

Increasing safety, productivity, and performance

Safety and critical control
digital applications and tools



When safety, resilience, and sustainability are critical to the success of your operations, you can rely on EcoStruxure Triconex Safety Systems.

As the foremost supplier of safety instrumented systems, Schneider Electric's EcoStruxure Triconex solutions help to protect people, the surrounding communities, and the environment while keeping production operating safely and continuously for the operating life of the asset.

EcoStruxure Triconex solutions help to deliver:

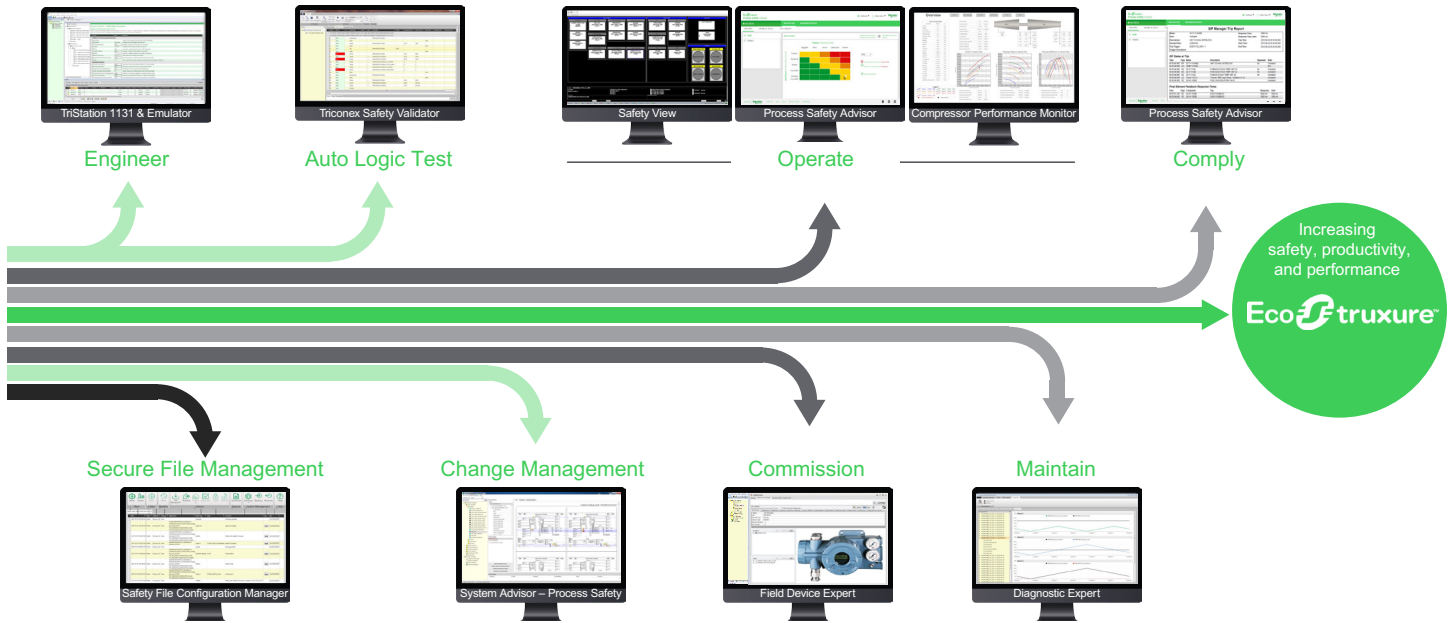
- Safer, more reliable, uninterrupted operations
- Increased plant uptime, minimum unplanned downtime, and less potential production loss
- Avoidance of costly harm to plant assets, reputational damage, and regulatory compliance fines
- Lower operational risk, with reduced impacts on health, safety, and the environment
- Maximum ownership value

EcoStruxure Triconex Safety Systems meet the stringent needs of applications in high-hazard industries such as oil and gas, refining, chemicals, petrochemicals, power, pharmaceutical, and nuclear.

Certified by TÜV Rheinland for use in safety applications up to safety integrity level 3 (SIL3), EcoStruxure Triconex Safety Systems are renowned throughout the world for safety, availability, and security, and can be used for all major safety and critical control applications, including:

- Emergency shutdown (ESD)
- Fire and gas (F&G)
- Burner management systems (BMS)
- High-integrity pressure protection systems (HIPPS)
- Turbomachinery protection and control (TMC)

Increasing safety, productivity, and performance



Triconex TriStation 1131

Achieve results faster with quick system configuration, programming, and documentation.

