

**EcoStruxure™**

**Energy Expert 2.0**

**Solution Guide**

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# 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.

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# 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

EcoStruxure™ Energy Expert – hereafter referred to as Energy Expert – is an engineered solution that embeds features of EcoStruxure™ Power Monitoring Expert (PME) into EcoStruxure™ Building Operation (Building Operation).

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

Energy Expert 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.

## About This Document

### Applicability

This guide applies to the Energy Expert 2.0 solution only. It does not apply to earlier or later versions of this solution. The Energy Expert 2.0 solution is based on Power Monitoring Expert 9.0 and Building Operation 2.0.

### Target Audience

This guide is intended for Application Engineers, third-party integrators, and other qualified personnel who are responsible for installing and integrating PME with Building Operation.

The deployment of the Energy Expert solution requires application engineering expertise in installing and configuring Building Operation and PME.

## Solution Components

The Energy Expert 2.0 solution includes the following components:

### Building Operation 2.0

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 9.0

Power Monitoring Expert is a complete 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 features that are embedded in Building Operation and that are described in this document are available in the Energy Expert solution. The following additional PME features are available in a fully licensed version of the software:

- Web Clients with access to Dashboards, Diagrams, Trends, Alarms, Reports
- Embeddable Web Applications: Trends, Alarms
- Engineering Tools: Vista, Designer, Virtual Processor (VIP)
- Power Quality Analysis Features such as Waveform Viewer, Harmonics Analysis, Phasor Diagram, and so on
- Power Quality Reports

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 Energy Expert solution. The PME Distributed Database architecture installation type is not supported. See the *EcoStruxure™ Power Monitoring Expert 9.0 System Guide* for more information on PME installation architectures.

## Resources

### Supporting Documentation

- EcoStruxure™ Power Monitoring Expert 9.0 System Guide
- Architectural Guidelines 2.0.1 - EcoStruxure Building Management
- 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

- [Exchange Extranet Downloads](#) (Energy Expert Toolkit)
- [PME Downloads](#) (Device Drivers, and so on)
- Power Monitoring Expert [Design and Quote](#) tools:
  - Daisy Chain Calculator
  - Commissioning Time Calculator
  - Database Growth Calculator



# Design

This chapter includes the following topics:

1. Software compatibility
2. Computer hardware
3. Solution architectures
4. Guidance on choosing an architecture
5. Communications and data transfer
6. Commissioning time

## 1. Software compatibility

This section describes the Energy Expert 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 Energy Expert 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 Energy Expert solution supports the following software versions:

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

## Operating Environment

### **PME**

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.

Software	Supported versions
Operating system	Windows 7 Professional/Enterprise ( <b>for Engineering clients only</b> ) Windows 10 Professional/Enterprise Windows Server 2012 R2 Standard/Enterprise Windows Server 2016 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 2010, 2013, 2016
Desktop Web browser	Microsoft Internet Explorer 11 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	4.6 for PME 3.5 (or 3.5 SP1) for the PME installer 4.0 for the Power Monitoring Expert licensing component

\*\* 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.

\*\*\* 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.

**NOTE:** Apply the latest updates to the OS and SQL Server before installing or upgrading PME.

**NOTE:** PME can be installed in a domain environment. However, it cannot be installed on a computer that is a domain controllers. If PME is installed on a server that is subsequently changed to a domain controller, the software ceases to function correctly.

## Building Operation

Refer to *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 same computer is NOT supported.
- Sharing SQL Server between PME and Building Operation Report Server is NOT supported.

