to consider when creating names for multi-circuit devices.

Constant Value vs. Mapped Value

To have an ION register linked to a measured value from a device, map this register to the appropriate Modbus register. To assign a constant value to an ION register, enter this value into the Value box for the ION register in the String Register Details pane. You must unmap a mapped

register first before you can edit the value of an ION register. To unmap a register, delete the ION Handle number for the mapped Modbus register, or delete the entire Modbus register row for the mapped Modbus register in the Register Map.

Disable Not Available Check

Use this field to skip the Not Available check for a register.

Enumeration

Enumeration is used to convert ordinals (position numbers) read from the device into the values these ordinals represent.

For example, a device may represent the Baud rate with a number from 0 to 3, where 0 = 19200 Baud and 3 = 115200 Baud. Using enumeration, the value 0 is converted to the string "19200 Baud", and the value 3 is converted to "115200 Baud". There are many applications for using enumerations when reading Modbus register data.

To create an enumeration:

1. In Device Type Editor, open the device type for which you want to define enumerations, and then browse to the **Enumerations** tab.

   NOTE: This tab is hidden by default. To show the tab, check **View > Register Map > Enumerations**.

2. In Enumerations, insert a new row, using the context menu commands.
3. Enter a name in the **Name** field to identify this enumeration.

   For the example above, the name could be "Baud_Rate".

4. Enter a default value for the enumeration in the Default Enum Value field.

   For the example above, this could be "19200 Baud".

5. Click the Enum Info Option icon in the name field for this enumeration to open the **Enum Info Option** table.
6. In Enum Info Option, insert new rows, using the context menu commands and enter the ordinals into the **Ordinal** fields and the corresponding values into the **Value** fields.

   For the example above, ordinal 0 has a value of 19200 Baud, ordinal 1 a value of 38400 Baud, ordinal 2 a value of 57600 Baud, and ordinal 3 a value of 115200 Baud.

7. Click the icon in the op left corner of the Enum Info Option grid to return to the **Enumerations** table.
8. Browse to the **Register Map** table and enter the enumeration name created in step 3 into the **Enum Name** field for the registers to which it applies.

Format

This data format is used for decoding the values returned from the meter. The selected data format must match the format delivered by the device. See Modbus Data Formats for the supported formats.

ION Handle

The ION handle is the reference ID used by Power Monitoring Expert to identify the ION register that is mapped to the Modbus register. The ION handle is automatically assigned when you map a Modbus register from the Register Map to the ION register in the ION Tree.

Mask

The mask is used to read individual bit values from a Modbus register value. It is applied to the register data using an AND logic. For example, if the mask “0x4” is applied, then the register value displayed is only nonzero if the 3rd least significant bit in the register is a 1. You can apply masks to both numeric and Boolean data types.

NOTE: For integer values, the bit order of the mask corresponds to the bit order of the actual data and NOT the order in which the bytes representing the data are returned over Modbus. The high-order nibble of a 32-bit value is selected as ‘0xf0000000’ regardless of whether the format is U32_4321 or U32_2143. It should also be noted that the resulting value of a masked integer is NOT bit shifted. A mask of ‘0xf000’ applied to a 16-bit value of ‘0x1234’ results in ‘0x1000’ (4096 decimal) and NOT 1.

Modbus Address

This is the physical address of the Modbus register. You can find this address number in the device documentation. Enter the number in either decimal or hexadecimal format. The address range depends on the register type as follows:

COIL STATUS = 0xxxx
INPUT STATUS = 1xxxx
INPUT REGISTER = 3xxxx
HOLDING REGISTER = 4xxxx

NOTE: When entered in hexadecimal format, the value is only the register offset and does not include the Register Type identification.

Not Available Value

If the Modbus register has a control signal value to indicate when the register is not available, then you can enter this value in this field. The value must match the control signal value that is received from the device. This allows the user interfaces that display data for this register in Power Monitoring Expert to indicate when the value is not available.

Number of Registers

This option is only available if the data type is set to ASCII, ASCII-Reverse or Packed BCD. It allows you to specify the number of registers to retrieve from the device on a request.

Request Type

This tells the system whether the register is for read (R) or write (W). Other options are read/write (RW), and command write (CW).

Scale, Multiplier, Offset

The scale, multiplier and offset can be set to any decimal value within the range of -3.402823466 E + 38 to 3.402823466 E + 38. These values are applied to the measured value returned from the device in the following way:

ION value = (Modbus value - offset) * multiplier / scale

Instead of setting these values to a constant, you can also map them to ION registers that hold these values. This is useful if the value of the ION registers can be read from the device. It is also useful if you want to use the same scale, multiplier, or offset for multiple registers. In this case you can map all of the registers to the same ION registers, and set their values to constants. You can only map to registers already created in the Device Type Editor.

To map the scale, multiplier, or offset to an ION register, enter the ION handle value for this register, in hex, into the Scale, Multiplier, or Offset fields in the Modbus Register Map.

Setup Reg

Use this field to indicate that a register is a setup register on the device. Setup registers are read at a lower polling rate than regular data registers, improving the overall performance of the device driver.

Write Value

This only applies to pulse registers. Use this field to specify the value that is written to the Modbus register on the device when the ION register is pulsed.

Measurement Tree

The Measurement Tree organizes the device measurements into a structure that is recognized by Power Monitoring Expert and that determines how you access these measurements in the software. The Measurement Tree consists of managers, modules, and registers.

Managers

Managers are at the top level of the tree. Managers group together modules of the same type. For example, a manager called **Maximum Readings** could contain the modules **Max Current**, **Max Frequency** and **Max Voltage**. You are free to choose a name for a manager that best meets your needs. Choose a name that is relevant to the type of modules it contains. You can create up to 127 managers.

Modules

Modules are contained inside managers. Modules group together related registers. For example, a module called **Max Current** could contain the registers **Max Current A**, **Max Current B**, **Max Current C**. You are free to choose a name for a module that best meets your needs. Choose a name that is relevant to the type of registers it contains. You can create up to 4095 modules inside a given manager.

Registers

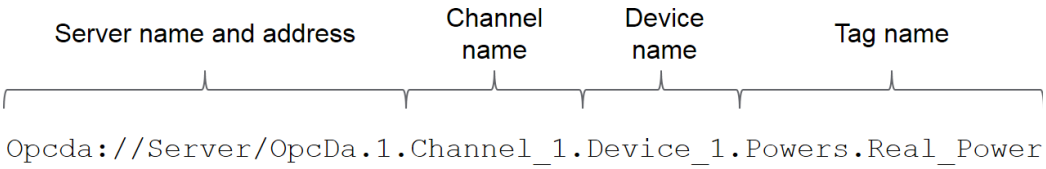
Registers are contained inside modules. (ION) Registers are linked to the Modbus registers and hold the measured values. You can map registers to a Modbus address, then use Power Monitoring Expert to read and write data to this Modbus device. You can create up to 255 registers per module.

Factory registers

You cannot add or remove Factory registers, but you can edit them. All Factory registers are initially set to a default constant value. You can change these constant values, or map the registers to a valid Modbus address.

OPC Tags

A complete OPC tag contains the elements shown in the following example:



Energy Analysis Reports Module references

This section contains reference information related to configuring the Energy Analysis Reports Module.

Use the following links to find the content you are looking for:

Supported measurements and devices

The reports in the Energy Analysis Reports Module support the measurements listed in the following table:

Reports	Input Measurements	Notes
Duration Curve Report	Single power measurement (kW, kVA, kvar)	Any device capable of providing the measurements.
Energy Modeling Reports	Dependent Variable, Independent Variable (*)	Any device capable of measuring the variables.
Energy Regression Analysis Report	Two measurements (model and driver) • Energy or power (model) • Environmental or process variable (driver)	Any device capable of providing the measurements.
Energy Usage Per State Report	Multiple energy measurements (electric or non-electric) (**) Single state measurement	Any device capable of providing the measurements.
KPI Report	Input parameters (application dependent)	Any device capable of providing the input parameters.
Multi Equipment Operation Report	Multiple state measurements (one for each source)	Any device capable of providing the state measurements.
Power Usage Per State Report	Two measurements (power and state) • kW or kVA or kvar (power) • Single state measurement	Any device capable of providing the measurements.
PUE Summary Report	Power: • Total Data Center Power • Total IT Equipment Power Energy : • Total Data Center Energy • Total IT Equipment Energy. (See PUE power and energy measurements below for more information)	PUE Category 1: ION9000 on MV Substation and main incomer, APC Symmetra MW for all IT UPSs PUE Category 2: ION9000 on MV Substation and main incomer, PM5320 for all PDUs***
Single Equipment Operation Report	Single state measurement	Any device capable of providing the state measurement.

* The dependent variable is the measurement you want to model. For example, if you are modeling the energy consumption of a building based on outside temperature, then the energy is the dependent variable.
The independent variable is the driver that influences the measurement you want to model. In the above example, the outside temperature is the independent variable. You can specify one or more independent variables.

** The energy measurements are aggregated into one total energy measurement by the report.

*** If the PDUs have embedded energy metering, with an accuracy of 1% or better, and can provide energy, power, voltage, and current data via an industry standard communications protocol, then no external metering is required to monitor the PDU mains.

PUE power and energy measurements

PUE Category 1

The VIP framework aggregates total kW values from all Main Incomer Meters and then calculates and logs 3 values that can be selected in the report and used in the Vista KPI screens: kWh del, kWh del int, and kW SWD. The VIP framework also aggregates total kW values from all UPS Meters and then calculates and logs 3 values that can be selected in the report and used in the Vista KPI screens: kWh del, kWh del int, and kW SWD.

PUE Category 2

The VIP framework aggregates total kW values from all Main Incomer Meters and then calculates and logs 3 values that can be selected in the report and used in the Vista KPI screens: kWh del, kWh del int, and kW SWD. The VIP framework also aggregates total kW values from all PDU Meters and then calculates and logs 3 values that can be selected in the report and used in the Vista KPI screens: kWh del, kWh del int, and kW SWD.

If multiple types of power and energy measurements exist in the system, then a look-up method is used to determine which one to use. The following tables lists the supported types in order of look-up priority.

Terms and Definitions

- **PUE** – Power Usage Effectiveness, defined as a ratio between the total power consumed by a data center facility and the power consumed by the IT equipment that runs in the facility. For example, a PUE value of 2.0 indicates that for every watt of IT equipment power consumed, an additional watt is consumed to operate the facility that houses the equipment (e.g. equipment cooling, power distribution to the equipment).
- **Total Data Center Power** – Represents all the power consumed by the data center facility at one point in time. This value should represent an instantaneous power consumption value.
- **Total Data Center Energy** – Represents all the energy used by the data center facility for a given time interval. This value typically represents a 15-minute energy usage value.
- **Total IT Equipment Power** – Represents all the power consumed by the IT equipment used in a data center facility at one point in time. This value should represent an instantaneous power consumption value
- **Total IT Equipment Energy** – Represents all the energy used by the IT equipment in the data center facility for a given time interval. This value typically represents a 15-minute energy usage value.
- **Support** – Represents the overhead amount of energy or power required to operate the data center, which does not account for IT equipment power consumption. This value represents the data center power distribution losses, as well as the power consumed to cool down the data center facility.

PUE Summary Report Calculations

In this sample, all time periods are based on July 25, 2013.

24 Hours	7 Days	30 Days	Last 12 Months
From July 24 12:00AM until July 25 12:00AM	From July 18 12:00AM until July 25 12:00AM	From June 25 12:00AM until July 25 12:00AM	From July 25, 2012 12:00AM until July 25, 2013 12:00AM

The values in the table below are calculated as follows:

				Average Load	
Reporting Period	Start Date and Time	End Date and Time	PUE	Data Center	IT Equipment
24 Hours	7/24/2014 12:00:00 AM	7/25/2014 12:00:00 AM	1.99	70 kW	35 kW
7 Days	7/18/2014 12:00:00 AM	7/25/2014 12:00:00 AM	1.98	70 kW	36 kW
30 Days	6/25/2014 12:00:00 AM	7/25/2014 12:00:00 AM	1.94	72 kW	37 kW
12 Months	7/25/2013 12:00:00 AM	7/25/2014 12:00:00 AM	1.83	57 kW	31 kW

PUE – The ratio between the data center and IT equipment energy measurement values. This value is calculated for each of the required time periods by the following formula:

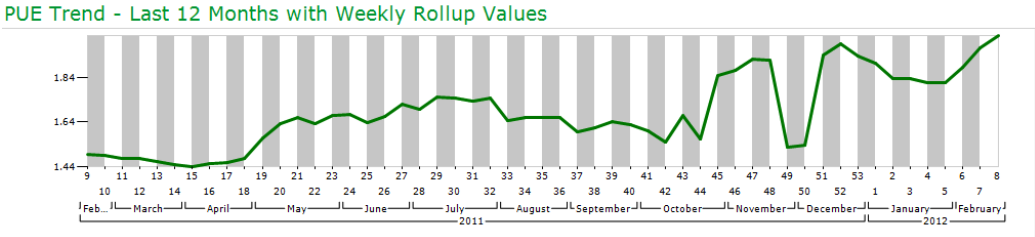
$$\text{PUE} = \frac{\text{Sum of Data Center Energy}}{\text{Sum of IT Equipment Energy}}$$

IT Equipment – The average of the IT equipment power measurement values for each of the time periods.

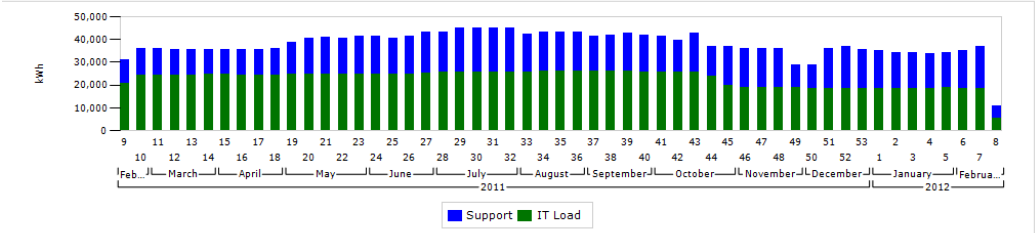
Data Center – The average of the data center power measurement values for each of the time periods.

The values displayed in the charts below are calculated as follows:

PUE Trend - Last 12 Months with Weekly Rollup Values



Energy Trend - Last 12 Months with Weekly Rollup Values



PUE Trend – The weekly PUE values are calculated by the following formula where N represents a week of the year:

$$\textbf{PUE}_{\text{week N}} = \frac{\text{Sum [Data Center Energy] week N}}{\text{Sum [IT Equipment Energy] week N}}$$

Energy Trend – The weekly energy values for IT equipment and support are calculated by the following formulas where N represents a week of the year:

IT Equipment Energyweek N =	Sum [IT Equipment Energy] week N	
Support Energy week N =	Sum [Data Center Energy] week N - Sum [IT Equipment Energy] week N	

Energy Billing Module references

This section contains reference information related to configuring the Energy Billing Module.

Use the links below to find the content you are looking for:

Supported measurements and devices

The following measurements have been pre-mapped in the Sample WAGES rate file:

Power

Measurement	Unit	ION Name
Block Demand Apparent Power Total	kVA	Apparent Power Sliding Window Demand Delivered+Received
Block Demand Reactive Power	kvar	Reactive Power Sliding Window Demand Delivered - Received
Block Demand Active Power	kW	Active Power Sliding Window Demand Delivered-Received

Energy

Measurement	Unit	ION Name
Apparent Energy Total	kVAh	Apparent Energy Delivered + Received
Reactive Energy Into the Load	kvarh	Reactive Energy Delivered
Active Energy Into the Load	kWh	Active Energy Delivered

The Energy by IT Customer Report supports the measurements listed in the tables below. Only one measurement of each type (Energy , Current) is required. If multiple types of the same measurement exist in the system, then a look-up method is used to determine which one to use. The tables list the supported types in order of look-up priority.

NOTE: You can edit this list of measurements in the PME database.

Energy

Measurement	Unit	ION Name	ION Label
Active Energy	kWh	Active Energy Delivered – Received	kWh del-rec
Active Energy Into the Load	kWh	Active Energy Delivered	Active Energy Delivered

Current

Measurement	Unit	ION Name	ION Label
Current Average Mean	A	Current Phase Average Mean	I avg mean

Measurement	Unit	ION Name	ION Label
Block Demand Current Avg Into the Load	A	Current Phase Average Sliding Window Demand Delivered	Amps Avg Dmd
Current Avg	A	Current Phase Average	Current Avg

The following devices can provide the measurements required for this report:

- BCPM-E, PM5350 (multi-circuit mode)
- Basic, Intermediate, or Advanced Device for main service entrance (PM5xxx, PM8xxx, ION7650, ION9000)

Event Notification configuration references

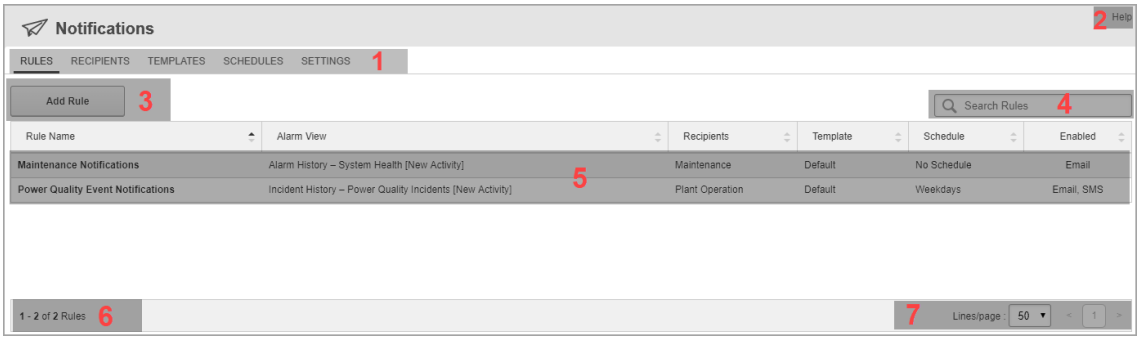
This section contains reference information related to Event Notification configuration.

Use the links below to find the content you are looking for:

Notification Manager user interface
Add Rule UI
Add Recipient UI
Add Template UI
Notification delay example

Notification Manager user interface

Main user interface (UI) and Rules tab



Main UI

1	**Selection tabs** Select a tab to see information related to notification Rules, Recipients, Templates, Schedules, or Settings.
2	**Help** Click Help to open the Notifications online help.
6	**Number of displayed items** Shows the number of items visible on this page, and the total number in this View.
7	**Page selector** Use the page selector to navigate between pages of information. Set the number of items that are displayed on a page.

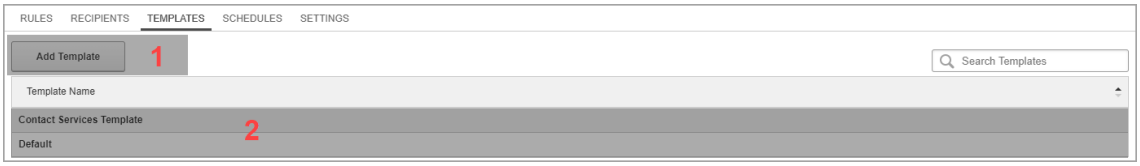
Rules tab

3	**Add Rule** Use Add Rule to create a new notification rule.
4	**Search Rules box.** Enter a search string to find rules in the notification rules table.
5	**Notification rules table** The notification rules table shows all the notification rules that are configured in the system.

Recipients UI

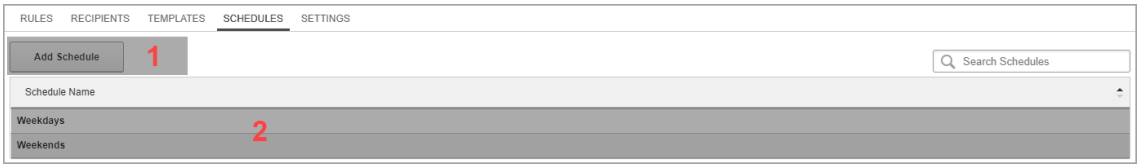
1	**Add Recipients** Use Add Recipients to create a new recipient for notifications.
2	**Recipients table** The recipients table shows all the recipients that are configured in the system.

Templates UI



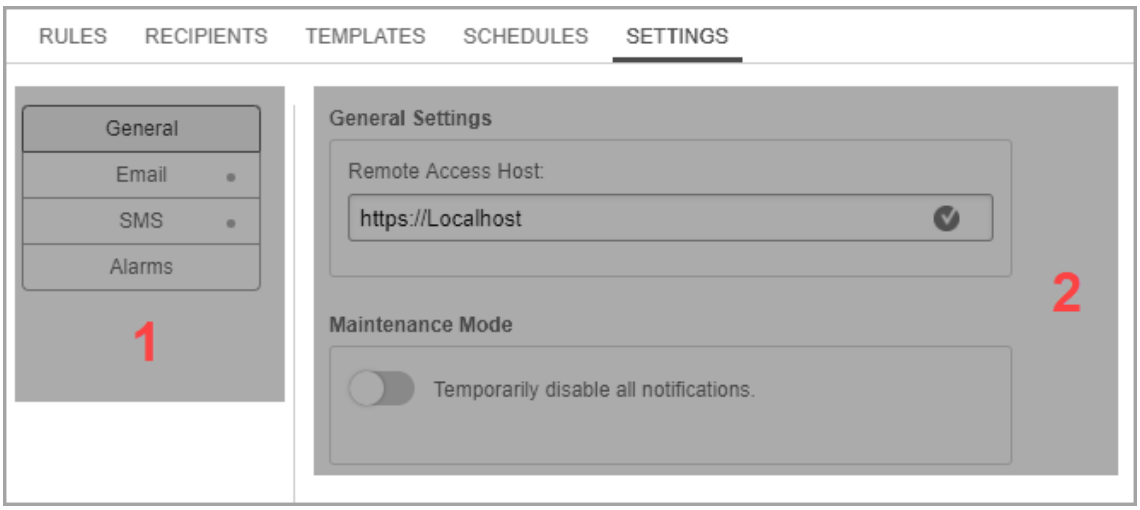
1	**Add Templates** Use Add Templates to create a new template for notifications.
2	**Templates table** The templates table shows all the templates that are configured in the system.

Schedules UI



1	**Add Schedule** Use Add Schedule to create a new schedule.
2	**Schedules table** The schedules table shows all the schedules that are configured in the system.

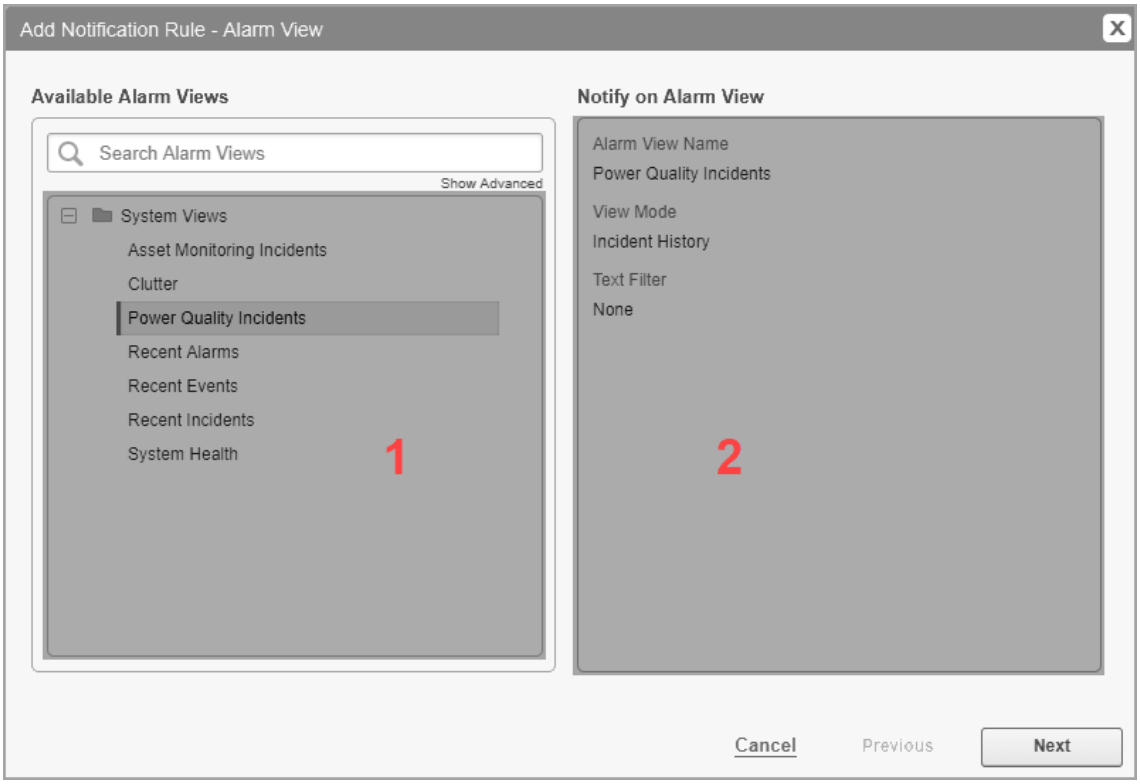
Settings UI



1	**Settings topic selector** The topic selector groups settings by function. Click a topic to see the relevant settings in the configuration pane. **NOTE**: A red dot beside a topic shows that this topic has not been completely configured.
2	**Settings configuration pane** The configuration pane shows the Notifications settings related to the selected topic. (General settings are shown in the above example.)

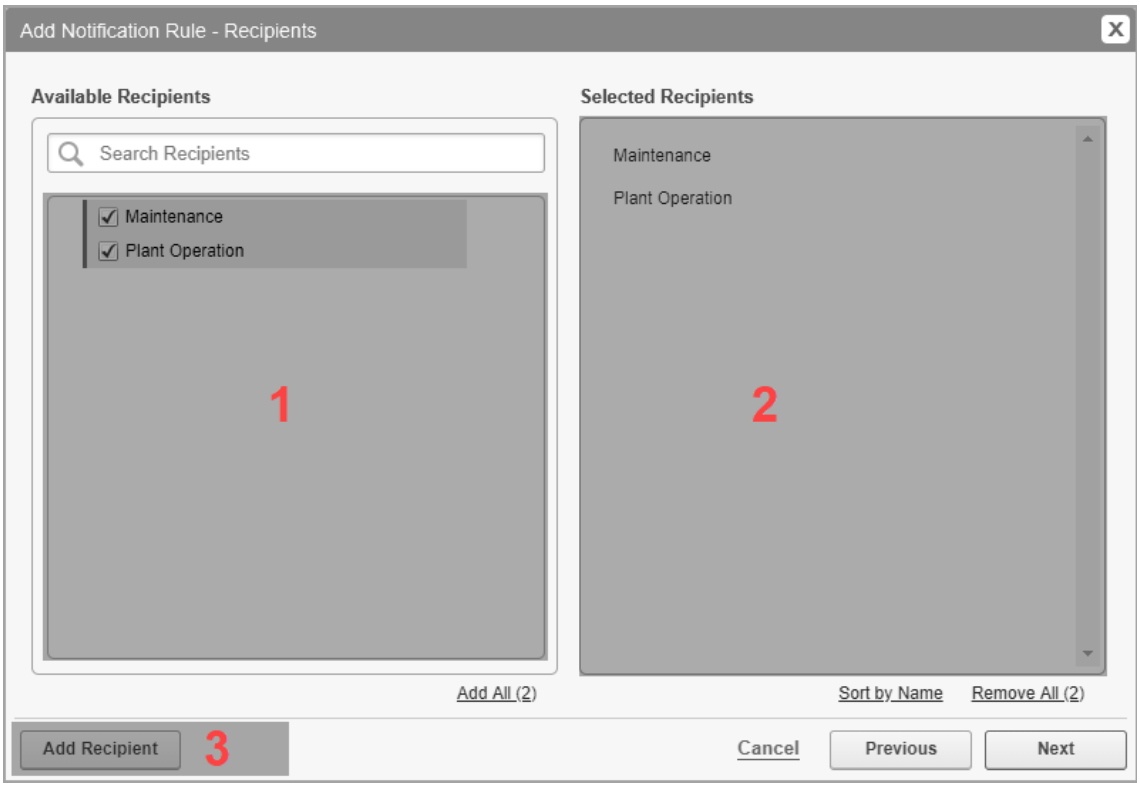
Add Rule UI

Alarm View



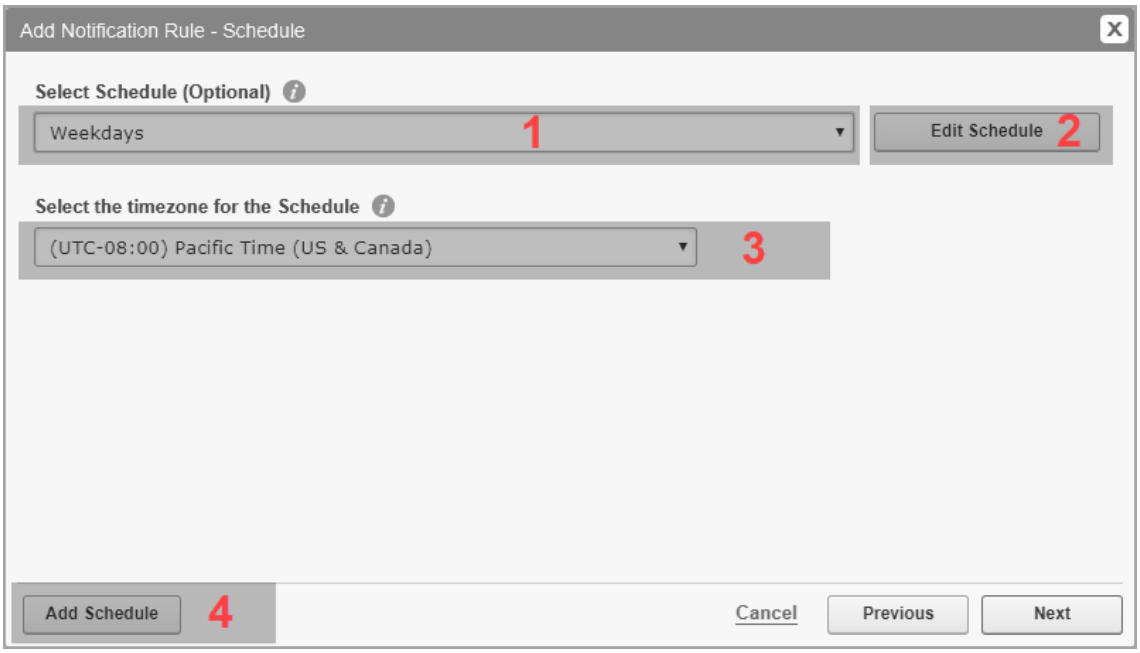
1	**Available Alarm Views** This shows the alarm views that are available in the system. It shows system views and any custom views that have been created.
2	**Notify on Alarm View** This shows the alarm view that has been selected for this notification rule. Only one alarm view can be selected.

Recipients



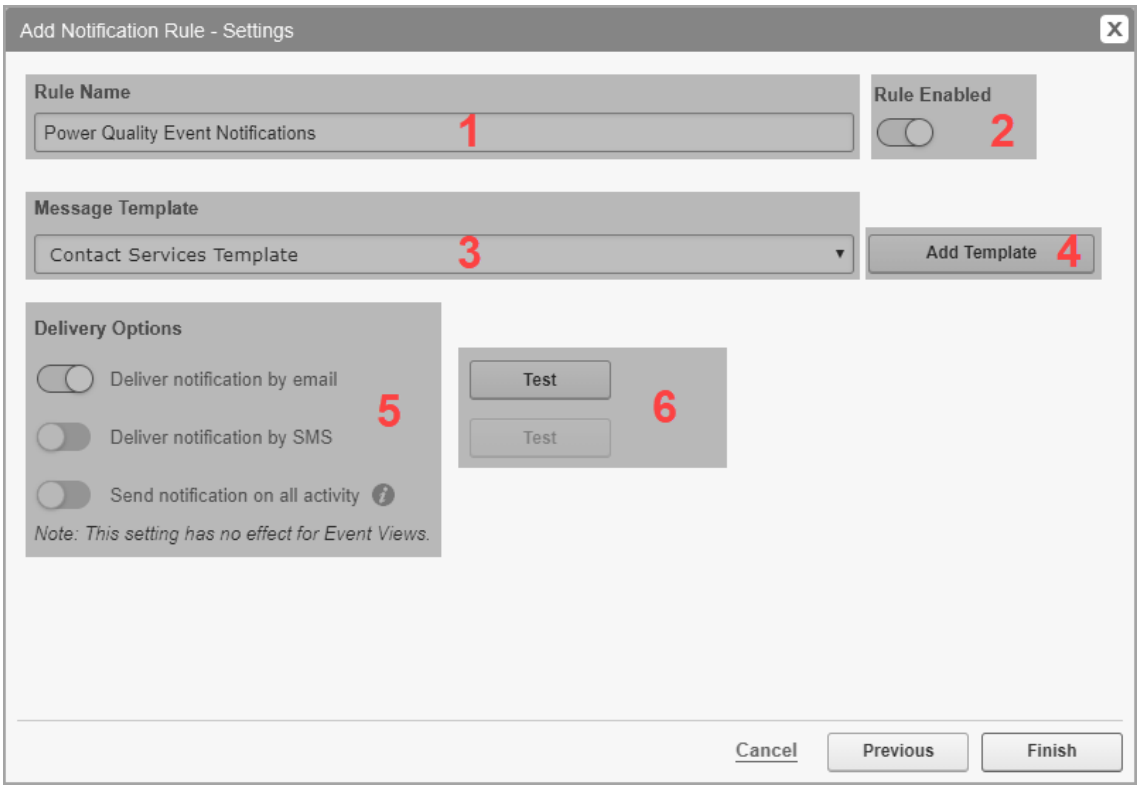
1	**Available Recipients** This shows the recipients that are available in the system.
2	**Selected Recipients** This shows the recipients that have been selected for this notification rule.
3	**Add Recipients** Click this button to add a new recipient to the system. This is a shortcut to the **Add Recipient** function on the **Recipients** tab.

Schedule



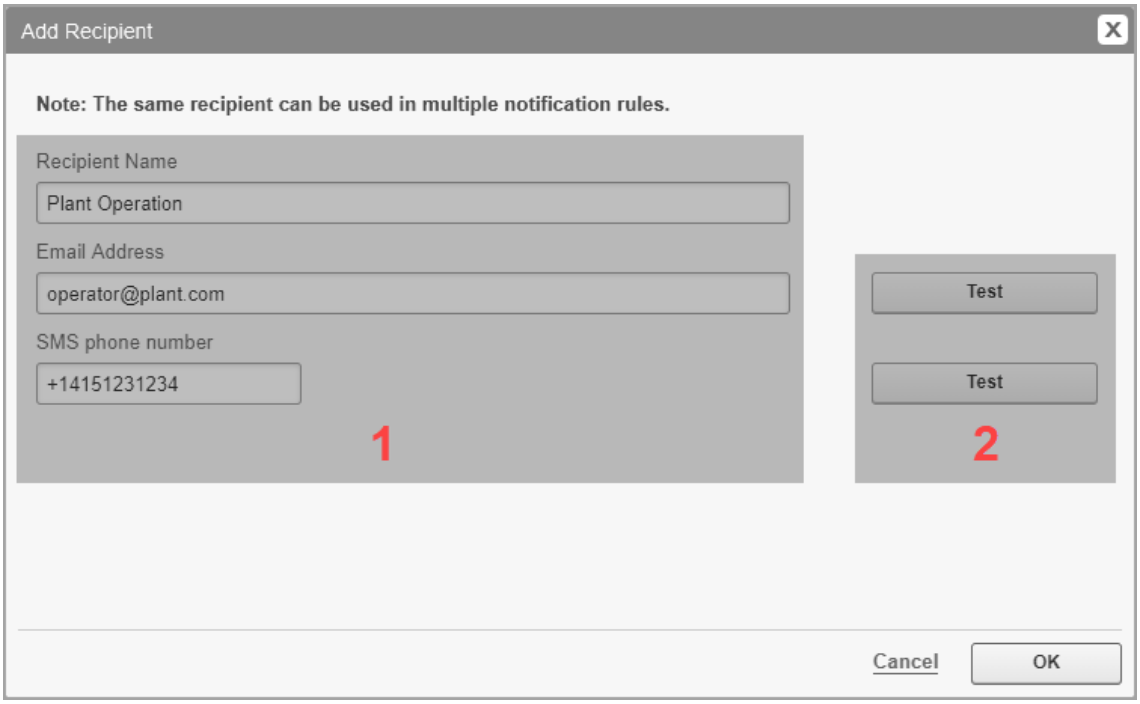
1	**Select Schedule** Use this to select the schedule you want to apply to this notification rule. Using a schedule with a notification rule is optional.
2	**Edit Schedule** Click this button to edit the selected schedule. This is a shortcut to the same function on the **Schedules** tab.
3	**Select Timezone** Select the timezone that is used to apply the schedule.
4	**Add Schedule** Click this button to add a new schedule to the system. This is a shortcut to the **Add Schedule** function on the **Schedules** tab.

Notification Rule Settings



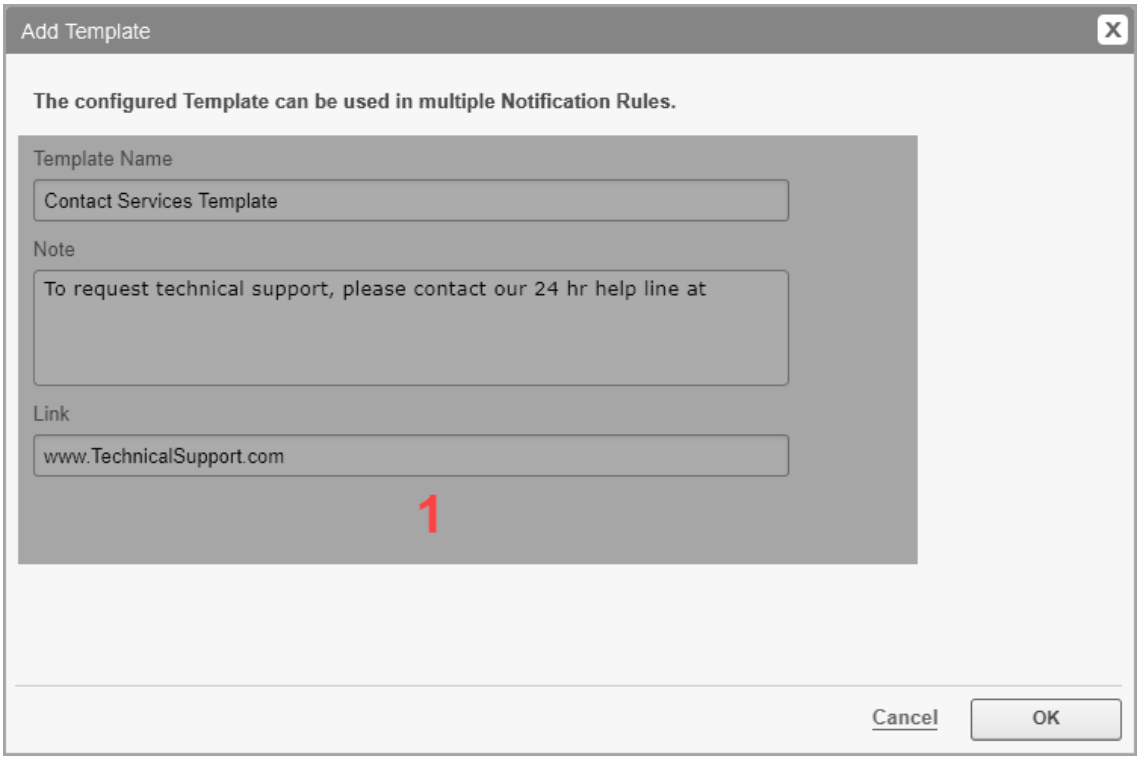
1	**Rule Name** The rule name is the identifier for this notification rule in the system.
2	**Rule Enabled** Use this to enable or disable the rule. When a rule is disabled, no notifications are sent for it.
3	**Message Template** Select the template you want to use for the notification message.
4	**Add Template** Click this button to add a new template to the system. This is a shortcut to the **Add Template** function on the **Templates** tab.
5	**Delivery Options** Set the delivery options you want to use for this notification. You can also select which types of alarm activity will trigger a notification. The available options include: - Deliver notifications by email - Deliver notifications by SMS - Send notifications on all activity (Note: This setting only applies to alarm views and incident views, not to event views.)
6	**Delivery Test** Click the **Test** button for the delivery method you want to test. A delivery test will send a test message to the address configured for this delivery method on the **Settings** tab.

Add Recipient UI



1	**Recipient details** The recipient name, email address, and phone number (used for SMS messaging). Email and phone number are optional; however they are needed if email or SMS notifications should be sent to this recipient. **NOTE**: Enter the phone number in E.164 number formatting: [+][country code][area code][local phone number]. Example: +14151231234.
2	**Address test** Click the **Test** button for the address (email or phone number) you want to test. An address test will send a test message to the email address or phone number configured in the recipient details.

Add Template UI



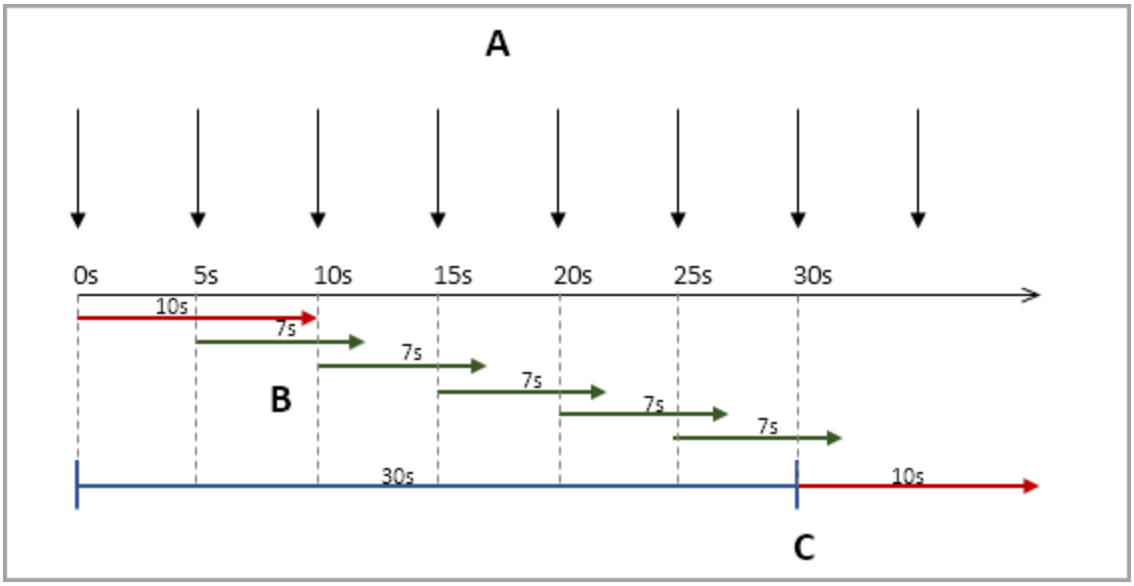
	Template details
1	The template name, note, and link. This note and link will be added to the notification message, after the alarm view details.

Notification delay example

The following example shows how the delay settings for notifications affect the message delivery.

Example settings:

Initial Delay (seconds) = 10
Incremental Delay (seconds) = 7
Maximum Delay (seconds) = 30



A - New alarm activity occurs every 5 seconds
B - Initial and incremental time delays
C - Notification message is sent after maximum delay of 30 seconds

NOTE: After the maximum delay, a notification message is sent that includes all alarms that were active in the notification time window up to the maximum delay cut off. In the example above, 6 alarms would be included.

General references

This section contains general reference information.

Use the following links to find the content you are looking for:

Customizing the Web Applications links

By default, Web Applications shows the following application links: Dashboards, Diagrams, Trends, Alarms, Reports, Settings. You can add custom links, hide/unhide links, re-order links, and delete links.

Default links:

Example customized links:

NOTICE
INOPERABLE DATABASE Back up the database before executing SQL scripts. **Failure to follow these instructions can result in an inoperable database and loss of data.**

To add a custom link:

1. On the PME application server, find the `Add_PQPerf_To_Web.sql` script file in `...\Power Monitoring Expert\diagnostic\PowerQuality\`
2. On the database server, open SQL Server Management Studio (SSMS).
3. Open the `Add_PQPerf_To_Web.sql` script in SSMS.

   NOTE: You can also copy and paste the example script below into SSMS.

4. Update the script settings, in the marked areas in the script, to meet your needs.

   NOTE: The order value determines the order in which the links are arranged in the web page banner. The order numbers increase from left to right. The numbers for the default links are: Dashboards (10), Diagrams (20), Trends (30), Alarms (40), Reports (50). The location of the SETTINGS link is not controlled by the order value. It is always in the right most position.

5. Execute the script on the ApplicationModules database.

   TIP: You can execute this query repeatedly to change any of the settings for the custom link.

6. Close SSMS.
7. Reload Web Applications if it is open in a browser.

Example script to create a MY CUSTOM LINK link between the REPORTS and SETTINGS links in the Web Applications banner that opens a custom web page:


```
USE ApplicationModules
DECLARE @id NVARCHAR(255)
DECLARE @name NVARCHAR(255)
DECLARE @displayName NVARCHAR(255)
DECLARE @description NVARCHAR(255)
DECLARE @order NVARCHAR(100)
DECLARE @target NVARCHAR(400)
----------------------------------------------------------------------
-- Edit the following values to define your custom settings
----------------------------------------------------------------------
-- Custom application link (internal) name.
SET @id = 'MyCustomLink'
-- Custom application link description
SET @description = 'My custom link shows my custom content'
-- Display Name
set @displayName = 'My Custom Link'
-- Custom application link order. Less than 10 will bring new link to
-- first left position.
SET @order = 60
-- Target URL can be provided in single quote here,
-- e.g. 'https://www.mypage.com'
-- If on the same machine, should be the relative path.
-- e.g., '/myApp/index.html'
SET @target = 'https://www.mypage.com'
----------------------------------------------------------------------
-- DO NOT MODIFY CONTENT BELOW
----------------------------------------------------------------------
DECLARE @configurationValue NVARCHAR(MAX)
SET @configurationValue =
'<FrameworkApplication id="' + @id + '"'
+ ' displayName="' + @displayName + '"'
+ ' description="' + @description + '"'
+ ' resourceSet="ApplicationFrameworkResources"'
+ ' target="' + @target + '"'
+ ' privilege=""'
+ ' order="' + @order + '"'
+ ' enabled="true"'
+ ' xmlns="uri:application-modules/power/framework/application#" />'
EXECUTE [ApplicationModules].[Configuration].[WriteConfigurationValue]
'ApplicationFramework'
,'Applications'
,@id
,@description
,@configurationValue
,NULL
,0
```

To hide or unhide a link:

1. On the database server, open SQL Server Management Studio (SSMS).
2. Copy the following SQL script into a query window in SSMS:

```
SELECT *
FROM [ApplicationModules].[Configuration].[ConfigurationSettings]
WHERE ItemType ='ApplicationFramework' AND Item = 'Applications'
```

3. Execute the query on the ApplicationModules database. This returns the settings for the Web Applications links.
4. Copy the content of the **Value** column for the link you want to hide or unhide, into a text editing tool such as notepad.

   Example: `<FrameworkApplication id="MyCustomLink" displayName="My Custom Link" description="My custom link shows my custom content" resourceSet="ApplicationFrameworkResources" target="https://www.mypage.com" privilege="" order="60" **enabled="true"** xmlns="uri:application-modules/power/framework/application#" />`
5. Change the enabled property value to "false" in the text editor to hide a link, or to "true" if to unhide a link
6. Copy the following SQL script into a query window in SSMS:

```
UPDATE [ApplicationModules].[Configuration].
[ConfigurationSettings]
SET Value = '<Copy entire data from notepad with the modified
enabled property here>'
WHERE [key]= '<Type the custom application link (internal) name
here, in our example this is MyCustomLink>'
```

7. Update the query settings as described in the script above.
8. Execute the script on the ApplicationModules database.
9. (Optional) Repeat steps 4-8 to hide or unhide additional links.
10. Close SSMS.
11. Reload the Web Applications if they are open in a browser.

To re-order links:

1. On the database server, open SQL Server Management Studio (SSMS).
2. Copy the following SQL script into a query window in SSMS:

```
SELECT *
FROM [ApplicationModules].[Configuration].[ConfigurationSettings]
WHERE ItemType ='ApplicationFramework' AND Item = 'Applications'
```

3. Execute the query on the ApplicationModules database. This returns the settings for the Web Applications links.

4. Copy the content of the **Value** column for the link you want to reorder, into a text editing tool such as notepad.

   Example: `<FrameworkApplication id="MyCustomLink" displayName="My Custom Link" description="My custom link shows my custom content" resourceSet="ApplicationFrameworkResources" target="https://www.mypage.com" privilege="" order="60" enabled="true" xmlns="uri:application-modules/power/framework/application#" />`

5. Change the order property value to a new value in the text editor.

   NOTE: The order value determines the order in which the links are arranged in the web page banner. The order numbers increase from left to right. The numbers for the default links are: Dashboards (10), Diagrams (20), Trends (30), Alarms (40), Reports (50). The location of the SETTINGS link is not controlled by the order value. It is always in the right most position.

6. Copy the following SQL script into a query window in SSMS:

```
UPDATE [ApplicationModules].[Configuration].
[ConfigurationSettings]
SET Value = '<Copy entire data from notepad with the modified
order property here>'
WHERE [key]= '<Type the custom application link (internal) name
here, in our example this is MyCustomLink>'
```

7. Update the query settings as described in the script above.
8. Execute the script on the ApplicationModules database.
9. (Optional) Repeat steps 4-8 to re-order additional links.
10. Close SSMS.
11. Reload the Web Applications if they are open in a browser.

To delete a link:

1. On the database server, open SQL Server Management Studio (SSMS).
2. Copy the following SQL script into a query window in SSMS:

```
DELETE FROM [ApplicationModules].[Configuration].
[ConfigurationValue]
WHERE ConfigurationKeyId = (Select id from [ApplicationModules].
[Configuration].[ConfigurationKey] where Name='<Type the custom
application link (internal) name here, in our example this is
MyCustomLink>')
DELETE FROM [ApplicationModules].[Configuration].
[ConfigurationKey]
WHERE Name='<Type the custom application link (internal) name
here, in our example this is MyCustomLink>'
```

3. Update the query settings as described in the script above.

4. Execute the query on the ApplicationModules database. This deletes the Web Applications link.
5. (Optional) Repeat steps 3-4 to delete additional links.
6. Close SSMS.
7. Reload the Web Applications if they are open in a browser.

Adding idle detection to custom Web Application links

PME automatically times out inactive client sessions. If custom content links are added to the Web Applications framework, then the custom content must implement the idle detection, or activity on that content is not registered and the Web client session can time out unexpectedly.

Prerequisite: The custom application must be in the same Application Pool as the regular PME applications, and must use the same authentication configuration.

To add idle detection to custom content:

1. In the custom Web application, Add references to jquery and jquery.idle.js.
2. Create an IdleDetection object when the document has loaded.

> **NOTE**: If you want your application to take part in keeping PME non-idle, but you do not want your application to log itself out after the idle period, you can add the following JSON as a parameter to the idle() method: `{enableLogoutRedirection: false;}`

Example web.config for an application in the PME Application Pool:

```
<?xml version="1.0" encoding="UTF-8"?>
<configuration>
 <system.web>
 <compilation debug="true" targetFramework="4.6" />
 <httpRuntime targetFramework="4.6" requestValidationMode="2.0"
enableVersionHeader="false" />
 <authentication mode="Forms">
 <forms name=".APPLICATIONFRAMEWORK"
loginUrl="/SystemDataService/Auth"
defaultUrl="/SystemDataService/Auth/GenerateAuthUrl" timeout="2880"
protection="All" enableCrossAppRedirects="true" />
 </authentication>
 <machineKey decryption="AES" decryptionKey="AutoGenerate"
validation="HMACSHA256" validationKey="AutoGenerate" />
 <authorization>
 <deny users="?" />
 </authorization>
</system.web>
</configuration>
```

Example minimal page that has idle detection added to it:

test.html

```
<!DOCTYPE html>
<html>
<head>
    <title>Example Application for Idle Detection</title>
    <script src="/SystemDataService/Content/External/jquery/jquery-2.1.4.modified.js"></script>
    <script src="/SystemDataService/Content/External/jquery/jquery.idle.js"></script>
    <script>
        $(document).ready(function() {
            $(document).idle();
        });
    </script>
</head>
<body>
   Example Application
</body>
</html>
```

Configure database connection encryption

You can configure PME to use encryption for the communication between the application server and the database server. You can also specify if PME trusts self-signed server certificates on the database server or not. For more information on setting up encryption for database connections, see Set up encrypted database communication for Distributed Database architectures.