TriStation 1131 is the engineering and maintenance software toolset for the EcoStruxure Triconex family of logic solvers, specifically designed to help you configure, program, and document Triconex systems throughout the safety lifecycle.

TriStation 1131 tools are easy to learn, efficient to program and test, and require minimal training.

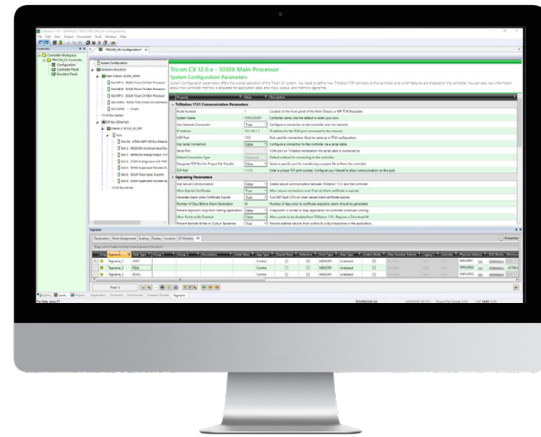
TriStation 1131 allows you to:

- Define the controller configuration
- Create programs, functions, and function blocks
- Test and validate applications
- Download and monitor applications

The inherent error checking helps you avoid mistakes and speeds up the engineering process.

Features

- Choice of IEC61131 programming language: Function Block Diagram, Structured Text, Cause and Effect Matrix, and Ladder Diagram
- Graphical drag-and-drop programming
- Management of multiple projects within the same environment
- Comprehensive library of validated function blocks
- Application validation using powerful emulation tools
- Secured user access and authorization for projects and controllers
- Project history automatically recorded
- Free-form entry of annotations and comments
- Reports and documentation
- Ability to import and export project data and settings



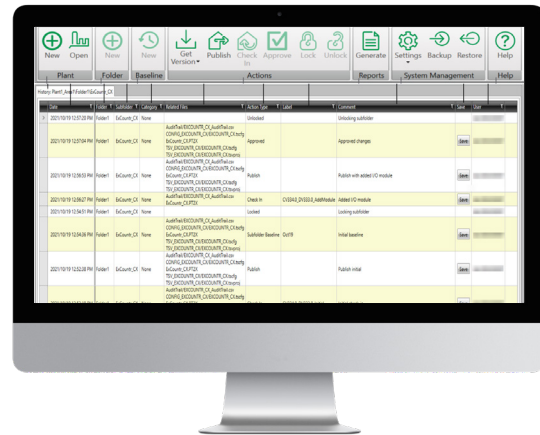
Benefits

- Software license same cost regardless of number of tagnames
- No hard lock license required
- IEC 61131-3 compliant
- Certified by TÜV, including TÜV-approved function blocks

Triconex Safety File Configuration Manager

Secure storage, organization, and tracking of safety-related files

Safety File Configuration Manager is designed to help you comply with IEC 61511 requirements. The fit-for-purpose file management system provides storage, organization, and tracking of safety-related files, such as TriStation 1131 project files, configuration files, and audit trail files. It allows for secured authorization-based file sharing in a collaborative file management workflow.



Features

Control files:

- Authorization-based file sharing among users
- Define privileges for file actions, including check-in, publish, and approve
- Safeguard files with locks

Organize files:

- Hierarchically organize files by plants, areas, and SIFs (Safety Instrumented Functions)

Range of file formats:

- Support for a range of file formats, such as .pt2x, .txt, .csv, and more

Manage and track changes:

- Saves a record of all file actions with timestamp for version history
- Generate reports for stored files
- Add labels for identification and tracking of different file versions

Safety and cybersecurity certified:

- Certified by TÜV Rheinland Industrie Service GmbH per IEC 61508 for use with SIL3 safety systems and IEC 62443-4-2

Benefits

- Assists in compliance with IEC 61511 SIS configuration management requirements
- Simplifies audits and functional safety assessments
- Helps prevent unauthorized access to files
- Centralizes file storage for easier retrieval and findability
- Integrated with other Triconex applications, such as the Digital Engineering Console

