



PLANNING GUIDE

Schneider-Electric DEPLOYMENT AT CUSTOMER PREMISES

Introduction

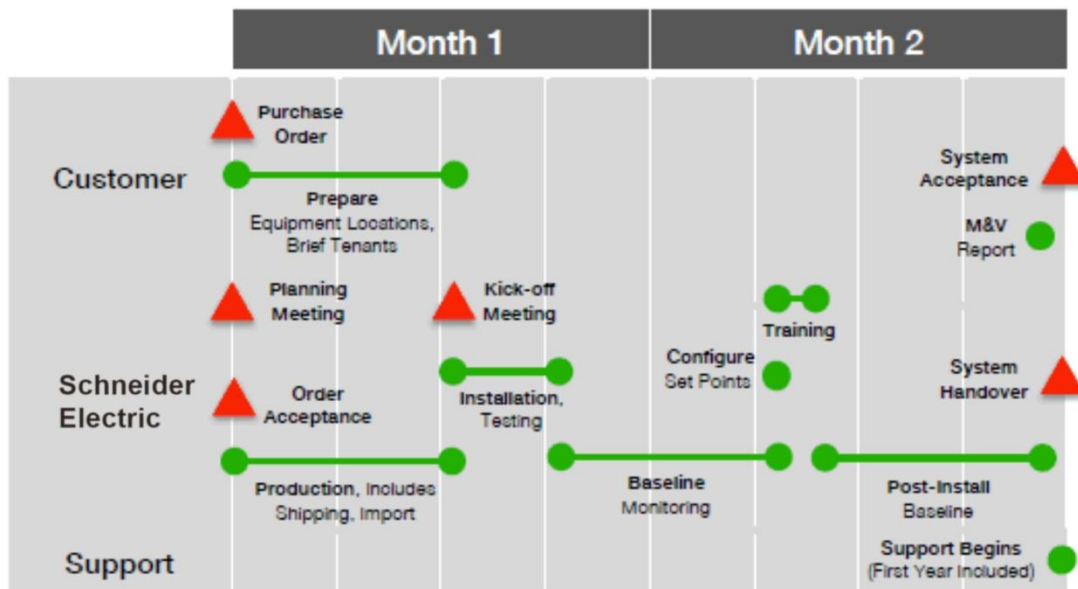
This document provides a guide to the integration of the Data Center Operation Cooling Optimize solution in your physical infrastructure and network.

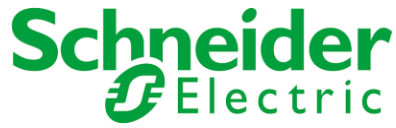
This guide serves a number of key purposes:

- Provide an overview of the Cooling Optimize System installation process to ensure the customer team knows what to expect.
- Define roles and responsibilities to ensure a smooth working between SE and the customer organization.
- Offer recommendations for the placement of Cooling Optimize components within the facility to be managed.
- Exchange information to properly and fully integrate the Cooling Optimize system into the customer's existing operations environment including network connectivity, security, and operations processes.
- Capture specific metrics for the individual site to ensure correct commissioning and configuration of the Cooling Optimize system. This ensures that the system will support the specific target environmental parameters for each site.

A site-specific plan is included at the outset of the project, and will include the names and contact information for SE and customer team members. Project-specific questions should be directed to the Schneider Electric project manager responsible for the project.

Typical Project Plan



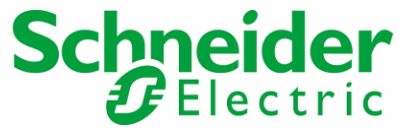


Roles and Responsibilities

An initial analysis of the customer site will have to been performed via paper survey or physical walkthrough. Once commitment to deploy the Cooling Optimize solution has been agreed, Schneider Electric will need to engage with local facilities and operations personnel to achieve a successful installation.

Role	Responsibility
Solution Engineer (SE)	Build model of projected energy savings based on the physical details of the specific facility.
	Provide high-level Cooling Optimize parts list to support pre-sales activity and estimate of customer benefits.
Technical Project Manager (TPM)	Act as the single point for coordination between SE and Customer Staff for the project duration.
	Confirm details of project implementation, including specific placement of all Cooling Optimize components with local cooling equipment.
	Develop wiring diagrams for integration of Cooling Optimize control modules.
	Confirm the customer electrician has wiring diagrams and properly installed control modules.
	Install sensors throughout the critical facility.
	Configure and commission the Cooling Optimize module including baseline data capture, failsafe testing, system learning and post-learning baseline.
	Train local staff in the use and operation of the Cooling Optimize module
	Prepare and present the Measurement & Verification report.
	Confirm customer acceptance at the project conclusion.
	Customer Coordinator
Convey all customer site policies and procedures to SE staff to ensure compliance.	
Enable Site Access	
Identify and involve additional named contacts for SE to support the capture of relevant data and enable smooth installation of hardware, network connectivity and network access.	