To enable or disable encryption for database connections:

NOTE: Before editing the settings in the registry, confirm that your PME system has been taken out of service and that all system services have been stopped.

1. Open the Windows Registry Editor.
2. Navigate to the following registry key:`Computer\HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Schneider Electric\Power Monitoring Expert\9.1\Databases`
3. Set the `UseEncryption` value to 1, to enable encryption, or to 0, to disable encryption.

To configure the software to trust or not trust self-signed certificates on the database server:

1. Open the Windows Registry Editor.
2. Navigate to the following registry key:`Computer\HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Schneider Electric\Power Monitoring Expert\9.1\Databases`
3. Set the `TrustServerCertificate` value to 1, to trust self-signed certificates, or to 0, to not trust self-signed certificates.

Insulation Monitoring Module references

This section contains reference information related to configuring the Insulation Monitoring Module.

Use the following links to find the content you are looking for:

Supported measurements and devices

Supported measurements and devices

The report and Vista diagrams in the Insulation Monitoring Module support the following measurements and devices:

Standard	Input Measurements	Suitable Devices
ANSI	Total Hazard Current (THC) Panel Temperature Line Isolation Monitor (LIM) specific measurements	Iso-Gard Series 6 Line Isolation Monitor (Schneider Electric device) EDS 151 Insulation Fault Locator (Bender device) EDS 461 Insulation Fault Locator (Bender device)
IEC	Insulation Resistance (Ohm) Insulation Fault Panel Temperature Insulation Fault Locator (IFL) specific measurements	Vigilohm IM20 (Insulation Monitor) Vigilohm IFL12 (Insulation Fault Locator)

Manual Data Editor references

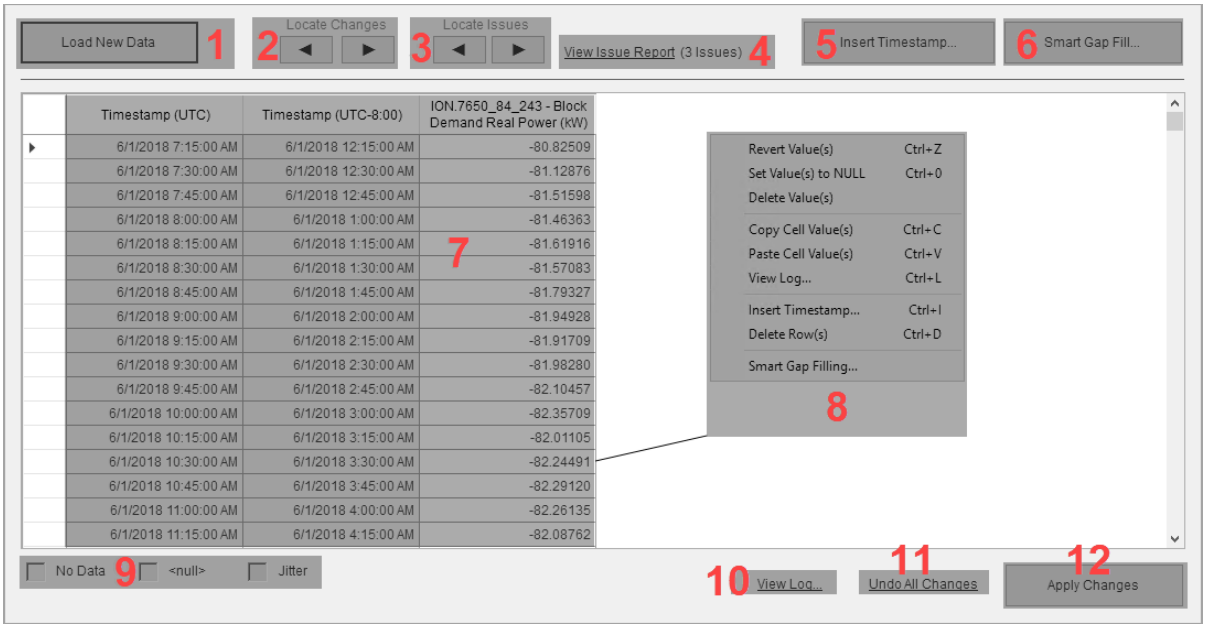
This section contains reference information related to Manual Data Editor.

Use the following links to find the content you are looking for:

Manual Data Editor user interface

Manual Data Editor user interface

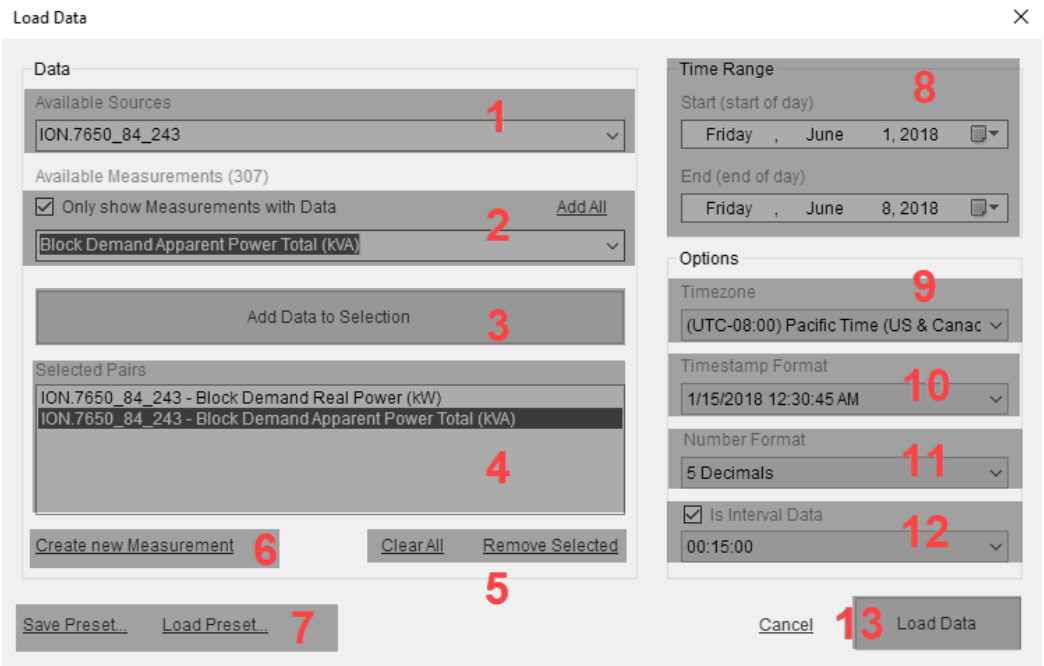
Data editor user interface (UI)



1	**Load New Data.** Click Load New Data to open the Load Data dialog box. In Load Data you select the sources, measurements, time range, and display options for the data that is loaded into the data editor. Load Data opens automatically when you start Manual Data Editor. See Load Data UI for more information.
2	**Locate Changes.** Use Locate Changes to find and step through any changes you made to the data loaded into the data editor, before you apply those changes. After you apply the changes, they become part of the data set in the database and Manual Data Editor no longer identifies them as changes.
3	**Locate Issues.** Use Locate Issues to find and step through any issues identified by Manual Data Editor in the data loaded into the data editor.
4	**View Issue Report.** Use View Issue Report to see which data issues were identified by Manual Data Editor in the data loaded into the data editor.
5	**Insert Timestamp.** Insert a new data record in the data loaded into the data editor with a timestamp you can specify. The timestamp must be in the time range of the data that is loaded into the editor. The new record has <no data> data values. When adding new data records, keep in mind that a historical data log timestamp marks the end of the logging interval. For example, a data log with a 15 minute logging interval and timestamp of 17:00 represents data for the time interval of 16:45 - 17:00.

6	**Smart Gap Fill.** Use Smart Gap Fill to fill in missing data in the data set loaded into the data editor. You can select a range of data that you want to fill the gaps in or you can fill all gaps in the entire loaded data range. When selecting a data range in the editor, only select the data values, not the timestamps. See Smart Gap Fill UI for more information.
7	**Data grid.** The data grid shows the sources/measurements that you specified in the Load Data dialog box. Use the grid and the functions in the data editor to edit the data as needed. **TIP**: Move the pointer over the header of a data column to see a tooltip with additional information.
8	**Context menu.** Right-click a data cell in the data grid to open the context menu. The Context menu gives you access to the commands and functions for editing the data loaded into the data editor.
9	**Color legend for issues highlight** The data editor uses different color highlights to mark data issues. This legend tells you which colors are used for which type of issues.
10	**View Log** Click View Log to open the Manual Data Editor historical audit log. See Audit Log UI for more information.
11	**Undo All Changes** You can undo changes that have not been applied yet. After changes have been applied to the database, they are permanent and can only be modified be manually editing the data again in the Manual Data Editor.
12	**Apply Changes** After you have completed your data edits, click Apply Changes to write the changes to the database. After changes have been applied to the database, they are permanent and can only be modified be manually editing the data again in the Manual Data Editor.

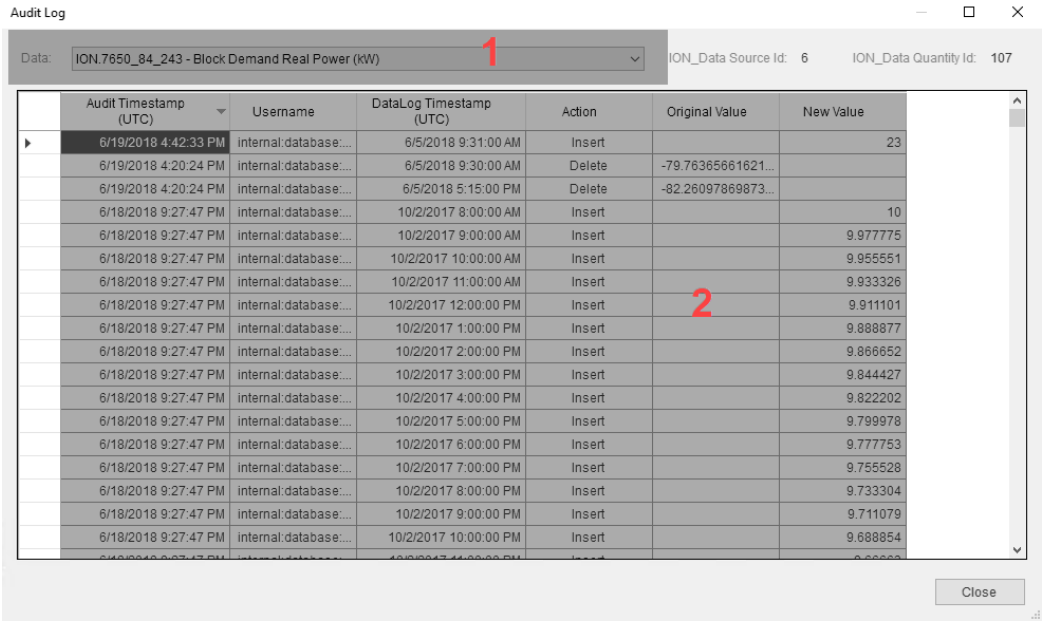
Load Data UI



1	**Available Sources.** Select the source for which want to load the data.
2	**Available Measurements.** Select the measurement for which you want to load data. You have the option to only see those measurements that have logged data for the selected source in the drop-down control, or see all measurements that are defined in the software.
3	**Add Data to Selection** Click Add Data to Selection to add the source/measurement you selected, to the list of data to be loaded into the data editor. You can add multiple measurements from the same source, and measurements from different sources to the list.
4	**Selected Pairs** This shows the list of selected source/measurement pairs that are to be loaded into the data editor.
5	**Edit commands for the Selected Pairs list** Use **Clear All** to remove all selected list items. Use **Remove Selected** to remove items that you selected from the list.
6	**Create new Measurement** Use this to create a new measurement in the software. This function is needed if you want to add data that was manually collected for a measurement that does not exist in the software. For example, if you wanted to add a daily count of cars parked in a parking lot, you could define a measurement called Number of Cars, which doesn't exist in the software by default. Then you can select this measurement and a source in Manual Data Editor and add data records with the daily counts. **NOTE**: Check the list of available measurements to see if one exists for your application before creating a new measurement.

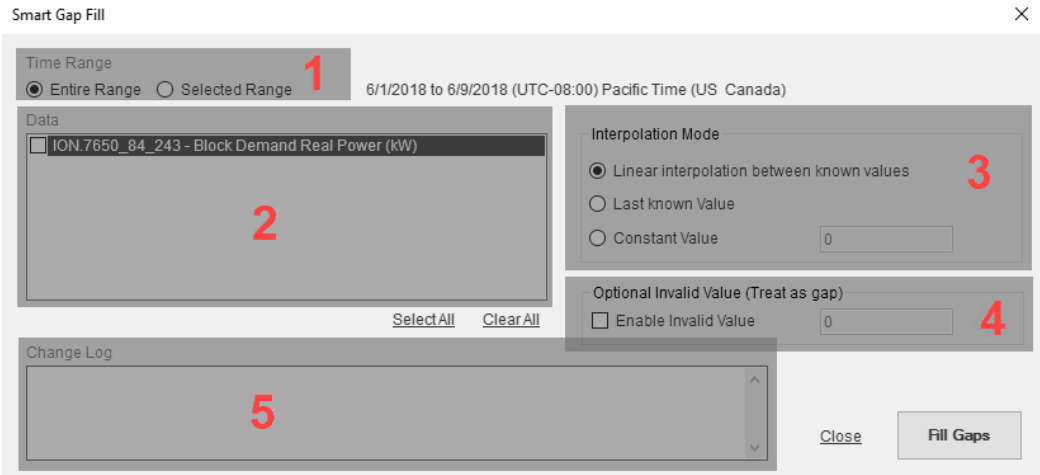
7	**Preset** Save and load settings for the Load Data dialog box. This is a way to simplify the data selection for data sets that you frequently access. Set all the settings in Load Data for the data sets you want and then save the settings to an external file using **Save Preset**. Load a pre-defined set of settings into Load Data using **Load Preset**.
8	**Time Range** Select the time range for which you want to load the data from the sources/measurements.
9	**Timezone** Set the timezone for the display of the configurable timestamp in the data editor. The data editor shows two timestamps for each data record, one timestamp in UTC and one in a configurable timezone.
10	**Timestamp Format** Set the format for the timestamp display in the data editor.
11	**Number Format** Set the number of decimals that are displayed for the logged data in the data editor. **NOTE**: This setting only affects the display of the data in the data editor and the accuracy to which you can enter new data values. It does not affect data that is loaded into the editor and then applied to the database without editing the values.
12	**Is Interval Data** Set the expected logging interval for the data. This setting ensures that there is a data row in the editor for every expected log entry. If there is no data record for an expected entry in the database, then the Manual Data Editor inserts a timestamped row with a <no data> data values in the editor. This makes it easier to identify missing records and correct them. **NOTE**: The data editor shows all logged records in the selected time range, regardless of the Interval Data settings. No records are hidden or filtered out.
13	**Load Data** Click Load Data to open the selected sources/measurements data in the data editor.

Audit Log UI



1	**Data.** Select the source/measurement for which want to see the audit data. The available options include all sources/measurements that have been loaded into the data editor.
2	**Audit log.** View the change history for edited data records including timestamp, username, action, original value, new value. You can use the information in the audit log to reset data values to their original value if they were changed accidentally or incorrectly.

Smart Gap Fill UI



1	**Time Range.** Select the range of data that you want to fill the gaps in or you can fill all gaps in the entire loaded data range. When selecting a data range in the editor, only select the data values, not the timestamps.

<table>
<tr><td>2</td><td>Data.
This is a list of all the sources/measurements that are loaded into the editor. Select the source/measurement pairs for which you want to fill gaps.</td></tr>
<tr><td>3</td><td>Interpolation Mode
Choose which algorithm is used to fill the gaps. You have the following choices:
<table>
<tr><td>Linear interpolation between known values.</td><td>Gaps are filled with the average of the last recorded value before the gaps and the first recorded value after the gaps. All consecutive gaps between the known values are filled with the same value.</td></tr>
<tr><td>Last known Value</td><td>Gaps are filled with the last recorded value before the gaps. All consecutive gaps after the known value are filled with the same value.</td></tr>
<tr><td>Constant Value</td><td>Gaps are filled with the value that you specify in the value box.</td></tr>
</table></td></tr>
<tr><td>4</td><td>Optional Invalid Value
You can define a data value that is treated by the gap fill algorithm as if it was a gap. For example, if you define 0 (zero) as the Invalid Value, then any data record in the Smart Gap Fill range that has a value of 0 is treated as if it was a gap.</td></tr>
<tr><td>5</td><td>Change Log
The Change Log shows how many gaps were filled, for each of the selected source/measurement pairs, after you click Fill Gaps.
NOTE: This is different from the Manual Data Editor audit log. The audit log records changes that are applied to the data in the database. The Change Log shows which gaps where filled in the data editor.</td></tr>
</table>

OPC references

This section contains reference information related to OPC.

Use the following links to find the content you are looking for:

Tunneling of OPC data

The networking protocol for OPC is DCOM. DCOM is difficult to configure, responds poorly to network interruptions, produces high network traffic, and has significant security weaknesses.

OPC tunneling applications are designed to overcome these limitations when using OPC over a network. The goal of OPC tunneling is to eliminate DCOM by replacing it with a network protocol like TCP. Instead of connecting the OPC client to a networked OPC server, the client program connects to a local OPC tunneling application, which acts as a local OPC server. The tunneling application accepts requests from the OPC client and converts them to TCP messages, which are then sent across the network to a companion tunneling application on the OPC server computer. There the request is converted back to OPC and is sent to the OPC server application for processing. Any response from the server is sent back across the tunnel to the OPC client application in the same manner.

Diagram: OPC data is sent over the network by OPC tunneler using common network protocols.

OPC tunneling products are available from several vendors, including Kepware and Matrikon.

When selecting OPC tunneling applications, look for products that

- keep the synchronous OPC transactions local to the client and server, with an asynchronous tunnel connection
- provide link monitoring
- handle network disruptions effectively
- meet your security needs

Power Quality Performance Module references

This section contains reference information related to configuring the Power Quality Performance Module.

Use the following links to find the content you are looking for:

Device Selection for Power Quality Performance monitoring

The power quality data that is needed for the Power Quality Performance module is aggregated across multiple devices and depends on data from the right device types in the right monitoring locations.

The following sections describe the recommended device types for:

- Service entrance
- Feeders and critical loads
- Non-critical loads

Service entrance

Service entrance includes utility feeds and local power sources, such as generators, solar power, or wind power. Service entrance monitoring should be done with high-end, high accuracy devices with advanced power quality capabilities. The devices should have revenue accuracy (0.2 Class accuracy or better) for the calculation of the power factor surcharges.

The following power quality measurements are required for service entrance monitoring:

- Interruption
- Voltage Sag/Swell
- Transient Voltage
- Over/Under Voltage
- Harmonics
- Frequency Variation
- Flicker
- Disturbance Direction Detection

NOTE: We recommend the ION9000 and ION7650 device types for service entrance monitoring.

Feeders and Critical Loads

This category includes low voltage substations, main distribution circuits, and critical loads. Monitoring in these locations is important for root cause analysis, which involves disturbance direction detection. Harmonics monitoring is also of great interest on these feeders and circuits. Feeders and critical loads may be the location for process impact monitoring, which may require digital or analog input capabilities on the monitoring device.

The following power quality measurements are required for feeder and critical load monitoring:

- Unbalance
- Harmonics

The following power quality measurements provide additional value for feeder and critical load monitoring:

- Interruption
- Voltage Sag/Swell

- Over/Under Voltage
- Frequency Variation
- Disturbance Direction Detection

NOTE: We recommend the PM5500 and PM5300 for the minimum required measurements, and the PM8000 for full value feeder and critical load monitoring.

Non-critical Loads

This category includes non-critical feeders, power distribution panels, and sub-process unit panels. Current unbalance and harmonics monitoring are of main interest at these locations. Non-critical loads may be the location for process impact monitoring, which may require digital or analog input capabilities on the monitoring device.

The following power quality measurements are required for feeder and critical load monitoring:

- Unbalance
- Harmonics

NOTE: We recommend the PM5300, PM5100, and PM325x device types for non-critical load monitoring.

Devices List

See the supported devices list for more information on device types that support the power quality measurements required for the Power Quality Performance module. To find the specific types that meet your needs, review the device data sheets and specification for the following capabilities:

- Accuracy and sampling rate
- Power quality event and harmonics monitoring
- Data recording
- On-board alarming
- Inputs / Outputs
- Communication

NOTE: If the devices that are used for power quality performance monitoring do not support all the required power quality measurements, then the information that is based on these measurements is not displayed in the gadgets, diagrams, and reports. However, other power quality information, that is based on available measurements might still be displayed.

Supported Devices for Power Quality Performance monitoring

The following table shows which monitoring device types support the measurements that are required for the different Power Quality Performance components:

PQ Events and Disturbances	Used by	Supported Meters	Supported Meter Template
Interruptions	PQ Performance Diagrams PQ Rating Gadget PQ Rating Trend Gadget PQ Incident Breakdown Gadget PQ Incident Impact Gadget PQ Incident Location Gadget PQ Analysis Report PQ Impact Gadget PQ Impact Trend Gadget PQ Impact Report	ION 7350, 7400, 7550, 7650, 8600A, 8600B, 8650A, 8650B, 8650C, 8800A, 8800B, 8800C, 9000, PM8000, PM870, CM3350, CM4000 DDD Support: ION7400, ION7550 V350 and newer, ION7650 V350 and newer, ION8650A/B V4.20 and newer, ION9000, PM8000, CM4000	All default meter template
Voltage Sag	Same as Interruptions	Same as Interruptions	All default meter template
Voltage Swell	Same as Interruptions	Same as Interruptions	All default meter template
Transient Voltage	Same as Interruptions	ION 7650, 8600A, 8650A, 8650B, 8800A, 9000, CM4000T DDD Support: ION7650 V350 and newer, ION8650A/B V4.20 and newer, ION9000, CM4000T	All default meter template
Over Voltage	Same as Interruptions	ION 7350, 7400, 7550, 7650, 8600A, 8600B, 8650A, 8650B, 8650C, 8800A, 8800B, 8800C, 9000, PM8000	All default meter template
Under Voltage	Same as Interruptions	ION 7350, 7400, 7550, 7650, 8600A, 8600B, 8650A, 8650B, 8650C, 8800A, 8800B, 8800C, 9000, PM8000	All default meter template
Voltage Unbalance	PQ Performance Diagrams PQ Rating Gadget PQ Rating Trend Gadget PQ Analysis Report	Logged By Default: ION 7330, 7350, 7400, 7550, 7650, 8600A, 8600B, 8650A, 8650B, 8800A, 8800B, 9000, PM8000, CM3000, CM4000, TesysT, Micrologic 5.0/6.0/7.0 E/P/H (including IFE/IFM) Not Logged By Default: PM800[1], PM3250, PM3255, PM5100, PM5300, PM5350, PM5500, EM6400, EM7000, Micrologic 5.2/6.2/5.3/6.3 E	All default meter template
Current Unbalance	PQ Performance Diagrams PQ Rating Gadget PQ Rating Trend Gadget PQ Analysis Report	Logged By Default: TesysT, Micrologic 5.0/6.0/7.0 E/P/H (including IFE/IFM) Not Logged By Default: PM800[1], CM3000, CM4000, PM3250, PM3255, PM5100, PM5300, PM5350, PM5500, EM6400, EM7000, Micrologic 5.2/6.2/5.3/6.3 A/E	n/a

PQ Events and Disturbances	Used by	Supported Meters	Supported Meter Template
Voltage Harmonics	PQ Performance Diagrams PQ Rating Gadget PQ Rating Trend Gadget PQ Analysis Report	Logged By Default: ION 7330, 7350, 7400, 7550, 7650, 8600A, 8600B, 8650A, 8650B, 8800A, 8800B, 9000, PM8000, CM3000, CM4000 Not Logged By Default: ION 6200, 7300, 8600C, 8650C, 8800C, PM200, PM700, PM800[1], PM1200, PM3250, PM3255, PM5100, PM5300, PM5350, PM5500, EM3460, EM6400, EM7000, Micrologic 5.2/6.2/5.3/6.3 E, Micrologic 5.0/6.0/7.0 H (including IFE/IFM)	All default meter template except PM8000 with IEEE 519 template
Current Harmonics	PQ Performance Diagrams PQ Analysis Report	Logged By Default: ION 7330, 7350, 7400, 7550, 7650, 8600A, 8600B, 8650A, 8650B, 8800A, 8800B, 9000, PM8000, CM3000, CM4000 Not Logged By Default: ION 6200, 7300, 8600C, 8650C, 8800C, PM200, PM700, PM800[1], PM1200, PM3250, PM3255, PM5100, PM5300, PM5350, PM5500, EM3460, EM6400, EM7000, Micrologic 5.2/6.2/5.3/6.3 E, Micrologic 5.0/6.0/7.0 H (including IFE/IFM)	All default meter template except PM8000 with IEEE 519 template
Frequency Variation	PQ Performance Diagrams PQ Rating Gadget PQ Rating Trend Gadget PQ Analysis Report	Logged By Default: ION 7330, 7350, 7400, 7550, 7650, 8600A, 8600B, 8650A, 8650B, 8800A, 8800B, 9000, PM8000	All default meter template
Flicker	PQ Performance Diagrams PQ Rating Gadget PQ Rating Trend Gadget PQ Analysis Report	Logged By Default: ION 7400, 7650, 8600A, 8650A, 8800A, 8800B, 9000	PQ Framework and EN50160 evaluation enabled
Power Factor	Power Factor Impact Gadget Power Factor Impact Trend Gadget	All meters that have measurements required by the calculation of the defined rate structure. For example: • Active energy • Reactive energy • Active power • Reactive power	n/a
Power Factor	PQ Analysis Report	All meters that measures active energy, reactive energy, and power factor	n/a

PQ Events and Disturbances	Used by	Supported Meters	Supported Meter Template
n/a	Standardized Equipment Diagrams	Uninterruptible Power Supplies (UPS): • Galaxy 5000 • Galaxy 5500 Active Harmonic Filters: • Accusine PCS+ • Accusine PFV+ Capacitor Banks: • VarPlus Logic VL6 and VL12	n/a

[1] The PM810 must be equipped with the PM810LOG option.

Power Factor Rate File Calculation

This appendix explains the power factor calculations in the default rate files. To learn how to modify the rate files, please refer to the PME Billing Module Toolkit.

Power Factor Impact – Active Energy Billing with PF Adjustment Option 1

The utility charges according to the active energy and adds a surcharge or adjustment for power factor.

$$PF_{cost} = (kWh_{billable} - kWh) \times Rate_{kWh}$$

$$kWh_{billable} = kWh \times \left(\frac{PF_{target}}{PF}\right)(C1)$$

Power Factor Impact – Active Energy Billing with PF Adjustment Option 2

The utility charges according to the active energy and adds a surcharge or adjustment for power factor.

$$PF_{cost} = (kWh_{billable} - kWh) \times Rate_{kWh}$$

$$kWh_{billable} = kWh \times (1 + PF_{target} - PF)$$

Power Factor Impact – Apparent Energy Billing.xml

The utility bills all consumed energy, including the reactive energy.

$$PF_{cost} = kVAh \times \left(1 - \frac{PF}{PF_{target}}\right) \times Rate_{kVAh}$$

Power Factor Impact – Reactive Energy Billing.xml

$$PF_{cost} = (kVARh - \text{kWh} \times \frac{\sqrt{1 - PF_{target}^2}}{PF_{target}}) \times Rate_{kVARh}$$

Required measurements for Power Quality Performance monitoring

The following table shows which measurements are required for the different Power Quality Performance components:

NOTE: For each disturbance category, choose only the needed measurements from the supported list to log. Do NOT Log all of them. Logging all measurements can cause unwanted database growth, and performance issues.

PQ Disturbances	Used by	Supported Measurements	Label Name
Voltage Unbalance	PQ Performance Diagrams PQ Rating Gadget PQ Rating Trend Gadget PQ Analysis Report	ION Devices Voltage Unbalance Mean	V unbal mean
		Non-ION Devices Voltage Unbalance L-L Worst Voltage Unbalance L-N Worst	Voltage Unbalance L-L Worst Voltage Unbalance L-N Worst
Current Unbalance	PQ Performance Diagrams PQ Rating Gadget PQ Rating Trend Gadget PQ Analysis Report	Non-ION Devices Current Unbalance Worst	Current Unbalance Worst
Voltage Harmonics	PQ Performance Diagrams PQ Rating Gadget PQ Rating Trend Gadget PQ Analysis Report	ION Devices Voltage Total Harmonic Distortion on Input V1[1] Voltage Total Harmonic Distortion on Input V2[1] Voltage Total Harmonic Distortion on Input V3[1] Voltage Total Harmonic Distortion Mean on Input V1 Voltage Total Harmonic Distortion Mean on Input V1 Voltage Total Harmonic Distortion Mean on Input V1	V1 Total HD[1] V2 Total HD[1] V3 Total HD[1] V1 THD mean V2 THD mean V3 THD mean
		Non-ION Devices THD Voltage A-B THD Voltage A-N THD Voltage B-C THD Voltage B-N THD Voltage C-A THD Voltage C-N THD Voltage L-L THD Voltage L-N	THD Voltage A-B THD Voltage A-N THD Voltage B-C THD Voltage B-N THD Voltage C-A THD Voltage C-N THD Voltage L-L THD Voltage L-N

PQ Disturbances	Used by	Supported Measurements	Label Name
Current Harmonics	PQ Performance Diagrams PQ Analysis Report	ION Devices Current Total Harmonic Distortion Phase A[1] Current Total Harmonic Distortion Phase B[1] Current Total Harmonic Distortion Phase C[1] Current Total Harmonic Distortion Phase A Mean Current Total Harmonic Distortion Phase B Mean Current Total Harmonic Distortion Phase C Mean	I1 Total HD[1] I2 Total HD[1] I3 Total HD[1] I1 THD mean I2 THD mean I3 THD mean
		Non-ION Devices Current Total Harmonic Distortion Phase A Current Total Harmonic Distortion Phase B Current Total Harmonic Distortion Phase C	THD Current A THD Current B THD Current C
Frequency Variation	PQ Performance Diagrams PQ Rating Gadget PQ Rating Trend Gadget PQ Analysis Report	ION Devices Frequency Mean	Freq mean
Flicker	PQ Performance Diagrams PQ Rating Gadget PQ Rating Trend Gadget PQ Analysis Report	ION Devices Voltage Flicker Plt on Input V1 Voltage Flicker Plt on Input V2 Voltage Flicker Plt on Input V3 Voltage Flicker Pst on Input V1 Voltage Flicker Pst on Input V2 Voltage Flicker Pst on Input V3	V1-Flck Plt V2-Flck Plt V3-Flck Plt V1-Flck Pst V2-Flck Pst V3-Flck Pst

NOTE: [1] Use only for ION 6200, 7300, 8600C, 8650C and 8800C. These measurements are NOT logged by default.

NOTE:

- PM8000 is categorized as an ION device.
- ION6200 is categorized as a non-ION device.

Reports references

This section contains reference information related to configuring Reports.

Use the following links to find the content you are looking for:

UPS Battery Health Report calculations

The following terms and explanations of various calculations are used in the **UPS Battery Health Report**:

First Drop Analysis – Minimum Drop Voltage (V), Maximum Drop Voltage (V) and Difference (%): The voltage drop minimum, maximum and percentage difference values are shown in the Drop Analysis table section. To calculate these values, a valid waveform voltage drop must be found first by sampling the waveform data.

A valid voltage drop is defined as the first waveform section of size n, where the relative minimum and maximum voltage values have a percentage difference d. In addition, the next sample n+1 must be greater in value than the minimum voltage, to ensure that the lowest value has been found in the voltage drop.

The sampling section size n and the percentage difference d are determined by the user-defined report parameters Waveform Drop Sample Size and Waveform Drop Percentage, respectively.

After the voltage drop has been found, the Minimum Voltage and Maximum Voltage are simply the min and max values in that drop samples, and the Difference is the percentage of the maximum voltage over the minimum voltage. For example:

Minimum Drop Voltage = Min(ws1 <= WaveformValues < = wsN)
Maximum Drop Voltage= Max(ws1 <= WaveformValues <= wsN)
ws1 is the first point in the sample and wsN is the last point in the sample
Difference (%) = [(Maximum Drop Voltage – Minimum Drop Voltage) / Maximum Drop Voltage]

Recovery Analysis – Target Recovery Voltage (V), Actual Recovery Voltage (V) and Recovery Time (ms):

Target Recovery Voltage (V): This value is calculated for the reference waveform only. This is calculated as follows:

*Target Recovery Voltage (V) = [Recovery Voltage * Recovery Value Multiplier]*
Where Recovery Voltage = Average(w1 <= WaveformValues < wN)
w1 is the very first point in the waveform and wN is the lowest point in the waveform voltage drop and Recovery Value Multiplier is a user-defined value in the report pre-requisite page

Actual Recovery Voltage (V): The first point in the reference and comparison waveforms that occurs after the voltage drop, that is equal or greater than the Target Recovery Voltage value.

Recovery Time (ms): This is the time elapsed from the Minimum Voltage Drop time and the Actual Recovery Voltage time, expressed in milliseconds.

Additional calculations

Voltage Threshold: This is the red horizontal area that is highlighted in the waveform drop chart. It represents a nominal voltage value, therefore there are no calculations for the Voltage Threshold.

For example, if the user sets the Voltage Threshold to 50V, then a red line will be drawn at 50v (based on the Y-axis) and the area below the red line appears shaded in red.

System Integration

This section contains reference information related to System Integration.

Use the following links to find the content you are looking for:

PME and EBO integration references

This section contains reference information related to configuring the PME/EBO Integration solution.

Use the links below to find the content you are looking for:

Add-on device drivers for PME

You can download add-on device drivers from the Exchange community. See Resources for contact information.

For devices, for which default drivers or downloadable add-on drivers do not exist, you can use the Device Type Editor (DTE) tool to create custom device drivers. See Device Type Editor for more details.

Advanced ETL Configuration References

This section contains reference information related to the ETL.

Use the links below to find the content you are looking for:

Position Counters

Position counters keep track of the data that is extracted from EBO and then loaded into PME. Each Trend log specified in ETL has a position counter associated with it. The position counter represents a timestamp of the most recent data point loaded for each Trend log. When ETL is run, only data after this timestamp value is extracted from the EBO Trend log.

To view the position counters for the mapped Trend logs:

- Click the Positions tab. The Positions tab appears showing the position counters.

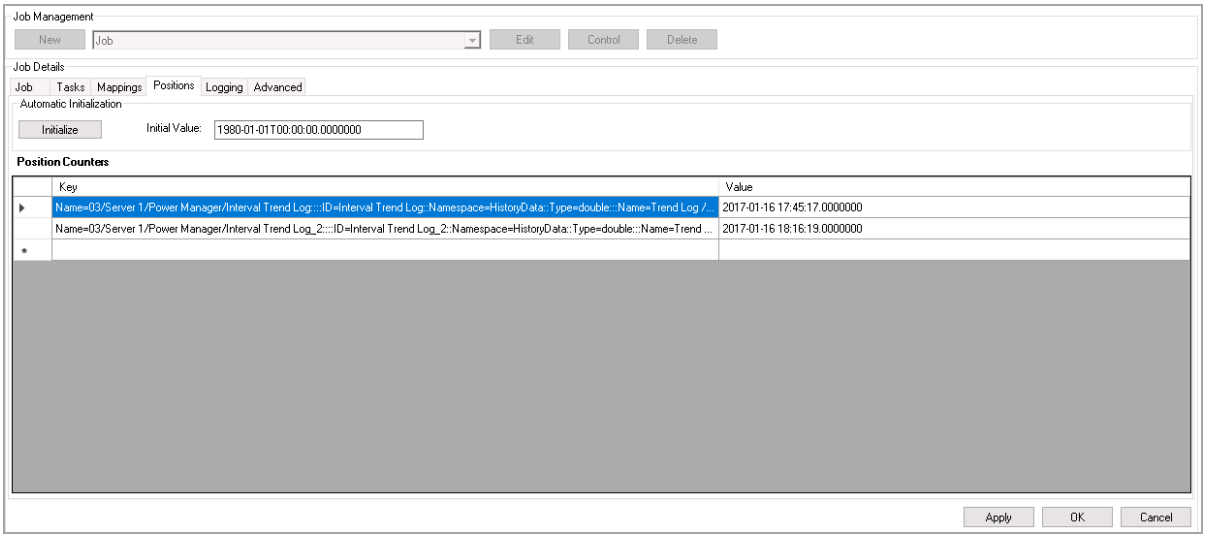
Resetting and resending the data (optional)

If you need to re-extract previously extracted data, or if you want to load data after a specific date, you can manually update the position counter. Otherwise, manually updating the position counter is not necessary.

To reset and resend the data for the mapped Trend logs:

1. Enter a specific value in the text box to set all position counters.
2. Click Initialize. Mapped Trend logs appear with associated timestamp data for each.

Now, the next time you run ETL, only data after the given timestamp is loaded.

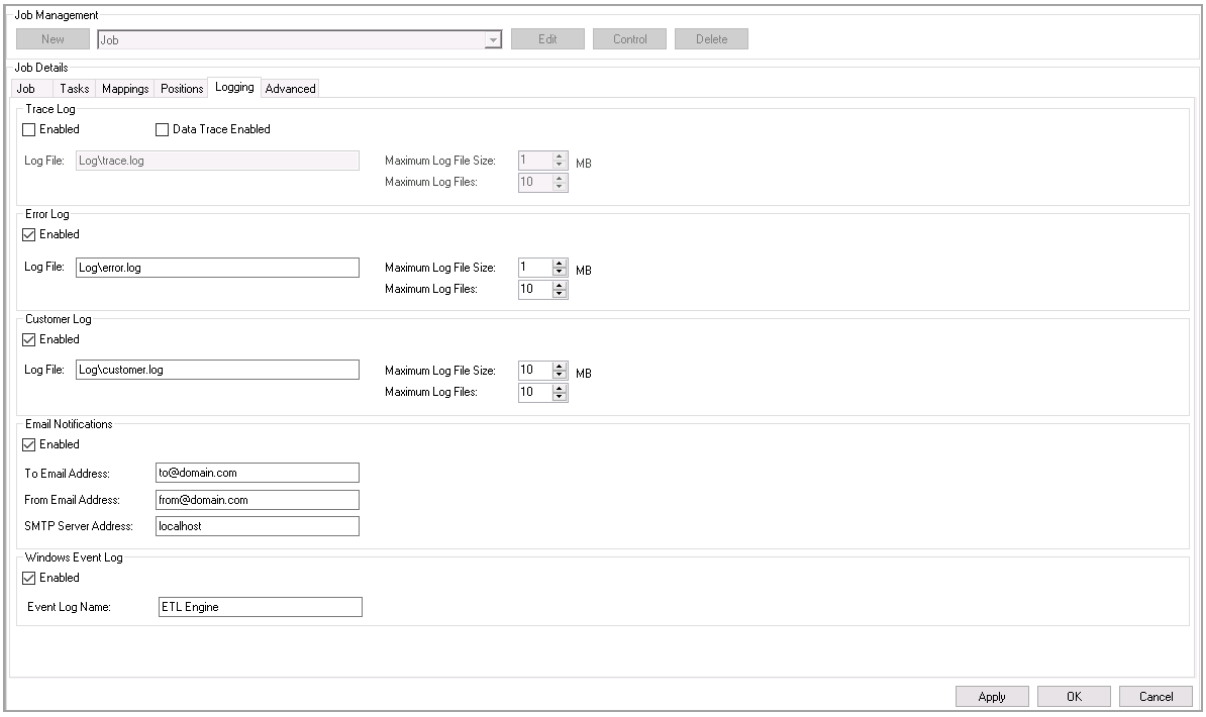


Logging setup

The Logging feature allows you to enable the various logs where ETL writes the information regarding the status of your ETL job. These logs can help when searching for the cause of an unsuccessful ETL job.

To enable the ETL logs:

1. Select the applicable job in ETL from the dropdown menu and click Edit.
2. Click the Logging tab. The Logging tab appears.



3. Select the Enabled checkbox for the Trace Log, Error Log, Customer Log, and Windows Event Log as required.
4. Provide the location for the log file in the Log File field or leave at the default location.

5. Set the Maximum Log File Size and Maximum Log Files for each log or leave at the default settings.
6. If required, select the Enabled checkbox for Email Notifications and complete the fields for To Email Address, From Email Address, and SMTP Server Address.
7. Click OK to save and exit the job.

Extract task: Setting parameters and recommended values

Extract task settings

Setting Name	Description	Setting Parameters / Recommended Values
Web Service		
Number of threads to use	The maximum number of threads to use when contacting the EWS server for the list of Trend logs. Set value to 4 for most cases, however, set value to a lower number if the EWS server is overwhelmed with requests.	Enter a value of 4.
Timeout (in minutes) for EWS response	The length of time (in minutes) to wait for a response from the EWS server when requesting information.	Enter a value of 10.
Web Service User Name	The user name for Web Service.	Provide EBO Workstation user name.
Web Service Password	Password for the Web Service user name.	Provide EBO Workstation password.
Web Service URL	The URL of the EcoStruxure Web Service called by this task.	Provide URL information. Default URL http://localhost:8080/EcoStruxure/DataExchange. Replace “localhost:8080” with your web server address and port as needed. **NOTE**: For HTTPS EcoStruxure Web Service connections, with a self-signed certificate, the certificate validation must be disabled for ETL. To disable certificate validation, set **<IsServerCertificateValidationCheckEnabled>** to **false** in the ETL job file. You can find the job file in `<ETL installation folder>\Jobs\`

Setting Name	Description	Setting Parameters / Recommended Values
Communication Options		
Enable the Digest Authentication Token Reuse Feature	When set to **True**, ETL will reuse digest authentication tokens for communicating with the EWS server. This can improve communication performance.	Set to 'True'
Reading Interval		
Interval Length Discovery	When set to True, allows the extract task to determine the reading interval for each pair based on each pair's data.	Set to 'True'
Record State Filter		
Limit Results Based on Record State	When set to True, enables a check on record state. Only records with a specified record state will be used. all other records will be ignored. When set to false, check is disabled and all records regardless of their record state are used.	Set to 'False'
Allowed Record State	Sets the specific record check to be used by the Limit Results Based on Record state setting. Record states can be Good, Uncertain, Forced, Offline, or Error.	Value not used if Limit Results setting is 'False'.

Transform task: Setting parameters and recommended values

Transform task settings

Setting Name	Description	Setting Parameters / Recommended Values
Transform		

Setting Name	Description	Setting Parameters / Recommended Values
Intervalization Method	Specifies the method used when converting the values from an irregular interval into a regular interval.	Use default 'Last Known Value' setting
Intervalize to present time	When set to True, the data is intervalized up to the current system time. If set to false, the data is intervalized up to the most recent data point.	Set value to “False”
Target Reading Interval (minutes)	Data is intervalized to a reading interval specified in this field.	Interval value in minutes. Select a value from the dropdown list. Default value of 15 minutes is suitable in most cases.

Load task: Setting parameters and recommended values

Load task settings

NOTE: You must set the Enable Recorder and Channel Creation parameter to ‘True’ in order for some Energy-related reports to run:

Setting Name	Description	Setting Parameters / Recommended Values
Database Settings		
SQL Command Timeout	Time in seconds before stopping a SQL command attempt and generating a message.	Default value is 3600 seconds (1 hour).
Database Settings (Application Modules)	Connection string to the Application Modules database	Provide connection information to Application Modules database for your system. Information can be found through SQL Management Studio.
Database Settings (ION_Data)	Connection string to the ION_Data database	Provide connection information to ION_Data database for your system. Information can be found through SQL Management Studio.

Setting Name	Description	Setting Parameters / Recommended Values
Database Settings (ION_Network)	Connection string to the ION_ Network_Database where source information should be loaded. Only applicable if the Enable Network Database Source Creation setting is True.	Provide connection information to ION_Network database for your system. Information can be found through SQL Management Studio.
Group Name Settings		
Add the 'Group Name' Prefix to Sources if Needed	When set to 'True', the task adds a group name prefix to all sources that do not already have one. When set to 'False', a group name prefix will not be added.	Set to 'False'.
Group Name	The name provided in this setting is used as the Group Name prefix setting described above.	If the previous setting is 'False', this setting does not need to be filled in.
Mapping Options – Source and Quantity End Names		
Populate Button – Automatically Set Quantity ‘End Names’ to ‘Start Names’		Set to ‘False’.
Populate Button – Automatically Set Source ‘End Names’ to ‘Start Names’		Set to ‘False’.
Null Values		
Allow Null Values	When set to 'False' the task ignores any null values. When set to 'True', null values in the data set are inserted into the database.	Set to 'False'.
Overwrite Values		
Allow existing values to be overwritten.		Set to ‘False’.
Recommended Source-Quantity Pairs Settings		
Limit Recommended Pairs to Known Quantities		Set to ‘True’.
Recorders and Channels		

Setting Name	Description	Setting Parameters / Recommended Values
Enable Recorder and Channel Creation	When set to 'False', the task does not create recorders and channels while inserting data. Some reports require that the parameter is set to ‘True’ to run.	Set to ‘True’.
Set the ISCurrentConfiguration Flag to False for New Channels		Leave this default setting to ‘True’.
Source and Quantity Creation Settings		
Enable Quantity Creation	When set to 'False' disables creating quantities if they are not already in the database.	Set to 'False'.
Enable Source Creation in ION_Data	When set to 'True', the setting enables the creation of sources that are not already in the ION_ Data database.	Set to 'True'.
Enable Source Creation in ION_ Network	When set to 'True', the setting enables the creation of sources that are not already in the ION_ Network database.	Set to 'True'.
Set Active Flag for All New Sources	When set to 'True', all new sources are marked as Active.	Set to 'True'.
Set Measurement Descriptive Name	When set to 'True', enables setting the descriptive name of new measurements.	Set to 'True'.
Set Measurement Engineering Name	When set to 'True', enables setting the engineering name of new measurements.	Set to 'True'.
Source Namespace Settings		
Source Namespace Override	Namespace given to all sources that do not have a namespace or that are created during the Load Task.	IONEnterprise
Source Type Settings		
Override Source Type	When set to 'True', enables the use of the Source Type Override value when creating sources.	Set to 'True'.
Source Type Override	The source type to use when creating sources.	Presumed downstream device.

Manage ETL jobs

You can set up logging to help manage ETL jobs. You can also switch between ETL jobs, change the order of ETL tasks, and remove ETL tasks from an ETL job.

Switching between ETL jobs

1. Click **OK** at the bottom right to save and exit the current job.
2. In the **Job Management** list select an ETL job and click **Edit**.

Removing a task from an ETL job

1. In the **Job Management** list click the applicable ETL job and then click **Edit**.
2. Click the **Tasks** tab.
3. Highlight the task that you want to remove from the left pane.
4. Click **Delete** 
5. Click **OK** to save and exit the job.

Tips for working with mappings

Loading sources can return thousands of rows. To help you manage a large result set, the ETL Administration Tool includes several features to help you search, filter, and update loaded sources.

Highlighting rows

Highlighting a source row lets you work with that source. When you highlight a row you can copy, include or exclude the row from the ETL job, or perform a batch edit on the row.

To highlight a row:

1. Click the row.

To highlight successive rows:

1. Click the row.
2. Press **Shift** and click another row.

To highlight non-successive rows:

1. Press **Ctrl** and click the desired rows.

To highlight all rows:

1. Press **Ctrl + A**.

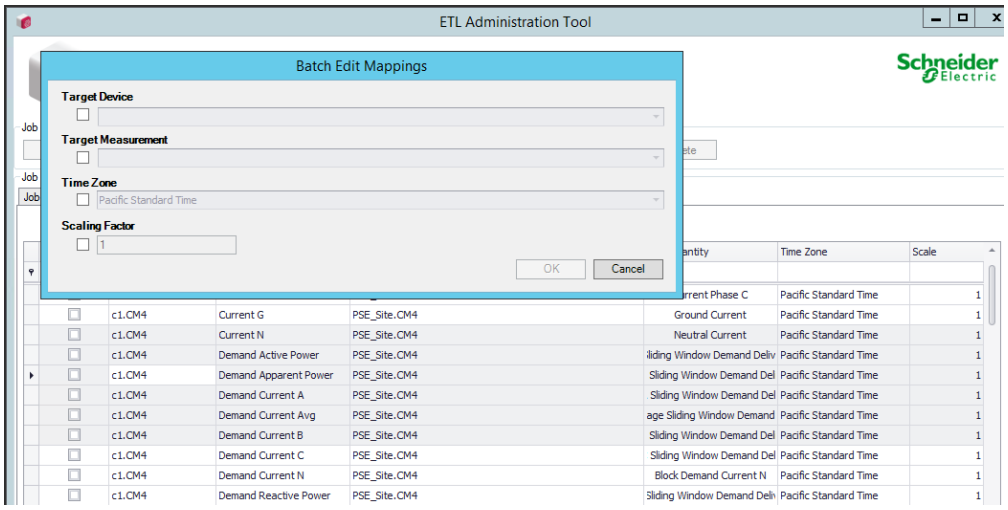
Batch Edits

A batch edit lets you update all highlighted rows at once.

To perform a batch edit:

1. In the **Mappings** pane highlight the rows you want to edit.
2. Right-click and click **Batch Edit**.

   The Batch Edit Mappings dialog appears.



3. Complete all applicable fields in the dialog as needed.

   NOTE: You have to complete the **Target Device** and **Target Measurement** fields before you can select Included for the row.

4. While the rows are still highlighted, right-click and click **Include Selected Mapping(s)**. The **Included** check box is checked for the selected rows and these devices are included in the job.
5. Click **OK**, and then click **Apply** to save the changes to the job. The Batch Edit values appear for the selected rows.

Sorting contents by column

To sort contents by column:

1. Right-click a column heading and from the sort menu choose to sort column contents by ascending or descending order.

Searching by column

To search by column:

1. Click in the Auto Filter Row (search field below a column heading.)
2. Begin typing characters. Column contents appear based on the search criteria you enter. Note

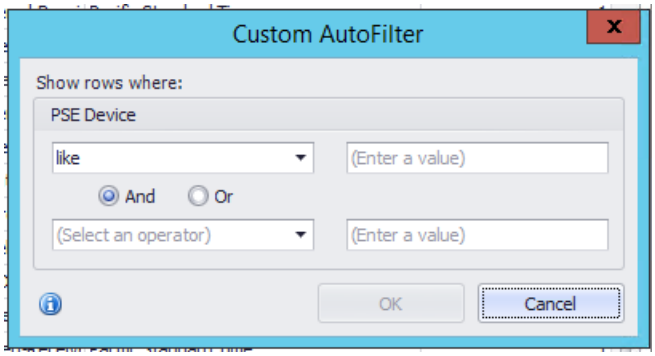
that characters are not case sensitive.

PSE Device	PSE Topic	PME Source
	Demand	
c1.CM4	Demand Current C	PSE_Site.CM4
c1.CM4	Peak Demand Current B	PSE_Site.CM4
c1.CM4	Demand Current B	PSE_Site.CM4
c1.CM4	Peak Demand Current Avg	PSE_Site.CM4
c1.CM4	Demand Current Avg	PSE_Site.CM4
c1.CM4	Peak Demand Current A	PSE_Site.CM4
c1.CM4	Demand Current A	PSE_Site.CM4
c1.CM4	Demand Current N	PSE_Site.CM4
c1.ION	Peak Demand Apparent P...	PSE_Site.ION
c1.CM4	Peak Demand Apparent P...	PSE_Site.CM4
c1.ION	Demand Apparent Power	PSE_Site.ION
c1.CM4	Demand Apparent Power	PSE_Site.CM4
c1.ION	Peak Demand Active Power	PSE_Site.ION
c1.CM4	Peak Demand Active Power	PSE_Site.CM4

Filtering content by column

To filter the contents by column:

1. Click the filter symbol to the right of the column heading, and then choose (Custom), (Blanks), (Non blanks), Checked, Unchecked, or a specific device.
2. If you choose (Custom), you can define a unique filter, based on your input, in the Custom AutoFilter dialog. Complete the fields in the dialog and then click **OK**.



Filtering content using the Filter Editor

To filter the contents using the Filter Editor:

1. Right-click the column header you want to filter and select **Filter Editor**.

   You must complete the Target Device and Target Measurement fields before you can select Included for the row.
2. Click an operator or enter a filter value.
3. Click **Apply**.

   The sources are filtered based on the filtering criteria you enter.
4. Click **OK** to return to the **Mappings** tab.

Copying and pasting devices

You can select and copy one or more devices and paste that data into a document, such as a text editor or a spreadsheet.

To copy and paste devices into a document:

1. In the **Mappings** tab select one or more device rows.
2. Press **CTRL+C** or right-click and click **Copy**.
3. Open your document and place the cursor where you want to paste.
4. Press **CTRL+V** or right-click and click **Paste**.