## Port Settings

### 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.

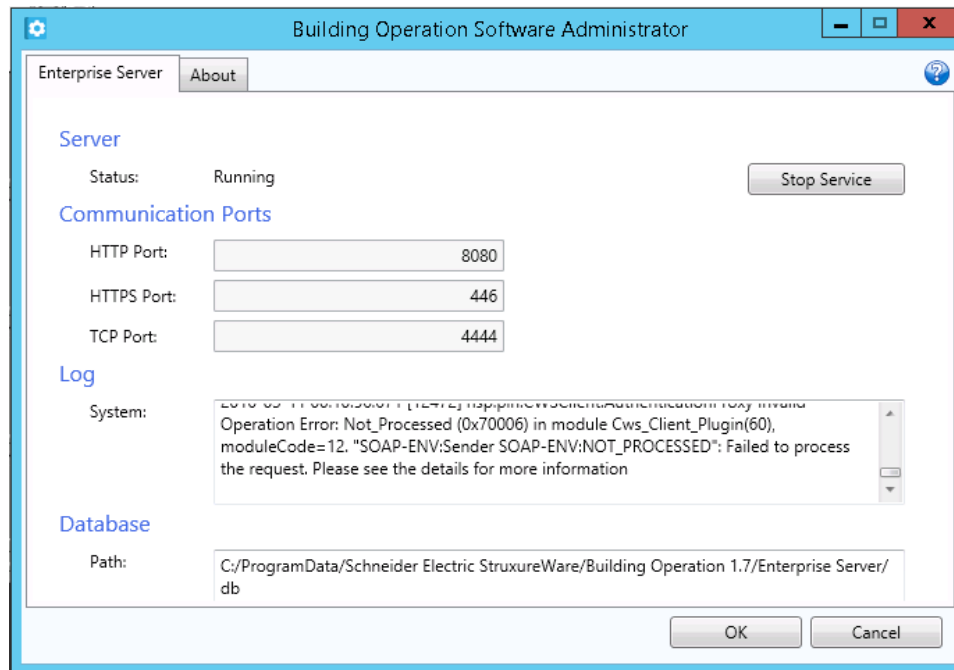
### PME

See [PME IP Port Requirements](#) for more information.

### 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.

## 2. Computer hardware

### PME

#### 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  $\geq$  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	$\leq 100$	$\leq 5$	Desktop Intel Core i5 (2 core) 8 GB (RAM)
Medium	$\leq 250$	$\leq 10$	Workstation Intel Xeon W-21xx (4 core) 16 GB (RAM)
	$\leq 600$	$\leq 10$	Server Intel Xeon E3-12xx (6 core) 24 GB (RAM)
Large	$\leq 2500$	$\leq 10$	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	HW
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)
Large	≤ 2500	≤ 50	50000	Server Intel Xeon Scalable Silver (12 core) 64 GB (RAM)

### Choosing Hard Disk Drives (HDDs)

The HDDs determine the historical data access performance and the amount of historical data that can be stored in the system. HDD configurations are also important for system availability and recovery.

#### HDD Size

The HDD 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 HDD space that is required, without the historical data logs. The estimates are rounded up and allow for updates and system maintenance.

Component	HDD 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 HDD size

## PME historical database

The HDD 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).

$$\text{HDD Space for ION\_Data (GB)} = 5 \times \text{.mdf (GB)}$$

It can be broken down into the following components:

Component	HDD 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
<b>Total</b>	<b>(5x) ION_data.mdf size</b>

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, they each 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.

## HDD Configuration

HDDs can be configured as single drives or drive groups. For a small [Basic Systems](#), a single HDD is sufficient. For all other systems, we recommend that you separate the major components into different HDD groups.

## RAID Systems

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

Recommended RAID 1 configurations:

### 2x HDD

Component	Group 0
	HDD1 + HDD2
OS	✓
tempDB	✓
MDF	✓
LDF	✓
Backups	✓

### 4x HDD

Component	Group 0	Group 1
	HDD1 + HDD2	HDD3 + HDD4
OS	✓	
tempDB		✓
MDF	✓	
LDF		✓
Backups		✓

### 6x HDD

Component	Group 0	Group 1	Group 2
	HDD1 + HDD2	HDD3 + HDD4	HDD5 + HDD6
OS	✓		
tempDB	✓		
MDF		✓	
LDF			✓
Backups			✓

**6x HDD**

Component	Group 0	Group 1	Group 2	Group 3
	HDD1 + HDD2	HDD3	HDD4 + HDD5	HDD6
OS	✓			
tempDB		✓		
MDF			✓	
LDF				✓
Backups				✓

**8x HDD**

Component	Group 0	Group 1	Group 2	Group 3
	HDD1 + HDD2	HDD3 + HDD4	HDD5 + HDD6	HDD7 + HDD8
OS	✓			
tempDB		✓		
MDF			✓	
LDF				✓
Backups				✓

**NOTE:** Plan for system growth by having a computer with space for additional HDDs. This makes it easy to add additional HDDs 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.