Triconex Digital Engineering Console

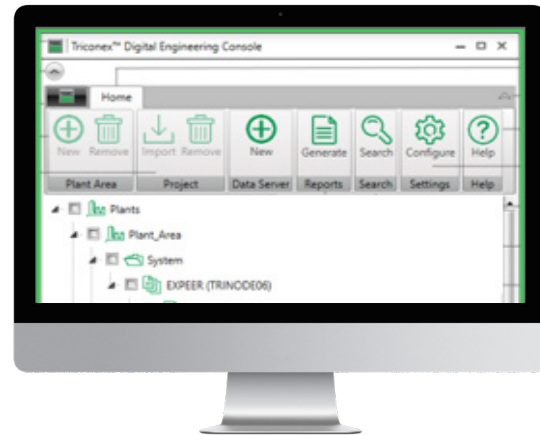
Store and manage Triconex application files and more

The Digital Engineering Console is a multi-purpose Triconex application that allows you to generate and store a variety of configuration files for use with other Triconex applications such as the Data Server, Triconex Safety Validator, and the Safety View Bypass and Alarm Management (BAM) application.

It also provides you with the ability to easily start other Triconex applications—such as TriStation 1131, Triconex Safety Validator, and the Triconex Safety View suite—to edit the files, or generate other file packages as needed.

The Digital Engineering Console can also be used with the Triconex Safety File Configuration Manager, a file management system that provides version control for project files.

You can also generate reports for one or more Triconex controllers based on the information contained in TriStation 1131 project files.



Features

- Open TriStation 1131 project files to easily import and use controller and tagname information in reports, simulation files, and configuration files
- Create Triconex Safety Validator project files from TriStation 1131 project files, attach a simulation file to a test project, and open the TieBack application
- Create and configure Triconex Data Server instances by generating configuration files, enabling the Triconex Auto Start Service, and configuring secure communication
- Integration with Triconex Safety File Configuration Manager
- Create and customize configuration files for Triconex Safety View, start the Safety View HMI Designer, and create configuration packages via the Safety View Configuration Assistant
- Generate and view reports, including:
 - Peer-to-Peer Duplicate I/O Report
 - Peer-to-Peer Function Block Usage Report
 - Peer-to-Peer Configuration Report
 - Tagname Cross Reference Report

Benefits

- Helps simplify and reduce engineering time and effort
- Flexible and scalable architecture makes it adaptable for use in organizations of all sizes

Triconex TriStation 1131 Emulator

'Digital Twin' emulates your Triconex controller in a virtual environment

The Triconex Emulator allows you to emulate and execute TriStation 1131 application logic without connecting to the physical Tricon CX, Tricon, Trident, or Tri-GP controller. Using the Emulator, you can test your application logic in an offline environment, without exposing your online processes to potential application errors or invalid application logic.



Features

- Emulation of application logic, Peer-to-Peer communication, SOE data, Modbus communication
- Enable, disable, or force points to specific values
- Configurable color-coding for easy visual program monitoring
- Monitor and display running application logic and values
- Third-party simulation software can be used in conjunction with the Emulator (external DDE servers, Modbus client/server protocols)
- Monitor program scan times and execution times
- Separate application from TriStation 1131, so it can be updated at any time without having to re-install TriStation 1131

Benefits

- Identify application logic errors or anomalies early in the project
- Avoid costly re-work
- Avoid potential operational issues or upsets
- Ideal for testing modifications prior to implementation on the controller
- Can be used with Triconex Safety Validator for automated application logic testing and validation

Triconex Safety Validator

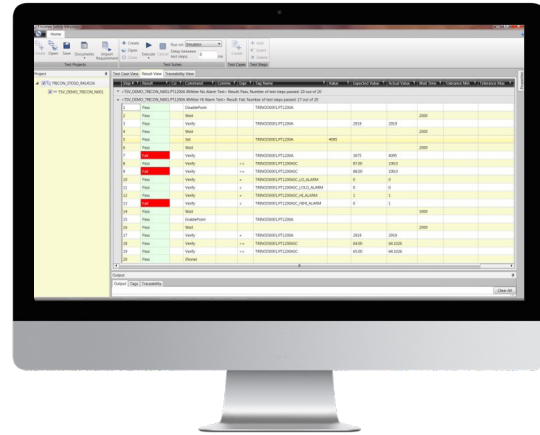
The easiest and quickest way to validate and document Triconex application logic

Certified by TÜV, Safety Validator is a powerful and easy-to-use application that automatically verifies that the application logic running in your Triconex controller is working as intended. Safety Validator automatically documents the results, saving time, effort, and money.