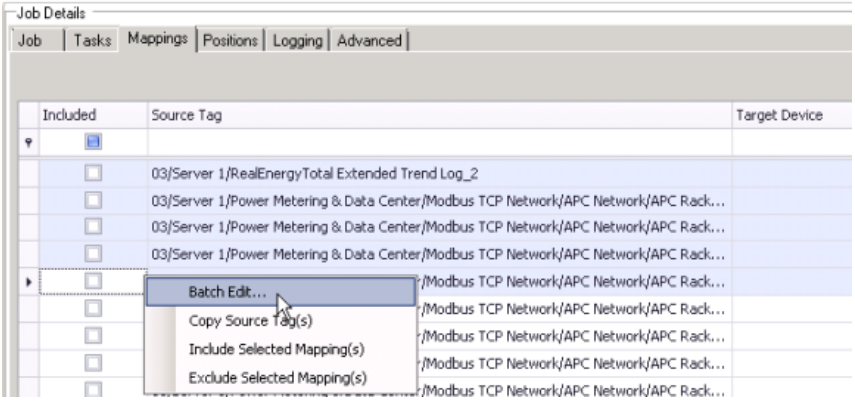
   The device data appears in the document.

ETL tips and tricks

Performing a Batch Edit for Trend logs

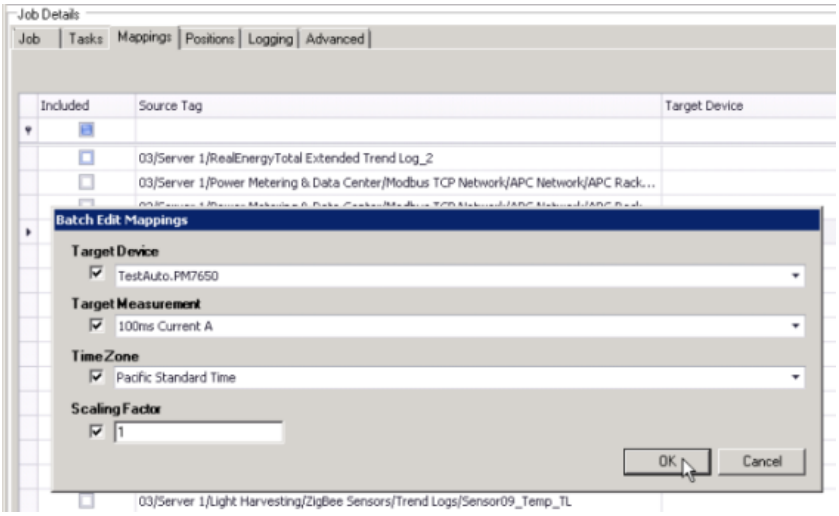
To perform a Batch Edit (map multiple Trend logs at once):

1. Highlight multiple rows in the Mappings tab by clicking and dragging downward the handles to the left of the rows. To select all rows, press Ctrl+A.
2. Right-click and select Batch Edit. The Batch Edit Mappings dialog appears.



3. Complete all applicable fields in the dialog as needed.

   You must complete the Target Device and Target Measurement fields before you can select Included for the row.



4. While the rows are still highlighted, right-click and select Include Selected Mapping(s). The Included check box is now checked for the selected rows and these Trend logs are now included in the job.
5. Click OK, and then click Apply to save the changes to the job. The Batch Edit values now appear for the selected rows.

See Measurement mapping for ETL to learn about the most common, supported measurements in used in PME and how to link to typical Building Management tags.

Sorting contents by column

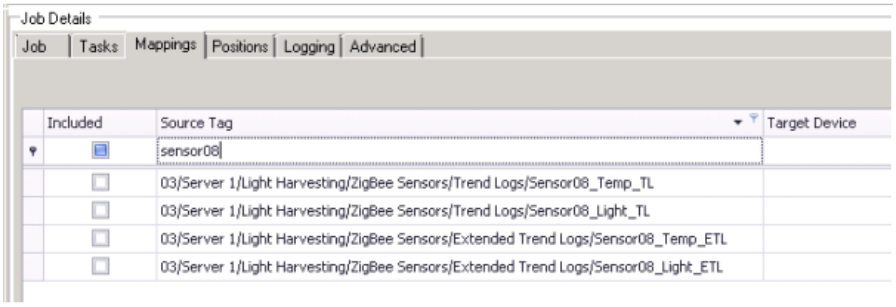
To sort contents by column:

- Right-click a column heading and choose from the sort menu to sort column contents by ascending or descending order.

Searching contents by column

To search the contents by column:

1. Click in the search field below a column heading.
2. Begin typing characters. Only column contents appear based on the search criteria you enter. Note that characters are not case sensitive.



Searching Target Measurements by column

To search the Target Measurements by column:

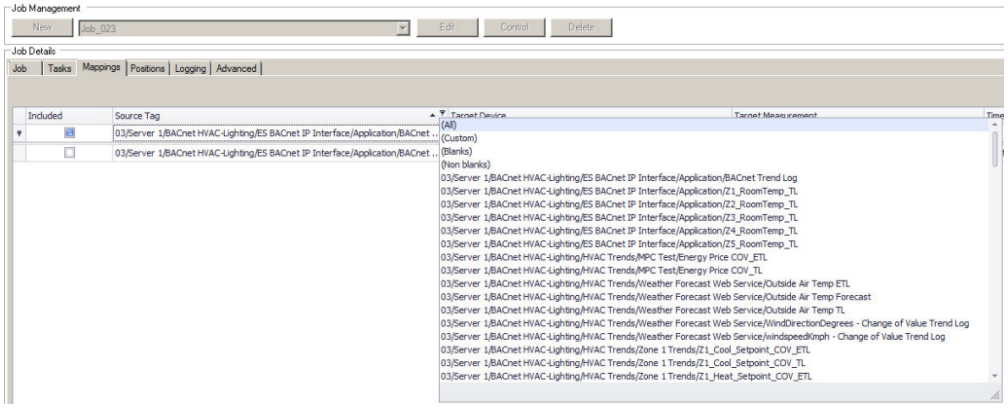
1. Click in the search field below the column heading.
2. Begin typing characters. Only column contents appear based on the search criteria you enter. Note that characters are not case sensitive.

See Measurement mapping for ETL to learn about the most common, supported measurements in use in PME.

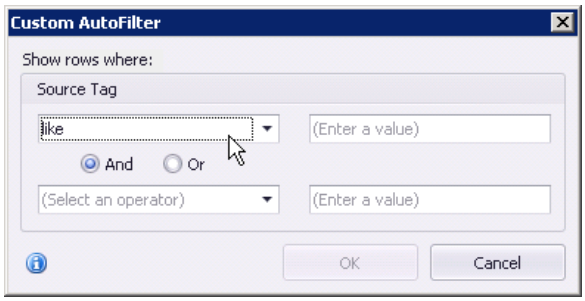
Filtering content by column

To filter the contents by column:

1. Click the filter symbol to the right of the column heading, and then choose (All), (Custom), (Blanks), (Non blanks), or a specific Trend log.



2. If you choose (Custom), you can define a unique filter, based on your input, in the Custom AutoFilter dialog. Complete the fields in the dialog and click OK.



Copying and pasting Trend logs

You can select and copy one or more Trend logs from Building Operation and paste that data into a document, such as a text editor or a spreadsheet.

To copy and paste Trend logs into a document:

1. Select one or more rows in the Mappings tab.
2. Press Ctrl + C or right-click and choose Copy.
3. Open your document and place the cursor where you want to paste.
4. Press Ctrl + V or right-click and choose Paste.
5. The Trend log data appears in the document.

Finding and opening a Trend log in Building Operation

You can find and open a Trend log with the source tag path.

1. From the document created in the previous step Copy Source Tag(s) from the list.
2. Click in the Building Operation address bar.
3. Press Ctrl + V or right-click and choose Paste, and then press Enter. The Trend log opens.

Running a job manually

1. In the ETL Configuration Job Configuration Tool screen, select a job to run from the Job Management drop-down list.
2. Click **Control**. The Job Control tab appears.
3. Click **Run Once**, and then click **OK** in the dialog when it appears. Wait until the output dialog box appears (depending on your system size, this could take up to a few hours).

NOTE: To confirm the ETL job, look to see that the job executed successfully.

If the ETL Engine returns a Job execution failed message, click Open Log Folder in the dialog and open the error log. Locate the timestamp that corresponds to your job and review the log. Based on this information, make the appropriate changes to the job and then run the job again.

Running a job as a service

You can configure a job to run as a service. Using this method, the job automatically runs at set times based on the settings you provide in the Job tab. Make sure to change the Sleep Time Between Execution value (in seconds) if you require the service to be run on a schedule different from the default value of 3600 seconds.

NOTE: Run the service under a dedicated Windows user account.

To configure a dedicated Windows user account for an ETL job service:

1. Create a Windows user account with User access permissions.

   NOTE: If the ETL is installed in its default location, `C:\Program Files\...`, then the Windows user must have **Administrator** access.

   ⚠ WARNING

   POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

   Use cybersecurity best practices for password creation and management.

   Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

Cybersecurity policies that govern user accounts and access - such as least privilege, separation of duties - vary from site to site. Work with the facility IT System Administrator to ensure that user access adheres to the site-specific cybersecurity policies.

2. Add the Windows user account to the PME SQL database server with db_owner rights to the ION_Data and ION_Network databases.

To configure the ETL job to run as a service:

1. In the ETL Configuration Job Configuration Tool screen, select a job to run from the Job Management drop-down list.
2. Click **Control**. The Job Control tab appears.
3. Click **Register**. ETL creates a registered service under the job name. Click **OK** in the dialog when it appears. This option is available only after running a job successfully at least once.
4. Open Windows Services and change the Log On account for the service to the dedicated Windows account.
5. In ETL Configuration Job Configuration, click **Start/Continue** to start the service.
6. Click **Stop** to stop the service or click **Unregister** to unregister the service for this job.
7. Press **OK** to save and exit job.

Managing your ETL jobs

You can also switch between jobs, change task order and remove tasks from a job.

Switching between jobs

1. Click **OK** at the bottom right to save and exit the current job.
2. Select another job in the Job Management drop-down list.
3. Click **Edit**.

Changing the order of tasks for a job

1. Select a job from the Job Management drop-down list and click Edit.
2. Click the **Tasks** tab.
3. Highlight the task you want to move from the left pane.
4. Click the Up arrow or Down arrow icon to move the task.
5. Press **OK** to save and exit job.

Removing a task from a job

1. Select a job from the Job Management drop-down list and click Edit.
2. Click the **Tasks** tab.
3. Highlight the task you want to remove from the left pane.

4. Click the Delete icon. The task is removed from the pane.
5. Press **OK** to save and exit job.

Measurement mapping for ETL

This table describes the suggested mappings for supported EBO values:

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
Absolute voltage in dB			
		dBuV	
AbsoluteHumidityMass			
		kg/kg	
		lb/lb	
Acceleration			
	meters per second squared	m/s^2	
	feet per second squared	ft/s^2	
	inches per second squared	in/s^2	
Acidity			
		pH	
Angle			
	radian	rad	
		deg	Fundamental Current Angle A Fundamental Current Angle B Fundamental Current Angle C Fundamental Current Angle N Fundamental Current Angle G
		grad	
Angular momentum			
	joule second	Js	
Area			
	square meter	m^2	
	square inch	in^2	
	square foot	ft^2	
	square yard	yd^2	
	acre	a.	
	square mile	$mile^2$	
Capacitance			
	farad	F	
Compressibility			
	meters squared per Newton	m^2/N	
Conductance			

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
	siemens	S	
Conductivity			
	siemens per meter	S/m	
Corrosion Rate			
	m/yr		
	in/yr		
Currency			
	currency1	Energy Cost Energy Cost AUD Energy Cost EUR Energy Cost GBP Energy Cost CNY	
	currency2		
	currency3		
	currency4		
	currency5		
	currency6		
	currency7		
	currency8		
	currency9		
	currency10		
Current			
	A	Current Phase Average Current Phase A Current Phase B Current Phase C Neutral Current Ground Current	
Current Density			
		A/m²	Current Density (A/m^2)
Density			
	grams per cubic meter	g/m³	
	pounds per cubic inch	lb/in³	
	pounds per cubic foot	lb/ft³	
Diffusivity			
	meters squared per second	m²/s	
	foot squared per second	ft²/s	
Dipole Moment			
	debye		
	coulombmeter		

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
Electrical Field Strength			
		V/m	
Energy			
		J	
		Wh	Active Energy Delivered (kWh) Active Energy Received (kWh) Active Energy Delivered-Received (kWh)
		Btu	Water Heat Flow (BTU 59) Energy Consumption (BTU ISO) Air Heat Flow (BTU 59) Air Heat Flow (BTU ISO) Natural Gas Energy Flow (BTU 59) Natural Gas Energy Flow (BTU ISO) Steam Heat Flow (BTU 59) Steam Heat Flow (BTU ISO) Hot Water (Btu) Gas btus
		cal	
		thermal	
		tonh	
Energy Apparent			
		Vah	Apparent Energy Received (KVAh) Apparent Energy Delivered-Received (KVAh)
Energy Reactive			
		Varh	Reactive Energy Delivered (kvarh) Reactive Energy Received (kvarh) Reactive Energy Delivered-Received (kvarh)
Enthalpy			
		J/kg	Specific Enthalpy (J/kg)
		Btu/lb	Specific Enthalpy (BTU 59/lb av)
Enthalpy Dry Air			
		J/kg dry air	Specific Enthalpy Dry Air (J/kg)
		Btu/lb dry air	Specific Enthalpy Dry Air (BTU 59/lb av)
Entropy			
		J/K	
Flow			
	cubic meters per second	m³/s	Steam Volume Flow Rate (m^3/s) Water Volume Flow Rate Supply (m^3/s) Water Volume Flow Rate Return (m^3/s) Water Volume Flow Rate (m^3/s) Air Volume Flow Rate (m^3/s) Natural Gas Volume Flow Rate (m^3/s) Wastewater Volume Flow Rate (m^3/s)

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
	cubic meters per minute	m³/min	Steam Volume Flow Rate (m^3/min) Water Volume Flow Rate Supply (m^3/min) Water Volume Flow Rate Return (m^3/min) Water Volume Flow Rate (m^3/min) Air Volume Flow Rate (m^3/min) Natural Gas Volume Flow Rate (m^3/min) Wastewater Volume Flow Rate (m^3/min)
	cubic meters per hour	m³/h	Steam Volume Flow Rate (m^3/h) Water Volume Flow Rate Supply (m^3/h) Water Volume Flow Rate Return (m^3/h) Water Volume Flow Rate (m^3/h) Air Volume Flow Rate (m^3/h) Natural Gas Volume Flow Rate (m^3/h) Wastewater Volume Flow Rate (m^3/h)
	cubic feet per second	ft³/s	Steam Volume Flow Rate(cf/s) Water Volume Flow Rate Supply (cf/s) Water Volume Flow Rate Return (cf/s) Water Volume Flow Rate (cf/s) Air Volume Flow Rate (cf/s) Air Volume Flow Rate (scf/s) Natural Gas Volume Flow Rate (cf/s) Natural Gas Volume Flow Rate (scf/s) Wastewater Volume Flow Rate (cf/s)
	cubic feet per minute	ft³/min	Steam Volume Flow Rate(cf/min) Water Volume Flow Rate Supply (cf/min) Water Volume Flow Rate Return (cf/min) Water Volume Flow Rate (cf/min) Air Volume Flow Rate (cf/min) Air Volume Flow Rate (scf/min) Natural Gas Volume Flow Rate (cf/min) Natural Gas Volume Flow Rate (scf/min) Wastewater Volume Flow Rate (cf/min)
	cubic feet per hour	ft³/h	Steam Volume Flow Rate(cf/h) Water Volume Flow Rate Supply (cf/h) Water Volume Flow Rate Return (cf/h) Water Volume Flow Rate (cf/h) Air Volume Flow Rate (cf/h) Air Volume Flow Rate (scf/h) Natural Gas Volume Flow Rate (cf/h) Natural Gas Volume Flow Rate (scf/h) Wastewater Volume Flow Rate (cf/h)
	gallons per second	Usgal/s	Water Volume Flow Rate Supply (gal/s) Water Volume Flow Rate Return (gal/s) Water Volume Flow Rate (gal/s) Wastewater Volume Flow Rate (gal/s)
	gallons per minute	Usgal/min	Water Volume Flow Rate Return (gal/min) Water Volume Flow Rate Return (gal/min) Water Volume Flow Rate (gal/min) Wastewater Volume Flow Rate (gal/min)
	gallons per hour	Usgal/h	Water Volume Flow Rate Supply (gal/h) Water Volume Flow Rate Return (gal/h) Water Volume Flow Rate (gal/h) Wastewater Volume Flow Rate (gal/h)

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
	liters per second	l/s	Water Volume Flow Rate Supply (L/s) Water Volume Flow Rate Return (L/s) Water Volume Flow Rate (L/s) Wastewater Volume Flow Rate (L/s)
	liters per minute	l/min	Water Volume Flow Rate Supply (L/min) Water Volume Flow Rate Return (L/min) Water Volume Flow Rate (L/min) Wastewater Volume Flow Rate (L/min)
	liters per hour	l/h	Water Volume Flow Rate Supply (L/h) Water Volume Flow Rate Return (L/h) Water Volume Flow Rate (L/h) Wastewater Volume Flow Rate (L/h)
		liq oz/s	Water Volume Flow Rate Supply (fl oz imp/s) Water Volume Flow Rate Return (fl oz imp/s) Water Volume Flow Rate (fl oz imp/s) Wastewater Volume Flow Rate (fl oz imp/s)
	imperial gallons per minute	Ukgal/min	Water Volume Flow Rate Supply (gal imp/min) Water Volume Flow Rate Return (gal imp/min) Water Volume Flow Rate (gal imp/min) Wastewater Volume Flow Rate (gal imp/min)
Flow Rate Mass			
		g/s	
		lb/s	
		oz/s	
		g/min	
		g/h	
		lb/min	
		Uston/h	
Force			
		N	
		lbf	
Frequency			
		Hz	Frequency (Hz) Frequency (MHz) Frequency (kHz) Frequency (MHz)
		cycles/min	
		cycles/h	
		/s	
		/min	
		/h	
		%/s	

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
Grammage (GSM)			
		g/m²	Grammage (GSM) (g/m²) Grammage (GSM) (mg/m²) Grammage (GSM) (kg/m²) Grammage (GSM) (Mg/m²)
Heat Capacity			
		J/(g·C)	Specific Heat Capacity (J/(g deg C))
		Btu/(lb·F)	Specific Heat Capacity (BTU 59/(lb av deg F))
Heat Degree Days			
		°Cdays	Heating Degree Days Celsius
		°Fdays	Heating Degree Days Fahrenheit
Heat Flux			
		W/m²	
		Btu/(s·ft²)	
		W/ft²	
Heat Transfer Coefficient			
		W/(m²·K)	Heat Transfer Coefficient (W/(m^2 K))
		Btu/(s·ft²·K)	Heat Transfer Coefficient (BTU 59/(s ft^2 K))
Humidity			
		% Rh	Relative Humidity (Hour Interval) Air Relative Humidity Supply (percent) Air Relative Humidity Return (percent) Air Relative Humidity Mixed (percent) Weather Relative Humidity
Illuminance			
	lux	lx	Illuminance (lx) Illuminance (Mlx) Illuminance (Klx) Illuminance (Mlx) Global Horizontal Illuminance (Hour Interval) Direct Normal Illuminance (Hour Interval) Diffuse Horizontal Illuminance (Hour Interval)
		ft·cd	
	Candelas per sq. meter	H	Illuminance (H) Illuminance (mH) Illuminance (kH) Illuminance (MH)
Inductance			
	henry	H	
Length			
	meter	m	
	inch	in	

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
	foot	ft	
	yard	yd	
	mile	mile	
Linear Momentum			
	Newton Second	Ns	
Luminance			
	candelas per square meter	cd/m²	
Luminous Flux			
		lm	
Luminous Intensity			
		cd	
Magnetic Dipole Moment			
		A·m²	
Magnetic Field Strength			
		A/m	
Magnetic Flux			
		Wb	
Magnetic Flux Density			
		T	
Mass			
	gram	g	
	pound	lb	
	ounce	oz	
		carat	
		grains	
		USTon	
Mass Transfer Coefficient			
		(mol/(s·m²))/ (mol/m³)	
		(mol/(s·ft²))/ (mol/ft³)	
Mass Velocity			
		g/(s·m²)	
		lb/(s·ft²)	
Moles			
	mole	mol	
		lbmol	
Moment of Inertia			

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
		g/m²	
		lb/ft²	
Momentum			
		g·m/s	
		lb·ft/s	
NoCategory			
		NoUnit	
		?	
Percent Obscuration			
		%/m	
		%/ft	
Percentage			
		%	Damper Position (percent) Valve Position (percent)
		ppm	CO_2 Concentration Indoor (ppm) CO_2 Concentration Outdoor (ppm)
		ppb	
Phase			
		deg	
Power			
		W	Active Power Phase B (kW) Active Power Phase A (kW) Active Power Phase C (kW)
		VA	Apparent Power Phase A (KVA) Apparent Power Phase B (KVA) Apparent Power Phase C (KVA)
		Btu/s	
		hp	
		Btu/h	Water Heat Flow Rate (BTU 59/h) Water Heat Flow Rate (BTU ISO/h) Energy Consumption Rate (BTU 59/h) Energy Consumption Rate (BTU ISO/h) Air Heat Flow Rate (BTU 59/h) Air Heat Flow Rate (BTU ISO/h) Natural Gas Energy Flow Rate (BTU 59/h) Natural Gas Energy Flow Rate (BTU ISO/h) Steam Heat Flow Rate (BTU 59/h) Steam Heat Flow Rate (BTU ISO/h)
		tons refrig	
Power Factor			
		cosf	Power Factor Signed Phase A Power Factor Signed Phase B Power Factor Signed Phase C
Power Reactive			

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
		var	Reactive Power Phase A (kvar) Reactive Power Phase B (kvar) Reactive Power Phase C (kvar)
Pressure			
		N/m²	Air Pressure (N/m^2) Natural Gas Pressure (N/m^2) Steam Pressure (N/m^2) Water Pressure Supply (N/m^2) Water Pressure Return (N/m^2) Water Pressure (N/m^2)
		Pa	Air Pressure (Pa) Natural Gas Pressure (Pa) Steam Pressure (Pa) Water Pressure Supply (Pa) Water Pressure Return (Pa) Water Pressure (Pa) Water Pressure Differential (kPa)
		psi	Air Pressure psi Natural Gas Pressure (psi) Steam pressure (psi) Water Pressure Supply (psi) Water Pressure Return (psi) Water Pressure (psi)
		mHg	Air Pressure (m Hg) Natural Gas Pressure (N/m^2) Steam Pressure (N/m^2) Water Pressure Supply (N/m^2) Water Pressure Return (N/m^2) Water Pressure (N/m^2
		inH_20	Air Pressure (in H2O) Natural Gas Pressure (in H2O) Steam Pressure (in H2O) Water Pressure Supply (in H2O) Water Pressure Return (in H2O) Water Pressure (in H2O)
		bar	Air Pressure (bar) Natural Gas Pressure (bar) Steam Pressure (bar) Water Pressure Supply (bar) Water Pressure Return (bar) Water Pressure (bar) Water Pressure Differential (bar) Air Pressure Absolute (bar)
		mH_20	Air Pressure (m H2O) Natural Gas Pressure (m H2O) Steam Pressure (m H2O) Water Pressure Supply (m H2O) Water Pressure Return (m H2O) Water Pressure (m H2O)
		inHg	Air Pressure (in Hg) Natural Gas Pressure (in Hg) Steam Pressure (in Hg) Water Pressure Supply (in Hg) Water Pressure Return (in Hg) Water Pressure (in Hg)
		db (SPL)	Sound Pressure Level (dB)

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
Pressure Drop Per Length			
		Pa/m	Air Pressure Drop Per Length (Pa/m) Natural Gas Pressure Drop Per Length (Pa/m) Steam Pressure Drop Per Length (Pa/m) Water Pressure Supply Drop Per Length (Pa/m) Water Pressure Return Drop Per Length (Pa/m) Water Pressure Drop Per Length (Pa/m)
		psi/ft	Air Pressure Drop Per Length (psi/ft) Natural Gas Pressure Drop Per Length (psi/ft) Steam Pressure Drop Per Length (psi/ft) Water Pressure Supply Drop Per Length (psi/ft) Water Pressure Return Drop Per Length (psi/ft) Water Pressure Drop Per Length (psi/ft)
Resistance			
	ohm	Ω	Resistance
Resistivity			
	ohm meter	Ωm	
Specific Entropy			
		J(g·K)	
		Btu/(lb·R)	
		J/(kg·K)	
Specific Humidity			
		g H_2O/kg dry air	
Specific Volume			
		m^3/g	
		ft^3/lb	
Surface Energy Density			
		J/m^2	
		J/ft^2	
		W/(h·m^2)	
		W/(h·ft^2)	
Surface Tension			
		N/m^2	
		lbf/ft	
Temperature			

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
		°C	Weather Temperature Celsius Water Temperature (deg C) Water Temperature Supply (deg C) Water Temperature Return (deg C) Water Temperature Mixed (deg C) Air Temperature (deg C) Air Temperature Return (deg C) Air Temperature Supply (deg C) Steam Temperature (deg C) Compressed Air Temperature (deg C) Natural Gas Temperature (deg C) Steam Temperature (deg C) Ambient Temperature Celsius Temperature Celsius
		K	
		°F	Weather Temperature Fahrenheit Water Temperature (deg F) Water Temperature Supply (deg F) Water Temperature Return (deg F) Water Temperature Mixed (deg F) Air Temperature (deg F) Air Temperature Return (deg F) Air Temperature Supply (deg F) Steam Temperature (deg F) Compressed Air Temperature (deg F) Natural Gas Temperature (deg F) Steam Temperature (deg F) Ambient Temperature Fahrenheit Temperature Fahrenheit
Temperature Diff			
		Δ°C	Weather Temperature Differential (deg C) Water Temperature Differential (deg C) Water Temperature Supply Differential (deg C) Water Temperature Return Differential (deg C) Water Temperature Mixed Differential (deg C) Air Temperature Differential (deg C) Steam Temperature Differential (deg C) Temperature Differential (deg C) Ambient Temperature Differential (deg C)
		ΔK	
		Δ°F	Weather Temperature Differential (deg F) Water Temperature Differential (deg F) Water Temperature Supply Differential (deg F) Water Temperature Return Differential (deg F) Water Temperature Mixed Differential (deg F) Air Temperature Differential (deg F) Steam Temperature Differential (deg F) Temperature Differential (deg F) Ambient Temperature Differential (deg F)
Temperature Rate of Change			

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
		°C/min	Air Temperature Mixed Rate of Change (deg C/min) Air Temperature Rate of Change (deg C/min) Air Temperature Return Rate of Change (deg C/min) Air Temperature Supply Rate of Change (deg C/min) Ambient Temperature Rate of Change (deg C/min) Steam Temperature Rate of Change (deg C/min) Temperature Rate of Change (deg C/min) Water Temperature Mixed Rate of Change (deg C/min) Water Temperature Rate of Change (deg C/min) Water Temperature Return Rate of Change (deg C/min) Water Temperature Supply Rate of Change (deg C/min) Weather Temperature Rate of Change (deg C/min
		K/min	
		°F/min	Air Temperature Mixed Rate of Change (deg F/min) Air Temperature Rate of Change (deg F/min) Air Temperature Return Rate of Change (deg F/min) Air Temperature Supply Rate of Change (deg F/min) Ambient Temperature Rate of Change (deg F/min) Steam Temperature Rate of Change (deg F/min) Temperature Rate of Change (deg F/min) Water Temperature Mixed Rate of Change (deg F/min) Water Temperature Rate of Change (deg F/min) Water Temperature Return Rate of Change (deg F/min) Water Temperature Supply Rate of Change (deg F/min) Weather Temperature Rate of Change (deg F/min)

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
		°C/h	Air Temperature Mixed Rate of Change (deg C/h) Air Temperature Rate of Change (deg C/h) Air Temperature Return Rate of Change (deg C/h) Air Temperature Supply Rate of Change (deg C/h) Ambient Temperature Rate of Change (deg C/h) Steam Temperature Rate of Change (deg C/h) Temperature Rate of Change (deg C/h) Water Temperature Mixed Rate of Change (deg C/h) Water Temperature Rate of Change (deg C/h) Water Temperature Return Rate of Change (deg C/h) Water Temperature Supply Rate of Change (deg C/h) Weather Temperature Rate of Change (deg C/h)
		K/h	
		°F/h	Air Temperature Mixed Rate of Change (deg F/h) Air Temperature Rate of Change (deg F/h) Air Temperature Return Rate of Change (deg F/h) Air Temperature Supply Rate of Change (deg F/h) Ambient Temperature Rate of Change (deg F/h) Steam Temperature Rate of Change (deg F/h) Temperature Rate of Change (deg F/h) Water Temperature Mixed Rate of Change (deg F/h) Water Temperature Rate of Change (deg F/h) Water Temperature Return Rate of Change (deg F/h) Water Temperature Supply Rate of Change (deg F/h) Weather Temperature Rate of Change (deg F/h)
Thermal Conductance			
		W/(m²·K)	
Thermal Conductivity			
		W/(m²·K/m)	Air Thermal Conductivity (W/(m K)) Water Thermal Conductivity (W/(m K)) Steam Thermal Conductivity (W/(m K)) Natural Gas Thermal Conductivity (W/(m K))

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
		Btu/(h·ft²·F/ft)	Air Thermal Conductivity (BTU 59/(h ft deg F)) Water Thermal Conductivity (BTU 59/(h ft deg F)) Steam Thermal Conductivity (BTU 59/(h ft deg F)) Natural Gas Thermal Conductivity (BTU 59/(h ft deg F))
Thermal Linear Expansion			
		m/C	
		in/F	
		ft/F	
Thermal Pressure			
		psi/ºF	
Thermal Volume Expansion			
		m³/C	
		in³/F	
		ft³/F	
Thermoelectric Power			
		V/K	
Time			
		year	
		month	
		week	
		day	
		h	
		min	
		s	
Time Accuracy			
		s/h	
Torque			
		Nm	
		lbf·in	
		lbf·ft	
Turbidity			
		NTU	
Velocity			
		m/s	Air Velocity (m/s)
		m/h	Air Velocity (m/h)
		mile/h	Air Velocity (mile/h)

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
		ft/s	Air Velocity (ft/s)
		ft/min	Air Velocity (ft/min)
		m/min	Air Velocity (m/min)
Velocity Angular			
	radians per second	rad/s	
	revolutions per minute	RPM	
Voltage			
		V	Average Voltage Line-to-Neutral Voltage Phases AB Voltage Phases BC Voltage Phases CA Voltage Phases AN Voltage Phases BN Voltage Phases CN
Volume			
		m^3	Air Volume (m^3) Steam Volume (m^3) Wastewater Volume (m^3) Water Volume (m^3) Natural Gas Volume (m^3)
		in^3	
		ft^3	Air Volume (cubft) Steam Volume (cf) Wastewater Volume (cf) Water Volume (cf) Gas Volume (cf)
		Usgal	Wastewater Volume (gal) Water Volume (gal)
		litre	Wastewater Volume (L) Water Volume (L)

Configuring the PME EWS server for HTTPS

By default, the EWS server in PME is configured for HTTP client connections.

To configure the EWS server for HTTPS client connections:

1. On the PME server, open the `web.config` file for editing, for example in Notepad. You can find this file in `...\Power Monitoring Expert\applications\EWS`.
2. Search for the `<binding name="DataExchange_BP11Binding">` element in the file. Find the `<httpTransport ... />` child element and change it to `<`**`https`**`Transport ... />`.
3. Search for the `<behavior name="DataExchange_BP11Behavior">` element in the file. Find the `<serviceMetadata httpGetEnabled="true" />` child element and add the `httpsGetEnabled="true"` attribute. After the change the element should look like this: `<serviceMetadata httpGetEnabled="true" httpsGetEnabled="true"/>`.
4. Save the `web.config` file. Close the file.
5. Restart Internet Information Services (IIS) on this computer.

Configuring the PME EWS server regional setting

By default, the EWS regional setting in PME is set to use the PME system culture.

NOTE: For system to system data exchange using EWS, set the regional setting to **INVARIANT**.

To configure the EWS server regional setting:

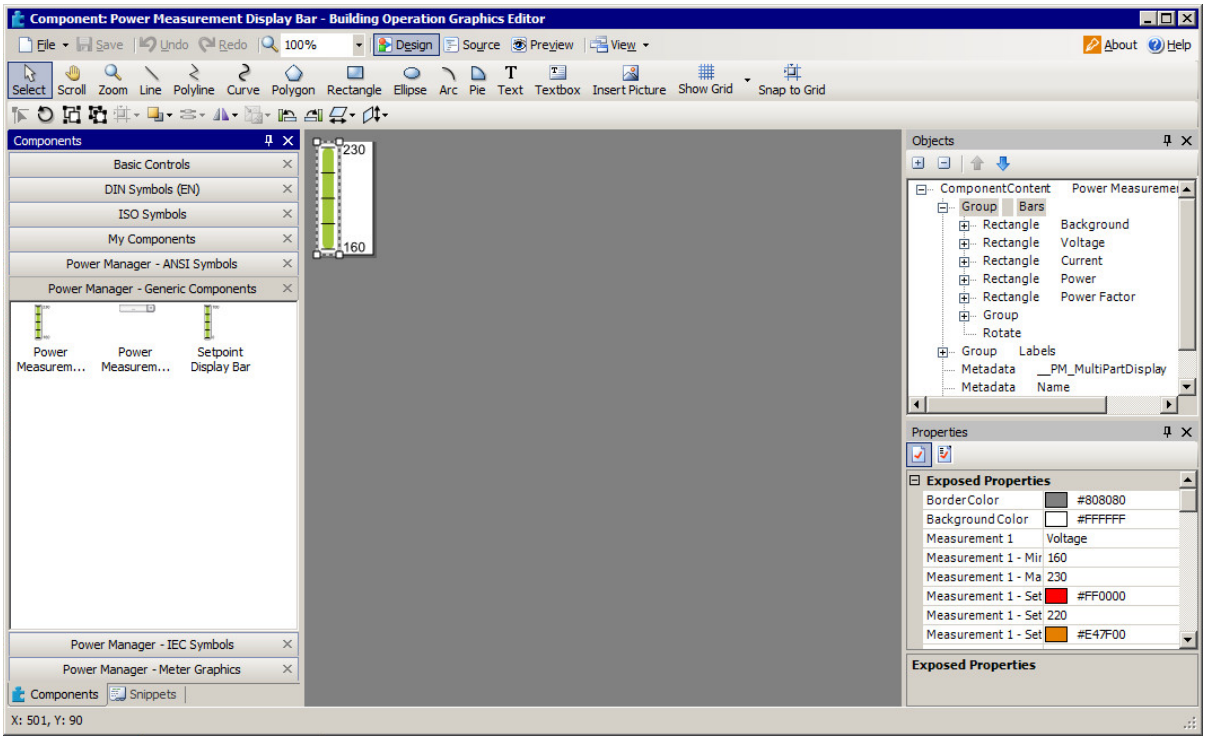
1. On the PME server, open the `web.config` file for editing, for example in Notepad. You can find this file in `...\Power Monitoring Expert\applications\EWS`.
2. Search for the `<add key="RegionalSetting" value="" />` element in the file.
3. Set the value property to a valid regional setting (for example **en-US**, **en-CA**, **fr-FR**, **de-DE**, and so on), or to **INVARIANT**.
4. Save the `web.config` file.
5. Close the file.
6. Restart Internet Information Services (IIS) on this computer.

Deploying and configuring a Multi-input Setpoint Display Bar graphic component

You can create and deploy a Multi-input Setpoint Display Bar graphic component in the Graphics Editor, and then bind and view the graphic object in Building Operation Workstation.

To create the graphic component:

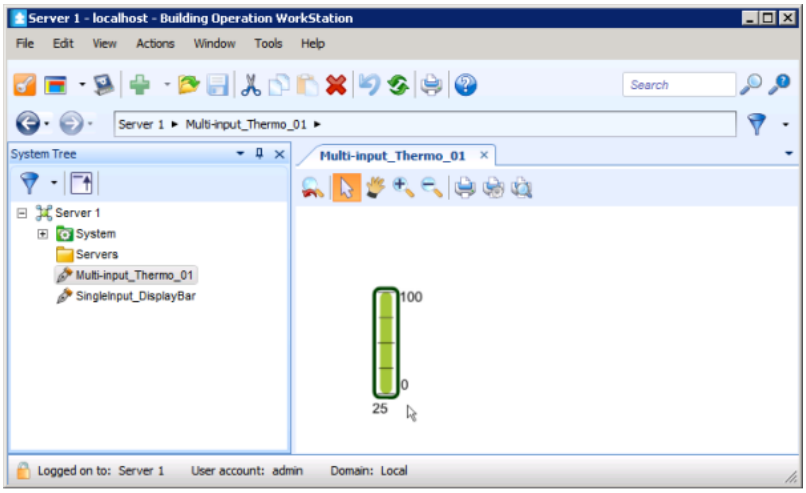
1. Navigate to: `<Extract path>\SBO Components\Graphics Editor\Components\` and double-click the " Energy Expert- Generic Components" file. The new thermometer graphic component is added to the Building Operation Graphics Editor library.
2. Open the Building Operation Graphics Editor.
3. From the Energy Expert– Generic Components category at the left, drag the Power Measurement Display Bar component onto a new page. The Multi-input Setpoint Display Bar component appears.



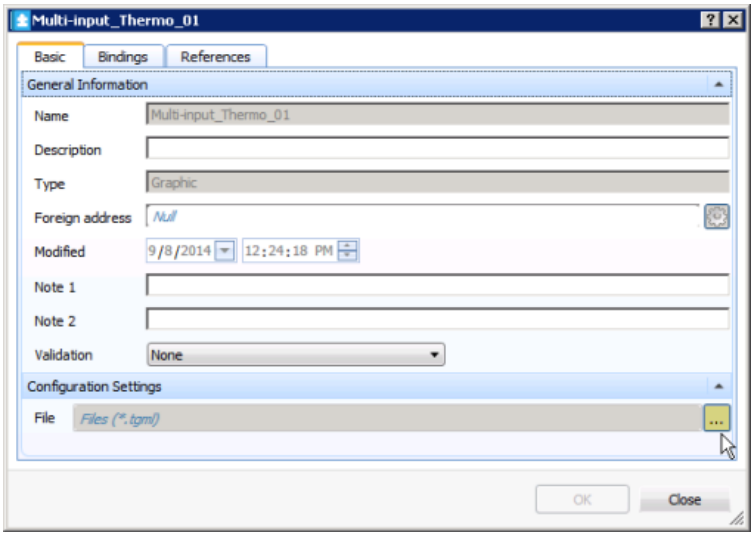
4. Select the component. In the Properties pane at the lower right, change the parameter settings as needed (name, min/max, setpoint values, and so on). Make sure that the settings make logical sense (for example, all setpoints are within the min/max range and in the following order: SP4>SP3>SP2>SP1).
5. Save the new graphic component page as a .tgml file.

To deploy the graphic component:

1. Log in to Building Operation Workstation.
2. In the System Tree, select a Server, and then choose File > New > Graphic, enter a name for the file, and click Create. The new graphic file name appears in the System Tree.



3. In the System Tree, right-click the graphic file name and select Properties.
4. In the Basic tab, click the button next to the File field and navigate to the .tgml file, select the file, click Open and then OK. The Multi-input Setpoint Display Bar now appears in the Building Operation Workstation.



5. In the System Tree, select the Server, and then choose **New > Value**. The Create Object dialog appears. Repeat the above steps four times to create four new values.
6. Select Analog Value and complete the fields for Name, Location, and Description as needed, and then click Create for each new value. The four new Analog Values now appear.
7. For each value, double-click the name after adding it. Click the up or down arrows to select a number, and then click the Value button to select Forced or Force value for the object. Click Yes to save the object.
8. To bind the graphic object to the value you just created, in the System Tree, right-click the graphic file name and select Properties.
9. In the Bindings tab, enter the location of the graphic object in the object value field and click OK. The Multi-input Setpoint Display Bar now shows the preset setpoint values and bound values. The reading bar height and color change accordingly.

To verify the bind of the graphic component:

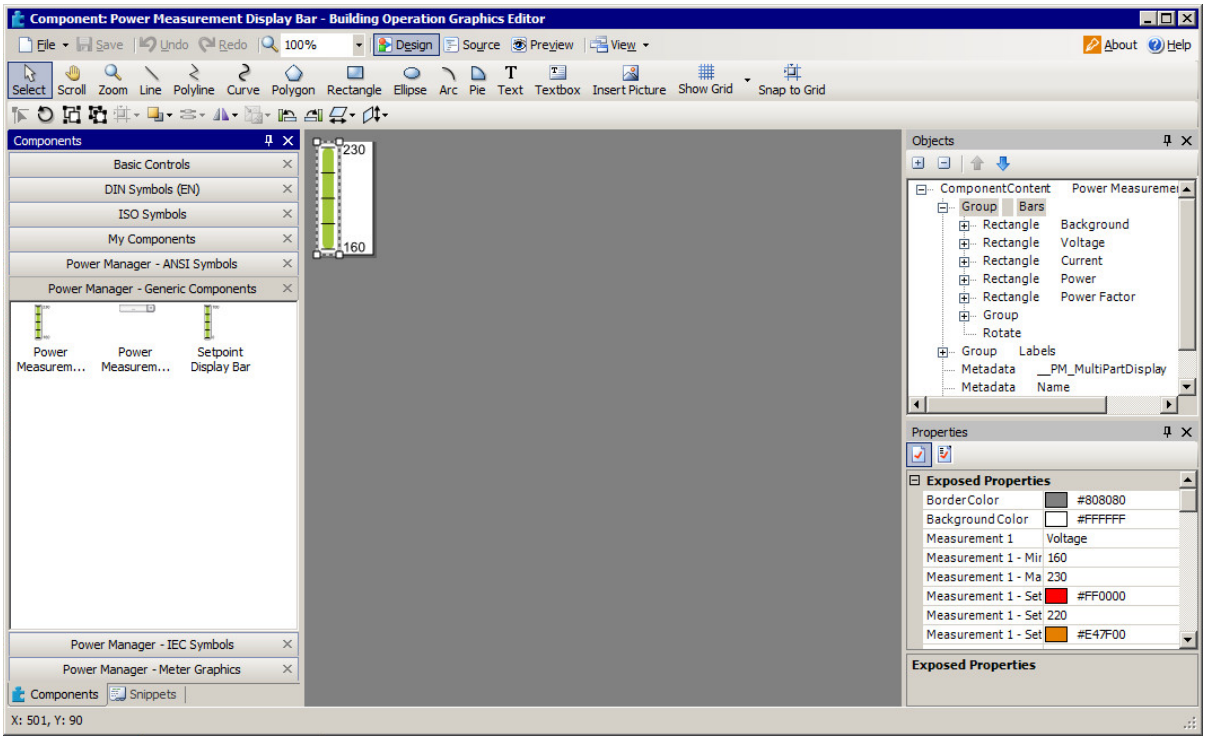
1. In the System Tree, right-click on the new graphic file name and click Edit. The Graphics Editor opens.
2. Revise some graphic component parameters (for example, min/max, setpoint values, or colors), save the file, and return to Building Operation Workstation. Your changes appear on the Graphics page in Building Operation Workstation.

Deploying and configuring a Single-input Thermometer graphic component

You can create and deploy a Single-input Thermometer graphic component in the Graphics Editor, and then bind and view the graphic object in Building Operation Workstation.

To create the graphic component:

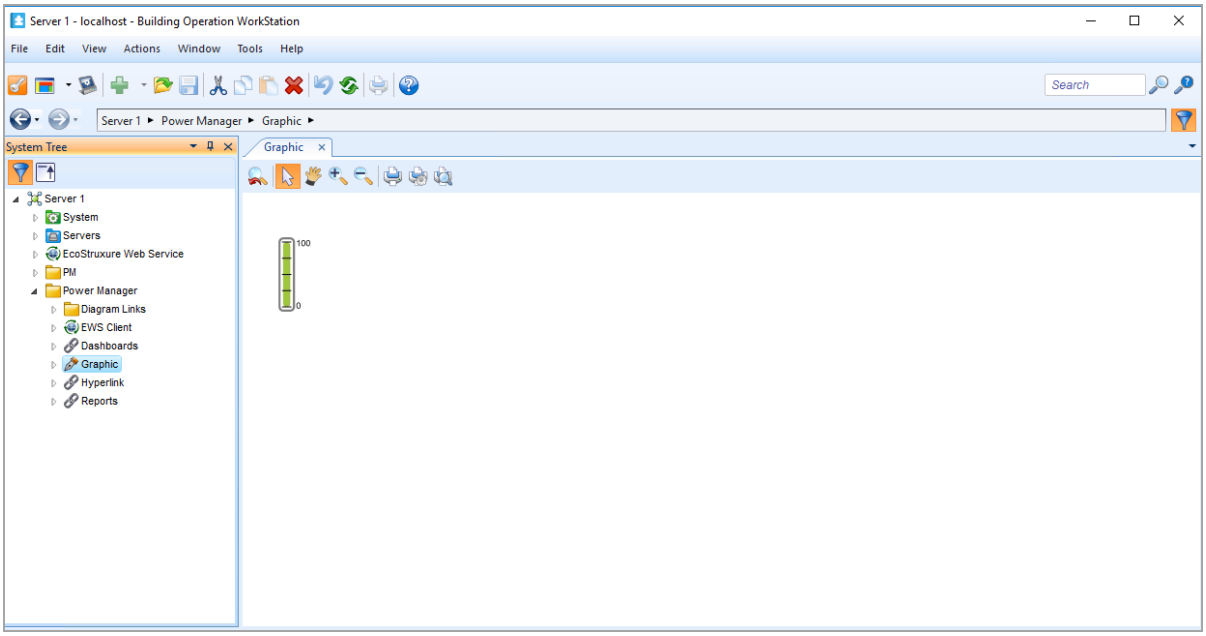
1. Navigate to: `<Extract path>\SBO Components\Graphics Editor\Components\` and double-click the "Power Module - Generic Components" file. The new thermometer graphic component is added to the Building Operation Graphics Editor library.
2. Open the Building Operation Graphics Editor.
3. From the Energy Expert– Generic Components category at the left, drag the Setpoint Display Bar component onto a new page. The Single-input Thermometer bar component appears.



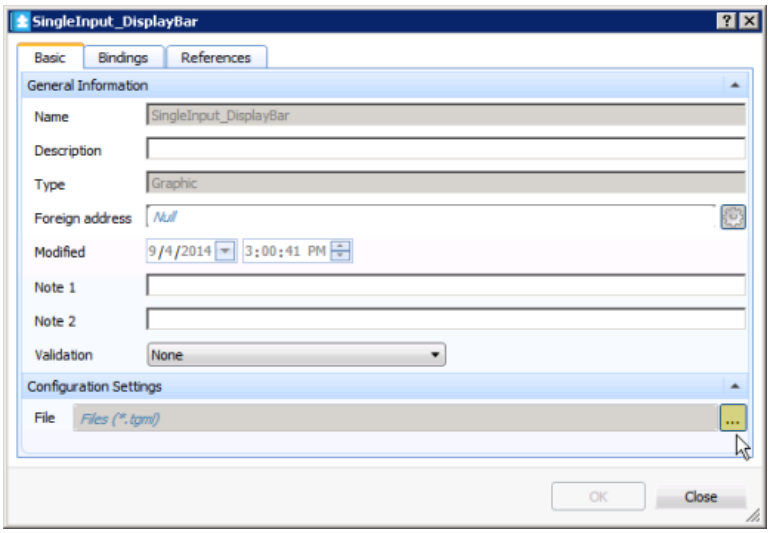
4. Select the component. In the Properties pane at the lower right, change the parameter settings as needed (name, min/max, setpoint values, and so on). Make sure that the settings make logical sense (for example, all setpoints are within the min/max range and in the following order: SP4>SP3>SP2>SP1).
5. Save the new graphic component page as a .tgml file.

To deploy the graphic component:

1. Log in to Building Operation Workstation.
2. In the System Tree, select a Server, and then choose File > New > Graphic, enter a name for the file, and click Create. The new graphic file name appears in the System Tree.



3. In the System Tree, right-click the graphic file name and select Properties.
4. In the Basic tab, click the button next to the File field and navigate to the .tgml file, select the file, click Open and then OK. The Single-input Thermometer bar now appears in the Building Operation Workstation.



5. In the System Tree, select the Server, and then choose **New > Value**. The Create Object dialog appears.
6. Select Analog Value and complete the fields for Name, Location, and Description as needed, and then click Create. The Analog Value now appears.
7. Double-click the value name after adding it. Click the up or down arrows to select a number, and then click the Value button to select Forced or Force value for the object. Click Yes to save the object.
8. To bind the graphic object to the value you just created, in the System Tree, right-click the graphic file name and select Properties.

9. In the Bindings tab, enter the location of the graphic object in the object value field and click OK. The Single-input Thermometer bar now shows the preset setpoint values and bound values. The reading bar height and color change accordingly.

To verify the bind of the graphic component:

1. In the System Tree, right-click on the new graphic file name and click Edit. The Graphics Editor opens.
2. Revise some graphic component parameters (for example, min/max, setpoint values, or colors), save the file, and return to Building Operation Workstation. Your changes appear on the Graphics page in Building Operation Workstation.

Exposing custom device driver measurements through EWS

If you create a custom device driver in PME using the Device Type Editor tool, you need to take extra steps to expose the measurements from this device through EWS. The default device drivers in PME and many of the downloadable add-on drivers have their measurements exposed by default.

⚠ WARNING

INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

To expose custom measurements from a custom device type through EWS:

1. Create a DTE driver. In this example, a driver file was created for “My_DTE” device with two registers, “My_Label_1” and “My_Label_2”.
2. Go in the following folder: `C:\Program Files (x86)\Schneider Electric\Power Monitoring Expert\system\WebServices\Extensions`.
3. Select any XML file (for example: “Types_Measurements_8000.xml”), copy and paste it to the same folder. Rename it to the newly created DTE "Device Type" name, “My_DTE.xml”
4. Open the XML file with a file editor. The structure of the XML resembles the following:

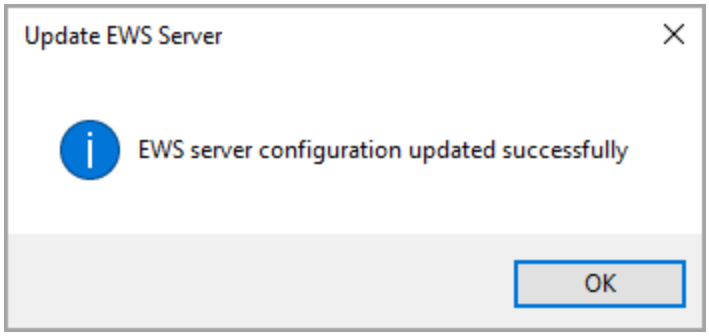
```
<?xml version="1.0"?>
<MeasurementStores xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xmlns:xsd="http://www.w3.org/2001/XMLSchema"> <Store
Name="8000" DisplayName="PM8000" Type="8000" SubType="Common">
...
...
<Measurement IONReferenceName="Active Energy Delivered"
MeasurementName="Real Energy Into the Load" MeasurementUnit="kWh"
Exposed="true" IsManual="false" Handle="22704" Format="double" />
<Measurement IONReferenceName="Active Energy Delivered Interval"
MeasurementName="Real Energy Into the Load Interval"
MeasurementUnit="kWh" Exposed="false" IsManual="false"
Handle="24483" Format="double" />
...
...
</Store>
</MeasurementStores>
```


5. Modify the bold sections like the following to match your "Device Type" name as well as your Register "Label". Make sure to change all the bold ones to what fits the new DTE, delete the "Handle" section and specify the format as necessary.

```
<?xml version="1.0"?>
<MeasurementStores xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xmlns:xsd="http://www.w3.org/2001/XMLSchema"> <Store
Name="My_DTE" DisplayName="My_DTE" Type="My_DTE" SubType="Common">
...
...
<Measurement IONReferenceName="My_Label_1" MeasurementName="My_
Label_1" MeasurementUnit="My_Unit_1" Exposed="true"
IsManual="false" Format="Boolean" />  <Measurement
IONReferenceName="My_Label_2" MeasurementName="My_Label_2"
MeasurementUnit="My_Unit_2" Exposed="true" IsManual="false"
Format="double" />
...
...
</Store>
</MeasurementStores>
```

NOTE: When editing the XML file, format “Boolean” should be used for all Boolean values and format “Double” for all analog values.

6. After completing the new xml file, go to Management Console > Tools > System and click **Update EWS Server**. It will take some time for the server to propagate the change via web service. An IIS and/or computer restart might even be required.