## 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.



### 3. Solution architectures

The Energy Expert solution supports the following integration 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.**

### 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

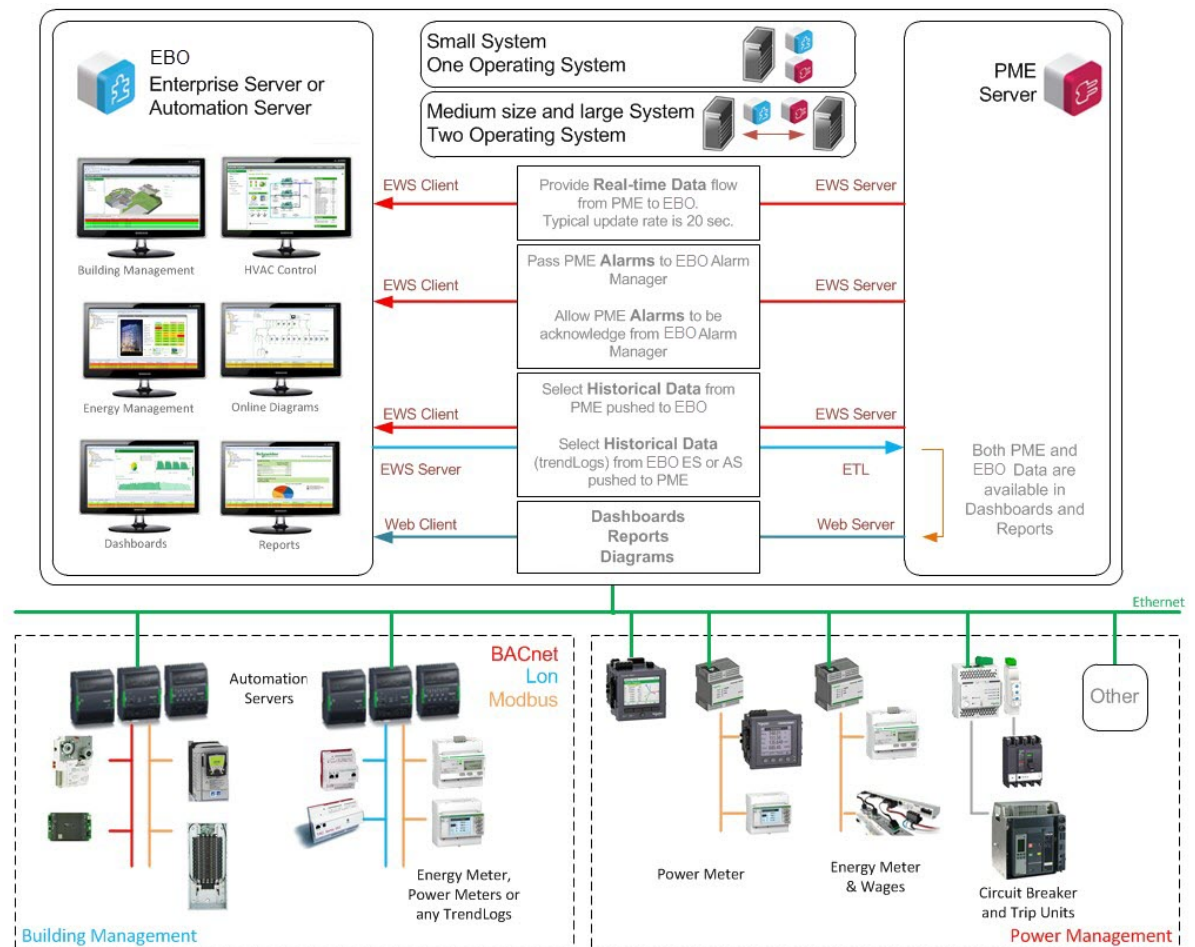
- Power devices are connected to PME.
- Logging of historical data is done by PME.