Contact information for all project team members will be detailed in the site-specific plan for each project.



Deployment Planning

A deployment planning meeting (held in person during a site walkthrough or by teleconference after a site has been select for deployment) is crucial to ensure that each installation is successful and supports the overall operation of each specific site.

At a minimum, the deployment planning meeting will address the following topics:

- Identify key facility stakeholders and ensure that they are included in the implementation planning. These resources will be added to the site-specific project plan.
- Discuss system operation to give stakeholders the opportunity to fully understand the functionality and capabilities of the Cooling Optimize module.
- Provide stakeholders with core system documentation to describe the system hardware, software, network, security and failsafe.
- Identify “Big Picture” deployment topics and agree ownership and delivery timetables.
 - SE Hardware Placement and Installation
 - Customer electrical contractor selection
 - Physical Access policies during installation
 - Includes local workspace for SE TPM
 - Management Network Participation (which network)
 - (Systems Names, Domain Names, IP Address Assignment, Firewall Rules, Remote Access)
 - Network security policy, firewall rules and remote access
 - Identify local Cooling Optimize module users, application administrators and system administrators.
- Confirm with the stakeholders that all elements must be in place before installation can begin.



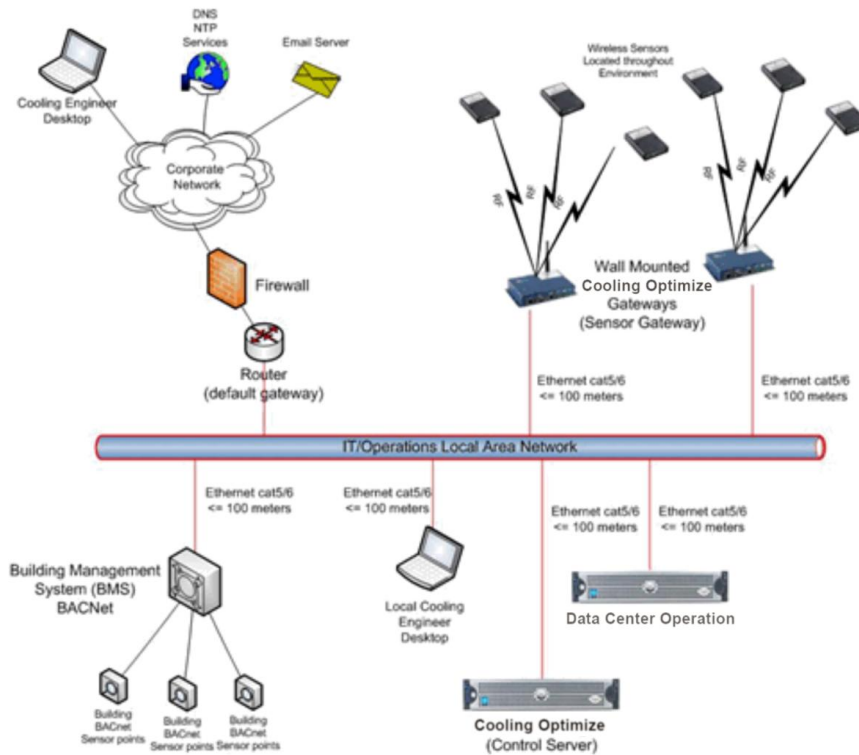
Deployment Project Overview

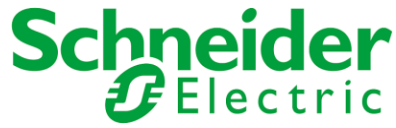
Commissioning Task Plan	Typical Date	Customer	Technical Project Manager	Electrical Contractor
Deployment Planning Meeting/Teleconference		√	√	
Determine sensor placement (consult tenants where appropriate)		√	√	
Determine Gateway placement		√	√	
Determine Server placement		√	√	
Define SE Integration Plan with Customer Operations		√	√	
Define workspace and network access for SE TPM		√		
Determine network switch and port assignments		√		
Assign IPv4 addresses to Servers and Gateways		√		
Define and implement network security policies, Firewall rules, and access		√		
Define and implement remote network access policy & procedure		√		
Prepare power and network services to Cooling Optimize equipment & TPM workspace		√		
Installation Kick-off meeting	Day 1	√	√	√
Install Gateways & Cooling Optimize Server	Day 1-2	√	√	
Install Temperature Sensors, Cooling Control Units	Day 1-7		√	√
Commission system for Environment Monitoring and begin Baseline capture	Day 7		√	
Complete Baseline Testing	Day 21		√	