7. The custom registers/measurements are now expose via EWS. See Hosting EWS values in Building Operation for information on this topic.

Manual integration steps without using the Integration Utility

This section describes how to manually integrate Building Operation and PME without using the PME/EBO Integration Utility. Sometimes manual steps are more convenient for certain tasks, for example: making minor changes to the system. This section also describes how the Integration Utility works.

NOTE: The manual steps cannot fully replace the Integration Utility for an PME/EBO Integration deployment. When deploying the PME/EBO Integration, you must use the Integration Utility to create the Diagram links.

The following manual steps are described in this section:

- Creating PME users for Building Operation
- Creating Diagrams, Reports, and Dashboards links in Building Operation
- Hosting EWS values in Building Operation

Creating PME users for Building Operation

You need to create two different PME users for the integration with Building Operation:

1. A user for the EWS connection between the two applications.
2. A user for the Building Operation connection to the PME Web applications (Dashboards and Reports).

For information on how to create the EWS user, see Setting up EWS credentials.

For information on how to create the user to access the Web Applications, see "Adding a standard user" in the *EcoStruxure™ Power Monitoring Expert System Guide* or the PME Web Applications Help .

Creating Diagrams, Reports, and Dashboards links in Building Operation

Create links to the PME Diagrams, Reports, and Dashboards applications in Building Operation.

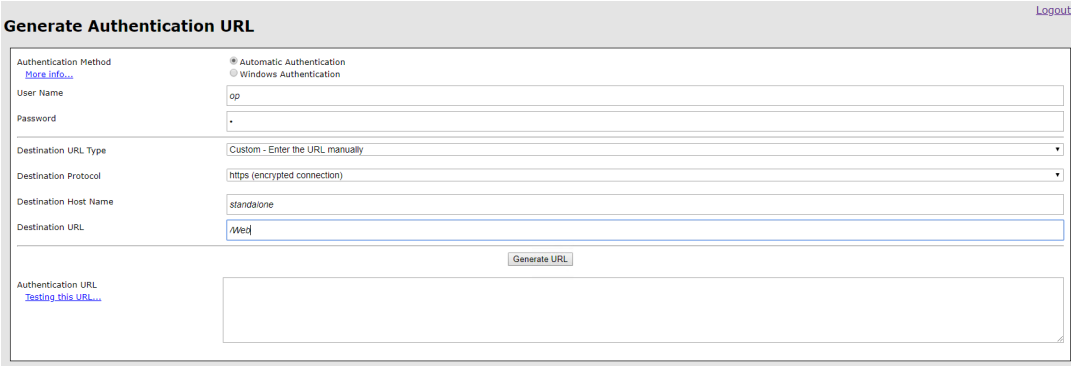
To create links in Building Operation:

1. On the PME database server, open Microsoft SQL Server Management Studio.
2. Run the following SQL script to enable the multi-use token:

   ```
   EXEC
   ApplicationModules.Configuration.WriteConfigurationValue 'Web
   Framework','Server','MultiUseTokenEnabled',NULL,'true',
   'GlobalSetting'
   ```

3. After the authentication is enabled, use a web browser to navigate to: `https://<YourServerName>/Web/MUT`.
4. Provide supervisor-level login information in the dialog and click **OK**. This opens the **Generate Authentication URL** page.

5. In Generate Authentication URL, enter the appropriate information.



Automatic Authentication: Provide the PME account login for an Operator level user account in the User name and Password fields.

Windows Authentication: Use the current Windows user account as a login. You must add this Windows user to PME. See User Manager for details on how to add a user in PME.

Destination URL Type: Leave the default settings.

Destination Protocol: Choose HTTP or HTTPS.

Destination Host Name: Enter the PME server name here. Use the fully-qualified server domain name.

Destination URL:
/Web for the PMEWeb Applications Settings page.
/Dashboard for the PME Dashboards page.
/Reporter for the PME Web Reports page.

6. Click **Generate URL**. The URL will appear in the **Authentication URL** box.
7. Log into Building Operation.
8. In Building Operation Workstation, create a new hyperlink for the URL generated in step 6 above.
9. Repeat steps 3 - 7 for each of the web applications.

Hosting EWS values in Building Operation

In order to integrate values from PME with Building Operation, you must:

1. Create the EWS interface in Building Operation Workstation.
2. Host the PME values for that interface.

Configuring the EWS Server

Before you create an EWS interface in Building Operation Workstation, you must first enable the EWS service. (The EWS service is disabled by default in PME.)

To enable the EWS service:

1. Navigate to `...\"Power Monitoring Expert Folder"\ Applications\EWS\`
2. Open `Web.Config` in a text editor, such as Notepad.
3. Search for `<add key="EWSEnabled" value="0" />` and change the value from "0" to "1". (Conversely, to disable the EWS service, change the value from "1" to "0".)
4. Search for `<add key="RealTimeRefreshRate" value="20" />` and make sure the value is set to "20".
5. Save and close `>Web.config`. The EWS service is now enabled and with the correct refresh rate. (The service can be enabled or disabled at any time by editing the `Web.config` file.)

Updating the EWS server

To update the EWS server in PME:

NOTE: Run Management Console as Administrator user. To do this, right-click the Management Console program icon and select **Run as administrator** from the context menu. If you do not run it as Administrator, then certain tools such as **Update EWS Server** are not functional.

1. Open Management Console.
2. Select **Tools > System > Update EWS Server**. A dialog box appears, indicating that the update to EWS server configuration is successful.
3. Click OK.

NOTE: For any changes in the PME Management Console, such as adding a new device or renaming an existing device, you must 1) update the EWS server, and 2) regenerate a Vista Diagram before using the Integration Utility.

Modifying which measurements EWS Server exposes by default

NOTE: The following step is optional, however, it becomes necessary if you want to change the list of measurements that the EWS server exposes by default.

The EWS Server relies on two control files to define which devices are exposed and which measurements are exposed for those devices.

- The following file contains the list of all PME devices:

  ```
  ...\<Power Monitoring Expert
  Folder>\config\WebServices\Devices.Measurements.xml
  ```

  If you do not want a device to be exposed, delete the complete line of an entry.

- The following file contains the list of measurement exposed for all supported devices types:

  ```
  ...\<Power Monitoring Expert
  Folder>\config\WebServices\Types.Measurements.xml
  ```

  To expose or un-expose a specific measurement for a specific device type, do the following:

  a. Browse to that specific device type.

  b. Identify the measurement you wish to expose.

  c. Set the “Exposed” parameter to “true” to expose or "false" to un-expose.

d. Set the “IsManual” parameter to “true”.

If you do not set “IsManual” to true, the next time you run Update EWS Server from the Management Console, your configuration will be overwritten by the system default.

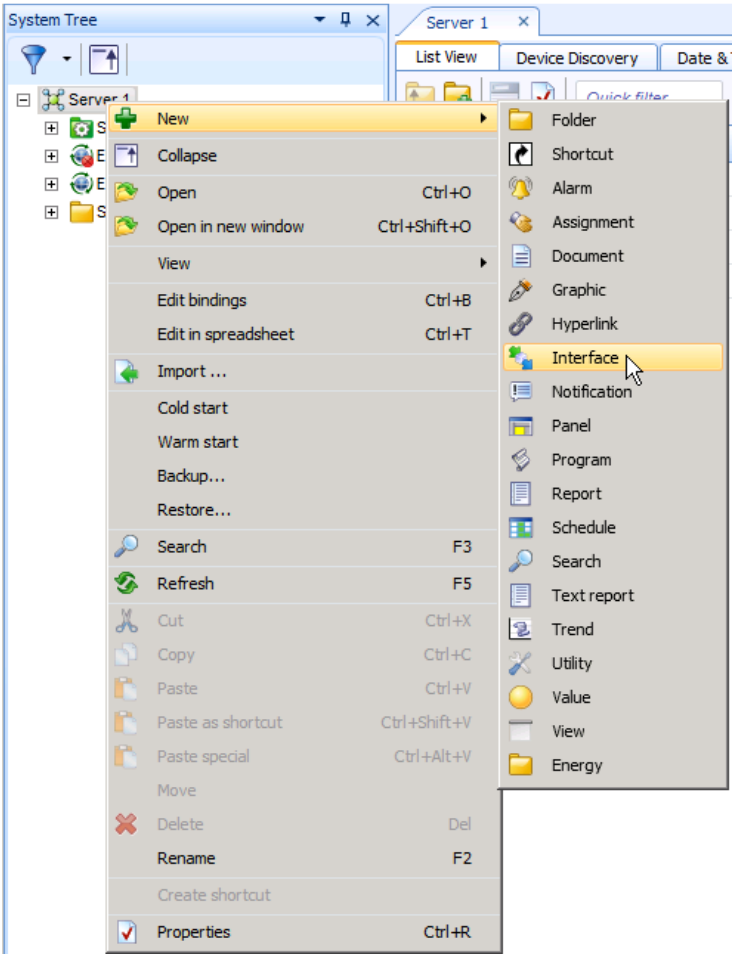
e. When you finish, select **Tools > System > Update EWS Server** to make the changes.

Creating and hosting the EWS interface in Building Operation Workstation

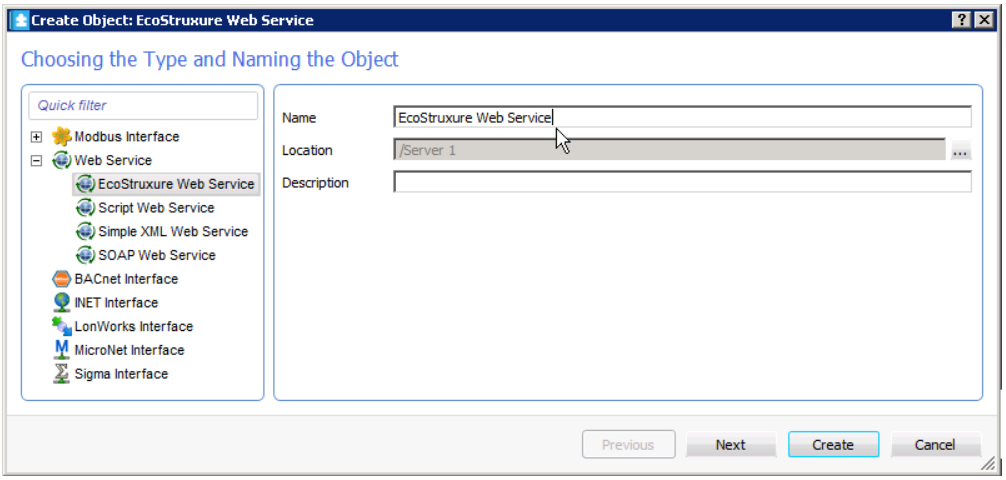
You can manually create the EWS interface in Building Operation Workstation and then host PME values so that you can browse those values from within Building Operation Workstation.

To manually create a new EWS web service interface:

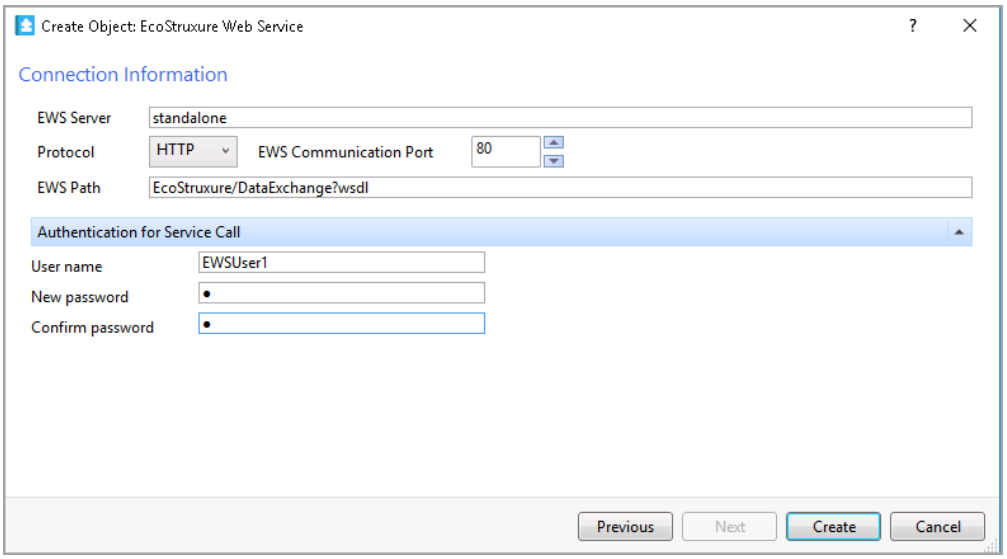
1. Log in to Building Operation.
2. In the System Tree, right-click on Server, and then click New > Interface.



The Create Object: EcoStruxure Web Service dialog appears.



3. Enter a name and description for the new web interface in the respective fields and click Next. The Connection Information dialog appears.



4. Enter the server name or the IP address where PME is hosted in the EWS Server field.
5. Leave unchanged the values for Protocol and EWS Communication Port.
6. Enter EWS/DataExchange.svc?wsdl in the EWS Path field.
7. Enter the same User name and Password that you created for EWS.
8. Click Create. The new web service now appears in the System Tree. Next, proceed to host the new web service.

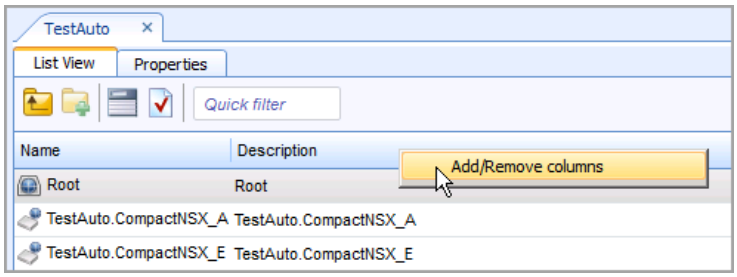
To manually host the new EWS web service:

1. In the System Tree, navigate to and expand the Hardware folder.
2. Expand, and then select the newly-created interface for which you want to host values.
3. Right-click Root or any underlying level/devices and choose Host EWS Objects. The Select EWS Interface dialog appears.

4. Choose the appropriate interface location, and then click Select.
   - Depending on the number of devices and measurements, this task can take up to an hour.
   - Repeat this step for any item you want to host.
   - The web service is now hosted and appears in the System Tree.
5. After the hosting completes, click the new EWS web service and browse the values in the List View tab at the right.

To add additional columns of values in the List View tab:

1. In the List View tab, right-click on the Name/Description heading and select Add/Remove columns.



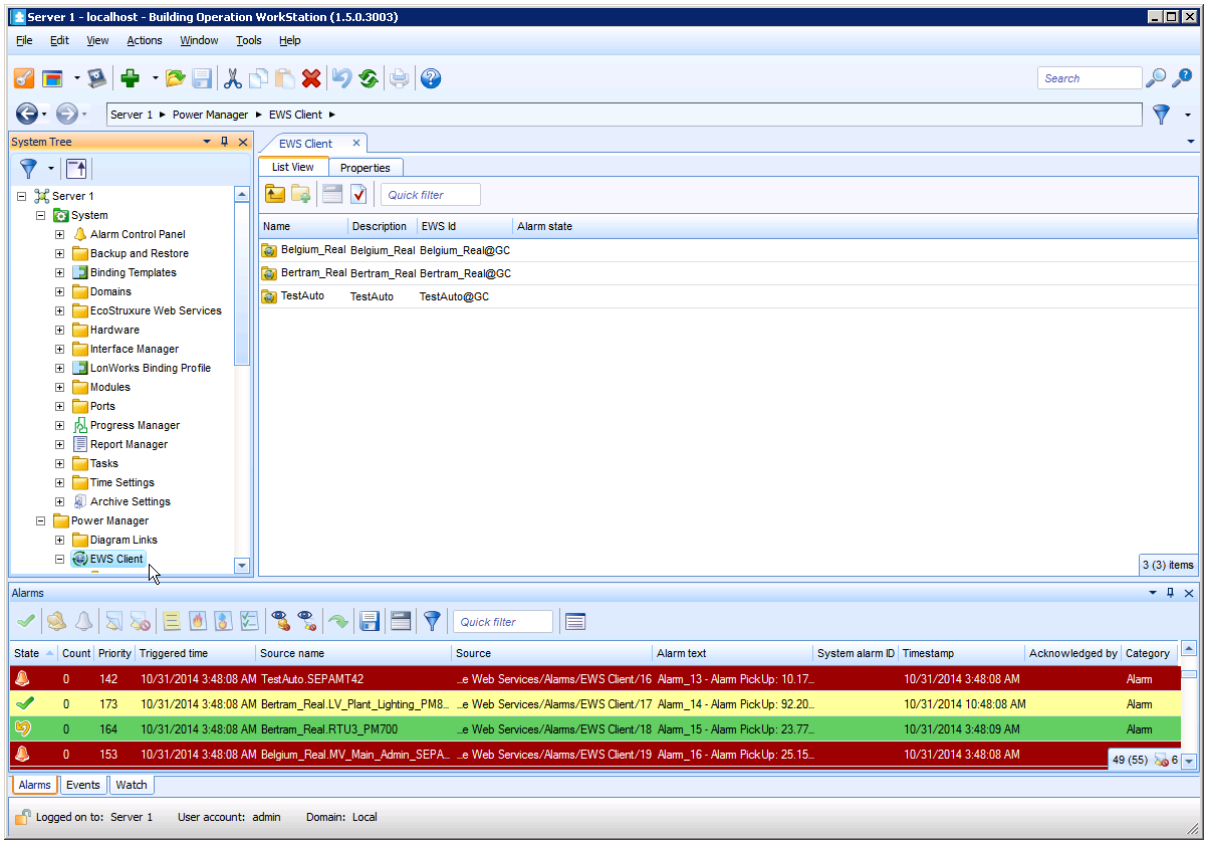
2. Select the check box next to any column type you want to add to the List View, and then click OK. The new column types and their respective values now appear in the List View tab.

NOTE: If you find that some measurements for a device are missing from the list of measurements, do the following:
Check to make sure that all of the measurements you want for that device are exposed; refer to "Modifying which measurements EWS Server exposes by default".
If all of the measurements you want for the device are exposed but still do not appear in the list of measurements, and then you will need to repeat the procedure to create and host the EWS interface. (PME takes some time between enabling the EWS server and when the EWS client shows the exposed measurements.) See "Creating and hosting the EWS interface in Building Operation Workstation".

NOTE: If you find that EWS measurements are displayed in an incorrect format, check and edit the EWS regional setting. See Configuring the PME EWS server regional setting for more information.

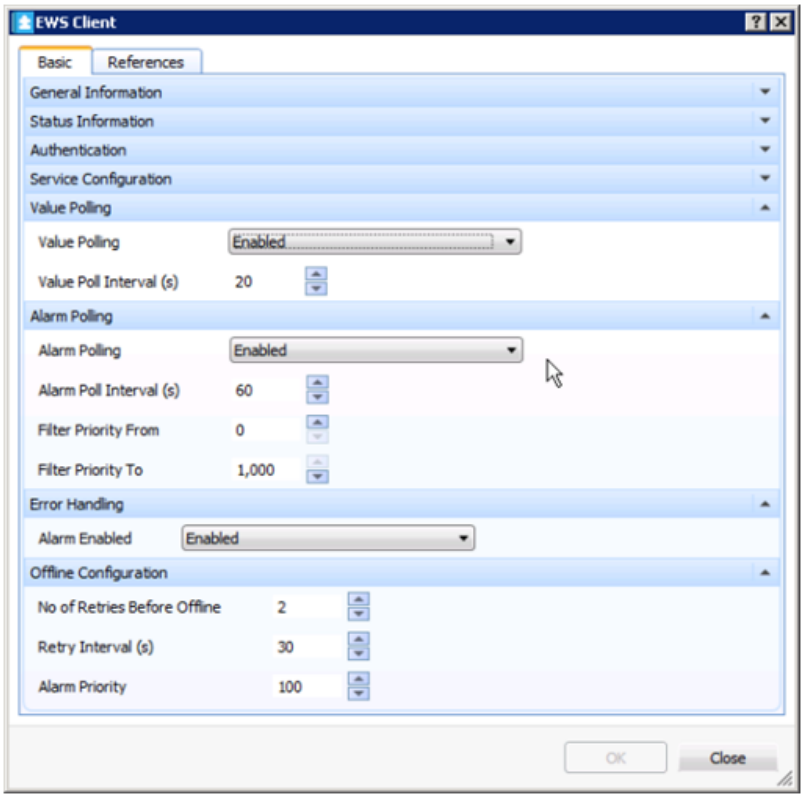
Configuring Alarms

1. Log in to Building Operation.



2. Alarms for Architecture 2 are automatically enabled after they are imported and can be viewed along with all other alarms within the Alarms pane at the bottom of the dialog.
3. To configure the alarms associated with the devices for the EWS Client, in the System Tree,

right click on EWS Client and select Properties. The EWS Client dialog appears.



4. Complete the various fields and select the options you want on this dialog, and then click OK. The system saves your configuration changes.

The Building Operation “Sum Alarm” is an ideal way to leverage alarms flowing from EWS. It allows the users to create actions and notifications on filtered PME alarms. Refer to the EcoStruxure Building Operation System Reference Guide for more information.

Terms and definitions

Activation ID: Each license definition has one or more features included in a specific license type. An activation ID allows you to license the features included in that license type. Any number of Activation ID's can be activated in the Floating License Manager at the same time.

American National Standards Institute (ANSI): The primary organization for the development of technology standards in the United States. ANSI works with industry groups and is the U.S. member of the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC).

EcoStruxure Building Operation: An integration platform for monitoring, control, and management of energy, lighting, fire safety, security and HVAC of buildings.

Entitlement ID: A new entitlement is generated for each Purchase Order. The entitlement is sent by email and will include all the Activation ID's.

FlexNet Operations Portal: The web portal hosted by Schneider Electric (http://schneider-electric.com/licensing) where the licenses are registered during activation. During an on-line activation, the Floating License Manager will connect to the FlexNet Operations Portal automatically. However, during an off-line activation, the user will need to connect to the FlexNet Operations Portal from an alternate PC or a smart phone.

FlexNet Publisher: A web interface hosted on the Power Monitoring Expert server for configuring licensing components. The URL is http://localhost:8090 and the service is called "ImadminSchneider".

Floating License Manager: All Power Monitoring Expert licenses are activated here. The Floating License Manager will also indicate the current state of licenses (active or untrusted).

HTTP: This protocol is not secure and is subject to "man-in-the-middle" and eavesdropping attacks that can allow attackers to gain access to website accounts and sensitive information.

HTTPS: This protocol provides secure communication over a computer network, with especially wide deployment on the Internet. It results from layering the Hypertext Transfer Protocol (HTTP) on top of the SSL/TLS protocol, thus adding the security capabilities of SSL/TLS to standard HTTP communications. HTTPS provides authentication of the website and associated web server with which one is communicating and thereby protects against "man-in-the-middle" attacks. Additionally, HTTPS provides bidirectional encryption of communications between a client and server. HTTPS creates a secure channel over insecure, unencrypted networks, such as Wi-Fi networks. HTTPS is designed to withstand attacks and is considered secure against attacks (with the exception of older deprecated versions of SSL). The encryption within HTTPS is intended to provide benefits like confidentiality, integrity and identity. Your information remains confidential because only your browser and your server can decrypt the traffic. Integrity protects the data from being modified without your knowledge.

International Electrotechnical Commission (IEC): The primary organization for the development of International Standards and Conformity Assessment for all electrical, electronic and related technologies.

License Manager: This is where the Trial licenses can be viewed. Power Monitoring Expert licenses cannot be activated in the License Manager.

License Returns: Once activated, a license is “locked” to its host computer (physical or virtual), and therefore can only be activated on one machine at a time. Returning the license simply means reversing the activation process that is, “unlocking” the license from its host, thereby making it available to be activated again, either on another host or the same host. By default, licenses can only be returned once per calendar year. If necessary, the return limit can be increased by the Software Registration Center.

Management Console “About” Box: This is the first place to check to help ensure that the licensing components are functioning correctly. It will indicate which modules are licensed or made available through the Trial.

Software Registration Center (SRC): The Software Registration Center cannot troubleshoot licensing questions. You should not have to call the Software Registration Center for any licensing questions except if you have exceeded your return limit or the licenses have become untrusted. The Software Registration Center cannot issue new licenses.

Power Monitoring Expert: A power management software solution for energy suppliers and consumers. It allows you to manage energy information from metering and control devices installed in your facility or other remote locations. The product offers control capabilities and comprehensive power quality and reliability analysis to help you reduce energy-related costs.

Web security changes

The Generate Authentication URL page allows for generating destination URL types that can be used in Building Operation. This section provides instructions for enabling the page and describes the function of the various components.

User authentication

PME Web applications require user authentication to launch. There are multiple methods to access a PME Web application from inside another EcoStruxure supervisor software:

- **Manual PME Authentication:** The user must enter PME user credentials into a login window before a PME Web application can launch. These credentials are then cached for the rest of the PME session.
- **Automatic PME Authentication:** (less secure) Specific URL addresses are created for the target PME web application. When one of these PME URLs is used to launch a PME Web application from another supervisory software, PME automatically allows access without prompting the user to enter PME credentials. This method provides a seamless user experience, but it does not provide the security level of the Manual Authentication method. For security reasons, supervisor-level user names cannot be used.
- **Windows Authentication:** (more secure) Logs the user into PME using their current Windows credentials. This method provides a seamless user experience and is more secure.

NOTE: The Windows Authentication option is more secure but requires that Power Monitoring Expert has been configured with Windows Active Directory users and user groups.

When testing the generated authentication URL, test the URL in a separate browser session, not just in a separate tab in the current browser. Otherwise, your current login credentials may be used, or you may be logged out of this page altogether.

To open a new browser session in Internet Explorer, open the File menu and select New Session. If you are using Chrome, open a new incognito window.

Setting Up User Authentication with Windows Active Directory in Building Operation

TIP: For information on setting up user authentication with Windows Active Directory in PME, see Adding a Windows user and Adding a Windows group.

To link Windows Active Directory to a Building Operation Domain:

1. Log on to WorkStation
2. Open **Control Panel**
3. Click **Domains**
4. Click **Add**
5. Give it a name, then click **Next**
6. In the Authentication window, type the Active Directory Windows domain name (for example, Example.org). Click **Next**.
7. Do not add domain members. Click **Next**.

8. Leave the default Domain Policies of 9 login attempts
9. Click **Create**

To add the Active Directory user groups to the Building Operation Domain:

1. In the System view, right-click the Groups in the new Domain
2. Click **New > User Account Group**
3. Ignore the Users page. Click **Next**.
4. Add the default workspace. Click **Next**.
5. (optional) adjust the policies.
6. click ... for the Windows group name field.
7. Select the AD user group from the list and click **OK**.
8. Click **Create**.

To give the User Group permissions in Building Operation:

1. Open the user group.
2. Select the **Permissions** tab
3. Click + to add a path permissions line
4. Assign read permissions (or more, if needed).
5. Save the changes

To log on to WorkStation with a Windows account:

1. Log into Windows / Remote Desktop with the Windows user
2. Open WorkStation and enter your Windows credentials or select to log on as the currently signed-in Windows account. Click **Log on**.

Trends references

This section contains reference information related to configuring Trends.

Use the following links to find the content you are looking for:

Configuring a trend

Configuring a trend

Configuring General settings

To configure general settings:

1. In the Trend Setup dialog, on the **General** tab, enter a title for the trend.
2. To add a new data series, click **Add** under **Data Series**. This opens the Add Data Series dialog.
3. To edit an existing series, select it, and then click **Edit**. This opens the Edit Data Series dialog.
4. In Add (or Edit) Data Series, click a source in the **Sources** area to select it.

   You can select sources organized by Devices or Hierarchy Views. You can use the **Search Sources** field to find entries by source, group name, or a combination of group and source names.

   (Optional) Click **Show Advanced** to have the option of showing only Devices, only Hierarchy Views, or both.
5. For the selected source, expand a measurement type, for example **Voltage**, and click the specific measurement you want to include in your trend, for example **Voltage A-B**.

   The measurements are listed in alphabetical order by measurement category. You can use the **Search Measurements** field to find a specific measurement category or measurement.

   (Optional) Click **Show Advanced** to open options for filtering the measurements.

   Select **Display only Measurements with historical data** to narrow the measurement choices for the selected source.
6. (Optional) Select **Display Name** if you want to enter a series name of your choice for trend data purposes. By default, a series name is a combination of source and measurement information formatted as `group.source measurement`, for example `BldgA.meterA Voltage A-B`.
7. (Optional) Select **Display Units** and enter a unit description of your choice.
8. You can modify the following settings for each source measurement:
   - **Style**: select the color and line thickness from the available choices in the dropdown menus.
   - **Decimals**: select the number of decimal places for the data displayed in the legend.
   - **Plot on**: select **Right** or **Left Axis** for the location of the measurement values for the selected measurement.
   - **Overlay**: select the values that you want to overlay on the trend. By default, no items are selected. The selections are **Min**, **Max**, and **Mean**.
   - **Data Source**: select where to access the data for the trend. The options are to gather series data from the source in real-time, gather series data from the database as it is being logged, or gather real-time series data from the source and historical data from the database to fill the trend, if possible.

9. Click **OK** to save your changes and close the Add (or Edit) Data Series dialog and to return to the Trend Setup dialog.
10. Click **Add** to specify additional sources and measurements for the trend.
11. Select **Private Trend** to keep this trend private or clear the check box to make it public.

> **NOTE**: A public item is visible to all users in your user group. A private item is visible to you and any user in your user group with Edit permissions on this item type. See Default User Access Level Privileges and Customizing Access Level Privileges for details.

Configuring Axes settings

To configure axes settings:

1. In the Trend Setup dialog, on the **Axes** tab, enter a label for the axes in the **Title** field under **Right Axis (Primary)** or **Left Axis (Secondary)**.

   Axis titles only appear if you have configured at least one measurement series and it appears on the trend.
2. For **Right Axis (Primary)**, **Max Value** and **Min Value** are set to **Auto** by default.
   a. (Optional) Select **Fixed** and enter the maximum or minimum values in the respective input fields.
      i. When you select **Upper Threshold**:
         - Select a color from the color selector for area shading on the trend between the maximum value and the upper threshold value.
         - Enter a value for the upper threshold in the input field.

           Each time the latest data point of a measurement series occurs in an upper or lower threshold, the color defined for the threshold also colors the background of the measurement series in the legend.
      ii. When you select **Lower Threshold**:
         - Select a color from the color selector for area shading on the trend between the minimum value and the lower threshold value.
         - Enter a value for the lower threshold in the input field.

           If the latest data point of a measurement series occurs in an upper or lower threshold, the color defined for the threshold also colors the background of the measurement series in the legend.
   b. (Optional) Select **Target Line**, then select a color from the color selector and enter a value for the target line in the input field.

      You can select the **Target Line** independently from the **Upper Threshold** or **Lower Threshold** settings.
3. For **Left Axis (Secondary)**, **Max Value** and **Min Value** are set to **Auto** by default.

   For **Fixed** maximum or minimum, enter the values in the respective input fields.

Configuring Chart settings

To configure chart settings:

1. In the Trend Setup dialog, on the **Chart** tab, select the text size from the list.

   The text size property is applied to trend axis labels, the size of the legend, the legend text size, and trend data point tooltips.

   The default setting is **Medium**, and the choices are **Small**, **Medium**, or **Large**.

2. Select the position of the legend included in the trend display area from the list.

   The default setting is **Right**, which places the legend on the right side of the trend. The available choices are **Off**, **Left**, or **Right**.

3. Select the content that you want to include in the legend from the available settings.

   The default selections are **Name** and **Value**. The additional selections are **Difference** and **Difference (%)**.

   Name is either the default measurement name in the form of `group.device measurement`, or the custom name that you specified on the **Add** or **Edit Data Series** dialogs.

   Value is latest data value and the unit of measurement. For example, for voltage measurements, the default value is *`numeric_value`* `V` such as `415.2 V`.

   Difference is the change in the measurement from one update to the next. For example, if the voltage is `415.8` and it changes to `416.1` at the next trend update, the difference appears as `+0.3` in the legend.

   Difference (%) is the percentage change in the measurement from one update to the next. For example, if the voltage changes from `415.8` to `416.1` at the next trend update, the difference expressed as a percentage appears as `+0.072%` in the legend.

Configuring Data display settings

To configure data display settings:

1. In the Trend Setup dialog, on the **Data** tab, specify the **Data Update Intervals** in the **From device** and **From database** dropdown lists.

   The default setting is `5 seconds` for data updates for trends using the data directly from a device, and `5 minutes` for data updates for trends with data from a database.

2. Specify the **Data Points** for the x-axis of the trend in the **Max per series** input field.

   The default setting is `40000`.

   The value must be between 100 and 500,000. Increasing the value adds more data points per series but this can result in a degradation of trend performance.

   Examples:

   - A data interval of 1 second equates to 3600 data points per hour (60 points per minute X 60 minutes per hour). At a setting of 40000 points, approximately 11.1 hours of data is retained for viewing (40, 000 points / 3600 points per hour = approximately 11.1 hours).
   - A data interval of 5 seconds equates to 720 data points per hour (12 points per minute X 60

minutes per hour). At a setting of 40000 points, approximately 55.5 hours of data is retained for viewing (40, 000 points / 720 points per hour = approximately 55.5 hours).

- A data interval of 10 seconds equates to 360 data points per hour (6 points per minute X 60 minutes per hour). At a setting of 40000 points, approximately 111.1 hours of data is retained for viewing (40, 000 points / 360 points per hour = approximately 111.1 hours).

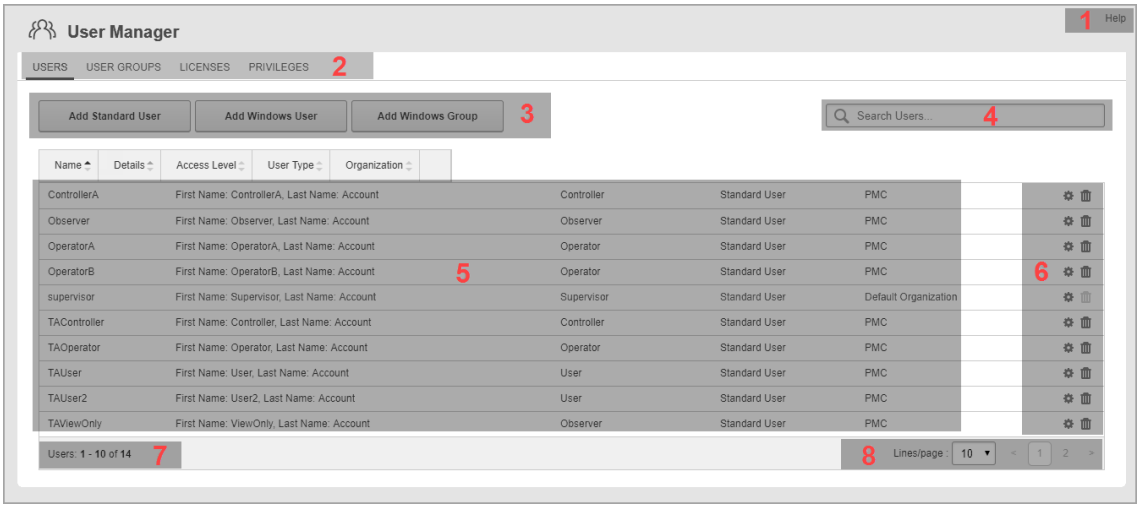
User Manager references

This section contains reference information related to User Manager.

Use the links below to find the content you are looking for:

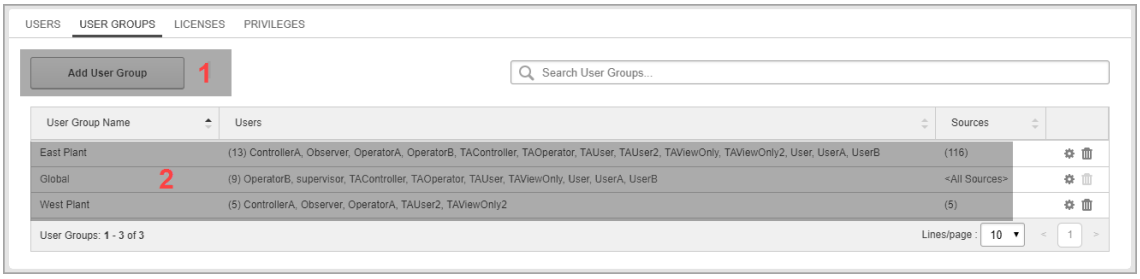
User Manager user interface

Users user interface (UI)



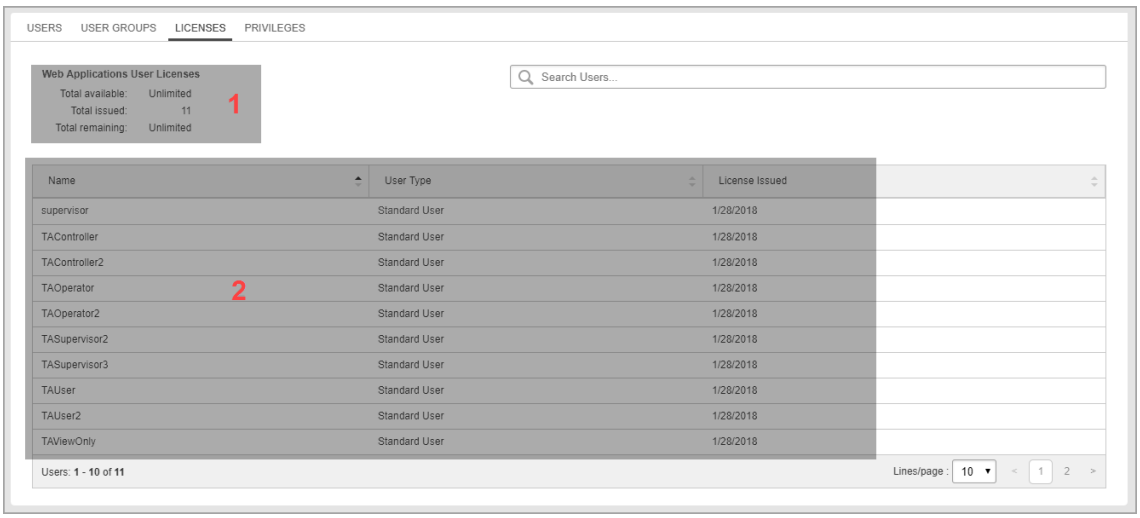
1	**User Manager Help.** Click Help to open the online help.
2	**Users, User Groups, and Licenses tabs.** Click a tab to open the associated screen.
3	**Add Standard User, Add Windows User, and Add Windows Group buttons.** Click a button to activate its function.
4	**Search Users box.** Enter a search string to find users in the users table.
5	**Users table.** Shows the existing users in the system.
6	**Edit and Delete icons.** Click Edit to make changes to this user. Click Delete to delete this user.
7	**Number of displayed users.** Shows the number of items visible on this page, and the total number of items in the system.
8	**Page selector.** Navigate between pages. Set the number of items that are displayed on a page.

User Groups UI



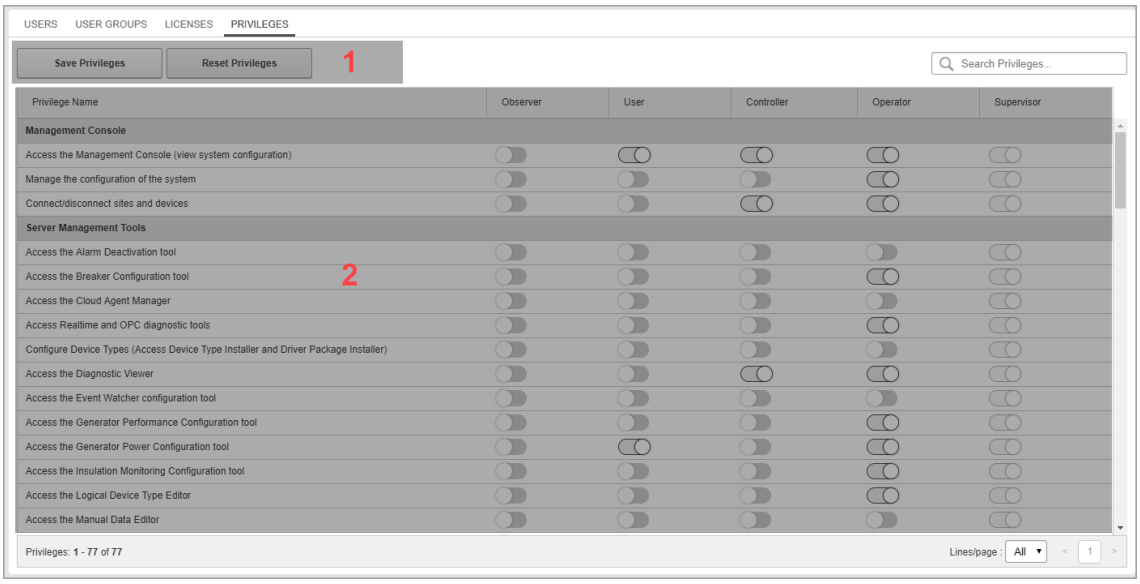
1	**Add User Group button.** Click the button to add a new user group.
2	**User Group table.** This table shows the existing user groups in the system.

Licenses UI



1	Web Applications User Licenses Summary.
2	Licenses table.

Privileges UI



1	**Save Privileges and Reset Privileges buttons** Click a button to activate its function. Note: Reset Privileges resets all access level privileges to their system defaults. See Default User Access Level Privileges for details.
2	Privileges table.

Default User Access Level Privileges

The access level that is assigned to a user in Power Monitoring Expert determines the permissions this user has in the system. There are five access levels - Observer, User, Controller, Operator, and Supervisor. Certain default privileges are assigned to the different access levels. Some of these privileges are configurable. See Customizing Access Level Privileges for details.

NOTE: Access to the web applications is controlled through user group settings. If a user group does not have access to a web application, then the group members cannot access this application regardless of their user access permissions.

The following table shows the system default privileges assigned to the different access levels:

Configurable	Application	Privilege	Observer	User	Controller	Operator	Supervisor*
Yes	Alarm Views	Access the settings	No	No	No	No	Yes
Yes	Alarms	Access the application	No	Yes	Yes	Yes	Yes
Yes	Alarms	Acknowledge alarms	No	No	Yes	Yes	Yes
Yes	Alarms	Create new alarm views	No	No	Yes	Yes	Yes
Yes	Alarms	Delete any alarm view	No	No	No	No	Yes
Yes	Alarms	Edit any alarm view	No	No	No	No	Yes
Yes	Alarms	Set system default alarm view	No	No	No	No	Yes
Yes	Alarms	View incidents	No	Yes	Yes	Yes	Yes
Yes	Authorized Hosts	Access the settings	No	No	No	No	Yes
Yes	Breaker Configuration Tool	Access the tool	No	No	No	Yes	Yes
Yes	Cloud Agent Manager	Access the tool	No	No	No	No	Yes
Yes	Dashboards	Access the application	Yes	Yes	Yes	Yes	Yes
Yes	Dashboards	Create new dashboards	No	Yes	Yes	Yes	Yes
Yes	Dashboards	Delete any dashboard	No	No	No	No	Yes
Yes	Dashboards	Edit any dashboard	No	No	No	No	Yes
Yes	Dashboards	Manage slideshows	No	No	Yes	Yes	Yes
Yes	Dashboards	Set system default dashboard	No	No	No	No	Yes
Yes	Dashboards	View slideshow list	Yes	Yes	Yes	Yes	Yes
Yes	Deactivate Alarms	Access the tool	No	No	No	No	Yes
Yes	Device Manager	Access the tool	No	No	No	Yes	Yes
Yes	Device Type and Driver Package Installer	Access the tool	No	No	No	No	Yes
Yes	Diagnostic Viewer	Access the tool	No	No	Yes	Yes	Yes
Yes	Diagnostics and Services	Access the settings	No	No	No	No	Yes
Yes	Diagrams	Access the application	Yes	Yes	Yes	Yes	Yes
Yes	Diagrams	Create new diagrams	No	No	No	No	Yes
Yes	Diagrams	Delete any diagram	No	No	No	No	Yes

Configurable	Application	Privilege	Observer	User	Controller	Operator	Supervisor*
Yes	Diagrams	Edit any diagram	No	No	No	No	Yes
Yes	Diagrams	Set system default diagram	No	No	No	No	Yes
Yes	Diagrams (Standalone)	Access the application	Yes	Yes	Yes	Yes	Yes
Yes	Event Watcher	Access the tool	No	No	No	No	Yes
Yes	EWS Login	Access the settings	No	No	No	No	Yes
Yes	Generator Performance Configuration Tool	Access the tool	No	No	No	Yes	Yes
Yes	Generator Power Configuration Utility	Access the tool	No	No	No	Yes	Yes
Yes	Hierarchy Manager	Access the tool	No	No	Yes	Yes	Yes
Yes	Insulation Monitoring Configuration Tool	Access the tool	No	No	No	Yes	Yes
Yes	Log Viewer	Access the tool	No	No	No	Yes	Yes
Yes	Logical Device Type Editor	Access the tool	No	No	No	Yes	Yes
Yes	Login Options	Access the settings	No	No	No	No	Yes
Yes	Management Console	Access the application	No	Yes	Yes	Yes	Yes
Yes	Management Console	Configure system	No	No	No	Yes	Yes
Yes	Management Console	Connect/disconnect sites and devices	No	No	Yes	Yes	Yes
Yes	Manual Data Editor	Access the tool	No	No	No	No	Yes
Yes	Modbus Gateway Service Configuration	Access the tool	No	No	No	No	Yes
Yes	Modeling Configuration	Access the tool	No	No	Yes	Yes	Yes
Yes	Notifications	Access the tool	No	No	No	Yes	Yes
Yes	Personal Preferences	Access the settings	No	Yes	Yes	Yes	Yes
Yes	Power Losses Configuration Utility	Access the tool	No	No	No	Yes	Yes
Yes	Rate Editor	Access the tool	No	No	Yes	Yes	Yes
Yes	Realtime and OPC Diagnostics	Access the tool	No	No	No	Yes	Yes
Yes	Registration	Access the settings	No	No	No	No	Yes
Yes	Report Theme	Access the settings	No	No	No	No	Yes
Yes	Reports	Access the application	Yes	Yes	Yes	Yes	Yes
Yes	Reports	Create new reports	No	Yes	Yes	Yes	Yes
Yes	Reports	Delete any report	No	No	No	No	Yes
Yes	Reports	Edit any report	No	No	No	No	Yes
Yes	Reports	Manage report subscriptions	No	Yes	Yes	Yes	Yes
Yes	Reports	Upload report packs	No	No	No	No	Yes
Yes	Security Options	Access the settings	No	No	No	No	Yes
Yes	Session Timeout	Access the settings	No	No	No	No	Yes
Yes	Software Alarms	Access the tool	No	No	Yes	Yes	Yes

Configurable	Application	Privilege	Observer	User	Controller	Operator	Supervisor*
Yes	System Language	Access the settings	No	No	No	No	Yes
Yes	System Theme	Access the settings	No	No	No	No	Yes
Yes	Time of Use Editor	Access the tool	No	No	Yes	Yes	Yes
Yes	Trends	Access the application	Yes	Yes	Yes	Yes	Yes
Yes	Trends	Create new trends	No	Yes	Yes	Yes	Yes
Yes	Trends	Delete any trend	No	No	No	No	Yes
Yes	Trends	Edit any trend	No	No	No	No	Yes
Yes	UPS Configuration Tool	Access the tool	No	No	No	Yes	Yes
Yes	UPS Power Configuration Utility	Access the tool	No	No	No	Yes	Yes
Yes	User Manager**	Access the tool	No	No	No	No	Yes
Yes	User Manager**	Add user groups	No	No	No	No	Yes
Yes	User Manager**	Add users	No	No	No	No	Yes
Yes	User Manager**	Delete any user	No	No	No	No	Yes
Yes	User Manager**	Delete any user group	No	No	No	No	Yes
Yes	User Manager**	Edit any user	No	No	No	No	Yes
Yes	User Manager**	Edit any user group	No	No	No	No	Yes
Yes	User Manager**	View user groups	No	No	No	No	Yes
Yes	User Manager**	View users	No	No	No	No	Yes

* Supervisor access level has all privileges. This is not configurable.

** User Manager privileges are not configurable.

VIP Setup references

This section contains reference information related to VIP setup.

Use the links below to find the content you are looking for:

VIP Modbus Slave port settings

Serial Port settings:

Setting	Range
Unit ID	1 - 247 (default: 100)
Receive Timeout (ms)	100 - 10000 (default: 1800)
Transmit Delay (ms)	10 - 60000 (default: 50)
Baud Rate	300 - 115200 (default: 9600)
Parity	NONE, ODD, EVEN, MARK, SPACE (default: NONE)
Stop Bits	1, 1.5, 2 (default: 1)

Modbus TCP settings:

Setting	Range	Notes
Unit ID	1 - 247 (default: 100)	
Receive Timeout (ms)	100 - 10000 (default: 10000)	
Transmit Delay (ms)	10 - 60000 (default: 50)	
Listening Port	1 - 9999 (default: 502)	It is possible that other Modbus Slaves are configured on the system, such as the ION Modbus Gateway Service that is used for breaker aging calculations. Configure different listening ports for the different Modbus Slaves. Each Modbus Slave needs its own, unique listening port.
Max Number Connections Allowed	1 - 32 (default: 5)	Configure this setting to only allow as many connections as needed for your application. Allowing more connections than needed increases that attack surface for unauthorized system access. Keeping the attack surface as small as possible is a basic security measure.

Web Applications settings references

This section contains reference information related to Web Applications settings.

Use the links below to find the content you are looking for:

System and personal localization settings

NOTE: The language settings in System Language and Personal Preferences determine the language the web applications are displayed in.

By default, the localization settings in Personal Preferences are the same as the ones in System Language. Changes to the settings in System Language are automatically copied to the Personal Preferences settings as long as the Personal Preferences settings have never been customized. After you customized the Personal Preferences localization settings once, they will no longer change when the System Language settings are changed.

NOTE: Your personal localization settings overrule the system localization settings for your user account.

Example 1: Language settings in Personal Preferences follow System Language if they have never been customized.

Condition	Language Settings	Comments
Default	System Language: English Personal Preferences: English	This is assuming the software was installed as an English system.
Change System Language to French	System Language: French Personal Preferences: French	The Personal Preferences language settings follow the System Language settings.

Example 2: Personal Preferences remain at customized setting after having been customized at some point.

Condition	Language Settings	Comments
Default	System Language: English Personal Preferences: English	This is assuming the software was installed as an English system.
Change Personal Preferences to French	System Language: English Personal Preferences: French	The Personal Preferences have been customized.
Change Personal Preferences back to English	System Language: English Personal Preferences: English	The settings are back to their defaults, but the Personal Preferences had been customized.
Change System Language to French	System Language: French Personal Preferences: English	The Personal Preferences language settings no longer follow the System Language settings.

Operation references

This section contains reference information related to the content in the Configuring chapter of this guide.

Use the following links to find the content you are looking for:

Topic	Links
Alarms	Alarms UI
	Timeline analysis UI
	Waveforms UI
	Alarm to incident mapping
	Load Impact calculations
	Alarms terminology
Dashboards	Dashboards user interface (UI)
Power Quality Performance	Power Quality Performance events and disturbances
Reports	Model creation example
	Report input parameters
	Interpreting the Energy Regression Analysis Report results
	Reports UI
	Reports Icons
	Reports Terminology
Trends	The Trends user interface
	Trend options

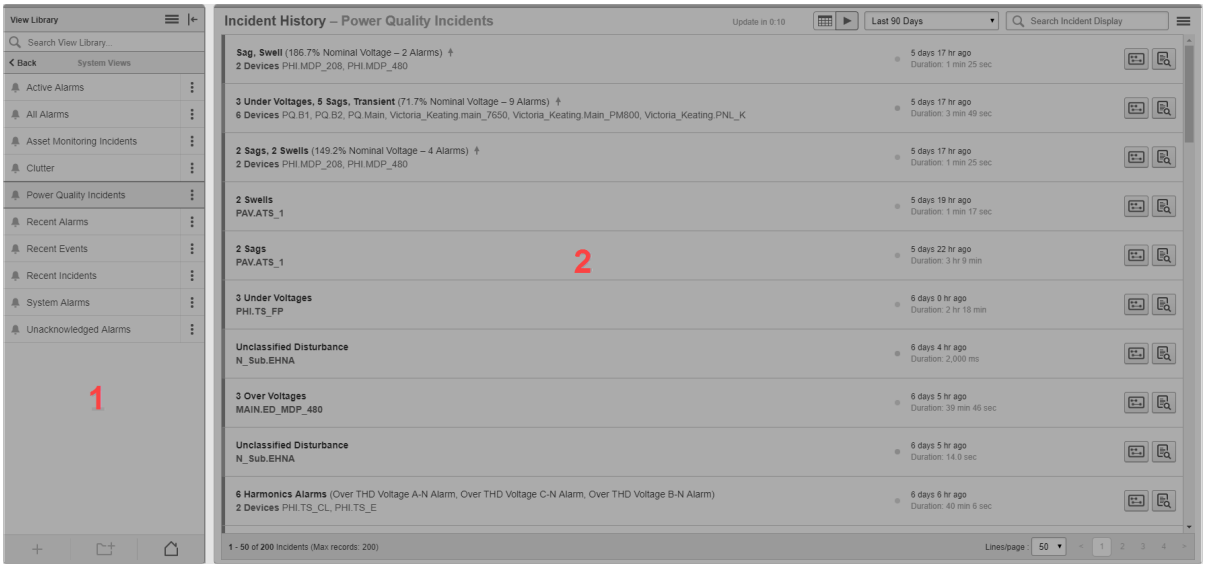
Alarms references

This section contains reference information related to using Alarms.