**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 secured Web Server

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

The following diagram shows an integrated view of both architectures:



## 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.

## 4. 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

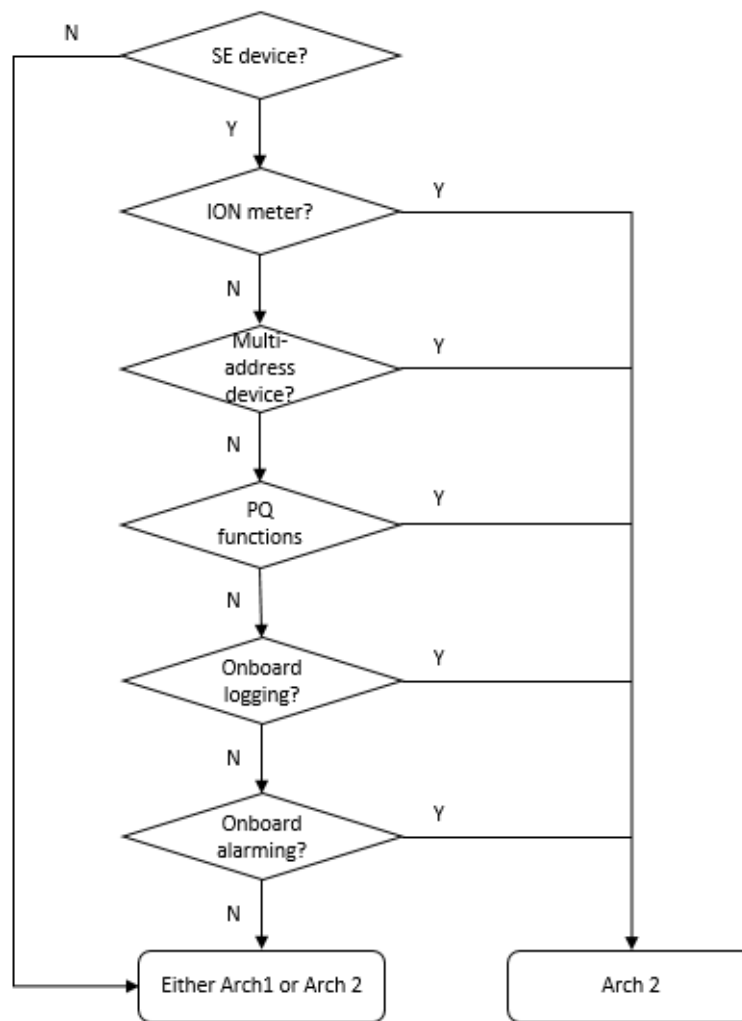
To decide which architecture is best for data collection, consider the following:

- 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 Masterpack. 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 EGX, 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 always 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

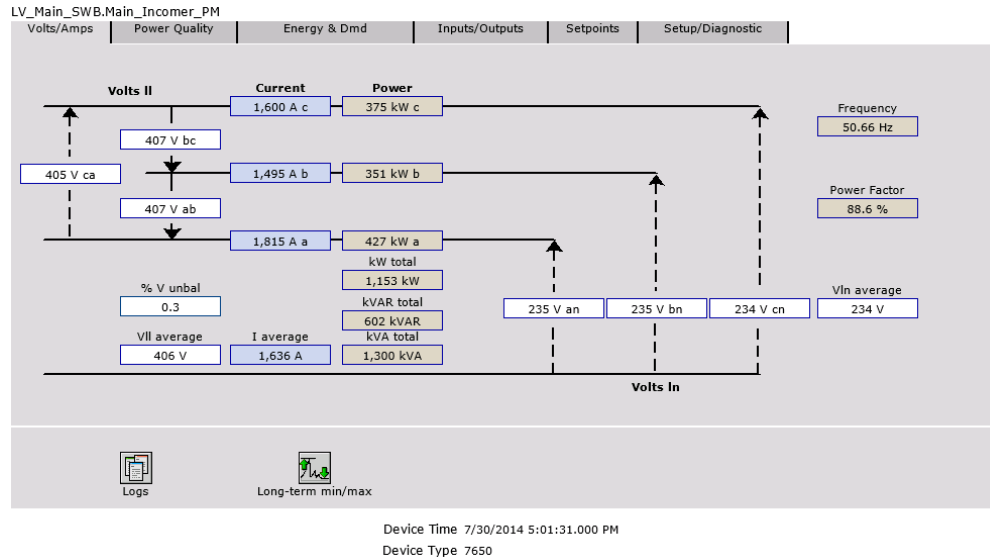
Real-time data is collected and displayed directly by Building Operation. If there is a SmartWidget available for a device type in Building Operation, users can use the pre-built graphics in the SmartWidget. If there is no SmartWidget for the device, users must build their own graphics based on their 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 [5. 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 [6. Commissioning time](#) section for details.