Automated testing is a valuable way to perform testing of Triconex application logic, helping ensure that the functionality or modifications operate as intended.

Automated testing compliments manual testing methods. No programming is required—simply configure Safety Validator for your specific test requirements.

Tests, test cases, and test scripts are quickly and easily created. Tests can be run on the Triconex Emulator or on EcoStruxure Triconex controllers. Test results are self-documented, making it ideal for use in new projects or when revalidating the safety system at periodic intervals.



Features

- Certified by TÜV
- Automatically test and document Triconex application logic
- Easy-to-create test procedures
- Quick and easy-to-use tests, test cases, and test scripts
- Run a single test, set of tests, or subset of tests
- Tests can run on the Triconex Emulator or Triconex controllers
- Single step or continuous tests

Benefits

In addition to saving time, money, and effort, Safety Validator helps to:

- Reduce traditional manual testing by as much as 50 percent
- Increase test accuracy and test coverage
- Optimize test resources
- Increase test efficiency
- Ensure repeatable test quality

EcoStruxure System Advisor – Process Safety

Quick and easy change management

EcoStruxure System Advisor – Process Safety is an ideal tool for managing and documenting changes throughout the operating life of the Triconex system.

Designed specifically for use with Triconex safety systems, it delivers increased insight into the configuration, changes, and I/O management. It helps meet the increasing demand of audits, compliance, and traceability to help ensure your Triconex safety systems are continually operating in a safe and secure way.



Features

System documentation:

- Provides comprehensive I/O documentation
- Documents all tagname references (including tagname references to EcoStruxure Foxboro DCS)
- Documents Cause and Effect Matrix (CEM), Structured Text, Ladder Diagram, and Function Block code

Change tracking:

Tracks a range of configuration changes, including:

- Logic
- Tagnames
- User privileges
- Cross-references
- TriStation 1131 configuration and security
- Hardware, execution order, and SOE configuration

I/O management:

- Documents I/O
- Finds spare I/O
- Reserves I/O

Advanced queries:

- Provides standard queries
- Allows customized queries

Reporting:

- Stores all historical information in a server database
- Provides historical view by date and change
- Allows customized views by filtering and sorting

Benefits

- Increase personnel productivity
- Accelerate troubleshooting time
- Reduce audit costs for regulatory compliance
- Decrease activities needed for project quality assurance
- Lower costs associated with managing documentation updates
- Reduce the likelihood of unexpected plant outages through increased accuracy
- Safeguard knowledge to future-proof investments

EcoStruxure Field Device Expert

Reduce manual field device loop checking activities and commissioning efforts

The EcoStruxure Field Device Expert instrument asset management system allows you to configure, commission, maintain, and diagnose your field devices throughout their entire life cycle.

The intelligent device commissioning wizard focuses on improving the speed and quality of site commissioning activities. It reduces the level of manual checking and commissioning usually needed during plant setup and improves start-up times and cost.



Features

- Configure and monitor HART™ devices connected to Triconex safety systems
- Support for FDT and Enhanced EDDL allows device vendors to program device configuration and maintenance content for the host system
- Reusable engineering via customizable templates for each device model
- Commissioning wizard automates HART device commissioning steps
- Device assignment as a safety device means that only users assigned the Safety Instrument Engineer role can download to or upload from that device

Benefits

- Saves Time - Streamlined device configuration reduces HART device commissioning time by as much as 75%
- Improves Efficiency - Decreases unnecessary work, so you can focus efforts on devices that need attention
- Reduces Errors - Helps lower the likelihood of human errors that can result from intensive manual activity
- Safeguards Workers - Minimizes the time workers need to spend in the field potentially exposed to hazardous conditions

Triconex Diagnostic Expert

Simplify maintenance with quick and easy system fault finding and resolution

Triconex Diagnostic Expert is a suite of applications that allows you to securely connect to up to 254 Triconex systems—either directly or through the Triconex Data Server—for configuration, data logging, system monitoring, and sequence of events data collection. You can collect real-time tagname data; configure trends, triggers, snapshots, and charts to display tagname data as trendlines on charts; monitor system status; and collect and analyze sequence of events data.



The information available via the Diagnostic Expert helps you quickly identify and resolve issues and make more informed decisions.