Use the links below to find the content you are looking for:

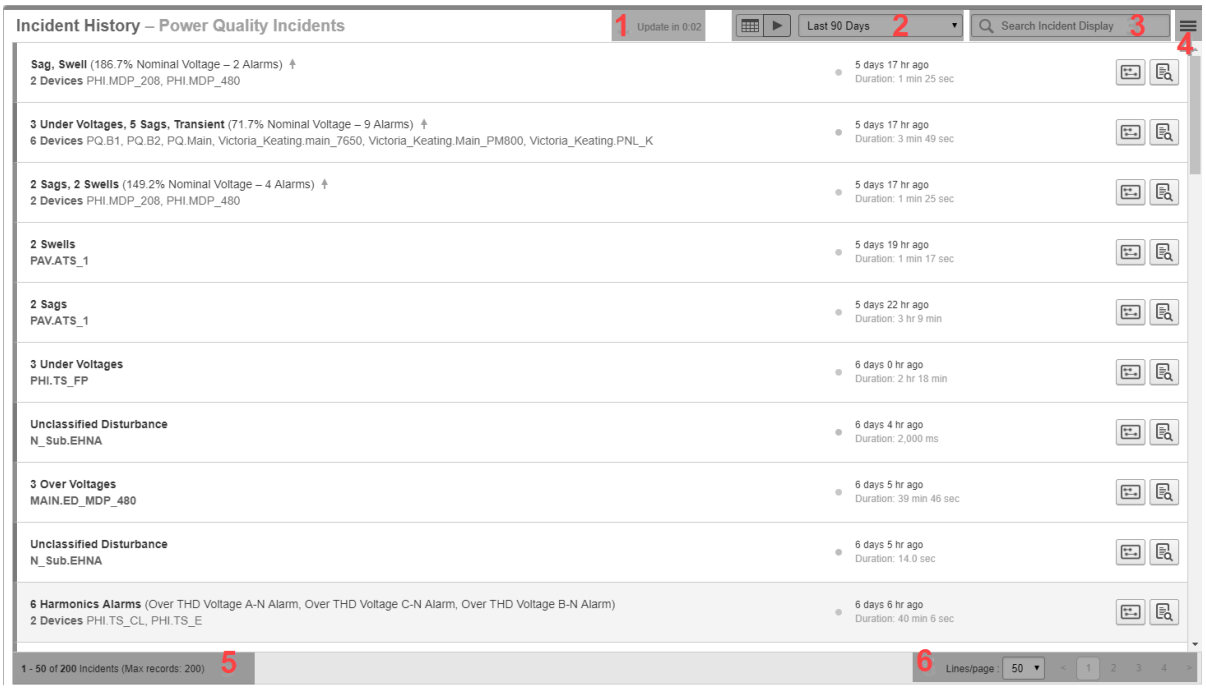
Alarms UI

1 Main UI



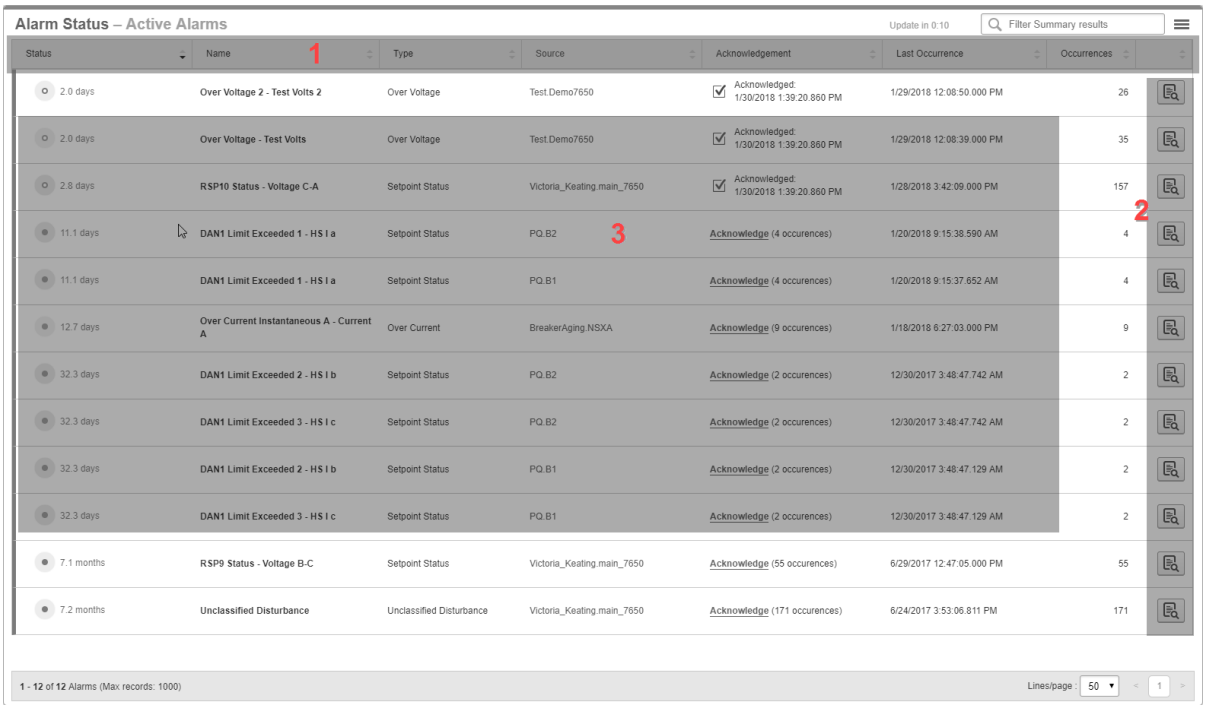
1	**View Library** The view library contains all the alarm views that are configured in the system. Alarm views can be listed individually, or they can be organized within folders. **TIP**: To hide the library, click the Hide Library icon (|← or →|) in the top right corner of the library. To show the library, click the Show Library icon (→▯ or ▯←) at the top of the library ribbon, or click anywhere in the minimized library ribbon.
2	**Alarms Display** The alarms display pane shows the alarm view selected in the view library.

2 Alarms display UI



1	**Update timer** The update timer shows the time until the next display refresh.
2	**Update mode** Use the update mode to switch between Date Filter mode and Auto-Update mode. 1/17/2018 - 4/16/2018 Date Filter mode: View alarms within a certain date range. Last 90 Days Auto-Update mode: View the latest alarms. **NOTE**: This element is only available for history views, not for status views.
3	**Search filter** Enter text into the search filter to search and filter the items displayed in the alarms display pane.
4	**Options menu** The Options menu contains options relevant to the content displayed in the alarms display pane.
5	**Number of displayed items** Shows the number of items visible on this page, and the total number in this view.
6	**Page selector** Use the page selector to navigate between pages. Set the number of items that are displayed on a page.

3 Alarm status UI



Alarm status table columns

Click on any of the column headers to sort by that column. Use the **Show/Hide Columns** option in the alarms display pane Options menu to customize which columns are visible. The following columns are available:

1

ID	Unique numeric alarm identifier.
Priority	Alarm priority number from 0 - 255.
State	Graphic display of active or inactive status. Also shows the amount of time since the alarm went last active.
Active	Active or Inactive status.
Name	Alarm name.
Type	Alarm type, for example Over Voltage.
Source	Origin of the alarm.
Unacknowledged	Number of unacknowledged alarm activations.
Acknowledgement	A link to acknowledge the alarm.
Last Occurrence	Datetime of latest alarm activation, in browser local time.
Last Occurrence UTC	Datetime of latest alarm activation, in UTC time.
First Occurrence	Datetime of first alarm activation, in browser local time.
Occurrences	Total number of alarm activations.

2 **Details button**

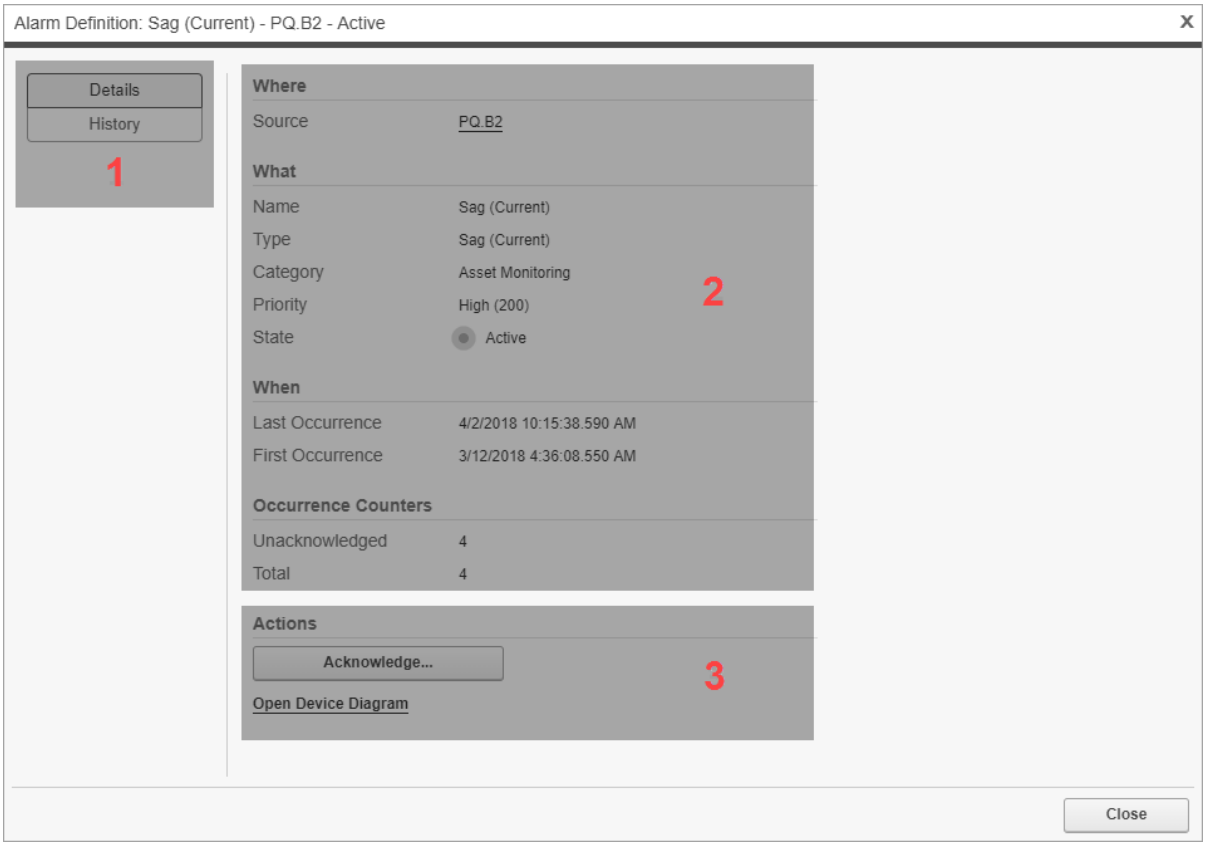
Click Details to see more information related to an alarm. (See below for more information.)

Alarm status table rows

3 Each row in the table shows an alarm definition that exists in the system. The filter settings in the view library control which alarm definitions are included in a view.

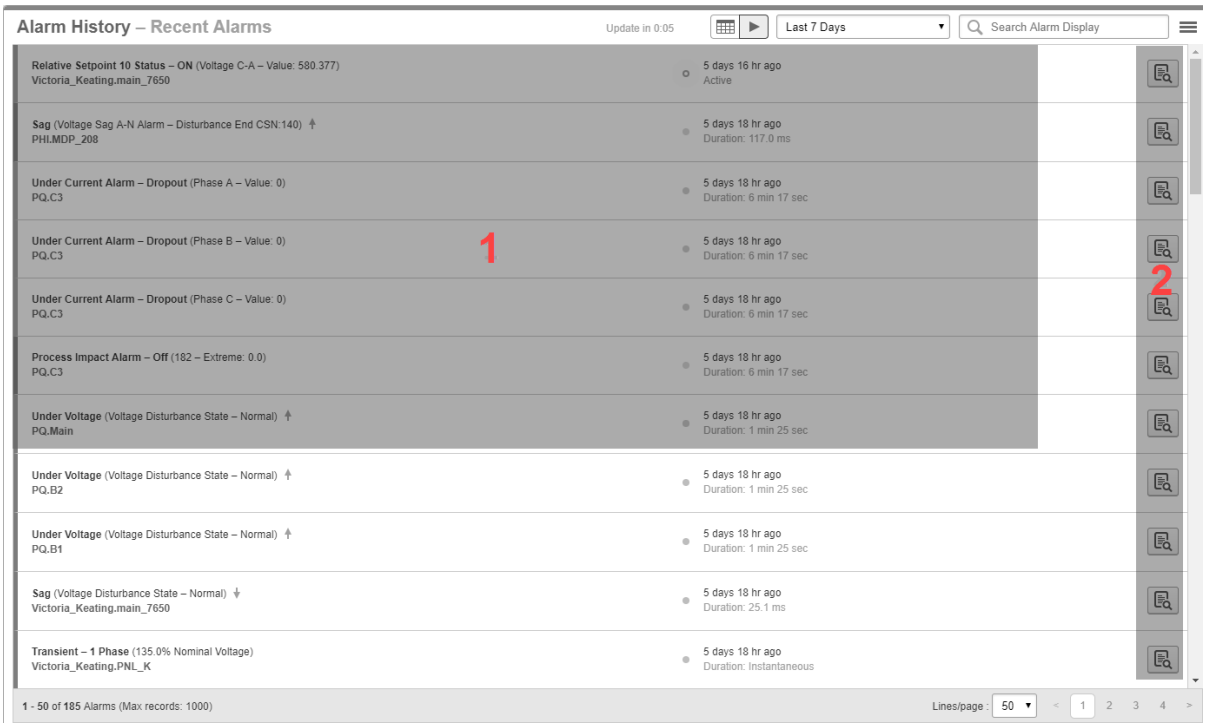
3-1 Alarm definition details

TIP: Click **Details** for an alarm definition or double-click an alarm definition row in the table to open the alarm details.



1	**Display selector** Select Details to see information about the alarm definition. Select History to see past instances of this alarm.
2	**Alarm Definition Details information** See detailed information about this alarm definition.
3	**Actions** Click Acknowledge to open the Acknowledge Alarms window. Click Open Device Diagram to open the device diagram for the source this alarm is associated with.

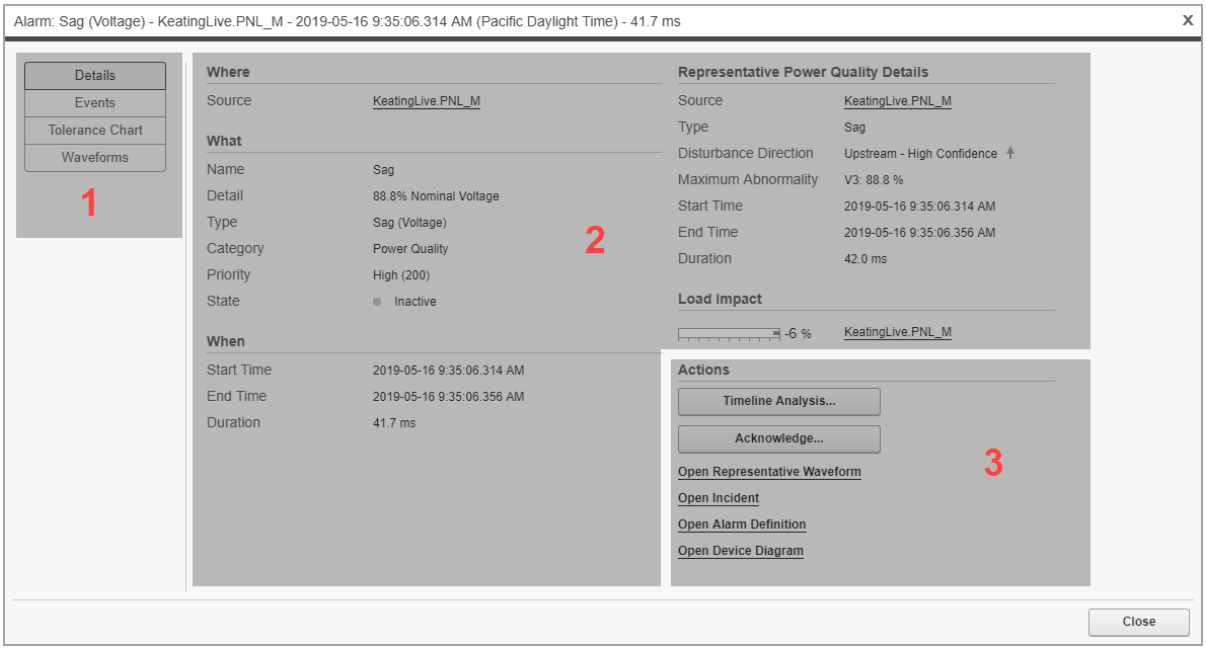
4 Alarm history UI



	Alarm history table rows
1	Each row in the table shows an alarm instance that occurred. The filter settings in the view library control which instances are included in a view.
	Details button
2	Click Details to see more information related to the alarm instance. (See below for more information.)

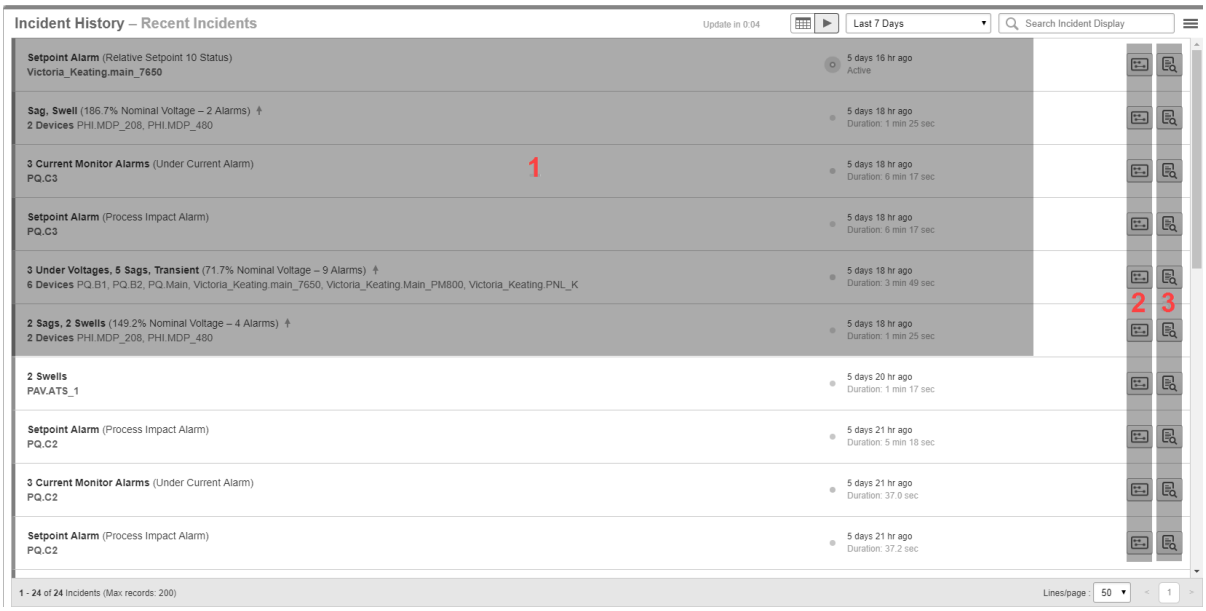
4-1 Alarm instance details

TIP: Click Details for an alarm instance or double-click an alarm instance row in the table to open the alarm details.



1	**Display selector** Select Details to see information about this alarm instance. Select Events to see the events that are associated with this alarm instance. Select Tolerance Chart to see an ITIC/CBEMA or SEMI F47-0706 plot for the alarm instance. Note: This only applies to voltage disturbance alarms. Select Waveforms to see all the waveform that are associated with this alarm instance.
2	**Alarm instance details information** See detailed information about this alarm instance.
3	**Actions** Click Timeline Analysis to open the Timeline window. Click Acknowledge to open the Acknowledge Alarms window. Click Open Representative Waveform to see the waveform of the worst disturbance that is associated with this alarm instance. Click Open Incident to see information on the incident that is associated with this alarm instance. Click Open Alarm Definition to see information on the alarm definition for this alarm. Click Open Device Diagram to see the device diagram for the source that is associated with this alarm.

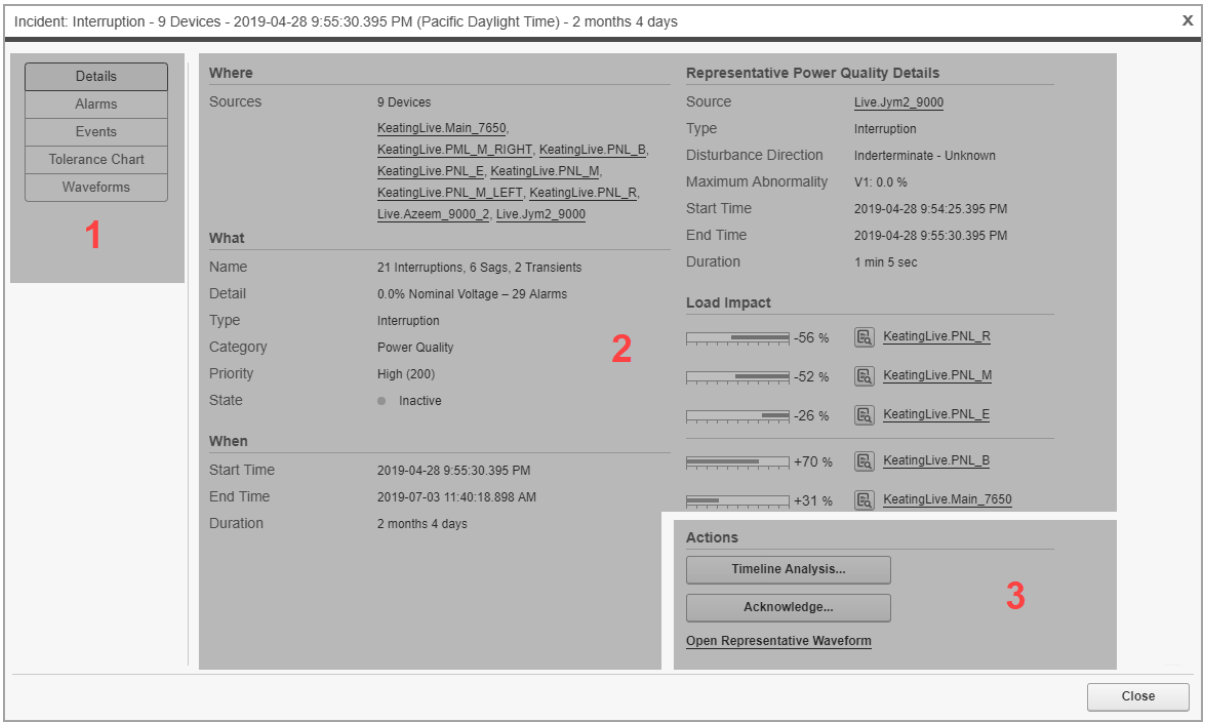
5 Incident history UI



	Incident history table rows
1	Each row in the table shows an incident that occurred. The filter settings in the view library control which incidents are included in a view.
	Analysis button
2	Click Open Timeline Analysis to open the timeline analysis window for the incident. **TIP**: To analyze multiple Incidents together, select the Incidents in the table and then choose **Open Timeline Analysis on selection** from the Options menu in the top right corner of the alarms display pane. **TIP**: For multi-selection, use `Ctrl+Click` to select individual Incidents, use `Shift+click` to select a block of Incidents.
	Details button
3	Click Details to see more information related to the incident. (See below for more information.)

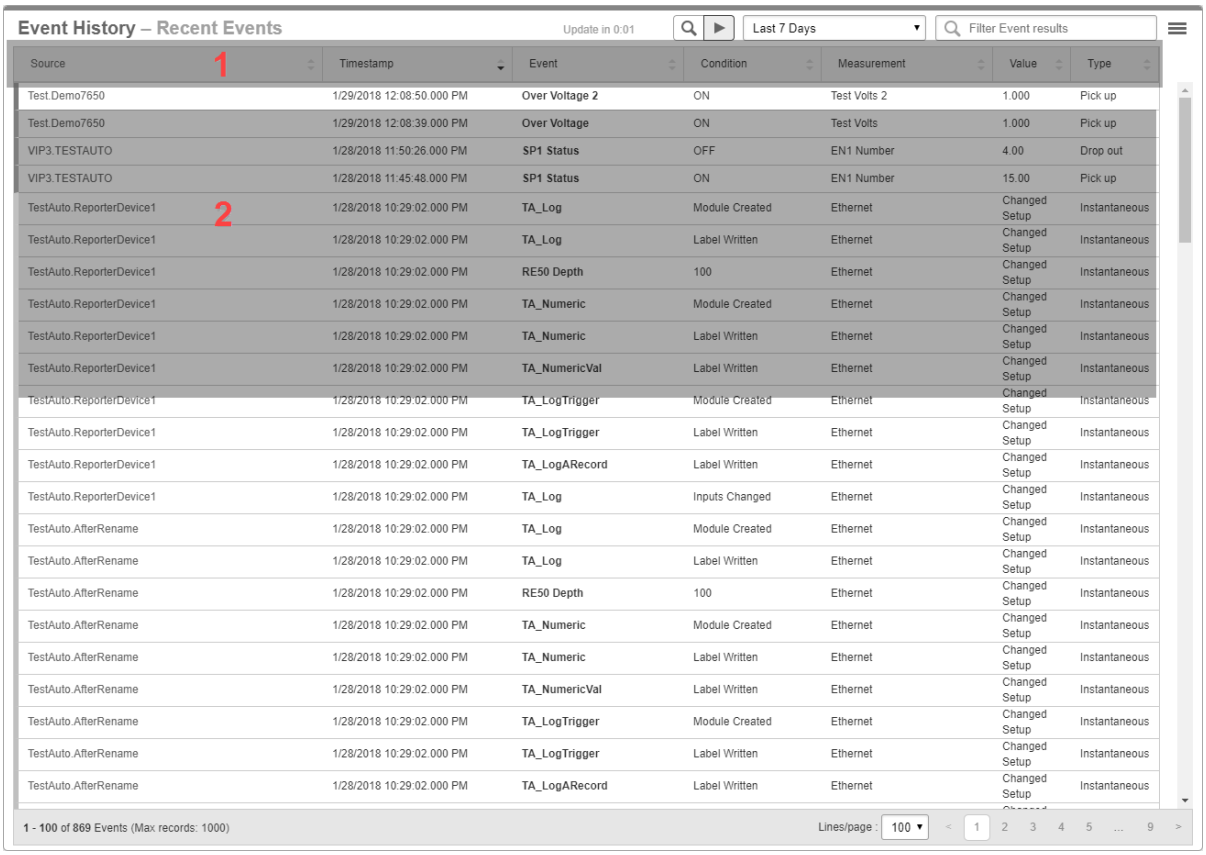
5-1 Incident details

TIP: Click Details for an incident or double-click an incident row in the table to open the incident details.



1	**Display selector** Select Details to see information about this incident. Select Alarms to see the alarm instances that are associated with this incident. Select Events to see the events that are associated with this incident. Select Tolerance Chart to see an ITIC/CBEMA or SEMI F47-0706 plot for the incident. Note: This only applies to voltage disturbances. Select Waveforms to see all the waveform that are associated with this incident.
2	**Incident Details information** See detailed information about this incident.
3	**Actions** Click Timeline Analysis to see the timeline analysis of the incident. Click Acknowledge to open the acknowledge alarms window. Click Open Representative Waveform to see the waveform of the worst disturbance that is associated with this incident.

6 Event history UI



Source	Timestamp	Event	Condition	Measurement	Value	Type
Test.Demo7650	1/29/2018 12:08:50.000 PM	Over Voltage 2	ON	Test Volts 2	1.000	Pick up
Test.Demo7650	1/29/2018 12:08:39.000 PM	Over Voltage	ON	Test Volts	1.000	Pick up
VIP3.TESTAUTO	1/28/2018 11:50:26.000 PM	SP1 Status	OFF	EN1 Number	4.00	Drop out
VIP3.TESTAUTO	1/28/2018 11:45:48.000 PM	SP1 Status	ON	EN1 Number	15.00	Pick up
TestAuto.ReporterDevice1	1/28/2018 10:29:02.000 PM	TA_Log	Module Created	Ethernet	Changed Setup	Instantaneous
TestAuto.ReporterDevice1	1/28/2018 10:29:02.000 PM	TA_Log	Label Written	Ethernet	Changed Setup	Instantaneous
TestAuto.ReporterDevice1	1/28/2018 10:29:02.000 PM	RE50 Depth	100	Ethernet	Changed Setup	Instantaneous
TestAuto.ReporterDevice1	1/28/2018 10:29:02.000 PM	TA_Numeric	Module Created	Ethernet	Changed Setup	Instantaneous
TestAuto.ReporterDevice1	1/28/2018 10:29:02.000 PM	TA_Numeric	Label Written	Ethernet	Changed Setup	Instantaneous
TestAuto.ReporterDevice1	1/28/2018 10:29:02.000 PM	TA_NumericVal	Label Written	Ethernet	Changed Setup	Instantaneous
TestAuto.ReporterDevice1	1/28/2018 10:29:02.000 PM	TA_LogTrigger	Module Created	Ethernet	Changed Setup	Instantaneous
TestAuto.ReporterDevice1	1/28/2018 10:29:02.000 PM	TA_LogTrigger	Label Written	Ethernet	Changed Setup	Instantaneous
TestAuto.ReporterDevice1	1/28/2018 10:29:02.000 PM	TA_LogARecord	Label Written	Ethernet	Changed Setup	Instantaneous
TestAuto.ReporterDevice1	1/28/2018 10:29:02.000 PM	TA_Log	Inputs Changed	Ethernet	Changed Setup	Instantaneous
TestAuto.AfterRename	1/28/2018 10:29:02.000 PM	TA_Log	Module Created	Ethernet	Changed Setup	Instantaneous
TestAuto.AfterRename	1/28/2018 10:29:02.000 PM	TA_Log	Label Written	Ethernet	Changed Setup	Instantaneous
TestAuto.AfterRename	1/28/2018 10:29:02.000 PM	RE50 Depth	100	Ethernet	Changed Setup	Instantaneous
TestAuto.AfterRename	1/28/2018 10:29:02.000 PM	TA_Numeric	Module Created	Ethernet	Changed Setup	Instantaneous
TestAuto.AfterRename	1/28/2018 10:29:02.000 PM	TA_Numeric	Label Written	Ethernet	Changed Setup	Instantaneous
TestAuto.AfterRename	1/28/2018 10:29:02.000 PM	TA_NumericVal	Label Written	Ethernet	Changed Setup	Instantaneous
TestAuto.AfterRename	1/28/2018 10:29:02.000 PM	TA_LogTrigger	Module Created	Ethernet	Changed Setup	Instantaneous
TestAuto.AfterRename	1/28/2018 10:29:02.000 PM	TA_LogTrigger	Label Written	Ethernet	Changed Setup	Instantaneous
TestAuto.AfterRename	1/28/2018 10:29:02.000 PM	TA_LogARecord	Label Written	Ethernet	Changed Setup	Instantaneous

Event history table columns

Use the Show/Hide Columns option in the alarms display pane Options menu to customize which columns are visible. The following columns are available:

ID	Unique numeric event identifier.
Source	Origin of the event.
Timestamp	Datetime when the event was recorded, in browser local time.
1 Timestamp UTC	Datetime when the event was recorded, in UTC time.
Event	Event string, for example RSP10 Status.
Condition	Threshold value of the event trigger at the time the event was recorded.
Measurement	Measurement that triggered the event.
Value	Measured value at the time the event was triggered.
Type	Event trigger type, Pick up, Drop out, or Instantaneous.
Priority	Event priority number from 0 - 255.

Event history table rows

2 Each row in the table shows an event that occurred. The filter settings in the view library control which events are included in a view.

TIP: Double-click an event row in the table to open the alarm instance details for the alarm that is associated with this event.

7 View settings

Alarm Status | Alarm and Incident History | Event History

1	**Options menu ☰ and Hide Library icon ⇤.** The Options menu contains options relevant to the view library. The following options are available: Add View Add Folder
2	**Search filter** Enter text into the search filter to search and filter the views displayed in the library.

3	**Back button** Use the Back button to exit the view settings and go back to the library.
4	**View Name** Set the name of the view in the library.
5	**Location** Determine where the view is stored in the library.
6	**View Access Permissions selector** Select Public to make this view public. Select Private to make this view private. **NOTE**: A public item is visible to all users in your user group. A private item is visible to you and any user in your user group with Edit permissions on this item type. See Default User Access Level Privileges and Customizing Access Level Privileges for details.
7	**View Type selector** Select Alarm Status to create an alarm status view. Select Alarm History to create an alarm history view.
8	**Priority filter** Click the priority buttons to include or exclude alarms with that priority. The priorities are, from left to right: No, Low, Medium, High.
9	**State selector** Select which alarm states to include. The following options are available: Active or Unacknowledged Active and Unacknowledged Unacknowledged Active All
10	**Sources selector** Include all sources or select specific sources.
11	**Category selector** Include or exclude certain categories of alarms and choose specific types within each category. The following categories are available: Power Quality (includes filter settings for Voltage Tolerance, Load Impact, and Disturbance Direction) Asset Monitoring Energy Management General Diagnostics See Alarms for a list of available types in each category.
12	**Level of Detail selector** Select to see incidents, alarms, or events. **NOTE**: This setting is only available for history views, not for alarm status views.

13

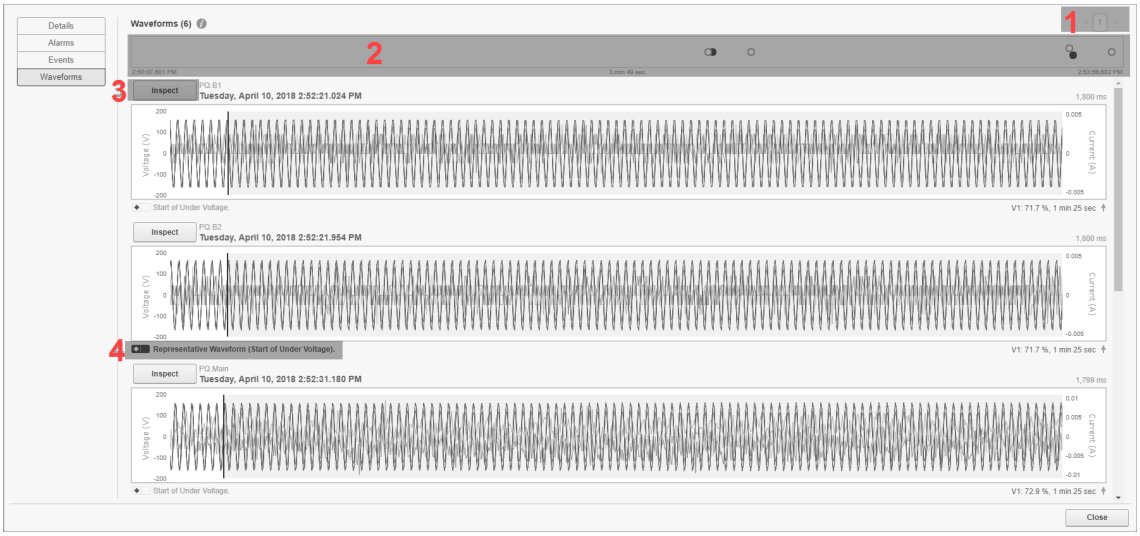
Priority filter

Select which priority events to include or exclude. This filter allows more precise priority filtering than the other priority filter.

NOTE: This selector is only available for event history views, not for alarm status or incident and alarm history views.

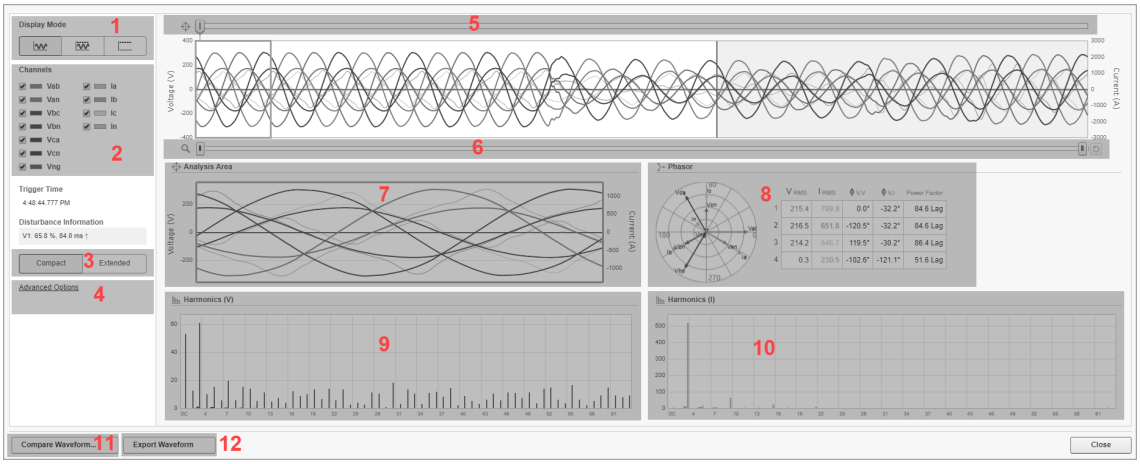
Waveforms UI

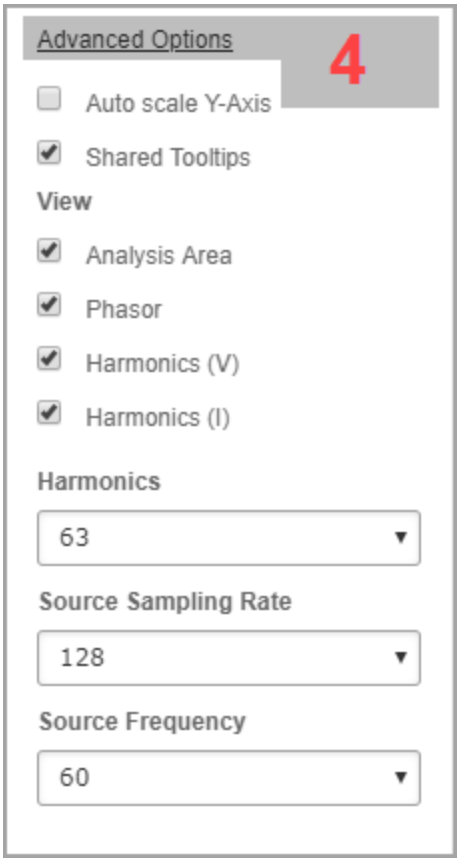
Incident and alarm instance waveforms UI



1	**Page selector.** Navigate between pages.
2	**Waveforms timeline.** The timeline shows at what point in time the waveforms that are associated with this incident or alarm instance were captured. Each waveform capture is represented by a dot. The representative waveforms for this incident or alarm instance are shown with black dots.
3	**Inspect button** Click the button to open the waveform inspection window for this waveform.
4	**Representative waveform** The black marking identifies the representative waveform for this incident or alarm instance. The representative waveform is the waveform for the worst disturbance in the incident or alarm instance.

Waveform inspection UI

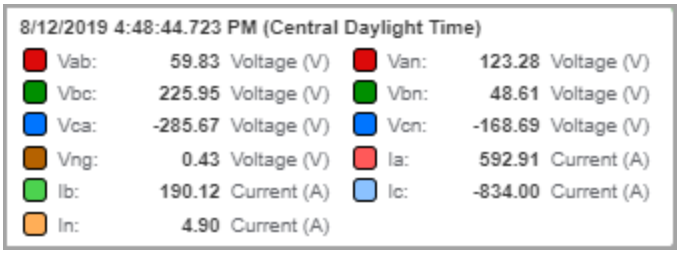




1	**Display Mode** Select one of the following display modes for the waveform chart: Waveform, Waveform and RMS, RMS. **NOTE**: The display mode selector is not available for high speed transient waveform captures.
2	**Channels** Select which channels (V1, V2, V3, I1, I2, I3) to include or exclude from the waveform chart.
3	**View type selector** Use the view type selector to switch between a Compact View and an Extended View. The Compact View groups the analysis charts together to fit the window size. The Extended View shows the charts below each other with a larger display area for each chart. **NOTE**: The view type selector is not available for high speed transient waveform captures.

Advanced Options

TIP: The Advanced Options are hidden by default. Click the Advanced Options label to show or hide these settings.

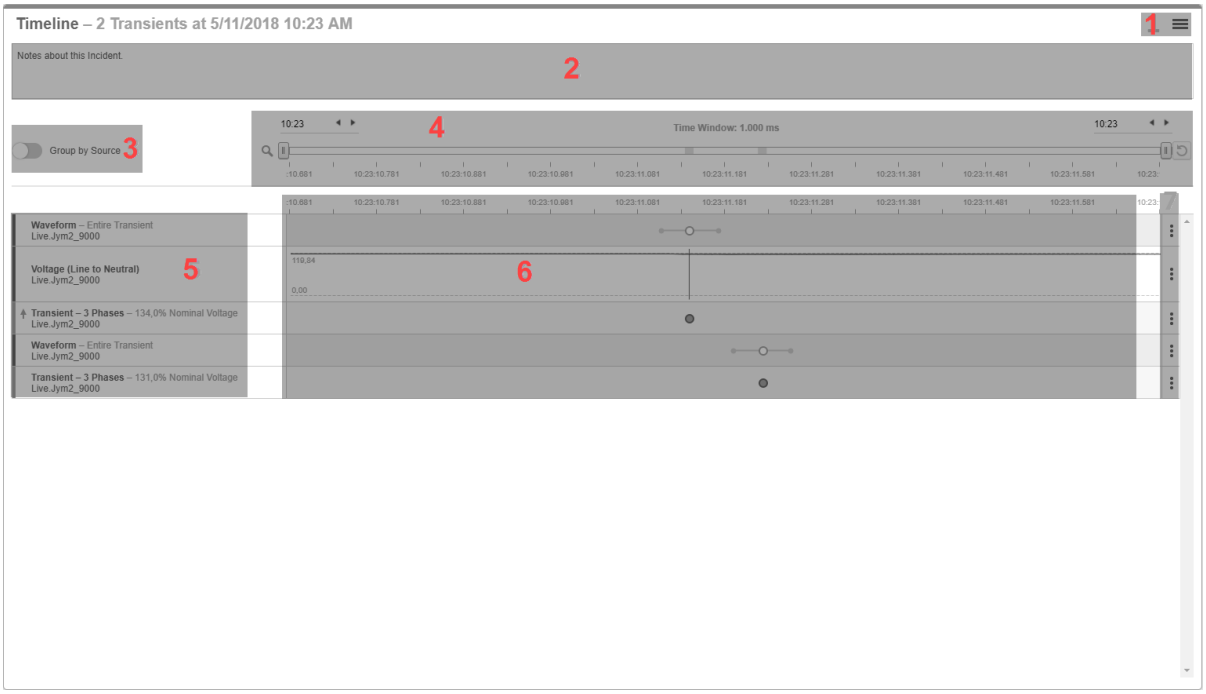
Auto scale Y-Axis	Auto scale adjusts the y-axis automatically as you zoom or pan the waveform plot.
Shared Tooltips	Shared tooltips display measurement details for all voltage and current phases as you move the pointer over the waveform plot. Non shared tooltips only display details for the voltage or current the pointer is hovering over. Example: Hover the pointer over the Vab voltage waveform plot. Shared Tooltips (shows all details)  Non Shared Tooltips (only shows Vab details) 
View	Select which charts (Analysis Area, Phasors, Harmonics (V), Harmonics (I)) are shown in the analysis pane. **NOTE**: The View option is not available for high speed transient waveform captures.
Harmonics	Set the number of harmonics to display in the harmonics column chart. **NOTE**: The harmonics setting is not available for high speed transient waveform captures.
Source Sampling Rate	Select the sampling rate at which the waveform was captured. The sampling rate is detected automatically. Use this control to make adjustments if the sampling rate setting is incorrect. The sampling rate is set correctly when the analysis region covers one cycle of waveform capture. **NOTE**: The sampling rate setting is not available for high speed transient waveform captures.
Source Frequency	Select the source frequency. The frequency is detected automatically. Use this control to make adjustments if the frequency setting is incorrect. **NOTE**: The frequency setting is not available for high speed transient waveform captures.

4

5	**Analysis area selector** Use the slider to select an analysis area in the waveform chart. **NOTE**: The analysis area selector is not available for high speed transient waveform captures.
6	**Zoom** Use the left and right sliders to zoom in and out of the waveform chart. You can also click and drag the pointer on the plot to zoom. To pan while zoomed in, click and drag the area between the sliders. Click to the right of the sliders to zoom out to the original size.
7	**Analysis area chart** This chart shows the waveform signature of the section of the waveform that has been selected by the analysis area selector (see 5). The phasor and harmonics calculations are based on the waveform data from the analysis area. The y-axis is automatically scaled. **NOTE**: The analysis area chart is not available for high speed transient waveform captures.
8	**Phasor chart** This chart shows the phasor analysis of the section of the waveform that has been selected by the analysis area selector (see 5). Phasor details are shown in a polar diagram and a data table. **NOTE**: The phasor chart is not available for high speed transient waveform captures.
9	**Voltage harmonics chart** This chart shows the voltage harmonic analysis of the section of the waveform that has been selected by the analysis area selector (see 5). Harmonic details are shown in a column chart. **NOTE**: The voltage harmonics chart is not available for high speed transient waveform captures.
10	**Current harmonics chart** This chart shows the current harmonic analysis of the section of the waveform that has been selected by the analysis area selector (see 5). Harmonic details are shown in a column chart. **NOTE**: The current harmonics chart is not available for high speed transient waveform captures.
11	**Compare Waveforms** Use this option to open this waveform in a new, Compare Waveforms tab in the browser. You can then select other waveforms to open in the same window. If a Compare Waveforms tab is already open, then the present waveform is added to that window.
12	**Export Waveform** Use this option to download the waveform data of the present waveform in .csv file format. The file is downloaded to your local Windows Downloads folder.

Timeline analysis UI

Analysis UI

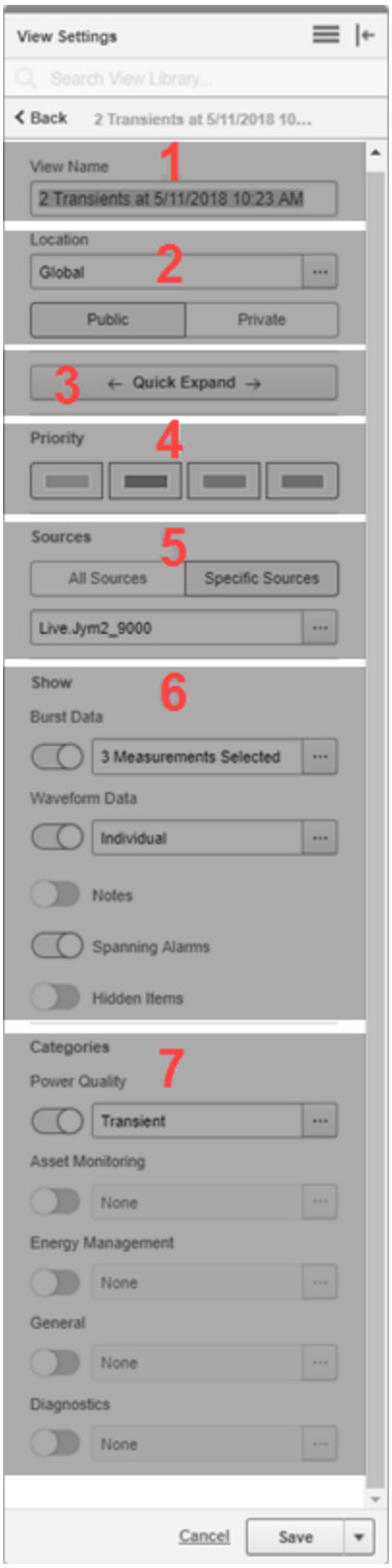


NOTE: Alarms and data measurements during an incident occur in very short time intervals. To show the correct sequence of events in the timeline analysis, the timestamps must be accurate. Consider using monitoring devices with Precision Time Protocol (PTP) or GPS time synchronization for accurate time stamping.

1	**Options menu** Contains options relevant to the content displayed in the Analysis UI.
2	**Notes area** (Optional) Enter notes related to the Analysis.
3	**Grouping control** Choose to group the items in the Analysis by time or by source.
4	**Zoom and Heatmap** Use the sliders or the time controls to zoom in or out of the analysis time window. Use the button on the right of the slider to zoom out to the original size. The colored areas act as a heatmap, showing you where the analysis items are located on the time window timeline.
5	**Analysis items** These are the alarms, waveforms, and bursts that are associated with this timeline. The color bars to the left of the items indicate the item priority. Arrows, pointing up or down, to the left of some of the items indicate Disturbance Direction Detection measurements. Hover the pointer over the arrows to get specific disturbance direction information. **TIP**: Click the item name to open a detail view for the item.

6	**Timeline** Each analysis item is represented by a dot on the timeline or a burst data display. The color of the dot indicates the priority of the item. Alarms with a start and end event are shown with two dots, connected by a line. Waveforms are shown with a white dot. Zoom in to see the waveforms timeline. Click a waveform dot to open the waveform viewer.
7	**Analysis item Options** Hide an item from view or choose to open a detail view for an item.

Timeline analysis view settings UI



1	**View Name** Shows the name of the timeline view.

2	**Location and sharing** Determines where the view is stored in the library and who can access it. **NOTE**: A public item is visible to all users in your user group. A private item is visible to you and any user in your user group with Edit permissions on this item type. See Default User Access Level Privileges and Customizing Access Level Privileges for details.
3	**Quick Expand** Click this option to extend the time window of the view and adds all devices, and all categories.
4	**Priority filter** Click the priority buttons to include or exclude alarms with that priority. The priorities are, from left to right: No, Low, Medium, High.
5	**Sources selector** Include all sources or select specific sources.
6	**Show control** Show or hide burst data, waveform data, the notes area, spanning alarms, hidden items. **NOTE**: Spanning alarms are alarms that started before the time window. Hidden items are analysis items that are marked as hidden through the item Options menu. Hidden items appear dimmed when shown.
7	**Category selectors** Include or exclude certain categories of alarms from the analysis and choose specific types within each category. The following categories are available: Power Quality Asset Monitoring Energy Management General Diagnostics See Alarms for a list of available types in each category.

Alarm to incident mapping

The following table shows the mapping of alarm types to Incidents:

Incident Category	Incident Type	Alarm Types
Power Quality	Interruption	Interruption
	Over Voltage	Over Voltage
	Under Voltage	Under Voltage
	Unclassified Disturbance	Unclassified Disturbance
	Sag	Sag (Voltage)
	Swell	Swell (Voltage)
	Transient	Transient
	Flicker	Flicker
	Frequency Variation	Frequency Variation
	Harmonics	Harmonics
		Harmonics (Current)
		Harmonics (Power)
		Harmonics (Voltage)
	Unbalance	Unbalance
		Unbalance (Current)
		Unbalance (Voltage)
Diagnostics	Communication Status	Communication Status
	Device Status	Device Status
	System Status	System Status
Energy Management	Air	Air
	Demand	Demand
	Electricity	Electricity
	Gas	Gas
	Power Factor	Power Factor
	Steam	Steam
	Water	Water
Asset Monitoring	Arc Flash	Arc Flash
	Backup Power	Backup Power
	Current Monitor	Over Current
		Sag (Current)
		Swell (Current)
		Under Current
	Protection	Protection
	Thermal Monitor	Thermal Monitor

Incident Category	Incident Type	Alarm Types
General	Clutter	General Event
		Clock / Time
		Device Settings
		Unassociated Dropout
	General Setpoints	General Setpoint

Load Impact calculations

Load Impact identifies changes in the steady state electrical loads of a power system triggered by a voltage disturbance, such as a voltage sag or interruption. To assess the impact of a disturbance on the load, the software compares the real power (kW) measurements of the monitored circuit before and after the event.