Optimize Cooling Unit Set Points	Day 22	√	√	
Commission system for Cooling Unit Control, Failsafe testing	Day 22	√	√	
Start Post-Commissioning Power Monitoring	Day 23-37		√	
Provide an overview to the Operations & Maintenance Staff	Day 23-24	√	√	
Perform Measurement & Verification Analysis and Review Results	Day 38	√	√	
Confirm System Acceptance	Day 38	√	√	

Typical Cooling Optimize System Deployment

This diagram depicts a typical configuration of Cooling Optimize deployed.





A single Cooling Optimize server can support Gateways deployed in different physical locations.

Physical Installation Requirements for Cooling Optimize hardware consists of computing appliances we call Servers, plus network gateways, control modules, and sensors. This section details the physical installation and connectivity requirements for each of these elements.

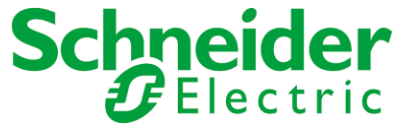
Cooling Optimize Servers

Subject to local practice, you may integrate Cooling Optimize Servers within any server rack that meets the physical space, power, and network requirements stated below.

Servers are compatible with standard Keyboard/Video/Mouse (KVM) switch infrastructure.

Cooling Optimize Server Installation Requirement

- 1U of vertical space in a minimum 19 inch EIA rack mount cabinet with depth of 27 inches (690mm)
- Environmental Operation 50 to 95°F; 10 to 35C, 20 to 80% relative humidity (non-condensing)
- Available maximum power use of 0.4kVA.
- Single or Dual (if optioned) 100-240V 50/60Hz Single-Phase AC power feeds. Independent UPS-protected power sources are recommended for each supply.
- Server power supplies present a C14 connector, and SE can supply a C13 power cable with one of the following terminations. Please specify the cable type required for your facility:
 - C14 (often provided with facility-grade power strips)
 - IEC Type B; NEMA 5-15 (USA)



- IEC Type F; CEE 7/7 (Western Europe, with exceptions)
- IEC Type G; BS 1363 (UK and select commonwealth countries)
- IEC Type L; CEI 23-16/VII (Italy)
- IEC Type K; Danish 107-2-D1 (Denmark)
- IEC Type J; SN SEV 1011:2009/A1:2012, Type 12 (Switzerland)

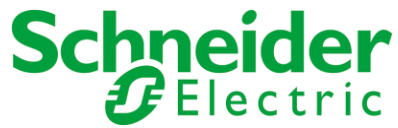
Cooling Optimize Server Network Connectivity Requirement

- One or two 10/100/1000Base-T Ethernet ports with RJ45 connector, with logical connectivity to each related Cooling Optimize gateway and Cooling Optimize server as appropriate.
- Physical assignment of network ports and patching to designated network equipment
- Static IPv4 Address Assignments for each port used, including relevant subnet mask and gateway, where appropriate.
- All Cooling Optimize hardware must be able to inter-communicate using the provided IP network connection. If devices will reside on separate networks, network engineering assistance is required to ensure that all traffic between Cooling Optimize components is routable and integrated with relevant security policy.

Cooling Optimize Network Gateway

The Cooling Optimize network gateway manages the wireless sensor network and aggregates traffic to and from the Cooling Optimize Server.

The network gateway should be wall, ceiling or column mounted with clear line-of-sight access to as many sensors and control modules contained in the Cooling Optimize control group as possible. Sensor motes and control modules are configured as a mesh network, so not all motes need to see the Cooling Optimize gateway to ensure communications.