Triconex Enhanced Diagnostic Monitor: Connects to Triconex controllers on a network to monitor the system, module, and communication status of the controllers, detect any alarms and/or faults, and collect system events.

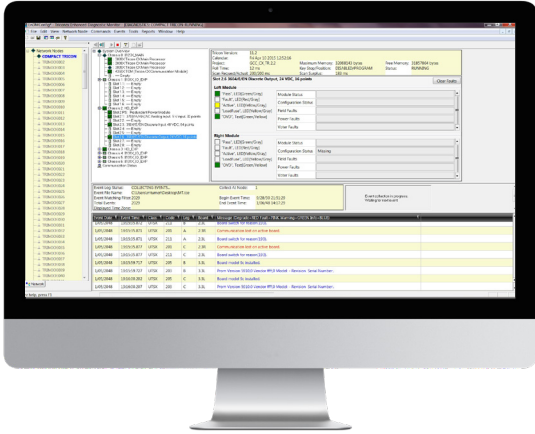
Triconex SOE Recorder: Retrieves sequence of events data from Triconex controllers (up to 16 controllers simultaneously). The collected data can be used to analyze and identify the causes of shutdowns, define corrective actions and procedures for preventive maintenance, and solve other process-control problems.

Triconex FDT Container: Associated with Enhanced Diagnostic Monitor, it can be used to view DTMs, associate a HART-enabled device with a DTM, and configure device parameters.

Triconex Data Server: An OPC UA server that communicates with Triconex controllers to collect real-time tagname data, sequence of events data, HART data, and other status-related data. It also allows OPC UA clients to write values to tagnames in the controller, when write access is permitted.

Triconex Data Logger: An OPC UA client that connects to the Data Server to receive real-time tagname data. This data is then sent to the Diagnostic Expert, where it is displayed in the form of trendlines on live charts. It also supports the automatic and manual creation of tagname data snapshots, for offline viewing and post-trip analysis.

Triconex Diagnostic Expert (continued)



Features

Enhanced Diagnostic Expert features:

- NAMUR 107 symbols
- Monitors controller hardware
- Displays system status, health, and alarm conditions
- Displays extended module information and firmware versions
- Collects system status (periodic or on demand)
- Monitors the controller's program scan time
- Displays communication performance and status
- Collects, views, and reports system events
- Operates independently from TriStation 1131
- Can also be used with the Foxboro DCS System Manager

Triconex SOE Recorder features:

- Manual or automatic SOE data collection
- View millisecond event data
- Find, filter, and search for specific events
- Copy event data for easier analysis
- Export data manually or automatically
- Generate SOE event data reports

Triconex Data Logger features:

- View real-time tagname data as trendlines on live charts
- Configure triggers (condition or value) for recording snapshots
- Record manual snapshots and display in static charts
- Zoom in / out on charts
- Generate snapshot files for offline viewing and analysis
- Secure connection via digital certificates; connection status monitoring

Benefits

- Saves valuable time through “at-a-glance” system health status displays
- Helps avoid costly downtime by identifying possible problems early
- Minimizes the likelihood of human error
- Quick and easy event analysis helps find the root cause of issues more rapidly
- Discover significant variations in tagname values instantly via live charts

Triconex Safety View Bypass and Alarm Management

Help operators manage elevated risk conditions, alarms, and bypasses impacting plant safety

Certified by TÜV, the Triconex Safety View Bypass and Alarm Management solution helps operators monitor and manage safety-related bypasses and alarms with ease (up to 7,000 bypass, alarm, or general purpose (GP) objects, from up to 64 Triconex controllers).

It is used to monitor, acknowledge, and bypass alarms, as well as manage bypasses. It also displays the alarm state and process condition for configured alarms.

The Safety View Bypass and Alarm Management (BAM) application adheres to the standards defined in IEC 61508 and IEC 62443-4-1 and is certified as compliant with security level 1 (SL1) according to IEC 62443-4-2.



Safety View draws the plant operator's attention to critical changes in process conditions that require immediate action. It also provides clear indication to operators, maintenance engineers, and shift supervisors of all safety critical devices that have been placed in bypass, thus reducing the risk levels for which they were designed.

A core role of Safety View is to replace traditional hardwired annunciator panels and bypass switch arrangements, while providing more intuitive information to the operator.

Safety View can be used in either a simplex or redundant configuration for maximum availability.