## IT Considerations

The server recommendations are different for Architecture 1 and Architecture 2. See [2. Computer hardware](#) for more information.

## 5. Communications and data transfer

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

### Architecture 1

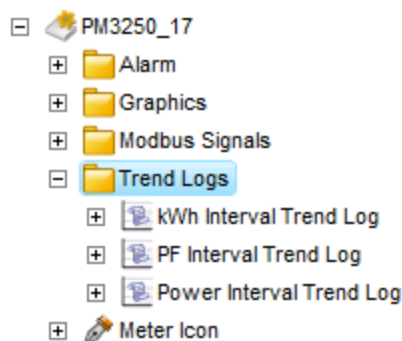
#### Device Communications

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

Refer to the *Architectural Guidelines 2.0.1 - 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

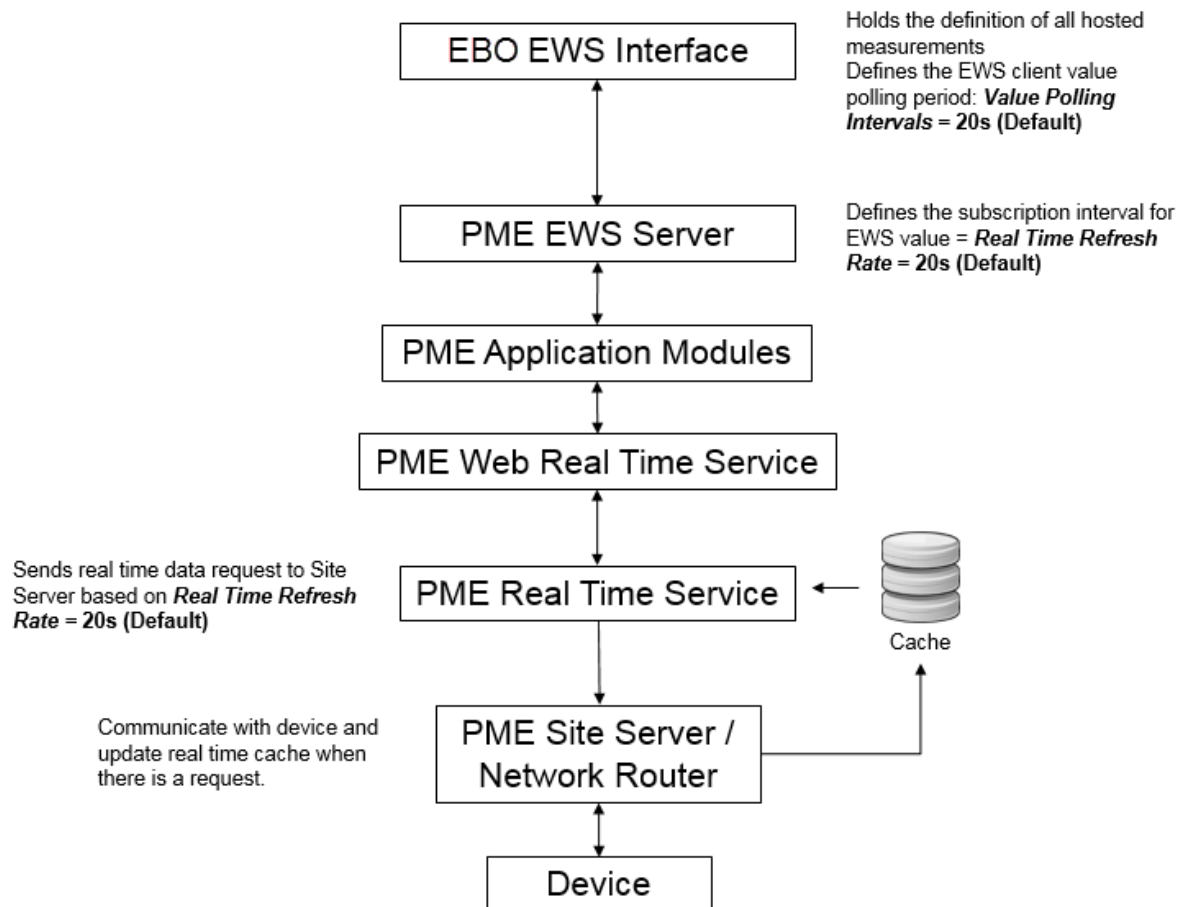
seconds is usually fast enough for the updates. When increasing this value, consider the Building Operation Trendlog size to make sure it can be covered before being overwritten in order to prevent missing TrendLogs.