Load Impact is calculated as:

$$\text{Load Impact } (\%) = ((P_{post\text{-}event} - P_{pre\text{-}event}) / P_{pre\text{-}event}) \times 100$$

- A negative Load Impact value between $-100\% < X < 0\%$ means a load loss. The real power (kW) of the monitored circuit has been reduced by X%.

  NOTE: Load loss is the most common load impact caused by voltage disturbances.

- A positive Load Impact value, $X > 0\%$, means a load gain. The real power (kW) of the monitored circuit has increased by X%.
- A negative Load Impact value, $X < -100\%$, means a potential load reversal. The energy flow in the monitored circuit might have been reversed. The percent value less than -100% is the portion of pre-event real power (kW) flowing in the opposite direction. For example, a Load Impact value of -125% means that the power flow has been reversed and 25% of the pre-event real power are now flowing in the opposite direction.

A voltage disturbance event can result in any or all of the above load changes. For example, starting a large load, such as a motor, can produce a voltage sag that causes another load to disconnect. In this case, the motor load circuit would show a load gain and the other circuit a load loss.

Alarms terminology

The following is a list of commonly used terms related to Alarms in PME.

Alarm

The term Alarm is commonly used to describe both, an alarm definition and an alarm instance. Which one it represents in an application must be derived from the context in which it is used. It is better to use the terms alarm definition and alarm instance to avoid ambiguity.

Alarm definition

An alarm definition is the specification of a defined condition for a particular measurement from a particular source. When the condition is met, the alarm goes active. When the condition is no longer met, the alarm goes inactive. Example: An Overcurrent alarm that goes active when the measured current for a load goes above a defined limit. The alarm definition includes the alarm name, the source and measurement, the alarm limits, and any other conditions that are relevant for the alarm.

Alarm instance

An alarm instance is a record of an occurrence where a monitored load exceeds the limits set in the alarm definition. An alarm instance starts when the alarm state goes active and ends when it goes inactive. An alarm Instance has a start and end date.

Alarm occurrence count

The alarm occurrence count is the number of alarm instances that have happened for an alarm definition.

Alarm state

The alarm state shows if the monitored load presently meets the conditions defined in the alarm definition or not. If it meets the conditions, the alarm state is Active. If it does not meet the conditions, the alarm state is Inactive.

Alarm acknowledgment

An alarm acknowledgment is a way to indicate in the software that you have seen the alarm and that it is being managed. When you acknowledge an alarm, the date and time of the acknowledgment is recorded together with an optional note that you can enter in the acknowledge window.

An alarm can be acknowledged after it has gone active. An alarm stays unacknowledged until you acknowledge it. After you have acknowledged an alarm, it stays acknowledged until the next time it goes active. At that point it is reset to unacknowledged and is waiting for you to acknowledge it again.

NOTE: You can acknowledge alarms in status views and history views. If you acknowledge alarms through an incident history view, all alarms that are part of this Incident will be acknowledged. Whenever you acknowledge an alarm, from any of these locations, you are acknowledging the alarm definition, not an instance of it. That means acknowledging an alarm marks it as acknowledged for all instances and resets the unacknowledged occurrence counter.

Incident

An incident combines alarms, waveforms, and burst data from many sources in the system. The elements are combined based on the proximity in time when the data was recorded and based on an analysis of the type of data. The goal is to create a single representation of a real-world power event

that shows the impact of this event on the power system as a whole.

Representative power quality details (representative disturbance)

The representative power quality details describe the representative disturbance for an alarm or incident. The representative disturbance is used to categorize and quantify the alarm or incident. For an alarm the representative disturbance is the one that triggered the alarm. For an incident, which can include multiple alarms, the representative disturbance is the one with the highest severity in the incident. The representative power quality details include the source, type, direction, maximum abnormality, start time, end time, and duration of the disturbance.

Example representative power quality details:

- Source: Campus.Residence Hall
- Type: Sag
- Disturbance Direction: Upstream - High Confidence
- Maximum Abnorality: V3: 88.5%
- Start Time: 2019-07-26 9:08:49.330 PM
- End Time: 2019-07-26 9:08:49.530 PM
- Duration: 200.0 ms

Representative waveform

The representative waveform is the waveform that is related to the representative disturbance for an alarm or an incident. If multiple waveforms are associated with the representative disturbance, then the representative waveform is selected based on the following priorities:

1. The waveform covers full disturbance
2. The waveform covers the start of the disturbance
3. The waveform covers the end of the disturbance
4. The waveform is inside the disturbance

Burst data

Burst data is pre- and post-event data that is logged during an alarm instance. The recording of the data is triggered by an alarm going active. Devices that support burst data keep a continuous buffer of data logs in memory, until a burst data capture is triggered. At that point, the data is recorded and uploaded to the software, together with the trigger time. By showing both pre- and post-event data, burst data is a very effective analysis tool. Burst data can be high speed data, such as half-cycle RMS measurements of voltages, currents, and other quantities, or it can be 1 second measurements for slowly changing parameters.

Event

Events are records of activity or conditions in the monitoring system. Events are generated by devices and the software and are logged and displayed as they happen in the system without any processing or aggregation. The system uses event records to determine alarm types and states.

Status view

A status view in the Alarms application shows alarm definitions in the system, their present state, how often they occurred, their priority, and other relevant information.

History view

A history view in the Alarms application shows instances of incidents, alarms, or events that have occurred in the system.

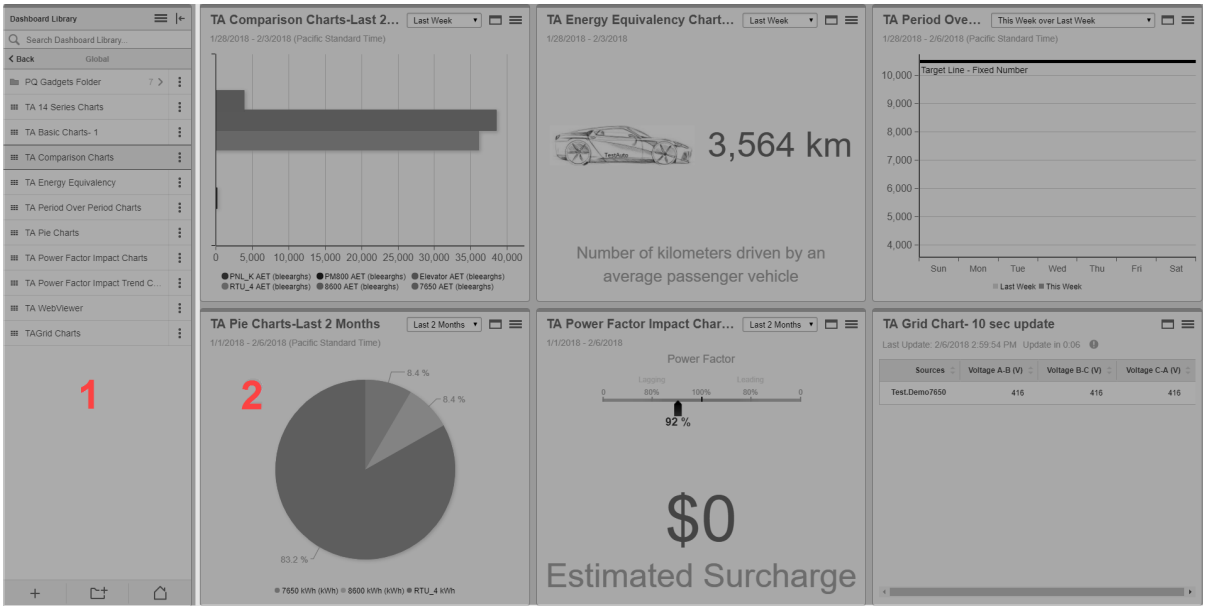
Dashboards references

This section contains reference information related to using Dashboards.

Use the links below to find the content you are looking for:

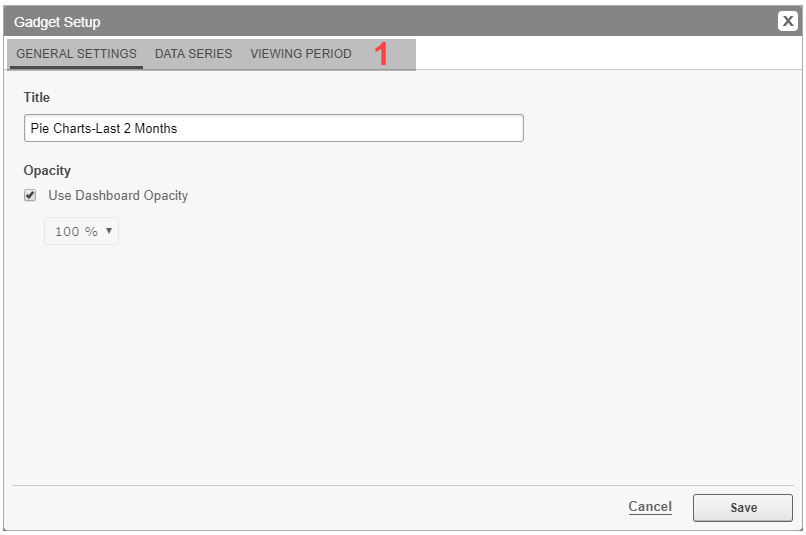
Dashboards user interface (UI)

Main UI



1	**Dashboard Library** Contains all the Dashboards that are configured in the system. Dashboards can be listed individually, or they can be organized within folders. **TIP**: To hide the library, click the Hide Library icon (|← or →|) in the top right corner of the library. To show the library, click the Show Library icon (→▯ or ▯←) at the top of the library ribbon, or click anywhere in the minimized library ribbon.
2	**Dashboards display pane.** Shows the Dashboard selected in the View Library.

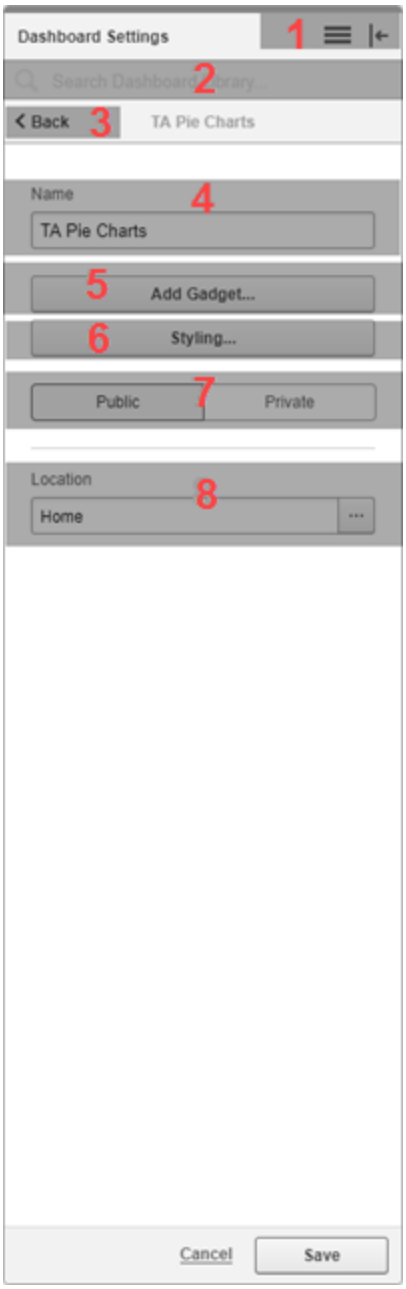
Gadget Settings UI



Gadget settings tabs.

1 The tabs group the different setting options for the gadget. Different gadget types can have different settings tabs and different settings options within those tabs.

Dashboard Settings



Options menu ☰ and Hide Library icon ⇤.

1 Contains options relevant to the Dashboard Library. The following options are available:

Add Dashboard

Add Folder

Slideshow Manager

2	**Search filter.** Enter text to search and filter the Dashboards displayed in the Library.
3	**Back button.** Exit the Dashboard Settings and go back to the Library.
4	**Dashboard Name.** Set the name of the Dashboard in the Library.
5	**Add Gadget.** Add new gadgets to the Dashboard. See Adding a gadget to a dashboard for more information.
6	**Styling.** Set the appearance of the Dashboard by adding a background image, setting the background color, and setting the gadget opacity. See Styling a dashboard for more information.
7	**View Access Permissions selector.** Select Public to make this Dashboard public. Select Private to make this Dashboard private. **NOTE**: A public item is visible to all users in your user group. A private item is visible to you and any user in your user group with Edit permissions on this item type. See Default User Access Level Privileges and Customizing Access Level Privileges for details.
8	**Location.** Determine where the Dashboard is stored in the Library.

Power Quality Performance Module references

This section contains reference information related to using the Power Quality Performance Module.

Use the links below to find the content you are looking for:

Power Quality Performance events and disturbances

Events

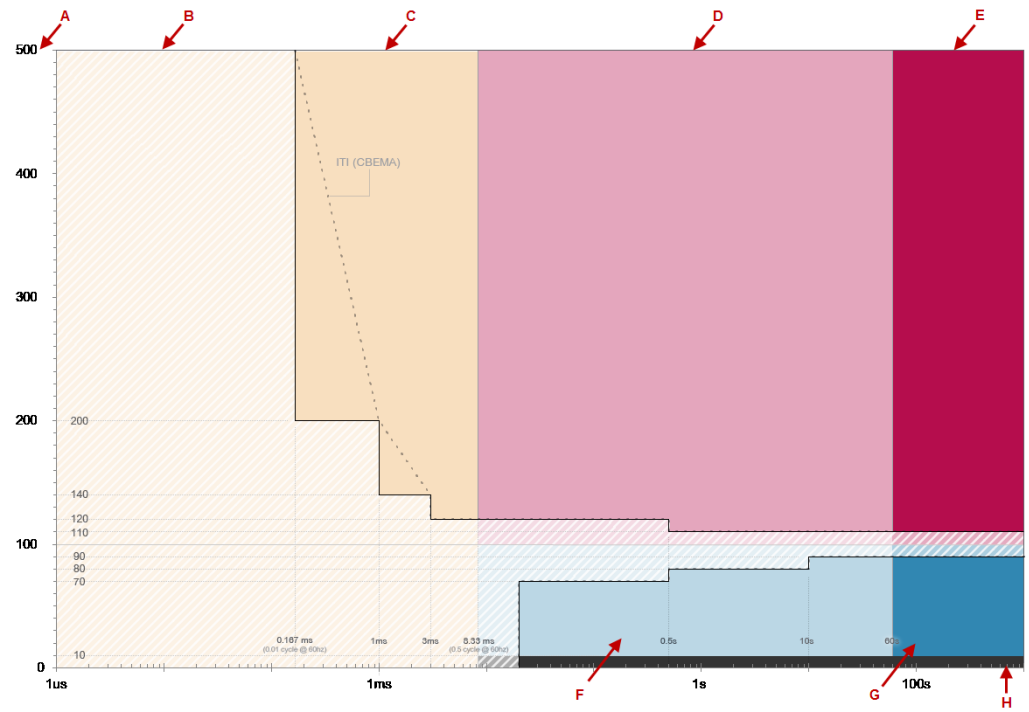
Power Quality (PQ) events are short-term disturbances that are characterized by magnitude, duration, and direction.

The following table provides definitions for the different PQ events:

PQ Events	Summary	Magnitude	Source	Duration	Consequence
Interruptions	Loss of the supply voltage	Less than 10% of nominal	Utility or facility	½ cycle to 1 minute or more	Downtime
Voltage Sag	Decrease in voltage magnitude	90% to 10% of nominal voltage (typical)	Utility or large motors starting	½ cycle to 1 minute	Malfunction or downtime
Voltage Swell	Increase in voltage magnitude	110% to 180% of nominal (typical)	Utility or facility	½ cycle to 1 minute	Equipment malfunction or damage
Transient Voltage	Short-duration high overvoltage	Potentially several thousands of volts and amps	Switching activities or lightning strikes	<50 ns to 50 ms	Electronic equipment damage
Over Voltage	Sustained increase in voltage magnitude	110% to 120% of nominal (typical)	Utility or facility	More than 1 minute	Equipment malfunction or motor heating
Under Voltage	Sustained decrease in voltage magnitude	80% to 90% of nominal (typical)	Utility or facility	More than 1 minute	Equipment malfunction or damage

Power Quality event classifications

The following image illustrates the classification of events in relation to a CBEMA chart. The Power Quality Performance gadgets and reports follow this same color classification of Power Quality Events.



A	Percent of nominal voltage	**B**	No impact region	**C**	Transient	**D**	Swell
E	Over Voltage	**F**	Sag	**G**	Under Voltage	**H**	Interruption

Disturbances

Power Quality (PQ) disturbances are long-term disturbances.

The following table provides definitions for the different PQ disturbances:

PQ Disturbances	Summary	Magnitude	Source	Duration	Consequence
Voltage Unbalance	Non-symmetrical voltages	0.5% - 2.5% of nominal voltage (typical)	Utility or facility	Steady state	Overheating or malfunction
Current Unbalance	Non-symmetrical current	1.0% - 30% of nominal current (typical)	Utility or facility	Steady state	Malfunction and breaker trip
Voltage Harmonics	Waveform distortion	0 to 20% (typical)	Nonlinear loads	Steady state	Malfunction and overheating
Current Harmonics	Waveform distortion	0 to 20% (typical)	Nonlinear loads	Steady state	Malfunction and breaker trip

PQ Disturbances	Summary	Magnitude	Source	Duration	Consequence
Frequency Variation	Deviation of the frequency from the nominal	Up to 5% deviation of nominal (typical)	Standby generators or poor power infrastructure	Intermittent	Malfunction or motor degradation
Flicker	Voltage waveform envelope variations	0.1% to 7% (typical)	Load exhibits significant current variations	Intermittent	Flickering lights, equipment malfunction

Reports references

This section contains reference information related to using Reports.

Use the links below to find the content you are looking for:

Model creation example

The following example shows the process of creating a model for use with the Use Model Report. It shows the steps for creating a basic model and then improving it iteratively.

In this example we use the report to model the HVAC related electrical energy consumption of a building. Our goal is to create a daily model for energy consumption based on outside temperature and humidity. We use consumption data for the year 2017 to create the model.

Model creation run 1

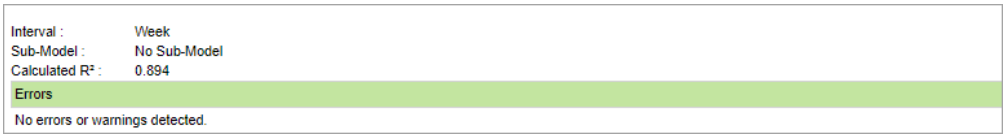
The dependent variable is the electrical Real Energy (kWh) measurement for the HVAC system of the building. The independent variables are the outside temperature and humidity.

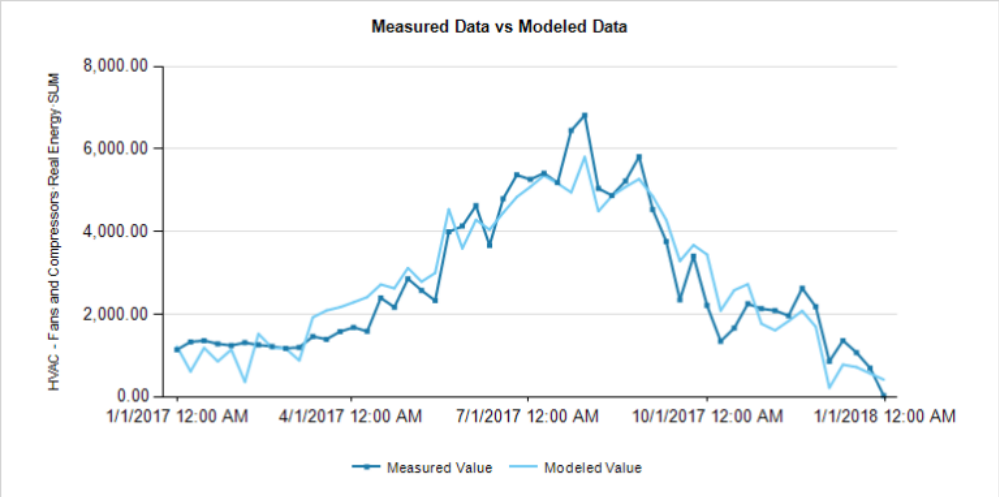
We use the following inputs for the Create Model report:

Title	Create Model Report
Dependent Variable	Source = HVAC - Fans and Compressors Measurement = Real Energy (kWh) Aggregation Method = SUM
Independent Variable(s)	Source = Victoria.Weather Measurement = Weather Temperature (°C) Aggregation Method = AVG Source = Victoria.Weather Measurement = Weather Relative Humidity (%) Aggregation Method = AVG
Reporting Period	1/1/2017 - 12/31/2017, Server Local Time
Interval and Sub Model Configuration	Interval = Week Sub Model = No Sub Model
Use Exception Periods	No
Show Detailed Results	No
Save Model Configuration	No

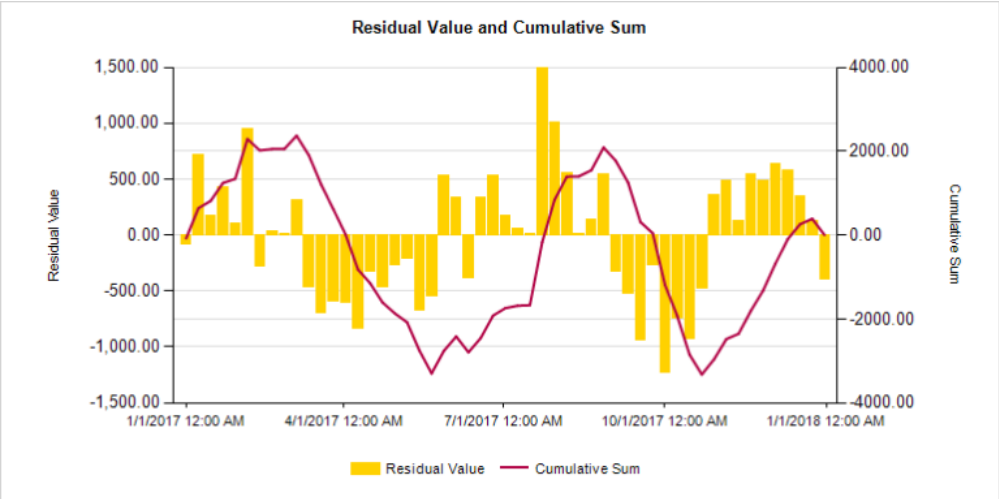
For the first run we choose an interval of **Week**, only to see if there is a strong relationship between consumption and the independent variables. Later we change this to **Day** to get a Daily Model.

Results:





TIP: Move your pointer over the chart line to see tooltips with measurement details.



The model accuracy, measured by the R^2 value, is pretty high, which show that the model is a good match for the correlation between the energy consumption and the outside temperature as well as humidity.

For the next run, we use a Daily aggregation method.

Model creation run 2

We change the Interval to Day.

We use the following inputs for the Create Model report:

Title	Create Model Report
Dependent Variable	Source = HVAC - Fans and Compressors Measurement = Real Energy (kWh) Aggregation Method = SUM

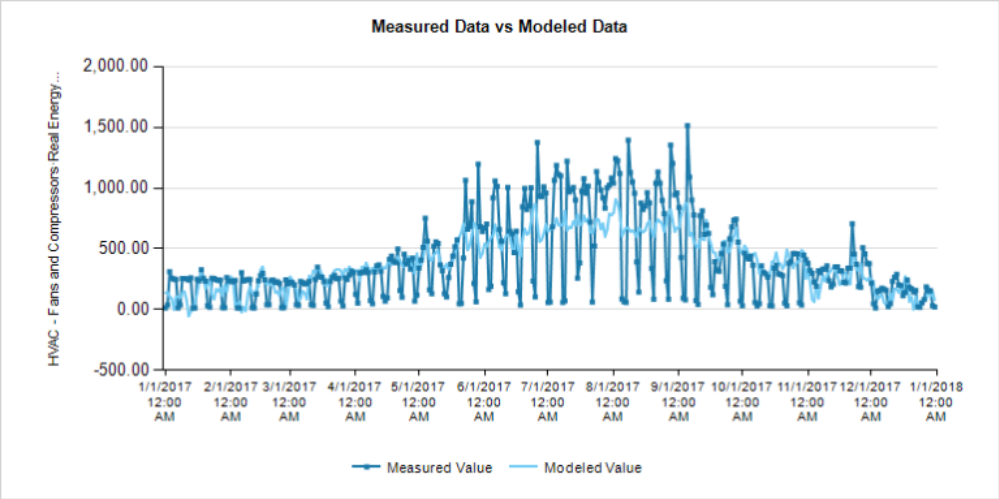
Title	Create Model Report
Independent Variable(s)	Source = Victoria.Weather Measurement = Weather Temperature (°C) Aggregation Method = AVG Source = Victoria.Weather Measurement = Weather Relative Humidity (%) Aggregation Method = AVG
Reporting Period	1/1/2017 - 12/31/2017, Server Local Time
Interval and Sub Model Configuration	Interval = **Day** Sub Model = No Sub Model
Use Exception Periods	No
Show Detailed Results	No
Save Model Configuration	No

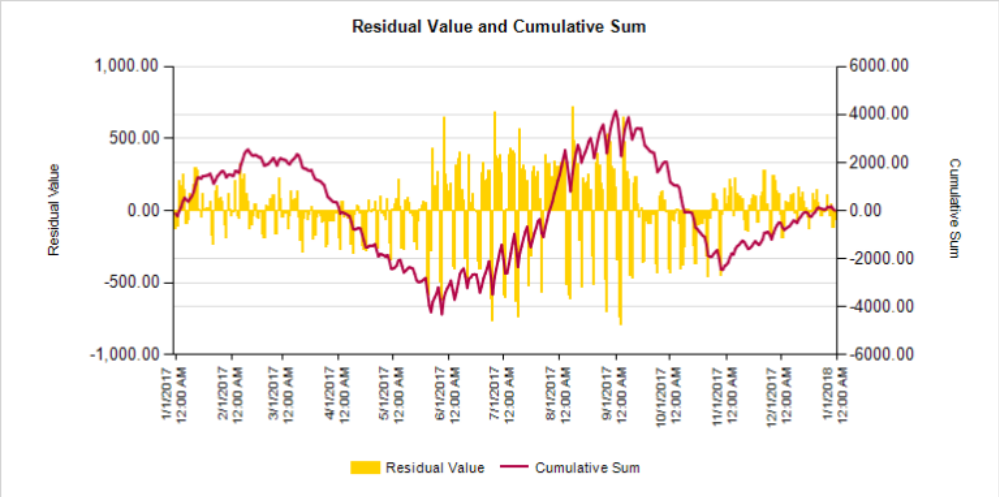
Results:

Interval : Day
Sub-Model : No Sub-Model
Calculated R^2 : 0.431

Errors

No errors or warnings detected.





The R^2 has dropped and the visual correlation is not very high. The charts show that there is a big difference in consumption between weekdays and weekends. This difference cannot be explained by outside temperature or humidity alone. For the next run we use sub-models for weekdays and weekends.

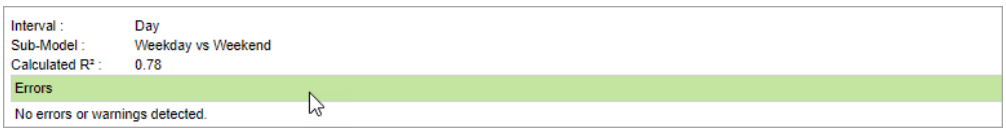
Model creation run 3

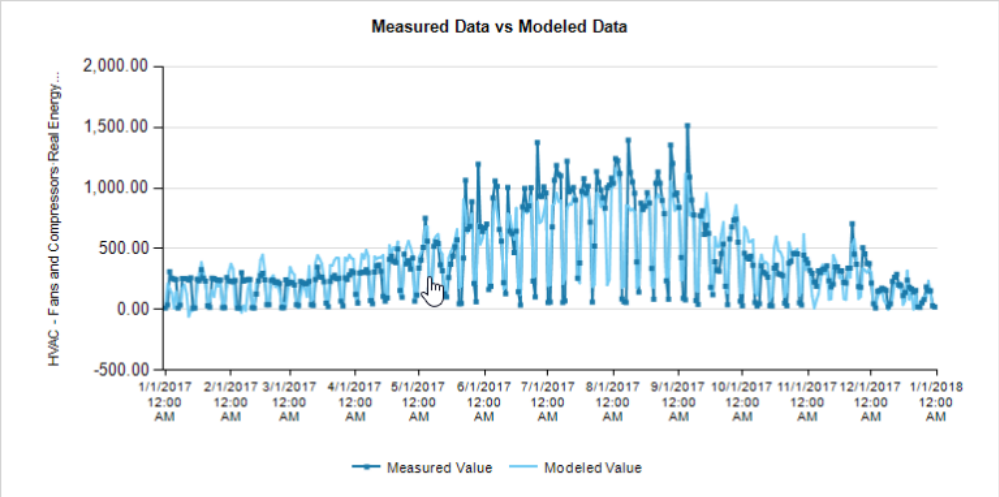
We use a Weekday vs Weekend sub-model.

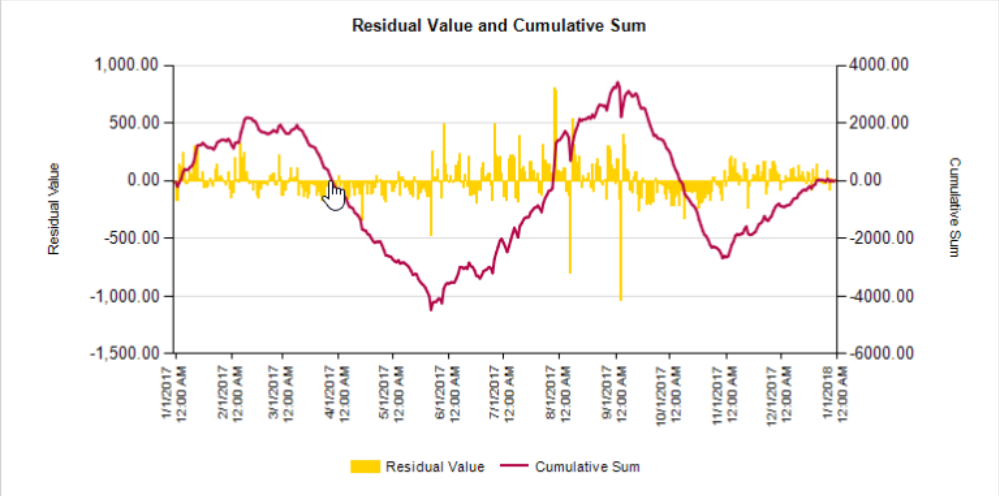
We use the following inputs for the Create Model report:

Title	Create Model Report
Dependent Variable	Source = HVAC - Fans and Compressors Measurement = Real Energy (kWh) Aggregation Method = SUM
Independent Variable(s)	Source = Victoria.Weather Measurement = Weather Temperature (°C) Aggregation Method = AVG Source = Victoria.Weather Measurement = Weather Relative Humidity (%) Aggregation Method = AVG
Reporting Period	1/1/2017 - 12/31/2017, Server Local Time
Interval and Sub Model Configuration	Interval = Day Sub Model = **Weekday vs Weekend**
Use Exception Periods	No
Show Detailed Results	No
Save Model Configuration	No

Results:







The R^2 has much improved. There is a good correlation between outside temperature and humidity and consumption. There are still a few days with a large negative residual value. Upon closer inspection we find that most of these days are holidays. For the next run we use exception periods to account for the holidays.

Model creation run 4

We use exception periods to account for the holidays.

We use the following inputs for the Create Model report:

Title	Create Model Report
Dependent Variable	Source = HVAC - Fans and Compressors Measurement = Real Energy (kWh) Aggregation Method = SUM

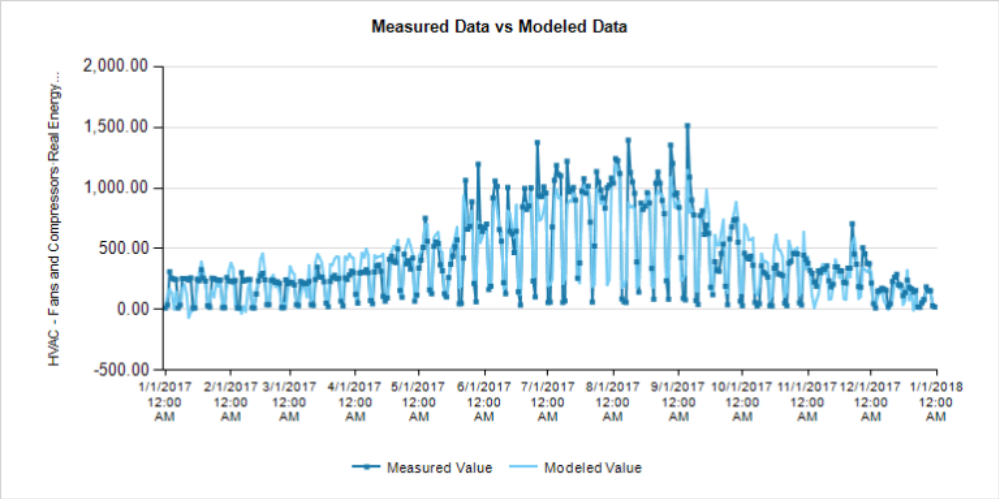
Title	Create Model Report
Independent Variable(s)	Source = Victoria.Weather Measurement = Weather Temperature (°C) Aggregation Method = AVG Source = Victoria.Weather Measurement = Weather Relative Humidity (%) Aggregation Method = AVG
Reporting Period	1/1/2017 - 12/31/2017, Server Local Time
Interval and Sub Model Configuration	Interval = Day Sub Model = Weekday vs Weekend
Use Exception Periods	**Yes**
Show Detailed Results	No
Save Model Configuration	No

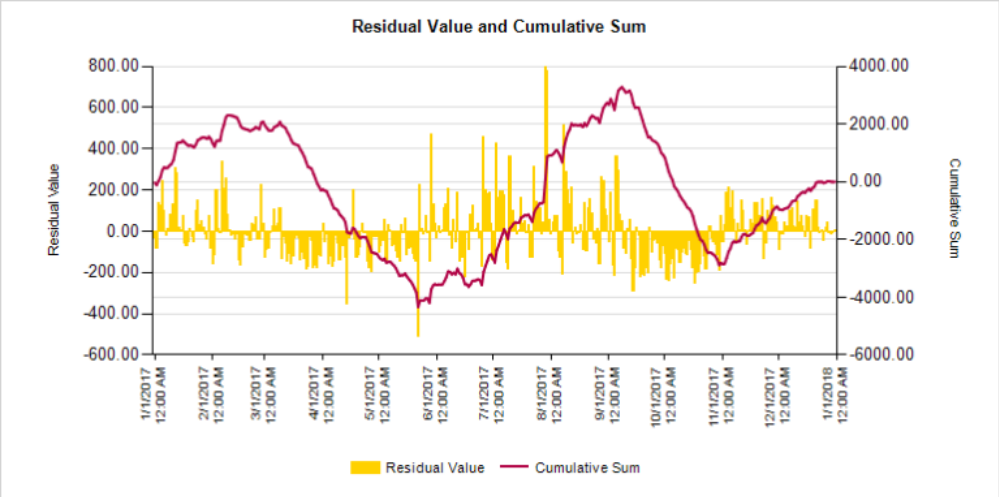
Results:

Interval : Day
Sub-Model : Weekday vs Weekend
Calculated R^2 : 0.82

Errors

No errors or warnings detected.





We have again improved the model. In our example, the building is cooled electrically, which means the greatest impact of outside temperature on energy consumption is during the cooling season. To account for that, we change the Aggregation Method for outside temperature to Cooling Degree Days (CDD) for the next run.

Model creation run 5

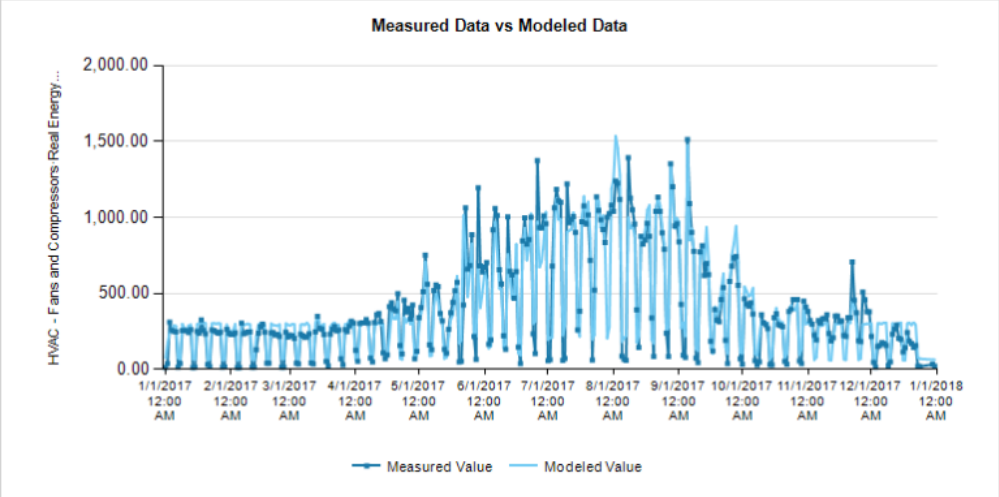
We change the Aggregation Method for outside temperature to Cooling Degree Days (CDD) with a base temperature of 11 °C.

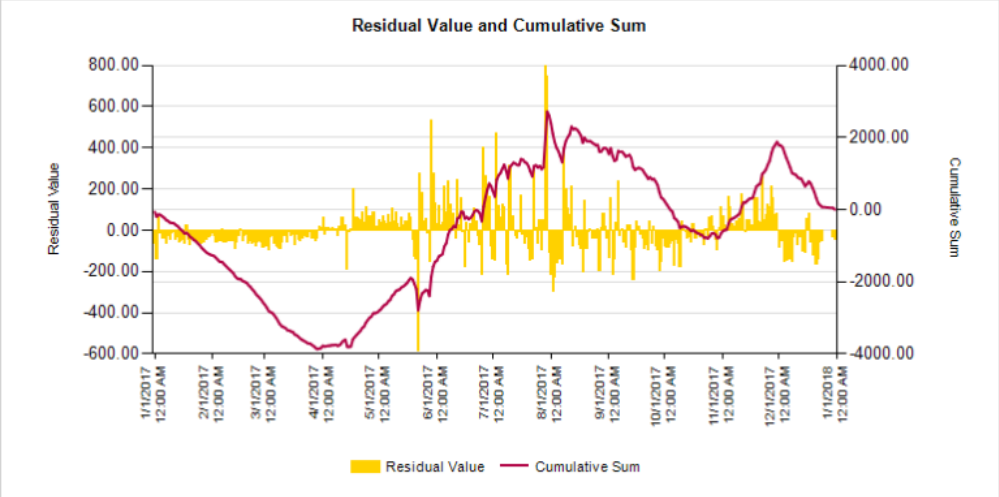
We use the following inputs for the Create Model report:

Title	Create Model Report
Dependent Variable	Source = HVAC - Fans and Compressors Measurement = Real Energy (kWh) Aggregation Method = SUM
Independent Variable(s)	Source = Victoria.Weather Measurement = Weather Temperature (°C) Aggregation Method = **CDD** Source = Victoria.Weather Measurement = Weather Relative Humidity (%) Aggregation Method = AVG
Reporting Period	1/1/2017 - 12/31/2017, Server Local Time
Interval and Sub Model Configuration	Interval = Day Sub Model = Weekday vs Weekend
Use Exception Periods	Yes
Show Detailed Results	No
Save Model Configuration	No

Results:

Interval :	Day
Sub-Model :	Weekday vs Weekend
Calculated R^2 :	0.866
Errors	
Matrix is rank deficient.	





We now have a pretty accurate model of our energy consumption based on outside temperature and humidity.

TIP: Choose to include model creation details in the report.

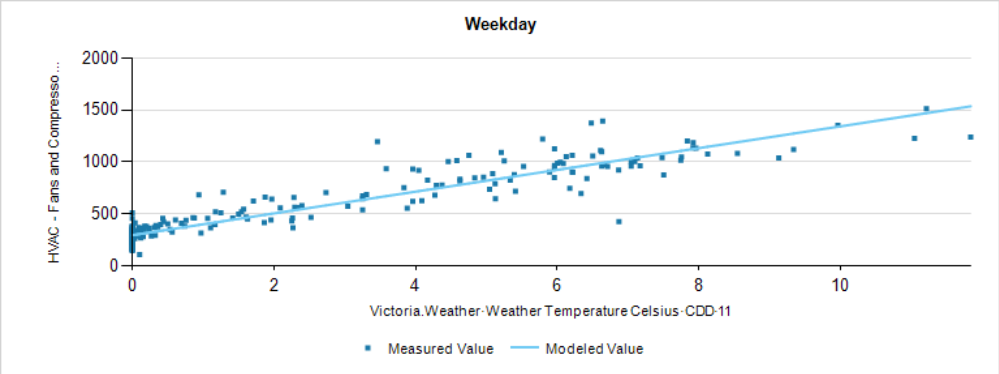
Select **Yes** for **Show Detailed Results** in the Report Inputs to include information on the modeling formulas and the relationship between the drivers and the sub model data. The following are selected examples of the type of details you can get.

Statistical information:

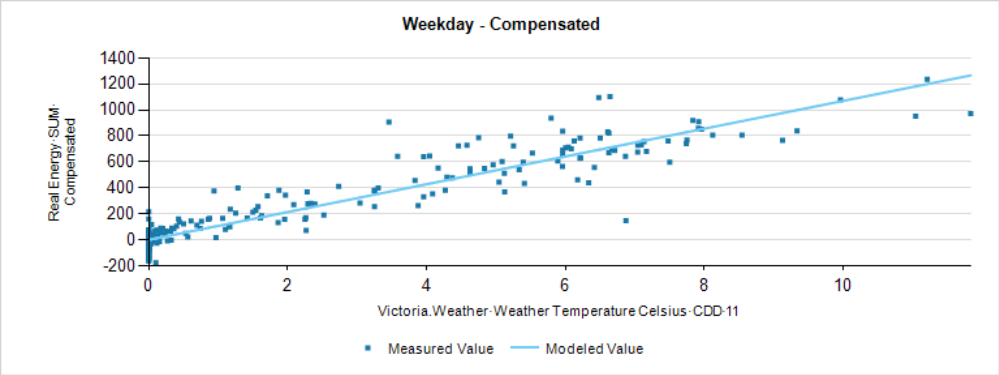
Errors		
Matrix is rank deficient.		
Sub Model	Sub Model R²	Formula
Weekday [n=246]	0.879	Y = 211.998 + 107.012 * [Victoria.Weather·Weather Temperature Celsius·CDD·11] + 0.987 * [Victoria.Weather·Weather Relative Humidity·AVG]
Weekend [n=105]	0.203	Y = 111.64 + 22.516 * [Victoria.Weather·Weather Temperature Celsius·CDD·11] - 0.534 * [Victoria.Weather·Weather Relative Humidity·AVG]
Holiday [n=9]	0.005	Y = 143.787 + 1.705 * [Victoria.Weather·Weather Temperature Celsius·CDD·11] + 0.882 * [Victoria.Weather·Weather Relative Humidity·AVG]

Sub Model and Driver	Std Dev	F-Test	P-Value	Significant	Min	Max	Avg	Impact
Weekday		884.96	0.0000	True				
Weekday - Intercept								40 %
Weekday - Victoria.Weather·Weather Temperature Celsius·CDD·11	2.92		0.0000	True	0.00	11.83	2.25	45.4 %
Weekday - Victoria.Weather·Weather Relative Humidity·AVG	11.64		0.1915	True	34.91	97.97	78.70	14.6 %
Weekend		13.03	0.0000	True				
Weekend - Intercept								93.9 %
Weekend - Victoria.Weather·Weather Temperature Celsius·CDD·11	3.00		0.0003	True	0.00	10.42	2.18	41.3 %
Weekend - Victoria.Weather·Weather Relative Humidity·AVG	10.60		0.7556	False	50.64	97.87	78.43	-35.2 %
Holiday		0.01	0.9863	False				
Holiday - Intercept								67.3 %
Holiday - Victoria.Weather·Weather Temperature Celsius·CDD·11	3.94		0.9393	False	0.00	11.33	2.69	2.2 %
Holiday - Victoria.Weather·Weather Relative Humidity·AVG	15.48		0.8773	False	37.04	89.73	73.96	30.5 %

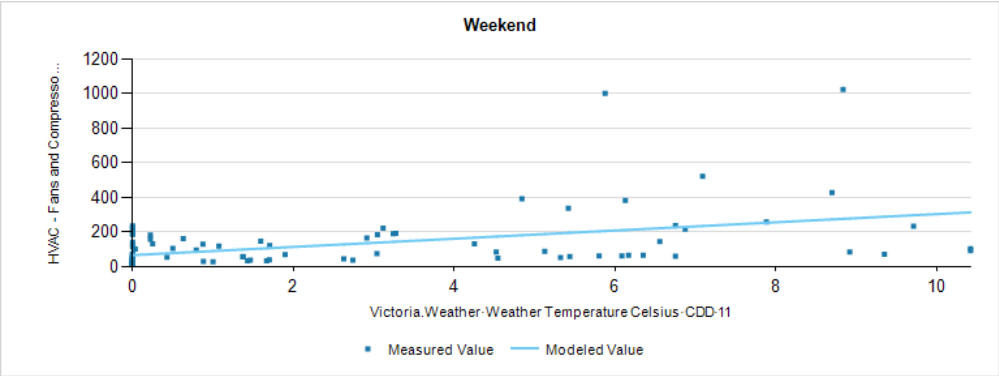
Weekday sub-model data driven by outside temperature vs measured data:



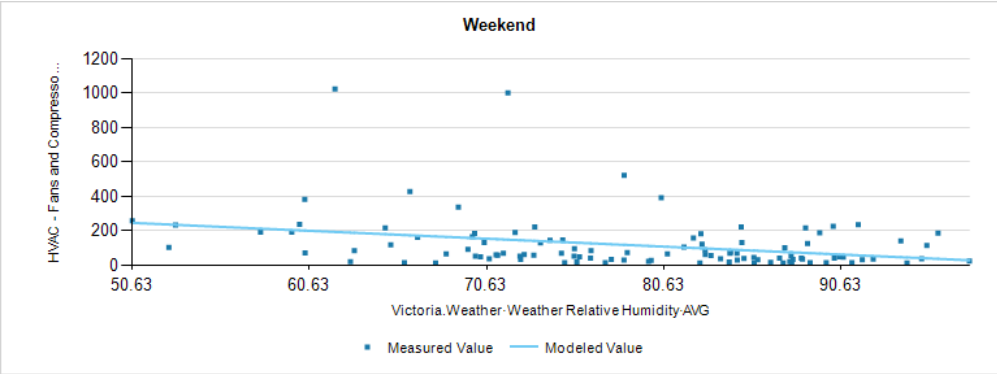
Weekday sub-model data driven by outside temperature with influence of humidity removed vs measured data:



Weekend sub-model data driven by outside temperature vs measured data:



Weekend sub-model data driven by relative humidity vs measured data:



Next Step:

Run the Create Model report one last time with the **Save Model Configuration** parameter set to **Yes**. This saves the model into the database and makes it available for use with the Use Model Report.

Report input parameters

The report input area opens when you select a report in the **Report Library**. You must specify the necessary input parameters before you can generate the report. For saved reports, some or all the input parameters may already be specified.

After you generate a report, you can display or change the input parameters you specified for it by clicking **show inputs** in the top-right corner of the report display area. To return to the generated report without changing any of the input parameters, click **hide inputs**. If you change any of the input parameters, click **Generate Report** to regenerate the report.

The following information describes the inputs for the report templates. The available inputs vary by report template listed in the **Reports Library**.

Actual Bill Cost

(Optional) Enter a billing amount, for example from a utility issued bill, which will be compared to the calculated bill value from the reference source. Set to **0** to ignore.

Aggregation Data

This input determines the period of time over which data is accumulated for presentation in the report, such as day, week, and so on. From the dropdown list, select the aggregation interval that you want to use. If a custom report includes a predefined aggregation interval, contact the owner to adjust the interval for your use.

Aggregation Interval

This input determines the period of time over which data is accumulated for presentation in the report, such as day, week, and so on. From the dropdown list, select the aggregation interval that you want to use. If a custom report includes a predefined aggregation interval, contact the owner to adjust the interval for your use.

Aggregation Period

This input determines the period of time over which data is accumulated for presentation in the report, such as day, week, and so on. From the dropdown list, select the aggregation interval that you want to use. If a custom report includes a predefined aggregation interval, contact the owner to adjust the interval for your use.

Aggregation Type

The aggregation data that will be displayed: Average, Maximum, or Minimum.

Alarm Threshold - Check Source vs Actual Total (%)

(Optional) Set the notification threshold, in %, for the billing difference between the Check source and the Actual Total. Set to **0** to ignore.

Alarm Threshold - Check Source vs Private Source (%)

(Optional) Set the notification threshold, in %, for the billing difference between the Check source and the Private source. Set to **0** to ignore.

Align Day of Week for Months

When the Aggregation Interval is **Month**, selecting **Yes** includes the data in the table by day of week (Sun, Mon, Tues, and so on). Selecting **No** includes the data in the table by the day of the month (1, 2, 3, and so on). The default is **Yes**.

Align Day of Week for Months on Energy Chart

Select **Yes** to show the data for the **Previous Period Energy Measurement** chart by day of week (Sat, Sun, Mo, ...) when a monthly rollup period is selected. Select **No** to show the data by day of month (1, 2, 3, ...).

Apply TOU Schedule

Select if you want to use a time of use (TOU) schedule with this report. If you want to use a TOU schedule, select a TOU schedule from the list. The list shows the existing TOU schedules that are configured in the system. If you have not created a TOU schedule, the field shows that no schedule is available.

Area

The area whose panels you want to include in the report.

ATS Summary

1. Click **ATS Summary**.
2. Click **Include ATS Summary** to include the Automatic Transfer Switch Summary section in the report. The remaining options in the screen are enabled. Alternatively, clear this check box to exclude the Automatic Transfer Switch Summary section from the report.
3. Click **Include Pass/Fail Indicator** to include both the Required Transfer Time and Test Status results. The Test Status shows the pass/fail grade. Alternatively, clear this check box to exclude the results from the report.
4. **Lead ATS** - Select the ATS device that you want to use as the lead ATS in reporting the transfer time. The lead ATS is the ATS upon which the pass/fail grade is based.

   You can choose the `Auto Select Lead ATS` option if you want the system to automatically select the lead ATS. The ATS device that is first to enter test mode becomes the lead ATS. If multiple ATS devices enter test mode at the same time, or if none of the devices enter test mode, the system selects the ATS based on alphabetical order.
5. Click **OK** to save your changes and return to the report template.

Auto-scale Y-Axis

Select whether or not to scale the chart normally. Selecting **No**, sets the starting point of the Y-axis at zero. The default is **Yes**.

Base Interval

This setting works together with **Include Empty Intervals**. When **Include Empty Intervals** is turned on, the system uses the **Base Interval** to determine the timestamps for the empty records that are inserted.

Baseline Date

Use the Baseline Date to compare the current state of the breaker settings to a baseline point in time. If a change is detected between the state of the settings today and the state of the settings on the baseline date the change will be noted in the report.

CBEMA (1996), CBEMA (Updated), ITIC, SEMI F47 curves

Click **Yes** for the power quality curve (CBEMA (1996), CBEMA (Updated), ITIC, or SEMI F47) that you want to show in the incident plots. Click **No** to hide the curve.

You can select one or more of the curves.

Change Summary

Click **Yes** to include the Change Summary section of the report. Click **No** to not include it. The default is **No**.

Chart Type

Select one of the available chart types from the dropdown list to graphically display the data that you specified for the report.

Check Source

Use this input to select the reference source for the bill comparison, for example the utility owned metering source. To select the source, choose a hierarchy view or virtual meter.

Choose a Model and a Reporting Aggregation Interval

Select the model you want to use for the report from the **Model** drop-down list.

Select the aggregation interval you want to use for the report from the **Reporting Aggregation Interval** drop-down list. The options available in this drop-down list depend on the selected model.

Circuit Breaker Inventory

Click **Yes** to include the Inventory section of the report. Click **No** to not include it. The default is **Yes**.

Comments

Use this field to add comments that will appear at the bottom of the generated report.

Company Name

Type a name for the company in the text box.

Cumulative Degradation Threshold

Enter the value that represents the maximum total voltage difference between the reference waveform and the evaluated waveforms. For example, if the waveform is off by 1.0 on each point from the reference, the total degradation is 10. If the threshold value is 8, then the degradation exceeds the threshold.