Features

Safety View provides contextual information to facilitate more informed decision making:

- Certified by TÜV for the highest levels of safety and cybersecurity
- ISA-18.1 Annunciator sequences include Codes M, A, R
- Redundancy for maximum availability
- Alarm functions include: enable/disable individual alarms and group alarms, reactivate alarms on shift hand over, silence alarms, clear first out alarms, reset alarms in ring back state
- Bypass functions include: apply and remove bypassed tag names, add / review notes for bypassed tag names, configurable bypass behavior
- General purpose buttons
- Secure access and audit trail
- Shift change one-time activation

Benefits

- Enhanced operator performance and response to critical conditions
- Helps reduce the likelihood of an adverse safety event
- Minimize operator errors that could lead to unscheduled asset downtime

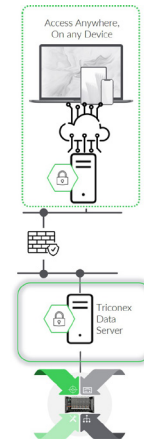
Triconex Data Server

Enable OPC UA clients to get Tricon CX system data

Triconex Data Server is a Windows®-based application that enables OPC UA-compliant clients to request data from Triconex controllers and, if allowed, write to Triconex control program variables.

For example, when used with an OPC UA client such as the Triconex Data Logger, the Data Server allows the Data Logger to access tagname data from the controller and monitor it through live charts in real time.

In the event of a server shutdown, the Data Server can be restarted using the Windows-based Triconex Auto Start Service, if enabled. The Auto Start Service is automatically installed with the Data Server and runs on the same workstation as the Data Server.



Features

- Each Data Server instance is dedicated to a single Triconex controller, via a unique IP address, port number, and communication module
- Multiple OPC UA clients can connect to a single Data Server instance through specific endpoint URLs
- Support for TSAA broadcast and multicast messaging with Triconex controllers
- Implementation of data quality for all tagname values and system status values
- Support for relay of status information related to HART devices
- Ability to auto-detect changes in a TriStation 1131 project file
- Allows an OPC UA client to write tagname values to the controller
- Ability to enable secure communication with the OPC UA client
- Support for sequence of events (SOE) data collection for Triconex controllers via the TSAA protocol

Benefits

- Secure data collection from Triconex controllers
- Exchange data with third-party applications

Triconex Intelligent Device Gateway

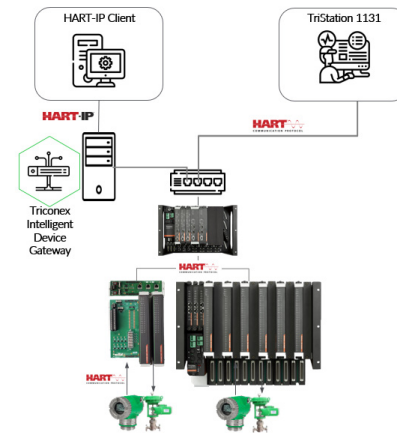
HART data at the speed of ethernet

The Triconex Intelligent Device Gateway allows you to use a HART-IP client (such as an asset management system) to view and communicate with HART field devices connected to Tricon CX HART-enabled I/O modules.

Using the HART-IP protocol, the Triconex Intelligent Device Gateway provides a direct path for transferring HART data via an IP-based network which can then be shared with enterprise systems.

Features

- Support for the HART-IP protocol on 4355X TCMs and 4610X UCMs in Tricon CX 11.5.x and later systems
- Triconex Intelligent Device Gateway Configurator for configuring parameters and controller connection settings
- Triconex Management Console for monitoring connections and shutting down and restarting the Triconex Intelligent Device Gateway
- Ability to view and communicate with HART field devices via a HART-IP client
- Compatible with most third-party Asset Management Systems



Benefits

- Improves operational efficiency
- Assists in resolving instrument issues faster
- Helps reduce downtime

Triconex DI Object / Data Acquisition Server and Safety Template Objects

Simplified data integration with Foxboro DCS and AVEVA™ System Platform

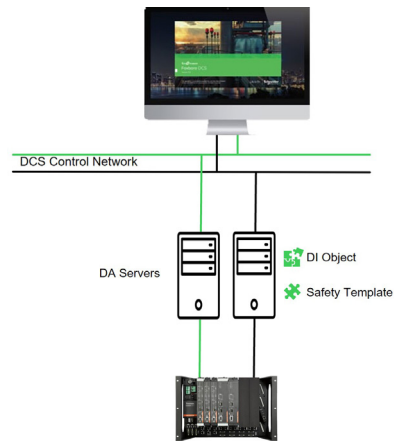
Triconex TriStation 1131 has been integrated with the AVEVA System Platform to provide a simplified way to program and deploy Triconex controllers within a unified System Platform and/or EcoStruxure Foxboro DCS environment via the TSAA Device Integration (DI) Object and the Triconex Safety Template Object.