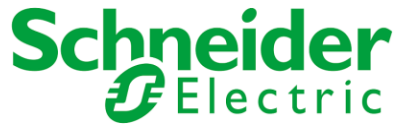
Cooling Optimize Network Gateway Installation Requirements

- Mounted within the same sensor control group that is being managed, using the supplied mounting template. Line-of-sight access to sensor nodes should be optimized. On completion, the gateway antenna must be vertically oriented.
- Environmental Operation 32 to 122°F; 0 to 50C, up to 80% relative humidity (non-condensing)
- Available maximum power use of 0.015kVA.
- Single or Dual (if optioned) Single-Phase AC power feeds supporting either 90-132 volts AC, 60Hz or 218-264VAC, 50Hz. Independent UPS-protected power sources are recommended for each supply.
- Stepdown transformers are available with the following interchangeable plug terminations:
 - IEC Type A; NEMA 1-15 ungrounded
 - CEE 7/17 'Europlug'

Cooling Optimize Network Gateway Connectivity Requirements

- One 10/100Base-T Ethernet port with RJ45 connector, with logical connection to the Cooling Optimize Server that manages the gateway's control group.
- Physical assignment of network ports and patching to designated network equipment
- Static IPv4 Address Assignment for the gateway, including relevant subnet mask and gateway, where appropriate.
- All Cooling Optimize hardware must be able to inter-communicate using the provided IP network connection. If devices will reside on separate networks, network engineering assistance is required to ensure that all traffic between Cooling Optimize components is routable and integrated with relevant security policy.

Cooling Optimize Control Modules and Sensors



Cooling Optimize control modules and sensors are installed by contracted electricians and support personnel, as overseen by the SE Technical Project Manager. A detailed review of the placement and wiring of these components is provided in the site-specific project plan created for each installation. Generic diagrams are provided at the outset of the project, and the specific control pin outs are field-verified and updated during the project to reflect the actual connections used in the cooling units.

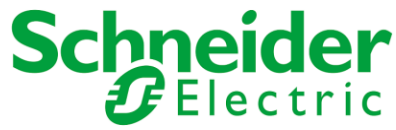
System Identification and Network Connectivity Requirements

The following table should be used to gather the initial information for Cooling Optimize Server deployment from your system and network-planning group.

System Parameter	Cooling Optimize Server
System Name	
Domain Name	
Facility Address	
Physical Data Center Location (Room, Rack Number and Position)	
Domain Name Service (DNS) Server(s) (<dnsServerIP>) (Not Mandatory)	
Network Time Protocol (NTP) Server(s) (<ntpServerIP>) (Not Mandatory)	
HTTP or HTTPS?	
HTTPS/SSL CA Signed Certificate or Self-Signed Certificate?	

IP Address Assignment

SE will provide a separate Excel file with the site-specific project plan to gather all required IP address assignments, including physical and logical port assignments for participation in the assigned network.



Network Security Planning

The following table lists the ports and protocols required by the Cooling Optimize System. Once IP addresses have been assigned, please be sure to open the ports mentioned below to ensure proper operation of the Cooling Optimize system within your management network.

Source to Destination	Network Protocol / Port	Use
<COServerIP> to <dnsServerIP>	udp/53 tcp/53	Name / Address Resolution for network endpoints
<COServerIP> to <ntpServerIP>	udp/123	Time Synchronization for servers
<COServerIP> to <SensorGatewayIP> <SensorGatewayIP> to <COServerIP>	icmp	ICMP get and ICMP get response Test network connectivity response from CO Server (ping)
<COServerIP> to <SensorGatewayIP>	tcp/22 tcp/80 tcp/443	Administrative command line and GUI access for the Cooling Optimize Sensor Gateways
<COServerIP> to <SensorGatewayIP>	tcp/4445 tcp/4495 tcp/24112	XML/RPC Application Data collection and control channel communications for sensors and control modules
<COServerIP> to <BACnetDeviceIP>	udp/47808	Used between the Cooling Optimize system and BACNet Devices deployed on the same subnetwork. SE requires that the Cooling Optimize system and BACnet devices be deployed on the same TCP/IP subnetwork (LAN or VLAN)
<UserDesktopIPs> to <COServerIP> <AdministratorDesktopIPs> to <COServerIP>	tcp/80 tcp/443	User Interface Access to the Cooling Optimize System

Source to Destination	Network Protocol / Port	Use
<AdministratorDesktopIPs> to <COServerIP>	tcp/22	<p>Command Line Administrator access via Secure Shell</p> <p>This port is also used by SE support personnel and should be permitted by your local VPN access rules for those SE Support personnel authorized to access via your local VPN solution.</p>
<AdministratorDesktopIPs> to <COServerIP>	tcp/1311	<p>Open Manage Server Administrator (OMSA) to monitor physical hardware of the Cooling Optimize Server</p> <p>This port is also used by SE support personnel and should be permitted by your local VPN access rules for those SE Support personnel authorized to access via your local VPN solution.</p>
<AdministratorDesktopIPs> to <COServerIP>	tcp/3050	<p>Database Access to the application database server</p> <p>This port is also used by SE support personnel and should be permitted by your local VPN access rules for those SE Support personnel authorized to access via your local VPN solution.</p>