Custom Page Height

Specify a custom output page height. This value is ignored if **Page Size** is set to **Fit to Page**.

Custom Page Width

Specify a custom output page width. This value is ignored if **Page Size** is set to **Fit to Page**.

Custom Units Label

Enter any text to be used as the measurement label for instances when normalization is used , for example, **kWh/Person**. The default is **kWh**.

Custom URL

(Optional) Specify the URL for any page or image that you would like to include in the report. This could be a page from an external or internal website, or a local image.

Customers

Click **Select Customers**. Select the customers that you want to include in the report from the list. Click **Select All** to select all the customers from the list. Click **None** to deselect all the customers. Click **OK**.

Data Center Energy Measurement

Click **Select Measurement** to choose the measurement for interval energy usage for the entire data center. This will typically be a 15-minute interval value.

Data Center Power Measurement

Click **Select Measurement** to choose the measurement for instantaneous power consumption for the entire data center.

Data Center Source

Click **Select Source** to choose a single source to represent the entire data center facility.

Degree Days Pivot Point

The Degree Days Pivot Point is the point where either heating or cooling is required to keep the temperature within the designated degree range.

Demand Adjustment (%)

Enter a multiplier, in %, to apply to the load measurements. For example, a demand adjustment of 125% applied to a load measurement of 100 kW, results in an adjusted load measurement of 125 kW. The default value is **125**.

Demand Rating

Enter a value for the rated capacity of the equipment, based on the selected measurement. For example, if you selected an Active Power measurement (kW), enter the rated kW capacity. The default value is **1000**.

Dependent Variable

The dependent variable is the measurement you want to model. For example, if you are modeling the energy consumption of a building based on outside temperature, then the energy is the dependent variable.

To specify the dependent variable,

1. Click **Select Source** and select a device from the **Devices list** or a Hierarchy node from the **Views** list.
2. Click **Select Measurement** and select the measurement to be modeled.
3. Select an aggregation method for the measurement from the **Aggregation Method** drop down list.

   The following aggregation methods are available:

   AVG: calculates the average measurement value over the interval.
   SUM: adds up the measurement values over the interval.
   DELTA: subtracts the beginning measurement value from the end measurement value of the interval.

NOTE: If you are using a Hierarchy node as a source for the dependent variable and you are using a cumulative measurement, such as Real Energy (kWh), you must use SUM as aggregation method. This is because the hierarchy converts the cumulative measurement into interval measurements.

Deviation Type

Enter a percentage or specific value to specify the type of deviation to show in the report.

Display Billing ID

Click **Yes** to show an alphanumeric billing ID for a tenant which can be used by third party billing engine.

Display Mode

Select in which form you would like to see the report output from the **Display Mode** drop-down list.

The following display modes are available:

Forecast: Compare the model output for the reporting period to the actually measured data for that period, where the model was created for a baseline period in the past.
Backcast: Compare the model output for a past period to the actually measured data for that period, where the model was created for the reporting period in the present time.

Display Zero Days

Select whether or not to show days where data is logged but the values are all zero. Note that days with no logged values at all are still included in the report. The default is **No**.

Driver Data Quantity

Click **Select Measurement**. Navigate to and select a measurement, and then click **OK**.

Driver Data Source

Click **Select Source**, and then choose from the dropdown list a Grouping: None, Group Name, Site, or Device Type. Navigate to and select a source, and then click **OK**.

Email Address

Enter a comma-separated list of email addresses to which notification emails will be sent.

Email Recipients (comma separated)

Enter a comma-separated list of email addresses to which to email the transformed XML.

Email Subject

Enter the subject line for the notification emails.

Email XML Export

Select **Yes** to email the transformed XML output ('XML Export File') to the addresses specified in **Email Recipients**.

End Hour

Select the end hour to display when filtering the data by the time of day.

The time range in the list is in 24-hour format in descending order.

Energy Cost per kWh

Enter the appropriate value for the blended cost of energy. This value is used in the calculations for the cost of losses in the report. Only numeric values with up to two decimal places will be used in the report.

The currency symbol used to display the cost values is set in Web Applications **SETTINGS** > **Personalization** > **System Language**.

Energy Measurement Label

Type a label to describe the measurements selected in **Energy Measurements**.

Use this label to aggregate disparate units into a common measurement unit.

For example, for Gas (GJ) and Electricity (kWh) values you could define the Energy Label as 'BTU'.

Energy Measurements

1. Click **Select Load Measurement** to open the Load Measurement Selector dialog.
2. Under **Load**, click **Select Source** to open the Source Selector.

   The Source Selector dialog provides options to show **Devices** or **Views**.

   - Use the **Devices** option to select the devices you want to include in the report.

     From the **Grouping** list, select the way in which you want to display the sources (for example by device type or by group name). Click **+** and **-** to expand and collapse items in the navigation tree. Click the check box beside a device (or group of devices) to select it. Click **Select All** or **Select None** in the top-right corner to select or clear all the check boxes.
   - Use the **Views** option to select a hierarchy view (a tree of relationships) or virtual meters.

     The hierarchy views and virtual meters are configured in the Hierarchy Manager component. (See the *Hierarchy Manager Help* for further information about hierarchies, virtual meters, and views.) Click **+** and **-** to expand and collapse items in the tree. Click the check box beside any hierarchy item in the tree or any virtual meter to select it.
   - Click **OK** after making your selections.
3. Under **Measurements**:
   a. Click **Select Measurement** to open the Measurement Selector.
   b. Choose the measurement you want to use for the energy comparison and click **OK**.
   c. If required, enter a **Multiplier** value.

      The multiplier lets you add multiple measurements. For example, a multiplier can be used to get gas and electricity energy currencies onto the same unit footings, so they can be added together.
4. (Optional) Use **Normalization** to normalize measurement values.
   a. In **Label**, enter the normalization label value.
   b. In **Value**, enter the value that you want to normalize.

      For example: To normalize energy usage per square foot of a building, enter Energy per Square Foot in the **Label** value, and the square footage of the building in the **Value** field.
5. Click **OK**.

Energy Period Comparison Range

Select the reporting period for the **Previous Period Energy Measurement**.

Select the reporting period from the dropdown list. The timeframe options in the timeframe dropdown are relative to the date the report is run. To run a report that starts and ends in the past, select the fixed date option. Type a start and end date in the date boxes or click the arrows beside the dates to display a pop-up calendar and select a date. Type a time in the time boxes or click the up and down arrows beside the time to adjust the hours or minutes up or down.

Select the timezone you want to view timestamps in.

Energy Period Rollup

Select the aggregation time interval for the **Previous Period Energy Measurement** data.

Enter an optional coefficient in % to be applied on the modeled data

(Optional) Enter coefficients that are applied to the modeled data to adjust the model output based on known or expected changes.

For example, if you implemented an energy conservation measure on June 1, 2016 for which you are expecting an energy saving of 15%, enter **-15** as a coefficient and June 1, 2016 as the start date from which to apply it on. All modeled data, starting with that date, will be adjusted by -15%. You can add multiple coefficients at multiple dates. Coefficients are applied cumulatively, on top of any previously applied coefficients.

To specify a coefficient,

1. Enter the coefficient value in percent, including the sign, in the text box.
2. Enter the date on which this coefficient takes effect into the date box.

To add additional coefficients, click the **+** sign next to the coefficient text box. Click **-** to remove a coefficient.

EPSS Group

Select the transfer switches and other equipment group for the report. The list shows the groups that you defined in the configuration utility. When you select a group from the list, the field to the right shows the devices included in the group.

Evaluation Limits

Click **Configure** to configure the EN50160 parameters used in the report. Default values are provided based on the EN50160 standard.

Click the links in the dialog box to access configuration options for various measurements included in the report:

- **Basic Configuration**: Type the maximum percentage of intervals in an observation period where the component does not meet the EN50160 N1 and N2 requirements before the component is considered non-compliant.
- **Supply Voltage Dips**: Type the maximum percentage of intervals in an observation period that the RMS value can drop below 90% of the nominal voltage for each duration and depth presented in the dialog box before the component is considered non-compliant.

- **Short and Long Interruptions**: Type the maximum percentage of intervals in an observation period that the RMS value can be less than 1% of the nominal voltage for the given duration before the component is considered non-compliant.
- **Temporary Overvoltages**: Type the maximum percentage of intervals in an observation period that the RMS value can exceed the nominal voltage by each magnitude for each duration presented in the dialog box before the component is considered non-compliant.

NOTE: The EN50160 standard defines the observation period for the above components as one week.

Event Location

Select how you want to identify the location of the events that are included in the generated report. The available selections are **Internal and External**, **Internal** only, or **External** only.

Event Priority

Select the priority of alarms and events that you want to include in the report. The options include high, medium, and low priority alarms and events.

Events Summary

1. Click **Events Summary**.
2. Click **Include Events Summary** to include the Events Summary section in the report. The remaining options in the screen are enabled. Alternatively, clear this check box to exclude the Events Summary section from the report.
3. Click **Include Generator Events** to include generator events in the report. Alternatively, clear this check box to exclude generator events from the report.
4. Click **Include ATS Events** to include ATS events in the report. Alternatively, clear this check box to exclude ATS events from the report.
5. Click **OK** to save your changes and return to the report template.

Exclude Days with Rollover

Exclude days that contain rollover from the report.

Exclude Incomplete Days

Exclude days that are incomplete from the report.

Exclude Incomplete Weeks

Exclude weeks that are incomplete from the report.

Exclude Sources

(Optional) Define the sources to exclude from the report:

a. In the **Sources Included** area, select sources to exclude and then click **>** to move those sources to the **Sources Excluded** area.
b. To move all of the sources into the **Sources Excluded** area, click **>>**.
c. Click **OK** to save the sources and return to the report template.

The devices in the group appear in the Sources section of the generated report. Excluded devices appear as grayed-out entries.

Exclude Values Over

Enter a value to indicate the point at which values over this number are not plotted in the chart. The default value is **No Exclusions**.

Exclude Values Under

Enter a value to indicate the point at which values over this number are not plotted in the chart. The default value is **No Exclusions**.

Export File Path

Enter a path or file share on the PME server where the report output files will be saved to. If you do not provide a file name as part of the path, the system will use the default file name `DefaultExport.csv` for the export file. You do not need to include an extension with the file name.

NOTE: The WebReporterAppPool application pool in IIS must have write permission on the Export File Path location. This application pool is running under the NetworkServices Identity when PME is installed with SQL Authentication. When it is installed with Windows Integrated Authentication, then the Windows account that is used to access the databases is used to run the application pool.

Examples:

Path, including file name: `C:\Temp\test`.

Path, without file name: `C:\Temp\`. (**NOTE:** Do not forget to include the **** at the end of the path.)

NOTE: When the CSV (RegGen Compatible) **Export Format** is selected, the report output is organized by source and saved to a file with the source name. If multiple sources are selected, one output file for each source is created.

Export Format

Select the format for the CSV export file. The available options are:

- **CSV**

  Standard CSV output format. All the data is saved into a single output file. Example:

```
SourceName,SourceDescription,MeasurementName,MeasurementShortUnitName,TouPeriod,Timestamp,Value
Campus.Academic_Hall,This is Academic Hall,Real Energy,kWh,Off Peak,7/5/2019 7:15:00 AM,13.9669999997132
Campus.Dining_Hall,,Real Energy,kWh,Off Peak,7/5/2019 7:15:00 AM,27.9909999999218
Campus.Academic_Hall,This is Academic Hall,Real Energy,kWh,Off Peak,7/5/2019 7:30:00 AM,12.6699999999255
Campus.Dining_Hall,,Real Energy,kWh,Off Peak,7/5/2019 7:30:00 AM,25.1970000001602
Campus.Academic_Hall,This is Academic Hall,Real Energy,kWh,Off Peak,7/5/2019 7:45:00 AM,15.3179999999702
Campus.Dining_Hall,,Real Energy,kWh,Off Peak,7/5/2019 7:45:00 AM,24.6099999998696
Campus.Academic_Hall,This is Academic Hall,Real Energy,kWh,Off Peak,7/5/2019 8:00:00 AM,14.1650000000373
```

- **CSV (RegGen compatible)**

  This format is compatible with RepGen, a Microsoft Excel based reporting system that was part of earlier versions of PME. One output file is created for each selected source. Example:

```
Timestamp,TimestampUtc,TouPeriod,Real Energy,
1/1/2019 12:15:00 AM,1/1/2019 8:15:00 AM,Off Peak,9.75199999986216,
1/1/2019 12:30:00 AM,1/1/2019 8:30:00 AM,Off Peak,8.67100000008941,
1/1/2019 12:45:00 AM,1/1/2019 8:45:00 AM,Off Peak,9.37099999981001,
1/1/2019 1:00:00 AM,1/1/2019 9:00:00 AM,Off Peak,10.566000000108,
1/1/2019 1:15:00 AM,1/1/2019 9:15:00 AM,Off Peak,9.70299999974668,
1/1/2019 1:30:00 AM,1/1/2019 9:30:00 AM,Off Peak,9.15599999995902,
```

- **Tidy**

  This format is similar to the RepGen compatible format. It includes the source names and all the data is saved into a single output file. Example:

```
SourceName,TimestampUtc,Timestamp,TouPeriod,Real Energy,
Campus.Dining_Hall,1/1/2019 8:15:00 AM,1/1/2019 12:15:00 AM,Off Peak,19.8009999999776,
Campus.Academic_Hall,1/1/2019 8:15:00 AM,1/1/2019 12:15:00 AM,Off Peak,9.75199999986216,
Campus.Dining_Hall,1/1/2019 8:30:00 AM,1/1/2019 12:30:00 AM,Off Peak,18.5579999997281,
Campus.Academic_Hall,1/1/2019 8:30:00 AM,1/1/2019 12:30:00 AM,Off Peak,8.67100000008941,
Campus.Dining_Hall,1/1/2019 8:45:00 AM,1/1/2019 12:45:00 AM,Off Peak,19.8330000001006,
Campus.Academic_Hall,1/1/2019 8:45:00 AM,1/1/2019 12:45:00 AM,Off Peak,9.37099999981001,
```

Facility Location

(Optional) Type the data center facility location.

Facility Name

Type the data center facility name.

Flicker Baseline - High

Type the Flicker Baseline High value if the default is not appropriate for your needs.

Flicker Baseline - Low

Type the Flicker Baseline Low value if the default is not appropriate for your needs.

Frequency Baseline [%]

Type the Frequency Baseline value if the default is not appropriate for your needs.

Frequency Nominal [Hz]

Type the nominal frequency of the system (for example, 60).

Generator Summary

1. Click **Generator Summary**.
2. Click **Include Generator Summary** to include the Generator Summary section in the report. The remaining options in the screen are enabled. Alternatively, clear this check box to exclude the Generator Summary section from the report.
3. Click **Include Pass/Fail Indicator** to include both the pass/fail grade and the test method used to evaluate each generator. The pass/fail grade is based on both the run duration and the minimum specified percentage of the prime nameplate rating. Alternatively, clear this check box to exclude the pass/fail grade and the test method from the report.
4. Select the **Electric Data** options to specify the electrical data in the report:
   - **Include Chart**: Select this check box to include a generator chart showing kW Load, kVA Load, and the threshold for the minimum acceptable power load based on the specified load percentage for the run duration.
   - **Include Avg., Min, Max Table**: Select this check box to include a table showing minimum, average, and maximum electrical readings for the longest continuous load at (or above) the specified load percentage. The electrical readings measured are: kW, kVA, Ia, Ib, Ic, In, Vab, Van, Vbc, Vbn, Vca, Vcn.
   - **Include Details**: Select this check box to include a table showing the generator electrical details. The data is organized by time intervals and displays the readings for kW, kVA,

load (the percentage of maximum load identified on the generator nameplate), Power Factor (PF), I avg, VLL avg, VLN avg, and Frequency.

5. Select the **Engine Temperature Data** options to specify the engine temperature data in the report:
   - **Include Chart**: Select this check box to include a chart showing the engine temperature for the run duration, and a horizontal line identifying the minimum temperature required for the run duration.
   - **Include Avg, Min, Max Table**: Select this check box to include a table showing Minimum, Average, and Maximum engine temperature readings for the longest continuous engine temperature equal to or above the minimum acceptable engine temperature.
   - **Include Details**: Select this check box to include a table showing the Longest Continuous ET (Engine Temperature) time period, the Minimum ET, Required Run Duration (Min), and Actual Run Duration.

     NOTE: The configuration tool does not convert the engine temperature values from one temperature type to another.
6. Select the **Exhaust Gas Temperature Data** options to specify the exhaust gas temperature data in the report:
   - **Include Chart**: Select this check box to include a chart showing the exhaust gas temperature for the run duration, and a horizontal line identifying the minimum temperature required for the run duration.
   - **Include Avg, Min, Max Table**: Select this check box to include a table showing Minimum, Average, and Maximum exhaust gas temperature readings for the longest continuous engine temperature equal to or above the minimum acceptable exhaust temperature.
   - **Include Details**: Select this check box to include a table showing the Longest Continuous EGT (Exhaust Gas Temperature) time period, the Minimum EGT, Required Run Duration (Min), and Actual Run Duration.
7. Under **Engine Data**, click **Include Details** to include engine details in the report. Details for each generator include:
   - Generator name
   - Generator start and stop times by date
   - A label to indicate whether the data was collected automatically or manually.
   - A table of measurements; such as battery voltage and coolant temperature. Each measurement includes a timestamp and the corresponding values.
8. Click **OK** to save your changes and return to the report template.

Gauge Scale Override

Choose a specific value for all of the gauge scales to use in custom situations, such as when normalizing data. This input is optional.

Group

Keep the default option **All Groups** or select a specific power quality group from the list.

The groups are defined in the Power Quality Group configuration file, which is implemented during Power Quality Performance commissioning.

Grouped By

Select from the dropdown list to determine how the circuit breaker aging and electrical wear analysis results are sorted.

High Target Line (Left and Right Axis)

Enter a value for the target line representing the target for the high end of your energy use. This target line is red in the generated report. The default is **No Target Line**.

High Target Name (Left and Right Axis)

Enter a name to identify the high target line in the chart legend for the left and right axis, respectively. The defaults are **Left Axis High Target** and **Right Axis High Target**, respectively.

Highlight End

Select the end hour to stop the highlighting of the line in the chart.

The time range in the list is in 24-hour format in descending order.

Highlight Start

Select the start hour to begin the highlighting of the line in the chart.

The time range in the list is in 24-hour format in ascending order.

Incident Interval

Select the incident interval that you want to use in the report (such as, 20 seconds, 10 minutes, 1 week).

The incident interval is the time window used by the generated report to group multiple disturbances together into a single incident. The default value is 20 seconds.

Include Activity Details

Click **Yes** to include a generator details section in the report. Click **No** to exclude this section.

Include Aggregation Chart

Select whether or not to include a bar chart in the generated report showing a summary of the measurement you chose for the selected sources. The default is **Yes**.

Include 100% Area Chart

Select whether or not to include an area chart showing the data results stacked to a 100% level. The default is **Yes**.

Include Area Chart

Select whether or not to include an area chart in the generated report to view the contribution of data over a given period of time.

Include Average Harmonic Charts

Select whether or not to include charts showing the average values related to harmonic compliance. The default is **Yes**.

Include Breakers with Minor Aging and Wear

Select **Yes** or **No**. Selecting **Yes** allows all of the breakers to appear in the report regardless of the current electrical aging and electrical wear levels. Selecting **No** allows only breakers with moderate or critical electrical aging and electrical wear to appear.

Include Chart

Select whether or not to include the chart in the generated report. The default is **Yes**.

Include Column Chart

Select whether or not to include a column chart in the generated report to compare the data represented in the chart. The default is **Yes**.

Include Data Table

Select whether or not to show the data table in the generated report. The default is **No**.

Include Data Tables

Click **Yes** to include a section for capacity data in the report. Click **No** to exclude capacity data.

Include Data Tables in the Detail Section

Select whether or not to show data table for power quality events in the generated report. The default is **No**.

Include Data Warnings

Click **Yes** to include data warnings in the report. If there are none, the section is not included. Click **No** to exclude this section.

Include Duplicates

Select whether or not to show duplicate data in the generated report. The default is **No**.

Duplicate data collection is disabled in Power Monitoring Expert by default. In order to be able to include duplicate data in a report, duplicate data collection must first be enabled for the system.

Include Electrical Details

Select the option to specify the start records. When you click **Select Reference Starts** you can choose the specific start records by generator and date. For example, you can use this option to compare yesterday's Gen 1 start voltage signature to the Gen 1 start voltage signature from six months prior.

Include Empty Intervals

Select to include or exclude data records in the report output that have no data. If Rollup is Interval, an empty data record will be shown as an empty row or column in the table with the corresponding interval timestamp. This can be useful for data exporting to avoid missing rows.

Include EN50160 Configuration Parameters

Select whether or not to include the configuration inputs entered in the Configure Evaluation Limits dialog in the generated report.

Include Event History

Click **Yes** to include event log data in the report. Click **No** to exclude it.

Include Events And Disturbances in the Detail Section

Click the field to open the Events and Disturbances dialog. By default, all items under **Events** and **Disturbances** are selected, as well as **Power Factor**.

Clear the checkboxes for any specific items that you do not want to include in the generated report. If you clear or select **Events** or **Disturbances**, the checkboxes for all of the items included in that category are cleared or selected.

Include Gauges

Select whether or not to include the gauges in the generated report. The default is **Yes**.

Include Harmonic Detail Charts

Select whether or not to include charts showing a second level of harmonic compliance detail for the generated report. The default is **No**.

Include Interval Column Trend

Select whether or not to include a bar chart in the generated report showing the measurement you chose for the sources for each hour in the 24-hour period for the specified days. The default is **Yes**.

Include Interval Line Trend

Select whether or not to include a line chart in the generated report showing the measurement you chose for the sources for each hour in the 24-hour period for the specified days . The default is **No**.

Include Line Chart

Select whether or not to include a line chart in the generated report to display the data trend over a given time period. The default is **Yes**.

Include Measured Data

Choose to include the actual data with the modeled data or not by selecting **Yes** or **No** for **Include Measured Data**.

Include Non Impacting Events

Select **Yes** if you want to include events in the **Power Quality Events — Details** section of the generated report that are classified as having no impact on the power quality of your site. By default, power quality events with no impact are excluded from the generated report.

Include Pie Chart

Select whether or not to include a pie chart in the generated report to show a numerical proportion of the results. The default is **Yes**.

Include Report Parameters Summary

Select whether or not to include report parameters in the generated report. The default is **Yes**.

Include Stacked Aggregation Chart

Select whether or not to include a stacked chart in the generated report showing the measurement you chose for the selected sources. The default is **No**.

Include Stacked Column Chart

Select whether or not to include a stacked column chart in the generated report to display the proportions for the data represented in the chart. The default is **Yes**.

Include Tables

Select whether or not to include the tables in the generated report. The default is **Yes**.

Include THD/TDD Charts

Select whether or not to include charts showing the total harmonic distortion (THD) of the voltage waveform, and the total demand distortion (TDD) of the current waveform, in the generated report. The default is **Yes**.

Include Two Specific Periods Only

Select whether or not to include only the first and last period of data in the selected date range. The default is **No**.

Include Unassociated Breakers

Include breakers that are not defined as being part of Switchboards and Groups in the report. The default is **Yes**.

Include Undetermined Incidents

This option represents the number of events that cannot be classified as **External** or **Internal**. Select Yes or No to include or exclude the data for these events from the generated report.

Independent Variable

The independent variable is the driver that influences the measurement you want to model. For example, if you are modeling the energy consumption of a building based on outside temperature, then the outside temperature is the independent variable. You can specify one or more independent variables.

To specify the independent variables,

1. Click **Select Source** and select a source from the list. Hierarchies are not supported for independent variables.
2. Click **Select Measurement** and select the measurement.
3. Select an aggregation method for the measurement from the **Aggregation Method** drop down list.

   The following aggregation methods are available:

   AVG: Calculates the average measurement value over the interval.
   SUM: Sums the measurements values over the interval.
   DELTA: Subtracts the beginning measurement value from the end measurement value of the interval.
   MIN: Selects the minimum measurement value over the interval.
   MAX: Selects the minimum measurement value over the interval.
   CDD: Calculates the Cooling Degree Days.
   HDD: Calculates the Heating Degree Days.

   For CDD or HDD, enter the base temperature in the **Degree Days Base Temperature** input box that is displayed when one of these options is selected.

To add additional variables, click the **+** sign next to the **Select Source** button. Click **-** to remove a variable. To enable or disable a variable, select or clear the check box next to the **Select Source** button.

Input Source Measurements

Select one or more measurements and their sources, to be used in the calculation of the KPI. Each measurement is associated with a label, for example A,B,C, ... which you use to define the KPI formula.

Insert Data

You can save the output of the model report into the Power Monitoring Expert database and use it for display in Dashboards and Trends. The source name created for this data in the database is **Modeled_Data.<*model name*>**. The following measurements will be recorded for this source:

Measured: This is a copy of the dependent variable measured data.
Modeled Data: This is the data calculated by the model for the dependent variable.
Residual: This is the delta between the Measured data and the Modeled data
Residual%: This is the Residual data in percent.

To save the data into the database, select **Yes** for **Insert Data**.

TIP: Setup a subscription to run the model report weekly for the last 7 days and save the output into the database. This will ensure you have a complete data set for modeled data for use in Dashboards and Trends.

Interval and Sub Model Configuration

Select the reporting interval from the **Interval** drop-down list.

Select the sub model from the Sub Model drop-down list. The options in this drop-down list depend on the selected Interval and the sub models that have been defined in **Settings** > **System** > **Modeling**.

The **Database Driven** option is used to define operating conditions instead of time periods for sub-modeling. For example, you could define the condition of Power Factor < 0.8. That means that one sub-model is used when the Power Factor is < 0.8 and a different one when it is >= 0.8. This is similar to sub-modeling based on weekdays versus weekend days, just that the Power Factor value is used as a condition instead of the day of the week.

When you select **Database Driven**, additional input boxes are displayed to select the **Source**, **Measurement**, **Key**, and **Value**. The Key is the condition, for example for Power Factory < 0.8, enter **<0.8** in the Key input box. The Value box is just a label to identify the condition, so you could enter **Low PF** for low Power Factor.

You can add one or more conditions. Click the **+** icon to add additional conditions.

NOTE: Conditions are applied in the order in which they are defined in the report.

IT Equipment Energy Measurement

Click **Select Measurement** to choose the measurement for interval energy usage for all the IT equipment used. This will typically be a 15-minute interval value.

IT Equipment Power Measurement

Click **Select Measurement** to choose the measurement for instantaneous power consumption for all the IT equipment used.

IT Equipment Source

Click **Select Source** to choose the single source that represents all the IT equipment operated in the data center facility.

Keep True Totals

Select **Yes** if you want the totals in the report to be unaffected by the filtering. If you want the totals in the report to be based on line item and tenant filter, select **No**.

KPI Formula

Enter the mathematical formula that is used to calculate the KPI from the input parameters. Use the labels that are associated with the input parameters in the **Input Source Measurements** section as variables in the formula. You can use the following operators +, -, /, *, Pow(), Sqrt().

Here are some examples of valid formula syntax:

- (A + B) / C
- A + B + C
- C / (A + B)
- Pow(A+B+C,2)
- Sqrt(A+B)

KPI Measurement

Select the measurement that is used to represent the KPI output value. The calculated KPI values will be logged under this measurement and the **KPI Source**. Use the **KPI Measurement Override** if you cannot find a suitable output measurement.

KPI Measurement Override

Only use this input if you cannot find a suitable measurement under **KPI Measurement**.

Manually enter the name of a measurement to be used to represent the KPI output value. This overrides any measurement selected under **KPI Measurement**. If the measurement you enter does not already exist in Power Monitoring Expert, it is created.

KPI Source

Enter the name of the source for which the calculated KPI values are logged in Power Monitoring Expert. The source is created automatically, if it does not exist already.

Line Item Filter

Anything entered in the **Line Item Filter** parameter (comma separated) includes rows from the Item column. For example, to include the **On Peak Usage** line item, enter **On Peak Usage** in the Line Item Filter. To include both On and Off Peak usage, enter **Peak Usage**.

Load Measurement

Select the source you want.

Load Profile Measurements

Select one or more measurements to be displayed in a trend chart at the end of each bill. The measurements are associated with the selected tenants. The date range for the chart is the same as the selected reporting period.

Lock Chart Scales at Zero

Select whether or not to force the y-axis to start at zero rather than scaling the chart normally. The default is **Yes**.

Logged Measurement

1. Click **Select Source** to open the Source Selector dialog.
2. Select the source and then click **OK**.
3. Click **Select Measurement** to open the Measurement Selector dialog.
4. Select the instantaneous measurement (power, power factor, current, THD, etc.) and then click **OK**.

Low Target Line (Left and Right Axis)

Enter a value for the target line representing the target for the low end of your energy use. This target line is yellow in the generated report. The default is **No Target Line**.

Low Target Name (Left and Right Axis)

Enter a name to identify the low target line in the chart legend for the left and right axis, respectively. The defaults are **Left Axis Low Target** and **Right Axis Low Target**, respectively.

Lower Target Line

Enter a value for the target line representing the target for the low end of the energy use. The lower target is a yellow line in the report. Columns in charts that are on lower target line, or between the lower target line and the upper target line, are outlined in yellow. The default value is **0**.

Maintenance Status

Click **Yes** to include the Maintenance Status section of the report. Click **No** to not include it. The default is **Yes**.

Manual

Click **Manual** to select the runs according to a date range and run reason, and then do the following:

1. Select the **Reporting Period** date range for the runs to include in the report.
2. Select the Run Reason for the runs to include in the report.

   If you select `Most recent run` and define excluded sources, the exclusions are ignored when you generate the report.

The devices in the group will appear in the Sources section of the report. Devices that you excluded from the report will be gray-shaded.

Max Authorized Deviation

Enter a value by which deviation is allowed for the report.

Measurement Label

Input the label to be used to describe the measurements selected in Load Measurement.

Measurements (Reports other than Load Profile)

Use this input to select the measurements you want to include in the report.

Click **Select Measurement** to open the Measurement Selector dialog. Click **+** and **-** to expand and collapse items in the navigation tree. For reports where you can select multiple measurements, click the check box beside a measurement (or group of measurements) to select it. For reports where you can only select a single measurement, click the measurement name to select it.

After selecting the measurements, click **OK**.

Measurements (with Smart Mode)

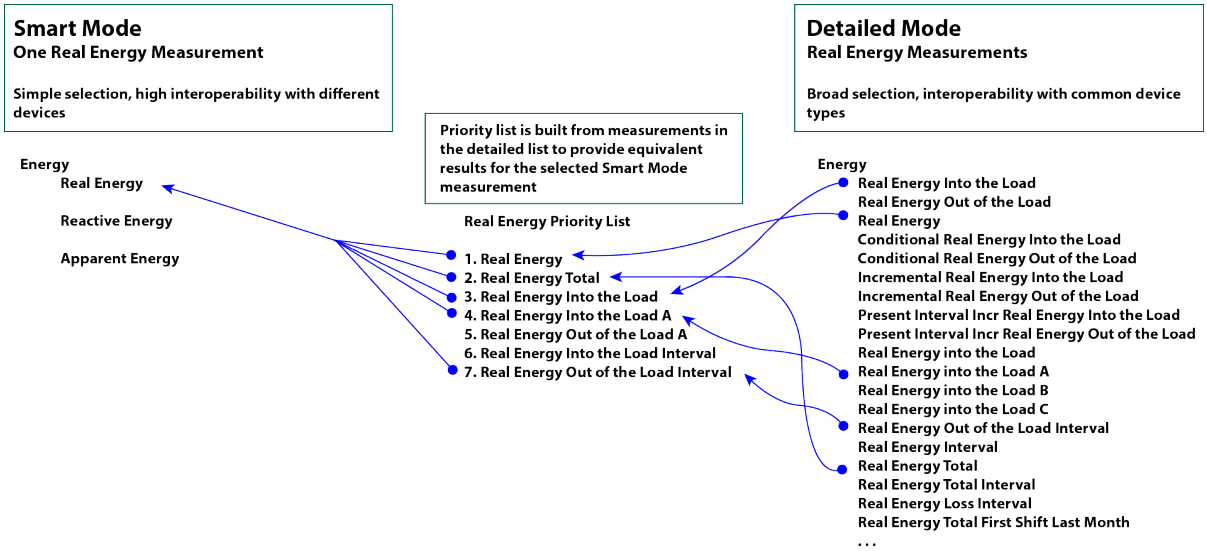
Smart Mode is enabled in the **Measurement Selector** when you select the **Views** radio button in the **Source Selector**, which then lets you select a hierarchy view or a virtual meter for your source parameter.

When you open the **Measurement Selector**, Smart Mode lists general measurement names by default. A **Detailed Mode** option is also available for the measurements.

Smart Mode provides a general measurement name for you to select. The measurement is based on a subset derived from all of the available measurements in the particular measurement category. The underlying operation selects an applicable measurement for each device to produce equivalent results for reporting purposes.

The following image illustrates how measurements in Smart Mode are determined and applied from the priority list of measurements. The priority list contains measurements that usually provide equivalent results for the measurement selected in Smart Mode.

For example, for each device included in a hierarchy view or in a virtual meter, the report starts with the Real Energy measurement in the priority list. If data for that measurement exists, then it is used in the report. If data does not exist for the Real Energy measurement, then the report goes to the Real Energy Total measurement in the list. If data exists for that measurement, then it is used. The report continues to progress through the priority list to select a measurement that pertains to each device associated with a hierarchy view or a virtual meter.



You can select **Detailed** to change to the detailed selection mode. This mode allows you to select from a full list of measurements.

Smart Mode	Detailed Mode
☐ Detailed + ☐ Demand − ☐ Energy ☐ Apparent Energy (kVAh) ☐ Reactive Energy (kVArh) ☐ Real Energy (kWh)	☑ Detailed + ☐ Demand − ☐ Energy ☐ Apparent Energy Total (kVAh) ☐ Conditional Real Energy Into the Load ☐ Conditional Real Energy Out of the Load ☐ Incremental Real Energy Into the Load ☐ Incremental Real Energy Out of the Load ☐ Reactive Energy (kVArh) ☐ Reactive Energy Into the Load (kVArh) ☐ Reactive Energy Into the Load Interval (kVArh) ☐ Reactive Energy Out of the Load (kVArh) ☐ Reactive Energy Out of the Load Interval (kVArh)

The **Measurement Selector** provides a full list of measurements when you select the **Devices** radio button in the **Source Selector**.

Click **+** and **-** to expand and collapse items in the navigation tree. For reports where you can select multiple measurements, click the check box beside a measurement (or group of measurements) to select it. For reports where you can only select a single measurement, click the measurement name to select it.

After selecting the measurements, click **OK**.

Measurements (Load Profile Report)

This input determines whether the report is calculated using demand or power measurements. Select either **Demand** or **Power** from the dropdown list.

Measurement Interval

Select the observation period (that is, the measurement interval) of **2 Hour**, **10 Minute**, or **3 Second** to use for the IEC61000-4-30 report.

Measurement Target Line

Select a measurement to use with the source identified in **Source Target Line** to establish ON and OFF peak target lines in the generated report.

Model Data Quantity

Click **Select Measurement**. Navigate to and select a measurement, and then click **OK**.

Model Data Source

Click **Select Source**, and then choose from the dropdown list a Grouping: None, Group Name, Site, or Device Type. Navigate to and select a source, and then click **OK**.

Multiplier

Enter a value to use as a multiplier in normalizing the raw data in the report. The default is **1**.

n % Crossing

Type a value for the duration percentage. This value indicates where to place a cross on the plotted line identifying where that percentage value occurs.

Notify On

Select a notification option for when to send out notification emails. The available options are:

- **Do Not Notify**

  No notification email will be sent.

- **Both**

  Send a notification email if either alarm threshold is exceeded.

- **Check Source vs Actual Total**

  Only send a notification if the threshold for the Check vs Actual Total is exceeded.

- **Check Source vs Private Source**

  Only send a notification if the threshold for the Check vs Private Source is exceeded.

Notes

Any notes appear at the bottom of the report page.

Non Cumulative Measurement Calculation

Select the aggregation method to be used for rolling up non cumulative measurements. Examples of non cumulative measurements include Voltage, Current, Power. An example of a cumulative measurement is Energy. Cumulative measurements are aggregated by summation.

Sub-reports

The options available for selection are **Generate dynamically** and **Embed into single report**.

- Select **Generate dynamically** to generate an incident summary report only. You can click the links in the report to view incident details and also associated waveforms.

  This option provides a convenient way to generate a summary of incidents to give you an indication for investigating a particular incident or waveform. This option is recommended for interactive viewing and analysis within the reporting period.

- Select **Embed into single report** to include the incident summary, the incident details, and the waveforms associated with those incidents in a single generated report. This single report format facilitates exporting the information to one of the available download formats, and it also facilitates setting and delivering a report subscription. This option is recommended for attaching the report to an email.

  This option provides a convenient way to extract and share power quality-related information. Although power quality events vary from system to system, it takes longer to generate the report using this option because the system queries more data, including data-intensive waveforms. To prevent possible report timeouts, it is suggested that you keep the number of waveforms to a minimum by:

- Selecting a single source.
- Specifying a reporting period of a single day or less.

Order By

Select to order the list of bills in the report output by tenant name or by rate file name.

Overwrite File

Selecting **Yes** overwrites an existing file if it exists and selecting **No** appends the new data to an existing file.

Overwrite XML Export

Selecting **Yes** overwrites an existing file if it exists and selecting **No** appends the new data to an existing file.

Page Size

Select from the dropdown list. Select **Fit to Page** to automatically scale each output page to fit onto a single report page. Select **Custom** to scale the output based on the height and width values provided in the **Custom Page Height** and **Custom Page Width** boxes.

Page Wait Time in Seconds

Specify the maximum time the report waits for the slideshow or custom URL to load. If you selected multiple slideshows, then this maximum wait time is applied to each of the slideshows. If a slideshow or URL loads faster than the maximum wait time, the report completes before this time has elapsed.

Power Factor Target

The target power factor for the site. The default target is 92, which you can change to match you site power factor target.

The target power factor is configured in the Power Factor Impact Rate.xml file when the Power Quality Performance module is commissioned. This rate file is included in the Energy Billing Module, which is subject to licensing. Contact your Schneider Electric representative for further information.

Previous Period Energy Measurement

Select one or more usage measurements. These measurements will be displayed in a column chart, as past consumption for the selected tenants, at the end of each bill. The reporting period for these measurements is set through the **Energy Period Comparison Range** input.

Primary Sort

Select the primary sort column from the drop-down list. Your choice sets the primary sort column for the report; customer, rack or circuit. Depending on how your hierarchy is configured, the sort might contain customer and circuit only.

Priority

Select the priority of alarms and events that you want to include in the report. The options include high, medium, and low priority alarms and events.

Private Source

Use this input to select a source for the bill comparison, for example the internal metering source. To select the source, choose a hierarchy view or virtual meter.

Protection Modes

Click **Yes** to include the Protection Modes section of the report. Click **No** to not include it. The default is **Yes**.

PUE Category

Select a number for the report category. The value appears as a label below the report title. The label will be “Category *n*”, where “*n*” represents the number selected.

Category 1 is measured at the Uninterrupted Power Supply (UPS). Category 2 is measured at the Power Distribution Units (PDU). Category 0 and 3 are not included in the PUE Report.

Rate

Select the rate structure to apply to this report. The rate determines how the cost for each source is calculated.

Rates

Use this input to set up parameters for energy cost reporting. Click **Configure Rates** to open the Energy Rates dialog.

- Click **Energy and Demand** to configure basic rate parameters for the report.
  - In the **Select Measurements** section, click the check box beside a measurement to include it in the report.
  - In the **Select Billing Calculation** section, select **Flat Rate** or select **TOU Schedule**. If you select **TOU Schedule**, select a time of use (TOU) schedule from the dropdown list (see the Time of Use Editor topic in the online help for Management Console Tools for information on configuring a time of use schedule).
  - In the **Set Rates** section, enter the rates for the selected measurements.
  - In the **Set Demand Calculation** section, select the calculation method used to determine demand: **Independent** (peak demand is calculated independently for each source) or **Coincident** (the demand measurements of the sources are correlated with the peak demand of the main meter). If you select **Coincident** for the calculation method, click **Main Meter** to select the source to which you want to correlate the demand measurements.
- Click **WAGES** to include WAGES (Water, Air, Gas, Electricity, Steam) measurements in the report. Click the +/- buttons to add or remove measurements. Enter a name for the measurement then click **Select Source** and **Select Measurement** to select a source and measurement. Enter a rate for the measurement in the **Rate** field.
- Click **Additional Fees** to add additional rate information to the report. Enter a name in the **Rate Name** field and rate information in the **Amount** field.

Recovery Value Multiplier

Enter the multiplier value from 0.01 to 1.00. This value is used by the algorithm to determine the waveform recovery voltage value and time (relative to the waveform voltage drop) for both reference and comparison waveforms.

Regression Type

Choose from the dropdown list Single-Line or Broken-Line.

Report Data

Select one or more system configurations to use in the report:

1. Click **Select Generator Systems**. The Selector screen appears with the UPS systems you set up in the Generator Power Configuration Utility.
2. Select one or more generator systems.
3. Click **OK**.

Report Data Generators

Select one or more system configurations to use in the report:

1. Click **Select Generator Systems**. The Selector screen appears with the UPS systems you set up in the Generator Power Configuration Utility.
2. Select one or more generator systems.
3. Click **OK**.

Report Data UPS

Select one or more system configurations to use in the report:

1. Click **Select UPS Systems**. The Selector screen appears with the UPS systems you set up in the UPS Power Configuration Utility.
2. Select one or more UPS systems.
3. Click **OK**.

Report End Date

Select either **Today** or **Fixed Date** for the data you want to generate in the report. If using **Fixed Date**, enter the desired date.

Select either **Server Local Time** or **UTC** (Coordinated Universal Time).

Report Group

Select the group for which the report is intended.

Reporting Period

Use this input to select the timeframe for the data you want to view in the report.

Select the reporting period from the dropdown list. The timeframe options in the timeframe dropdown are relative to the date the report is run. To run a report that starts and ends in the past, select the fixed date option. Type a start and end date in the date boxes or click the arrows beside the dates to display a pop-up calendar and select a date. Type a time in the time boxes or click the up and down arrows beside the time to adjust the hours or minutes up or down.

Select the timezone you want to view timestamps in.

Reporting Period (with additional options)

The Reporting Period input contains the following fields and dropdown lists:

- **Timezone**: Select whether you want to view timestamps in either Server Local Time or UTC (Universal Coordinated Time).
- **Aggregation Period**: Select the block of time for which you want to compare data (i.e., day, week).

- **Comparison Type**: Select what period of data you want to compare the selected Aggregation Period to (i.e., today vs. the same day from the previous month or current month vs. the same month from the previous year). The options vary depending on the Aggregation Period selected.
- **Number of Comparisons**: Enter the number of periods you want to compare.
- **Aggregation Interval**: This input appears when you select **Month** for the **Aggregation Period**. Select how you want data grouped for the report: by date (Day of Month) or the day of the week.
- **Selected Dates**: This box displays the dates of the data that will appear in the report based on the options selected.

For example, to compare the selected measurements for the same day of the month over the last 12 months, set **Aggregation Period** to **Day**, set **Comparison Type** to **Today vs. Same Weekday From Previous Month**, and enter **12** in the **Number of Comparisons** field.

Reporting Period (for Power Quality report)

Use this input to select the timeframe for the data you want to view in the report. The report retrieves all events over the duration of the reporting period. The events are summarized into incidents and displayed on the report according to the **Incident Interval** setting.

Select the reporting period from the dropdown list. The timeframe options in the timeframe dropdown are relative to the date the report is run. Use a relative date option for reports that you want to generate on a regularly scheduled basis. To run a report that starts and ends in the past, select the fixed date option. Type a start and end date in the date boxes or click the arrows beside the dates to display a pop-up calendar and select a date. Type a time in the time boxes or click the up and down arrows beside the time to adjust the hours or minutes up or down.

Select whether you want to view timestamps in either Server Local Time or UTC (Universal Coordinated Time).

Report Type

Select either **Summary** or **Detail**.

- **Summary** – Shows only the aggregated values for all racks/circuits for a given tenant.
- **Detail** – Shows the aggregated value as well as child values of the racks and circuits.

Rollup

Select the aggregation time interval for the reporting data.

Rollup Table Type

Select the format for the report data table. The available options are:

- **Horizontal Rollup Table**

  The data is shown with sources and measurements as columns and timestamps as rows. Example:

	Campus.Academic_Hall		Campus.Dining_Hall	
	Block Demand Real Power (Avg kW)	Block Demand Real Power (Avg kW)	Block Demand Real Power (Avg kW)	Block Demand Real Power (Avg kW)
Timestamp	Off Peak	On Peak	Off Peak	On Peak
6/29/2019 12:15 AM	38.00		67.00	
6/29/2019 12:30 AM	40.00		76.00	
6/29/2019 12:45 AM	44.00		78.00	
6/29/2019 1:00 AM	43.00		75.00	

- **Vertical Rollup Table**

  The data is shown with timestamps and measurements as columns and sources as rows.
  Example:

	Block Demand Real Power (Avg kW)				
Sources	6/29/2019 12:15 AM	6/29/2019 12:30 AM	6/29/2019 12:45 AM	6/29/2019 1:00 AM	6/29/2019 1:15 AM
Campus.Academic_Hall	38.00	40.00	44.00	43.00	43.00
Campus.Dining_Hall	67.00	76.00	78.00	75.00	77.00

- **Demand and Consumption Rollup Table**

  The data is shown with sources and measurements as columns and timestamps as rows. This view is similar to the horizontal table with more compact measurement column headers.
  Example:

	Campus.Academic_Hall		Campus.Dining_Hall	
Timestamp	kW Demand		kW Demand	
	Off Peak	On Peak	Off Peak	On Peak
6/29/2019 12:15 AM	38.00		67.00	
6/29/2019 12:30 AM	40.00		76.00	
6/29/2019 12:45 AM	44.00		78.00	
6/29/2019 1:00 AM	43.00		75.00	

- **Flat Rollup Table**

  The data is shown with the source name, measurement name, timestamp, value, and so on, in a single row per data record.
  Example:

Timestamp	Source	Measurement	Unit	Value	TOU
6/29/2019 12:15 AM	Campus.Academic_Hall	Block Demand Real Power	kW	38	Off Peak
6/29/2019 12:15 AM	Campus.Dining_Hall	Block Demand Real Power	kW	67	Off Peak
6/29/2019 12:30 AM	Campus.Academic_Hall	Block Demand Real Power	kW	40	Off Peak
6/29/2019 12:30 AM	Campus.Dining_Hall	Block Demand Real Power	kW	76	Off Peak

Save Billing Totals

Save Billing Totals calculates the billing total per Tenant (Source) and writes the value back into the database so that it can be used in other applications, such as Dashboards, Diagrams or Reports.

Save Calculated Values

Click **No** to preview the report outputs without saving them to the database. Click **Yes** to save the report outputs in the database.

The report overwrites any values, for this KPI, that already exist in the database from previous report runs.

Save Model Configuration

Choose to save the created model to the database or not by selecting **Yes** or **No** for **Safe Model Configuration**.

For saving the model, enter the model name in the **Model Name** input box that is displayed when **Yes** is selected for **Safe Model Configuration**.

Scale Measurement

Select the measurement as the base against which to scale the main dataset. This input is optional.

Scale Source

Select the source as the base against which to scale the main dataset. This input is optional.

Select

Select **Top** (highest result) or **Bottom** (lowest result) to indicate the order of the gauges in the generated report. The default is **Top**.

Select Date Range

Select this if you want to select the runs according to a date range and run reason, and then do the following:

1. Select the **Reporting Period** date range for the runs to include in the report.
2. Select the **Run Reason** for the runs to include in the report.

The devices in the group will appear in the Sources section of the report. Devices that you excluded from the report will be gray-shaded.

Select EPSS Group

Select the group for which the report is intended.

Select Generator Starts

Select the option to specify the start records. When you click **Select Reference Starts** you can choose the specific start records by generator and date. For example, you can use this option to compare yesterday's Gen 1 start voltage signature to the Gen 1 start voltage signature from six months prior.

Select Group

Select the group for which the report is intended.

Select Number

Enter the number of sources that you want to include in the ranking. The default is **99**.

Select Time of Use

Select a TOU schedule to use for the report. Existing time of use schedules are shown in the list. If you have not created a time of use schedule, the field shows that no time of use schedule is available.

Select Waveforms

1. Click **Select Source**, choose a source from the list, and then click **OK**.
2. Click **Select Reference Waveform**, select the check box next to one or more comparison waveforms, and then click **OK**.

3. Define the comparison waveforms using one of the following:
   - Click **Enter the number of comparison waveforms** and enter a value in the field.

     By default, the report looks for the five most recent waveforms that have been captured for the source to be compared against the reference waveform. Use this mode for reports that are to be delivered using a report subscription.
   - Click **Select the comparison waveforms**, then click **Select Comparison Waveforms**, select the check box next to the waveforms you choose, and then click **OK**.

     This mode allows you to select specific comparison waveforms. It is not recommended to use this mode with a report subscription.

Shifts

Use the +/- buttons to add additional shifts. For each shift, enter a name and set the start and end time for the shift.

To configure a shift that spans midnight, use two shifts with the same name. For example, to set up a day shift and a night shift, add three shifts: **Day** from 8:00 AM to 8:00 PM, **Night** from 8:00 PM to 12:00 AM, and **Night** from 12:00 AM to 8:00 AM.

Show Bill Details

Click **Yes** to include the comparison summary page and the individual bills for the source and the reference source in the report output. Click **No** to only include the comparison summary page in the report output.

Show Daily Rollups

Click **Yes** to include the daily peak load for the equipment. If you click **No**, the report shows the peak load for the entire reporting period.

Show Data Warnings

Click **Yes** to include data warnings in the report. If there are none, the section is not included. Click **No** to exclude this section.

Show Detailed Results

Choose to include details in the report or not by selecting **Yes** or **No** for **Show Detailed Results**.

Details include the calculated formulas and individual relationship between each driver and the sub model data.

Show Errors

Click **Yes** to include error messages in the report, or **No** to exclude them.

Show Footer Image

Select **Yes** to show an image instead of the **Notes** at the bottom of each bill. Select **No** to show the **Notes** instead of an image.

NOTE: The report displays the image file `BillingFooter.jpg` in `...\Web\ReportDepot\ION Reports\ION Report Packs\Billing Reports\` if it exists. There is no image provided by default. Create your own image and save it under the above name in the specified location.

Show Header

Click **Yes** to include the standard report header in the report. Click **No** to not include the standard report header in the report.

The standard report header includes the logo and report title.

Show Header & Footer

Click **Yes** to include the standard report header and footer in the report. Click **No** to not include the standard report header and footer in the report.

The standard report header includes the logo, report title, and report generation information.

Show Occurrences Chart

Click **Yes** to include an Occurrences chart in the report. Click **No** to exclude this chart.

Show Report Parameters Summary

Select whether or not to show report parameters in the generated report. The default is **Yes**.

Show Start & End Periods Only

Select to show or not in the report the start and end periods. The default is **No**.

Show Totals

Select to include or exclude totals columns or rows in the data tables.

Show Min/Max Timestamps

Click **Yes** to include the report period timestamps. Click **No** to exclude them.

Signaling Voltage 1, 2 and 3 Eval Limit [%]

Type the maximum percentage of intervals in an observation period in which the mean value of the signaling voltage can exceed the curve defined in the EN50160 standard before that mains signaling voltage is considered non-compliant.

Slideshows

This box shows all available slideshows in your system. Select the slideshows you want to include in the report.

Source Label

Select an option for the format of the label describing the source. The options are **Source Name**, **Source Description**, and **Combined Name/Description**.

NOTE: The source description is the description that was entered in Management Console or Device Manager for a source, when the source was added or edited.

Sources

Use this input to select the devices you want to include in the report.

Click **Select Sources** to open the Source Selector dialog. From the **Grouping** list, select the way in which you want to display the sources (for example by device type, by group name, and so on). Click **+** and **-** to expand and collapse items in the navigation tree. Click the check box beside a device (or group of devices) to select it. Click **Select All** or **Select None** in the top-right corner to select or clear all the check boxes.

After selecting the devices, click **OK**.

Sources (Devices and Views)

The Source Selector dialog provides options to show **Devices** or **Views**:

Use the **Devices** option to select the devices you want to include in the report.

From the **Grouping** list, select the way in which you want to display the sources (for example by device type or by group name). Click **+** and **-** to expand and collapse items in the navigation tree. Click the check box beside a device (or group of devices) to select it. Click **Select All** or **Select None** in the top-right corner to select or clear all the check boxes.

After selecting the devices, click **OK**.