The Triconex TSAA Device Integration (DI) Object provides direct integration of live data and Sequence of Events (SOE) data from Triconex safety PLCs to the AVEVA System Platform environment. It includes a TSAA Data Access Server (DAS) and a DI Object template.

The Triconex Safety Template Object is a tool that allows you to integrate Triconex safety controller configuration and run-time information into the AVEVA System Platform environment.

The Safety Template Object represents a physical Triconex safety controller, with a one-to-one relationship between one Safety Template Object and its respective physical safety controller.

You can import configuration information about your Triconex safety controller from a TriStation 1131 project or XML file and make that configuration data available for use by the EcoStruxure Foxboro DCS via the System Platform Galaxy.



Features

- Read and write live data from/to Triconex controllers using the TSAA (Triconex System Access Application) protocol
- Read time-stamped SOE data from Triconex controllers
- Configure the TSAA DI Object per Triconex controller, either manually or automatically
- Support for network-level and System Platform redundancy
- Enable or disable writes to the Triconex controller
- Support for up to 254 Triconex controllers through multiple TSAA DI Objects
- TÜV-approved for use as a non-safety-related application to be used for the monitoring and maintenance of Triconex controllers

Benefits

- Reduce engineering costs

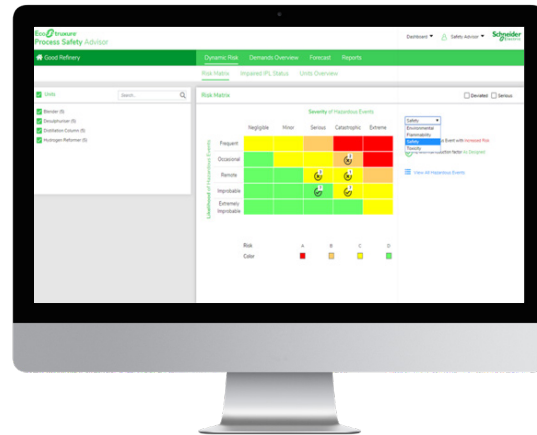
EcoStruxure Process Safety Advisor

Helps to reduce unplanned trips, lower SIF compliance effort, and reduce potentially high-risk operating conditions

EcoStruxure Process Safety Advisor is a cloud-based digital application that helps you to manage dynamic operational risk, understand where and what to pay attention to, and quickly identify items operating outside of design limits.

Automated trip reports and trends help you recover from unplanned plant trips faster.

Automated SIF performance monitoring and SIF compliance reporting helps reduce the time and effort required for performance reporting and periodic functional safety audits.



Features

- Real-time monitoring of the Independent Protection Layers (IPLs) status and performance
- Dynamic risk visualization for effective risk decision making
- Helps improve risk management and demonstrate compliance

IPL compliance, performance, and health:

- IPL Risk Reduction Compliance status:
 - BPCS Impairment (Controller Manual / Auto)
 - Alarm Suppression
 - SIS Impairment (bypass, overdue testing, etc.)
 - Manual / non-instrumented functions
- IPL Functional Status
- IPL Status History
- IPL Impairment History
- IPL Impairment Event Log

Instant visibility in a single view:

- Global, Regional, Site, Unit Area, and Equipment views
- Line of business views
- Dynamic risk matrix (4 types supported)
- Impaired IPL View
- IPL Impairment Detail View
- Demands Overview
- Demand Investigation History
- Forecast Future Risk Modelling
- Corporate Risk and Safety KPI View

Automated trip reporting:

- Unique event trip
- Automatic trip event detection
- Automatic trip reports
- Automatic trip trends
- Automatic trip sequence of events
- Critical trip event details

- Trip investigation history audit trail
- Leverage existing information and systems
- Highly scalable to meet current and future needs

Monitor, measure, and report SIF performance:

- SIF health, performance, and compliance in real time
- Significantly reduce human intervention and manual handling of SIF-related administration activities
- Helps reduce cost of compliance to IEC 61511 Ed2
- Helps reduce unplanned and planned outage duration
- Helps identify potential safety issues before an incident occurs
- Helps demonstrate best practices to regulators, insurers, and shareholders

Automatic SIF demand analytics:

- SIF demand rate validation (demand count tracking, demand rate validation, historical demand rate benchmarking)
- SIF demand type tracking (genuine / spurious / success, demand cause identification, demand history, trip event report)
- SIF bypass performance (activation tracking, time in bypass, duration, exceedance)
- SIF loop compliance (degraded or not functional tracking, proof test compliance, demand rate compliance, SIF degradation, dynamic PFD calculation)
- SIF field device bypass (activation tracking, time in bypass, duration, exceedance)
- SIF field device proof test tracking (tracking, compliance, due date calculation, overdue proof test, SIL impact analysis)

Benefits

- Helps reduce risk
- Restarts operations faster
- Demonstrates SIF performance
- Streamlines audits

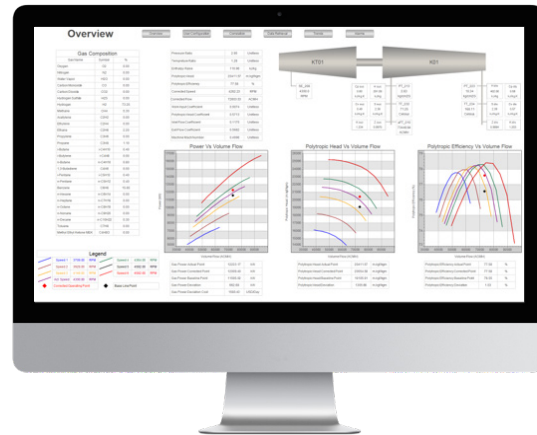
EcoStruxure Compressor Performance Monitor

Enhance compressor performance, maintenance, productivity, and energy efficiency

Compressor Performance Monitor (CPM) evaluates compressor performance parameters and compares the values to a performance baseline to help realistically quantify compressor deterioration. These calculations also allow for highly accurate estimations for the financial loss due to deterioration.

The CPM establishes sophisticated thermodynamic and mathematical models based on compression section measurements. The models use compressor flow, pressures, and temperatures measured at the suction and discharge sides of the sections. Gas composition data and speed of rotation are also used by CPM to model the compression section.

Using the principles of similarity of flow through turbomachinery, a conversion procedure is performed, after which, the CPM calculates the corrected performance for comparison with the unit performance baseline. Visualized deviations of polytropic head, polytropic efficiency, gas power, and other parameters help plant engineers make decisions about required maintenance.



Features

- Easy to Understand Graphical Interface - Dedicated displays make decision making quicker and easier
- Sophisticated Models - Thermodynamic and mathematical models based on compression section measurements
- Recognized Industry Standards - Based on ASME PTC-10 Performance Test Code
- Works with TMC Predictive Analytics - Get maximum value from early notification together with detailed insights into operating performance

Benefits

- Early indication of compressor trouble can help prevent unplanned shutdowns
- Evaluating compressor performance is an integral part of effectively enhancing maintenance scheduling, optimizing productivity, and improving energy efficiency

EcoStruxure TMC Predictive Analytics

Identify anomalous behavior early and recommend preventive actions before issues arise to maximize economic return on critical machinery assets

Traditional monitoring of critical rotating assets is no longer enough to meet the needs of rotating machinery operators. More than 80% of failures are random, with damage accumulating prior to reaching critical limits that are often “fixed” or constant.

Using the latest predictive analytics, Schneider Electric turbomachinery (TMC) experts can help identify anomalous behavior early on and advise you on preventive actions. Unique TMC operating models and advanced pattern recognition pinpoint even minor variations that would otherwise be difficult to detect, providing early warning and diagnosis of issues days, weeks, or even months before failures occur.



Features

- Historical data - Application learns normal operation from historical data
- Pattern recognition - Advanced algorithms automatically create and organize operational profiles
- Early warning detection - Deviations from normal operation and possible faults identified and displayed
- TMC experts' analysis - Data analysis and reports

Benefits

- Help avoid potential damage or equipment failure
- Decrease unplanned outages
- Reduce maintenance costs
- Increase asset utilization
- Extend equipment life
- Optimize operational efficiency
- Maximize economic return

Life Is On

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