Use the **Views** option to select a hierarchy view (a tree of relationships) or virtual meters. The hierarchy views and virtual meters are configured in the Hierarchy Manager component. (See the *Hierarchy Manager Help* for further information about hierarchies, virtual meters, and views.) Click **+** and **-** to expand and collapse items in the tree. Click the check box beside any hierarchy item in the tree or any virtual meter to select it.

Click **OK** after making your selections.

Source Target Line

Select a source to use with the measurement selected in **Measurement Target Line** to establish ON and OFF peak target lines in the generated report.

Start Hour

Select the start hour to display when filtering the data by the time of day.

The time range in the list is in 24-hour format in ascending order.

State Labels

Use state labels to add labels to equipment state codes. For example: value = 1, state = maintenance.

NOTE: State labels are related to the state measurements in the Power Monitoring Expert database.

For each state that you want to include in the report:

1. In the **Value** field, enter a state value.
2. In the **State** field, enter the value's corresponding state. For example, if the state with a value of 3 = medium, enter 'medium'.
3. (Optional) Click **+** and then repeat steps 1 and 2 to add a state label for each state that you want to include in the report.
4. (Optional) Click **-** to delete a state label.

NOTE: If you do not add state labels for every source state, and you set **Include Data Warnings** to Yes, the generated report will include error warnings indicating that equipment states are unaccounted for in the State Label mapping.

State Measurement

Use state measurement to select a piece of equipment with state values.

1. Click **Select Source** to open the Source Selector dialog.
2. Select the source and then click **OK**.
3. Click **Select Measurement** to open the Measurement Selector dialog.
4. Select the equipment state measurement and then click **OK**.

   Depending on how your state measurements are configured, the equipment state measurement could be grouped under "Miscellaneous" or "Custom".

State Measurements

Use state measurement to select equipment with state values.

1. Click **Select Source** to open the Source Selector dialog.
2. Select the source and then click **OK**.
3. Click **Select Measurement** to open the Measurement Selector dialog.
4. Select the equipment state measurement and then click **OK**.

   Depending on how your state measurements are configured, the equipment state measurement could be grouped under "Miscellaneous" or "Custom".
5. (Optional) Click **+** and add another source measurement pair.

Stylesheet (optional)

Apply further transformation of the XML file by selecting a stylesheet file to create an HTML page to display of the billing data with enhanced formatting.

Technical knowledge of XML, XSLT, and HTML is recommended.

Target Line

Enter a value for the target line in relation to the measurement you selected. The default value is not to include a target line.

Target Line (kW)

Enter a value for the location of the target line in the kW chart in the generated report. The default is **0**.

Target Line (kvar)

Enter a value for the location of the target line in the kvar chart in the generated report. The default is **0**.

Target Line (kVA)

Enter a value for the location of the target line in the kVA chart in the generated report. The default is **0**.

Technician Name

Type a name for the technician in the text box.

Tenant

Click **Select Source** to open the Source Selector dialog. Select a view name or **Virtual Meter** in the **View** dropdown list. Select a tenant name, a device under a tenant name, or a virtual meter. Click **OK** to add your selection to the report.

Selecting by view allows you to choose a source associated with a hierarchy configuration, such as a floor in a physical layout or a circuit in an electrical view. Virtual meters available for selection are defined separately in Hierarchy Manager. For additional information regarding hierarchies and virtual meters, see *Hierarchy Manager Help*.

Tenant (multiple selection)

Click **Select Source** to open the Source Selector dialog. Select a view name or **Virtual Meter** in the **View** dropdown list. Select one or more tenant names, one or more devices under a tenant name, or one or more virtual meters. Click **OK** to add your selections to the report.

Selecting by view allows you to choose sources associated with hierarchy configurations, such as a floor in a physical layout or a circuit in an electrical view. Virtual meters available for selection are defined separately in Hierarchy Manager. For additional information regarding hierarchies and virtual meters, see *Hierarchy Manager Help*.

Tenant Filter

Anything entered in the **Tenant Filter** parameter (comma separated) that matches any Billing meta data line items (Tenant column) is included. An **'*'** can be entered to include everything.

Tenants and Rates

To select a group of tenants that share the same rate, click **Select Sources** to open the source selector dialog. Select a view name or Virtual Meter in the **View** drop-down list. Select one or more tenant names, one or more devices under a tenant name, or one or more virtual meters. Click **OK** to add your selections to the report.

To add additional groups of tenants that share other rates, click the "Plus" icon besides the source selector.

To add rates for the groups of tenants, select a rate from the drop-down list for each tenant group.

THD Baseline [%]

Type the **THD Baseline** value if the default percentage is not appropriate for your needs.

Title

Type a title for the report in the text box.

Threshold

Enter the percentage for the maximum test run load capacity. This is the percentage of the equipment electrical rating (in amps) entered in the **Transfer Switches** tab or the **Equipment** tab.

Threshold Hours

Enter the maximum number of hours the generators should run in non-emergency use. Enter a value that is in compliance with local authority requirements. For example, in the United States, the Environmental Protection Agency (EPA) requires that generators can run no more than 100 hours in non-emergency use.

Timestamp Coincidence

Select either **with Customer Peak** or **with Data Center Peak**.

Trip Settings

Click **Yes** to include the Trip Settings section of the report. Click **No** to not include it. The default is **Yes**.

Unbalance Baseline [%]

Type the **Unbalance Baseline** value if the default percentage is not appropriate for your needs.

Upper Target Line

Enter a value for the target line representing the target for the high end of your energy use. The upper target is a red line in the report. Columns in charts that on or above the upper target line are outlined in red. The default value is **0**.

UPS Group

Add the UPS groups that you want to include in the report.

Use Exception Periods

Choose to use exception periods or not by selecting **Yes** or **No** for **Use Exception Periods**.

Use Run History

Click **Use Run History** to select the most recent run, or select other specific runs that are stored in history, and then do the following:

1. Click **Refresh Run History** to populate the Runs list with the latest run records.
2. In the Runs list, select `Most recent run` or the specific run record. The date and reason for the run appear below the dropdown list.

   If you select `Most recent run` and define excluded sources, the exclusions are ignored when you generate the report.

Voltage Baseline [%]

Type the **Voltage Baseline** value if the default percentage is not appropriate for your needs.

Voltage Nominal [V]

Type the nominal voltage of the system (for example, 120).

Voltage Threshold

Enter voltage threshold value. This input represents a nominal voltage that is used by the report to display a voltage threshold area below the reference waveform voltage drop.

Waveform Drop Percentage

Enter a percentage value from 1.00 to 100.00. This input value represents the percentage that is used by the algorithm to detect the first voltage drop in the reference and comparison waveforms.

Waveform Drop Sample Size

Enter a value for this sample size. This input represents the number of waveform samples (or points) - from 2 to a total number of waveform samples (for example, 1024, 2048, and so forth) - used by the algorithm in the detection of the waveform voltage drop for the reference and comparison waveforms.

X Axis Calculation Method

Choose from the dropdown list one of the following methods: Cooling Degree Days, Heating Degree Days, Average, Sum, or Delta.

XML Export File

Type the name of the XML output file (including the file share or physical path) that is created after the XML transform has been applied. For example: `C:\bill_report\MonthlyBillingDataMain.xml`.

XML Transform File

Select the XML transform (xslt) file (via file share or physical path) to transform the default XML output into a specific format.

Technical knowledge of XML and XSLT is recommended.

Y Axis Calculation Method

Choose from the dropdown list one of the following methods: Average, Sum, or Delta.

Y-Axis Max Value (% Nominal)

Choose one of the available percentage values to visually increase the level of detail above the nominal value. The percentage value that you select sets the maximum vertical axis in the incidents plot. The default value is 500%.

Interpreting the Energy Regression Analysis Report results

The Energy Regression Analysis Tool is a highly configurable tool that allows you to monitor and manage a building or facility's energy and resource consumption. This practice, called energy modeling, involves analyzing building energy systems, monitoring energy consumption, and detecting anomalies or changes in system behavior that may require that you perform energy efficiency upgrades or fixes. The Energy Regression Analysis Report allows you to model energy data one independent variable at a time with a wide range of desired independent variables, such as weather or occupancy rate.

It is recommended that users have a basic understanding of energy modeling and understand how to create an Energy Regression Analysis Report. This section discusses in detail the purpose of each parameter in the report and how to read and interpret meaningful results of an Energy Regression Analysis Report. After generating the report, conclusions can be drawn from the generated tables and charts to monitor energy consumption and make cost saving decisions.

Energy Regression Analysis Report results provide a characterization of a building's performance. You can perform different types of energy analysis with this information, including the following:

- Energy Benchmarking
- Energy Budgeting
- Energy Savings

Glossary of terms

Term	Definition
Cooling Degree Days (CDD)	Measurement designed to reflect the demand for energy needed to cool a building.
Cost Savings Analysis	Comparing energy profiles against expected profiles and identifying outlying data that may signify areas of improvement.
Degree Day	One degree of departure, on a single day, of the daily mean temperature from a given standard temperature.
Energy Benchmarking	Comparing the energy performance of similar buildings or comparing the energy performance of a single building over time.
Energy Budgeting	Determining future energy use and associated costs for different times of the year.
Energy Modeling	Computerized simulation of a building that focuses on energy consumption, utility bills and life cycle costs of various energy related items such as air conditioning, lights, and hot water.
Energy Savings	Measuring savings by comparing performance profiles before and after energy efficiency modifications.
Energy Use Breakdowns	Disaggregating building energy into different categories, such as weather-dependent energy use or weather-independent energy use.
Heating Degree Days (HDD)	Measurement designed to reflect the demand for energy needed to heat a building.

Term	Definition
Performance (Regression) Line	The statistical line of best fit.
Regression Analysis	Statistical process for estimating the relationships among variables. Includes many techniques for modeling and analyzing several variables, when the focus is on the relationship between a dependent variable and one or more independent variables.

Reading the report

This section discusses how to read the different types of information in the report.

Report Parameters Summary table

The Report Parameters Summary table appears at the beginning of the report. Based on what you select for the **Show Report Parameters Summary** option on the prerequisite page, you can make this table appear or be hidden in the report.

Report Parameters Summary

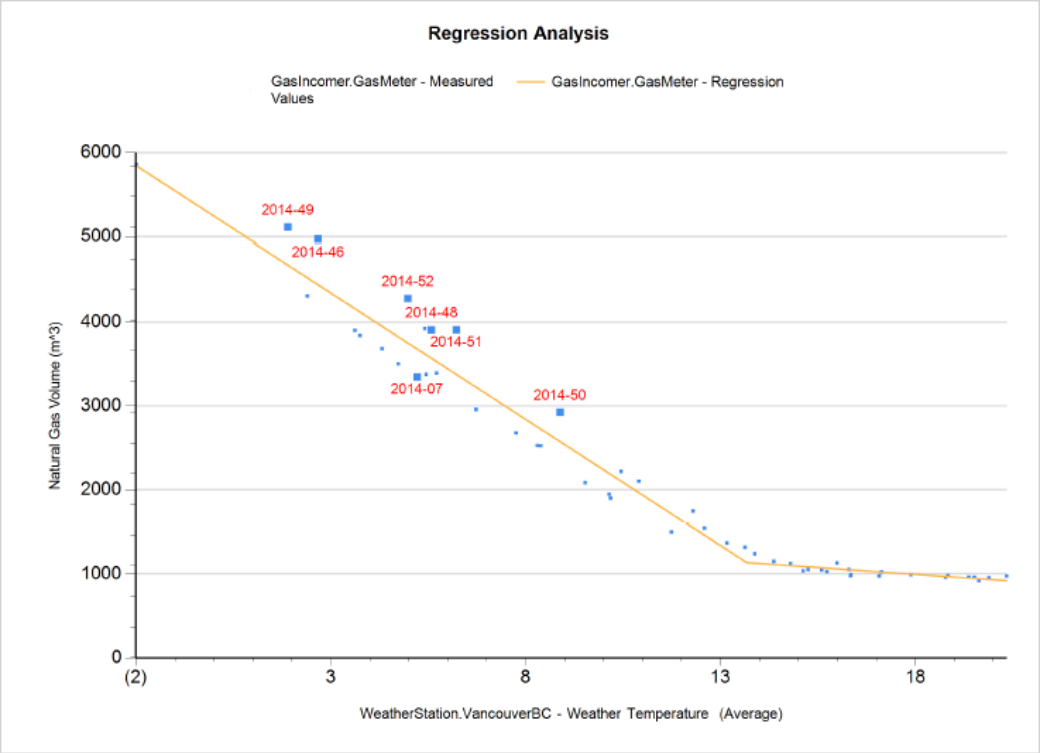
Driver Data Source	WeatherStation.VancouverBC	**Driver Data Quantity**	Weather Temperature (°C)
Model Data Source	GasIncomer.GasMeter	**Model Data Quantity**	Natural Gas Volume (m^3)
X Axis Calculation Method	Average	**Degree Days Pivot Point**	18
Y Axis Calculation Method	Delta		
Regression Type	Broken Line	**Aggregation Period**	Week
Deviation Type	Absolute Value	**Max Authorized Deviation**	330

This table provides important details, such as data sources, calculation methods, and other parameters about how the report inputs are configured that can help the user understand report results.

Regression Analysis Chart

The Regression Analysis Chart shows the relationship between the driver and model data.

In this chart, the blue dots represent real data points. In this case, the data is aggregated weekly over the course of one year, therefore, there are 52 data points with each data point representing one week of the year. The yellow line is the regression line, or performance line, of the building. The performance (regression) line is the best fit line--a line that indicates the expected energy consumption. The slope of the performance line is a measure of how much extra fuel, energy, or other resource is consumed for an increase in the independent variable (such as degree days, production units, and so forth).



Deviations between building performance lines over time means that something has changed in the way the facility consumes energy. This may be a result of energy efficiency modifications, or it could indicate an issue with building systems, equipment, or processes. The performance line provides a benchmark by which changes in energy consumption can be monitored, and appropriate actions can be taken if variations are detected.

The point of intersection between the two performance lines is called the breakpoint. For energy consumption analyzed with respect to average temperature, the breakpoint indicates the temperature at which heating or cooling of a facility begins. Therefore, having a breakpoint further to the right is better because this indicates that heating or cooling systems are running for less time, which results in less energy usage.

Regression Analysis Main Characteristics Table

The Regression Analysis Main Characteristics Table provides information about the Regression Analysis Chart.

Regression Analysis Main Characteristics Tables

Side	Slope	Y-Intercept	R^2	RMSE
Left	-300.67	5257.20	-0.971	290.14
Right	-32.52	1581.66	-0.822	43.92

	X Value	Y Value
Changepoint	13.71	1135.97

The **Side** column shows the left and right sides. The **Slope** column shows the slope values of the two best-fitting lines intersect. This intersection point is called the *breakpoint*. The **Y-Intercept** column shows a point where the graph of a function or relation intersects with the y-axis of the coordinate system. Therefore, these points satisfy x = 0.

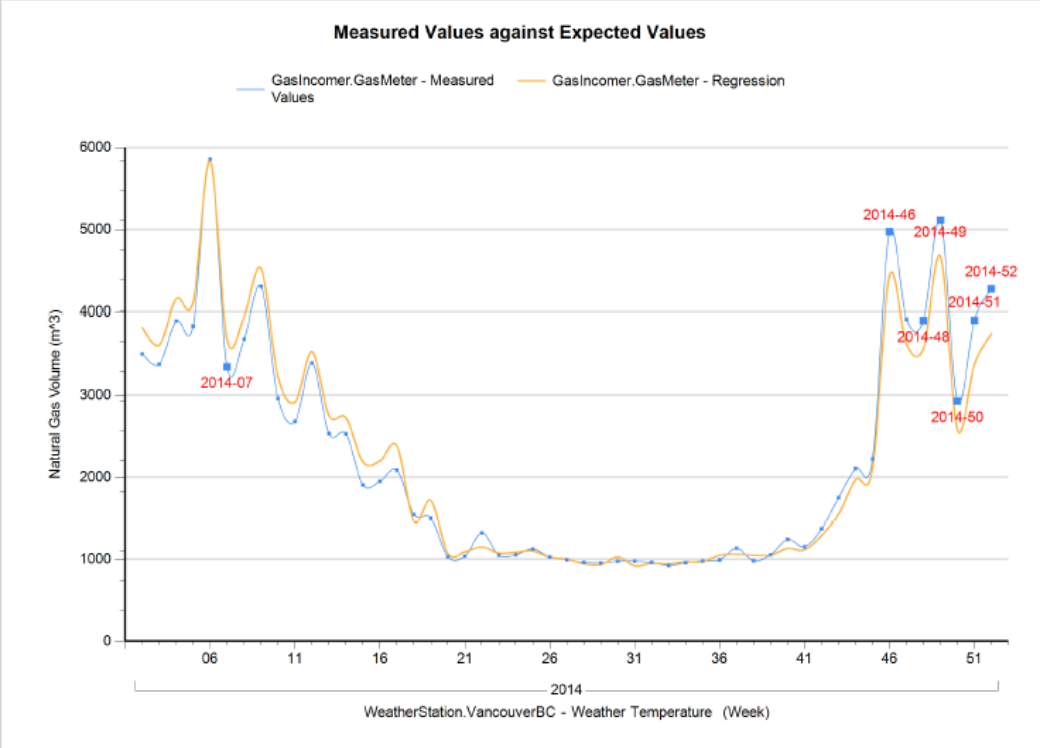
The **R2** column shows a value that indicates how well the data fits the model. The **RMSE** column shows the square root of the mean/average of the square of the error. The **X Value** and **Y Value** columns show the coordinates of the Change point.

Monitoring the slopes and breakpoint values provides useful information about a facility's energy consumption. Flatter slope lines are better as they indicate a smaller increase in energy consumption for every additional unit of the independent X-axis variable.

For more information on interpreting the report results, see Interpreting the report.

Measured Values Against Expected Values Chart

The Measured Values Against Expected Values Chart shows the relationship between the model data and time.



In this chart, the blue line indicates the real energy usage over time and the performance line indicates the expected energy usage over time based on the regression analysis.

The time axis, or X-axis, has different units depending on the selected aggregation period. For weekly aggregation, the numbers on the X-axis represent the weeks of the year and for daily aggregation, they represent the days of the year. The year or years contained within the reporting period are displayed on the chart directly below the X-axis values.

Exceptions Table

The Exceptions Table below shows information for any data point that falls outside of the exception range defined by the Deviation Type and Max Authorized Deviation parameters.

Exceptions Table

Device Name	Aggregation Period (Week)	X-Axis Value (Average)	Y-Axis Value (m^3)	Regression Value (m^3)	Delta Value (m^3)	Delta Value Percent (%)
GasIncomer.GasMeter	2014-49	1.94	5116.00	4674.06	441.94	9.46 %
GasIncomer.GasMeter	2014-46	2.71	4974.30	4442.87	531.43	11.96 %
GasIncomer.GasMeter	2014-52	5.02	4281.00	3749.08	531.92	14.19 %
GasIncomer.GasMeter	2014-07	5.26	3344.70	3676.72	-332.02	-9.03 %
GasIncomer.GasMeter	2014-48	5.62	3904.60	3567.70	336.90	9.44 %
GasIncomer.GasMeter	2014-51	6.26	3907.00	3374.41	532.59	15.78 %
GasIncomer.GasMeter	2014-50	8.92	2925.00	2574.40	350.60	13.62 %

If there are no exception points, this table does not appear in the report.

Full Table

The Full Table below shows information for all data points.

Full Table

Device Name	Aggregation Period (Week)	X-Axis Value (Average)	Y-Axis Value (m^3)	Regression Value (m^3)	Delta Value (m^3)	Delta Value Percent (%)
GasIncomer.GasMeter	2014-06	-1.95	5859.70	5844.23	15.47	0.26 %
GasIncomer.GasMeter	2014-49	1.94	5116.00	4674.06	441.94	9.46 %
GasIncomer.GasMeter	2014-09	2.43	4309.50	4525.20	-215.70	-4.77 %
GasIncomer.GasMeter	2014-46	2.71	4974.30	4442.87	531.43	11.96 %
GasIncomer.GasMeter	2014-04	3.65	3900.87	4158.31	-257.44	-6.19 %
GasIncomer.GasMeter	2014-05	3.79	3839.60	4118.93	-279.33	-6.78 %
GasIncomer.GasMeter	2014-08	4.35	3681.70	3948.91	-267.21	-6.77 %
GasIncomer.GasMeter	2014-02	4.77	3501.95	3823.01	-321.06	-8.40 %
GasIncomer.GasMeter	2014-52	5.02	4281.00	3749.08	531.92	14.19 %
GasIncomer.GasMeter	2014-07	5.26	3344.70	3676.72	-332.02	-9.03 %
GasIncomer.GasMeter	2014-47	5.45	3922.70	3618.82	303.88	8.40 %
GasIncomer.GasMeter	2014-03	5.48	3376.11	3608.86	-232.75	-6.45 %
GasIncomer.GasMeter	2014-48	5.62	3904.60	3567.70	336.90	9.44 %
GasIncomer.GasMeter	2014-12	5.75	3391.40	3527.70	-136.30	-3.86 %
GasIncomer.GasMeter	2014-51	6.26	3907.00	3374.41	532.59	15.78 %
GasIncomer.GasMeter	2014-10	6.76	2959.10	3223.53	-264.43	-8.20 %
GasIncomer.GasMeter	2014-11	7.79	2679.40	2914.45	-235.05	-8.06 %
GasIncomer.GasMeter	2014-13	8.34	2528.80	2749.79	-220.99	-8.04 %
GasIncomer.GasMeter	2014-14	8.43	2526.00	2723.49	-197.49	-7.25 %
GasIncomer.GasMeter	2014-50	8.92	2925.00	2574.40	350.60	13.62 %
GasIncomer.GasMeter	2014-17	9.57	2085.60	2381.11	-295.51	-12.41 %

Within the Full Table, there is a row with missing values.

Warp.GeneratorOne	2009-8	12.63	73.74	51.70	-22.04	-42.64 %
Warp.GeneratorOne	-	15.14		62.07		
Warp.GeneratorOne	2009-7	16.83	150.60	122.89	-27.71	-22.55 %

This row stores information about the breakpoint from the Regression Analysis Chart.

This report generates with almost any set of data and regardless of other parameter selections. However, the generated report is only of assistance in monitoring energy consumption if the parameters are configured correctly and with specific intent.

The following section provides specific examples of how to use the Energy Modeling Report to monitor certain aspects of a facility's energy consumption.

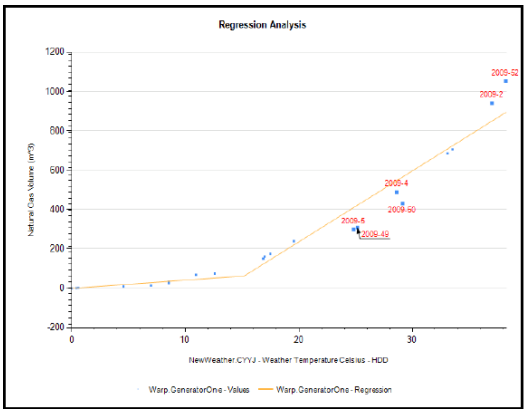
Interpreting the report

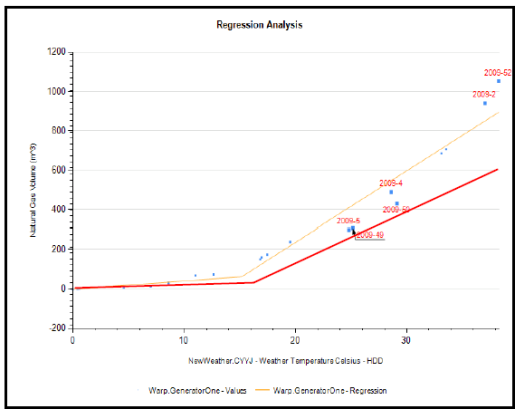
After generating the report, the data can be analyzed in different ways to draw different conclusions about energy and resource consumption. Below are two examples involving different independent variables.

Example 1: Justifying Energy Efficiency Upgrades

Regression analysis of energy or resource consumption with respect to Degree Days can provide valuable information about a facility's energy efficiency with respect to outside changes in temperature. Such information can be used to determine when energy efficiency upgrades are necessary, and to monitor the effectiveness of such solutions after implementation.

For example, a facility manager could compare the Heating Degree Day energy profile of their building to another facility in a similar climate. If the other building proves to be much more energy efficient, an analysis could be performed on the differences in building design that could cause these results. Perhaps the only significant difference is that the more efficient building recently upgraded their insulation. The less efficient building could then use this information, along with the Regression Analysis charts to pitch the case that an insulation upgrade should take place to reduce natural gas usage at the facility.



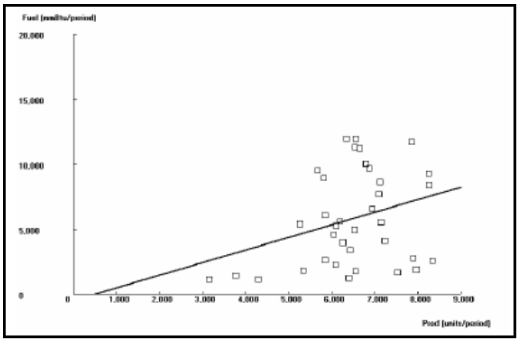


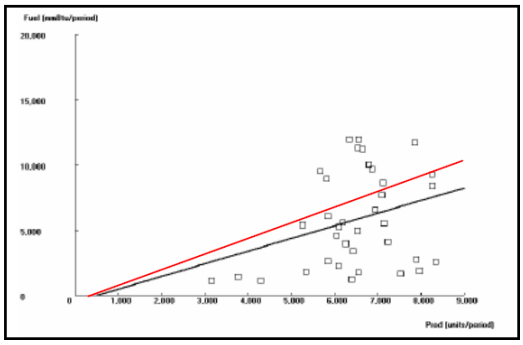
If the upgrade is successful, a change appears in the Regression Analysis chart the following year. The chart above shows a possible Regression analysis for the year before the energy efficiency modifications. The red line in the chart shows how the performance lines and breakpoint could change when the upgrades are successful. The slopes of the lines in the second figure are flatter, indicating less energy usage for every additional degree day. The breakpoint also occurs later, indicating that heating does not have to begin at as low of a temperature as before, thereby saving additional resources.

Example 2: Identifying Equipment Failure

Regression analysis can also be used to detect equipment deterioration or failure. Below are two Regression Analysis charts showing natural gas consumption with respect to production units.

The red line in the chart has a steeper slope and an earlier X-axis intersection point. This indicates that more natural gas is being used for every unit of production. If data for these charts is collected over different periods of time, but with no changes to manufacturing processes or equipment, the steeper regression line in the second chart could indicate deterioration of equipment.





Plotting energy consumption data against any independent variable, not just time, allows you to analyze in greater detail the energy efficiency of your buildings or facilities, and to make necessary upgrades or cost analysis decisions.

Conclusion

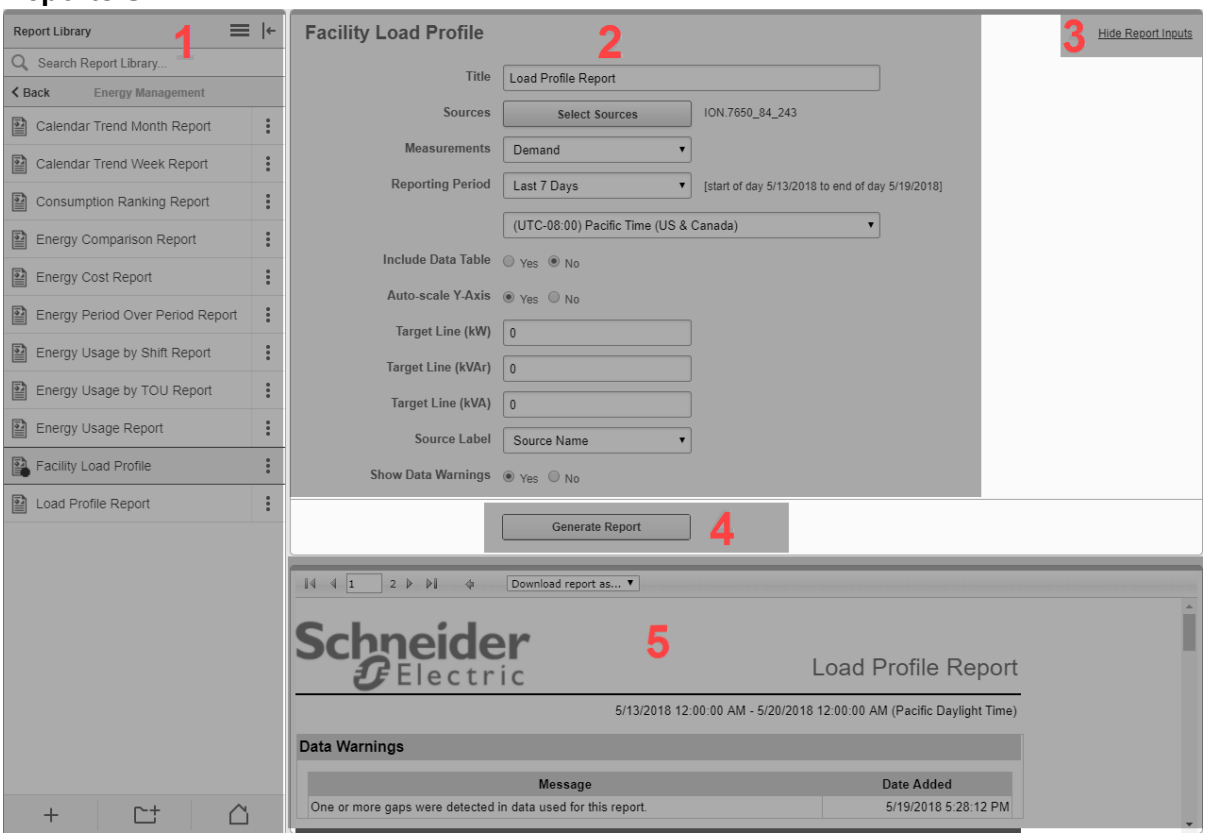
Energy modeling is a relatively new practice for monitoring and analyzing energy consumption in buildings and facilities. It involves using computerized simulations to analyze energy consumption, and it allows customers to understand their expected energy consumption and use this information to make system design decisions and perform cost benefit analysis.

The Energy Modeling Report, or XY Regression Report, allows users to create energy profiles for their buildings or facilities. These benchmark energy models provide valuable information about energy and resource consumption that can help Facility Managers save resources by identifying and addressing consumption issues.

Recommendations

Many of the report parameters on the prerequisite page are interdependent and configuring this page requires close attention. It is recommended to rely on documentation to correctly configure the report. Note that there is no filtering of parameters on the prerequisite page.

Reports UI



1	**Report Library** The Report Library contains all the Reports that are configured in the system. Reports can be listed individually, or they can be organized within folders. **TIP**: To hide the library, click the Hide Library icon (|← or →|) in the top right corner of the library. To show the library, click the Show Library icon (→▯ or ▯←) at the top of the library ribbon, or click anywhere in the minimized library ribbon.
2	**Reports Inputs panel** The top part of the Reports Display pane shows the inputs for the selected report. Different reports have different input types. Some inputs are preset with default values, others are unassigned and must be set before the report can be generated.
3	**Hide Report Inputs / Show Report Inputs link** Click this link to hide or show the report input panel.
4	**Generate Report button** Click this button to generate the report after you have set all the required input parameters.
5	**Report Display panel** View the report output after generating the report. Use **Download report as**, at the top of the panel, to download the report in PDF, Excel, or Tiff image format.

Reports Icons

Reports uses different icons to differentiate between reports and report templates in the Report Library. The following is a list of icons used.

	Private Report with some inputs saved
	Private Report with all inputs saved
	Public Report with some inputs saved
	Public Report with all inputs saved

Reports Terminology

The following is a list of commonly used terms related to Reports in PME.

Report

A report is a report template that has been saved with some or all of its input parameters set. Every time you run a report, it queries the database to retrieve the required data. A report does not store the output data after it was generated. To save a permanent copy of the output, download the report in one of the supported formats and save it externally.

Report Template

A report template defines the output layout, the types of inputs and the information in the database that is accessed for that report. The difference between a report and a report template is that a report has one or more of its input parameters saved and a template does not.

Downloaded Report

A downloaded report is a copy of the output of a report. You can download a report in different formats. Download a report to permanently save a copy of its output.

Report Input Parameters (or Inputs)

Report input parameters are the variables that must be entered before a report can be generated. For example, the input parameters can determine for which devices a report is run, or which measurements are included. Different report templates have different input parameters.

Trends references

This section contains reference information related to using Trends.

Use the links below to find the content you are looking for:

The Trends user interface

The Trends user interface consists of a trends display pane and a Trend Library pane.

Trends display pane

The Trends display pane shows the trends selected in the **Trend Library**. When you create a trend, it automatically opens in the display pane and the trend name is selected in the **Trend Library**. You can select multiple trends to be shown simultaneously in the display pane. Scroll the display pane to view all of the trends that you selected in the **Trend Library**. For information on the options and controls available in the trend view, see Trend options.

If you log out of the application, your selections are retained and are loaded in the Trends display pane the next time you log in.

Trend Library

The **Trend Library** contains all the trends that are configured in the system. Trends can be listed individually, or they can be organized within folders. You use the Trend Library to select the trends you want to view.

TIP: To hide the library, click the Hide Library icon (or) in the top right corner of the library. To show the library, click the Show Library icon (or) at the top of the library ribbon, or click anywhere in the minimized library ribbon.

For information on how to configure Trends, see Trends configuration.

Trend options

The following options are available in the upper right area of the trend in the display pane.

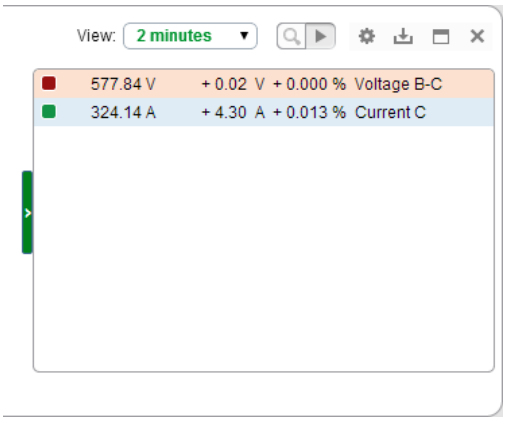
These options are summarized in the following table.

	Open the Diagnostic Log Viewer	This icon appears only if there is an information, error, or warning message associated with the device. If the icon pulses, the viewer contains a new error or warning message that has not yet been viewed. When you open the viewer, you can click **Clear Log** to remove the existing entries. This action removes the icon from the trend display area until new information is logged in the viewer. Click **Close** to close the viewer and return to the trend display.
View: 15 minutes	View list	The setting for the time range on the X-axis. Select a time range from the dropdown list. The view window reflects the time in minutes or hours from the last data point read from the source. For example, if you are viewing a 15 minute window and the last data point occurred 20 minutes ago, then the trend time range spans the previous 35 to 20 minutes.
	Inspect	Acts as toggle to enable and disable the inspection mode for the trend. When you enable inspection mode, inspect icons appear on the trend when you place your pointer anywhere on the diagram. A slider also opens below the X-axis. Use the slider to adjust the time range for the trend. Data values are not updated in the trend, but they continue to be updated in the legend. When you disable inspection mode, all data that was captured is shown.
	Edit	Opens the Trend Setup dialog. You can modify any of the settings for the trend.
	Download trend data as CSV	Saves the trend data that is displayed in the diagram in a CSV file on your system. When events occur, you can download the data to a CSV file for further analysis.

	Maximize	Displays the trend in a full browser page. Click the Restore icon to return to the default size in the trend display area.
	Close	Closes the trend. This also clears the checkbox for the trend in the **Trend Library**.

Trend legend

The legend opens on the right of the trend by default. You can select **Left** or **Off** on the **Chart** tab in the Add Trend or Trend Setup dialogs to change the location of the legend or to remove it from the trend display.

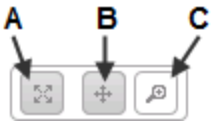


The legend provides the following capabilities:

- You can close and open the legend by clicking the arrow on the left side of the legend.
- If you have enabled multiple axes in your trend, when you place your mouse pointer over a measurement series in the legend, it indicates which axis the series is drawn on.
- You can temporarily disable a measurement series by clicking the color swatch for the series.
- The background color of a measurement series entry changes to match the threshold colors when the series passes into the upper or lower threshold. You set the threshold colors on the **Axes** tab of the Add Trend or the Trend Setup dialog.

Inspection mode

The following icons appear when you enable the inspection mode and you place your pointer on the trend.



A	Reset Zoom (100%) - resets the trend to its default size.
B	Pan the chart - after you zoom in to an area of the diagram, click **Pan the chart**, then click and hold the left mouse button on the diagram and drag it left or right.
C	Zoom in to selection area - zooms in when you drag the mouse over an area of the chart. The zoom action occurs when you release the left mouse button.

When the trend is in inspection mode, the trend remains static until you toggle inspection mode off to return the trend to its update mode. Note that the data in the legend continues to update in real time with the latest values even though the trend remains static for analysis purposes. When you toggle inspection mode off, the trend refreshes and includes all of the data that was captured while you were in inspection mode.

You can drag the slider below the X-axis to the right to decrease the time range for the trend. For example, if the time range is set to 15 minutes and you drag the slider to the right, the range values decrease, and if you continue to drag the slider to the right, the values decrease further to show minutes and seconds on the scale.

Decommissioning Reference

This section contains detailed instructions for decommissioning your system. For an overview, see Decommissioning.

NOTICE

UNINTENDED DATA LOSS OR LOSS OF SOFTWARE FUNCTION

- Only decommission PME systems that are no longer needed.
- Archive important PME data and files before decommissioning. You cannot recover, reinstall, or otherwise retrieve any part of PME after decommissioning.

Failure to follow these instructions can result in irreversible damage to software and databases.

Choose **Destroy** or **Overwrite** to decommission your system.

You must decommission PME on all PME Servers, Database Servers, and PME Clients.

Decommissioning does not completely restore your computers to the state they were in before PME was installed. Decommissioning does not remove third-party software used by PME (for instance, the .NET framework), even if this software was installed using the PME installer.

NOTE: Decommissioning will not remove PME data that has been exported from PME or PME information in third-party software. This includes, but is not limited to:

- Data exported to other systems using EcoStruxure Web Services (EWS), OPC DA server, ETL, ODBC, PQDIF or VIP.
- Registration information shared with Schneider Electric.
- Diagnostics and Usage data sent to Schneider Electric.
- System information sent to Schneider Electric for licensing.
- Schneider Electric License Manager and Floating License Manager.
- Archived configurations created with the Configuration Manager.
- PME System Key exported from the Installer.
- PME information configured in third-party whitelisting software.
- Files or data copied, backed-up, exported, or otherwise saved to a file location other than the PME folder.

Destroy

⚠ WARNING

HAZARD OF PHYSICAL INJURY

- Do not destroy hard drives without the proper safety training.
- Never burn a hard drive, put a hard drive in a microwave, or pour acid on a hard drive.

Failure to follow these instructions can result in death or serious injury.

NOTE: If you do not have the proper safety training, consult your IT department to select an asset disposal company.

To destroy hard drives:

1. Identify all computers where PME is installed. In a Distributed Database architecture, this includes all PME Servers, Database Servers, and PME Clients.
2. Remove all hard drives from the computers identified in the previous step.
3. Destroy each hard drive:
   a. Puncture, shatter, or sand the hard drive plates. Follow local regulations for proper disposal of the hard drive.
   b. or, provide the hard drive to an asset disposal company.

Overwrite

NOTICE
UNINTENDED DATA LOSS OR LOSS OF SOFTWARE FUNCTION • Only overwrite files and folders from PME. • Back up important files from other software before overwriting PME. **Failure to follow these instructions can result in irreversible damage to software and databases.**

To overwrite PME:

1. Open the Windows Control Panel and select Programs and Features.
2. Uninstall PME.
3. Select and install a data destruction tool. There are many commercial and open-source data destruction tools available. Consult your IT department if you are unsure about which tool to choose.
4. Detach PME database archives:
   a. Open **SQL Server Management Studio**, enter your password if required and click **Connect** to access your SQL Server.
   b. In the **Object Explorer** pane on the left, expand **Databases**, right-click the database archive you want to detach and click **Tasks > Detach**… to open the **Detach Database** dialog.
   c. In the **Detach Database** dialog, click **OK**.
   d. Repeat the above steps for all PME database archives.
5. Locate your PME folder under Program Files. The PME folder contains the following subfolders:
   - `\applications`
   - `\config`
   - `\Database`

- `\Floating License Manager`
- `\License Manager`
- `\Setup Logs`
- `\system`
- `\web`

6. Follow instructions provided with your data destruction tool to overwrite the entire PME folder located in the previous step.
7. Locate any custom PME files in folders outside of the PME folder. This may include, but is not limited to, following file types:
   - Vista and Designer files: `.cfg, .dgm, .wsn, .wsg`
   - ION databases and archives: `.LDF, .MDF`
   - ION database backups: `.bak`
   - Custom report packs: `.rdlc`
   - PMESystem Key: `.key`
8. Follow instructions provided with your data destruction tool to overwrite the files located in the previous step.
9. Repeat the steps above on all PME Servers, Database Servers, and PME Clients.

Applications References

This section contains reference information related to the content in the Applications chapter of this guide.

Use the following links to find the content you are looking for:

Topic	Reference Links
Thermal Monitoring of LV Busways	Selecting Sensor Names

Thermal Monitoring of LV Busways Application References

This section contains reference information related to this application.

Use the following links to find the content you are looking for:

Selecting Sensor Names

Selecting Sensor Names

The ZBRN32 Access Point device driver creates individual sources for each of the sensors that are connected to the Access Point. To name the sources, the driver uses the sensor names. You can edit the default sensor names through the setup Vista diagram. See the Configuration section of the application description for details. You can use variable sensor names or fixed sensor names.

NOTE: Use sensor names that are unique in the PME system. This applies to both, variable names and fixed names. For variable names, they must be unique after the variable has been replaced with the Access Point name by the device driver.

Using Variable Sensor Names

The default sensor names include the **!!DeviceName!!** variable. If the sensor names include this variable, then the driver replaces the variable with the name of the Access Point device as it is specified in the Management Console. In this case, any reference to these sensor sources in the system includes the Access Point device name. For example, the source selectors in the PME applications will group the sensors under the Access Point device name.

NOTE: Diagrams does not recognize the variable and does not replace it with the Access Point device name. Diagrams displays the **!!DeviceName!!** string as part of the sensor name.

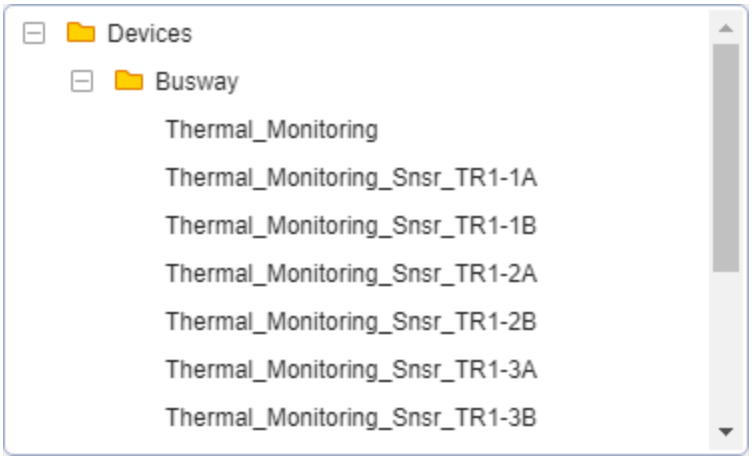
Example:

Sensors use variable names (!!DeviceName!!_Snsr_TR1-1A, !!DeviceName!!_Snsr_TR1-1B, ...).

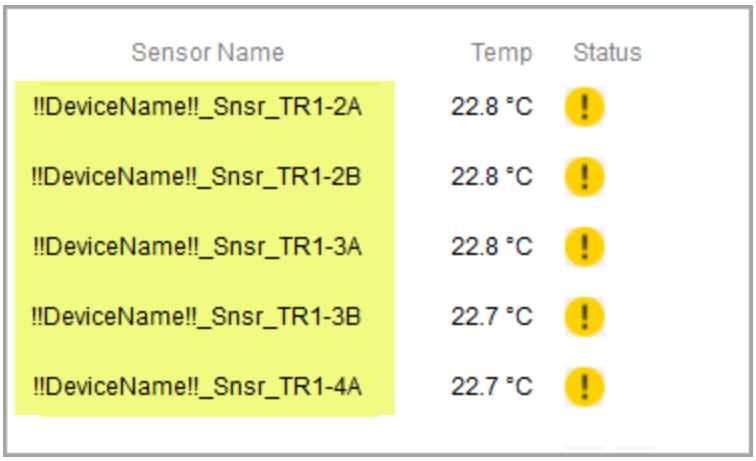
Access Point device in the Management Console

Enabled	Group	Name	Type	Address	Site	Status	Protocol	Description
✔	Busway	Thermal_Monitoring	ZBRN32 (CL110/TH110)	10.168.84.183/502/1	Thermal_Monitoring_Gateway	Site Available	MODBUS	

Source selector for sensor sources



Diagrams display of sensor data



Using Fixed Sensor Names

If you replace the default sensor names, which include the **!!DeviceName!!** variable, with fixed names, then the sensor sources will not be associated with the Access Point device. Each sensor source will appear as if it was its own device.

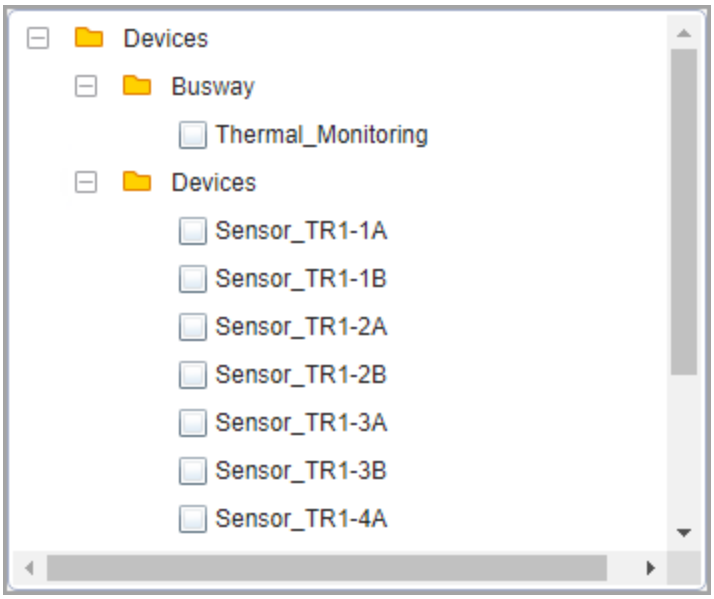
Example:

Sensors use fixed names (Sensor_TR1-1A, Sensor_TR1-1B, ...).

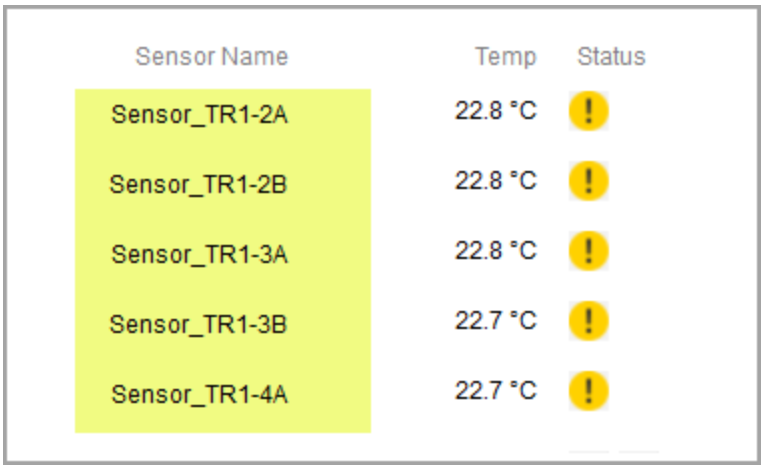
Access Point device in the Management Console

Enabled	Group	Name	Type	Address	Site	Status	Protocol	Description
✔	Busway	Thermal_Monitoring	ZBRN32 (CL110/TH110)	10.168.84.183/502/1	Thermal_Monitoring_Gateway	Site Available	MODBUS	

Source selector for sensor sources



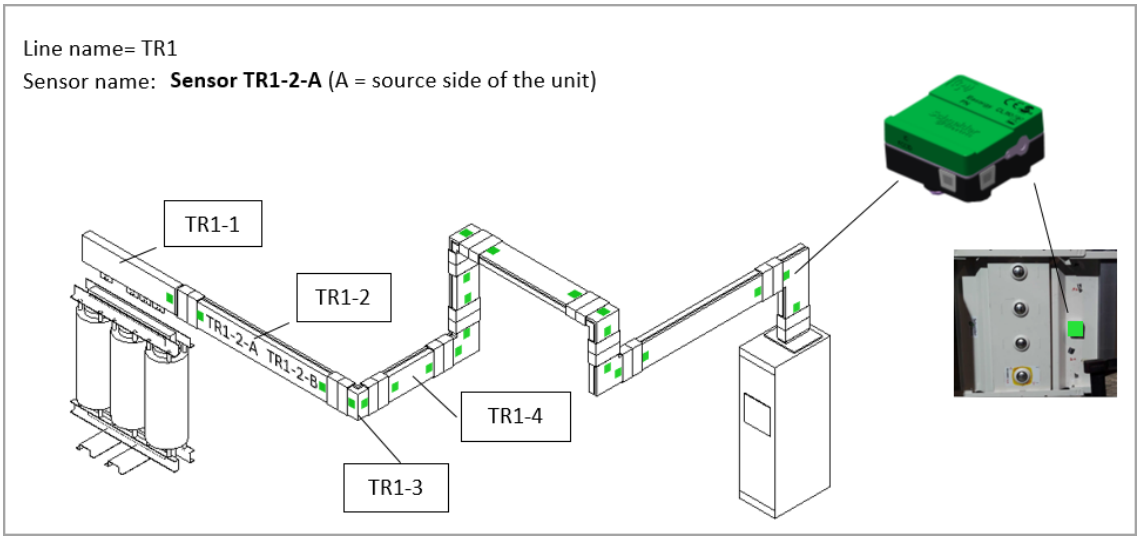
Diagrams display of sensor data



Sensor Name	Temp	Status
Sensor_TR1-2A	22.8 °C	!
Sensor_TR1-2B	22.8 °C	!
Sensor_TR1-3A	22.8 °C	!
Sensor_TR1-3B	22.7 °C	!
Sensor_TR1-4A	22.7 °C	!

Names Used in This Application Description

The sensor names used as examples in the screen captures shown in this document are based on the following assumed sensor locations:



Glossary

Process Impact Alarm

Process impact alarms are used by the Power Quality Performance module. These alarms indicate that a monitored process has been disrupted. If the disruption coincides with a power quality event, then the Power Quality Performance module assumes that it was caused by the event. The module then applies a flat-rate cost estimate to the duration of the process impact alarm to calculate an impact cost.

Process impact alarms can be generated based on:

- An electrical value, for example a current, voltage, or power measurement, taken by a power monitoring device. The software detects the process impact based on certain conditions for the measurement, for example a drop or increase.
- A process impact signal from a third party system or equipment, such as:
  - A digital or analog value that is hard wired to the input of a power monitor, or PLC, which is connected to the software.
  - An OPC tag served up by an OPC server and read by the software through it's OPC client capabilities.

Software Features

A feature is a system functions that can be used without requiring custom engineering. Most features require some configuration, such as selecting the input parameters for a report, or the specification of sources, measurements and time ranges for dashboard gadgets. Examples of features include the Dashboards, Diagrams, Trends, Alarms, and Reports applications.

Software Modules

Software modules combine different software features and capabilities to create a specific set of deliverables. Software modules are designed around a particular application. Examples of software modules include the Power Quality Performance Module, the Energy Analysis Reports Module, and the Breaker Performance Module.

System databases

Power Monitoring Expert uses four databases to store device communication parameters, system configuration settings, and logged historical data:

Database	Description
ApplicationModules	Contains all of the configuration data for the Web Applications component.
ION_Data	Contains the logged historical data, events, and waveforms from devices.
ION_Network	Contains device communication information and general settings.
ION_SystemLog	Contains system events that occur during the operation of the software.

System migration

A system migration is when you move a Power Monitoring Expert system from one computer to another, or uninstall and re-install it on the same computer.

Alarm

A condition that is being monitored for a particular source in the system. Example: Monitoring for an over voltage on feeder X.

Occurrence

The alarm condition for the monitored source is met and the alarm goes active. Example: The voltage on feeder X exceeds the threshold

Alarm Instance

The time period during which an alarm is active, starting when it goes active, ending when it goes inactive.

Alarm Status

The state the alarm is in. Alarm Status is either active or inactive.

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As standards, specifications, and designs change from time to time, please ask for confirmation of the information given in this publication.

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