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.

The screenshot shows the 'EWS Client - IEC' configuration window. It has two tabs: 'Basic' and 'References'. The 'Basic' tab is active, showing several sections: 'General Information', 'Status Information', 'Authentication', 'Service Configuration', 'Value Polling', and 'Alarm Polling'. The 'Value Polling' section is highlighted with a red box. It contains two settings: 'Value Polling' set to 'Enabled' and 'Value Poll Interval (s)' set to '20'.

### 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="45" />
<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 Energy Expert 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

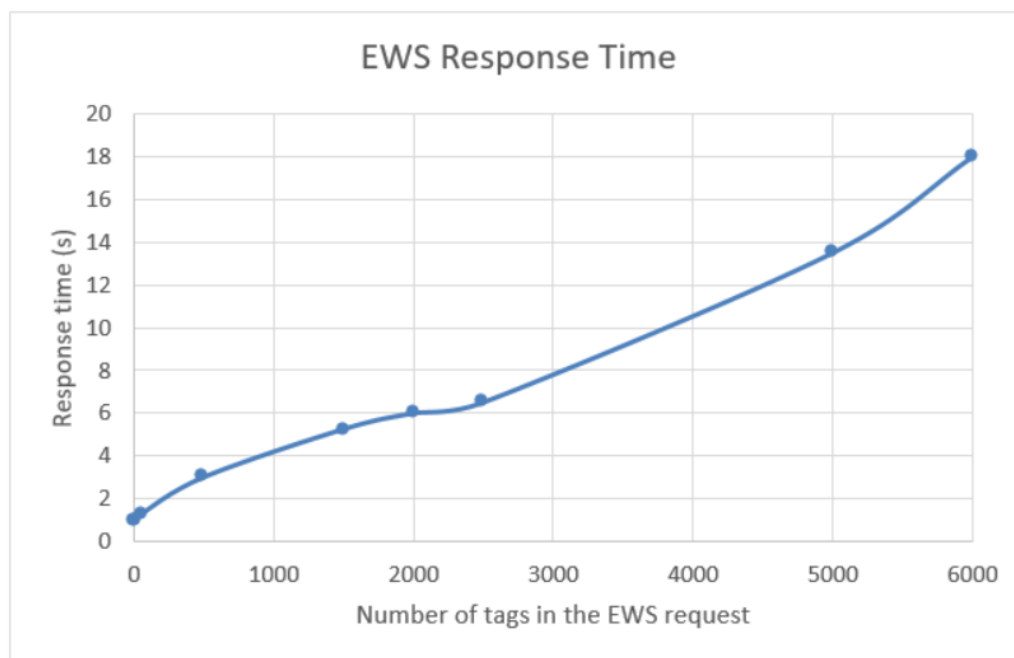
**HDD:** x6 300 GB

**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
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. So 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 critical alarms, such as circuit breaker trips, power outage, or over current, try to use the device on-board alarms in circuit breakers or meters because this is the core function of the power devices – to detect a failure and log it with a time stamp. Even for a non-critical alarm, on-board alarms are recommended to use to gain higher system reliability and also to make use of the device functionality.

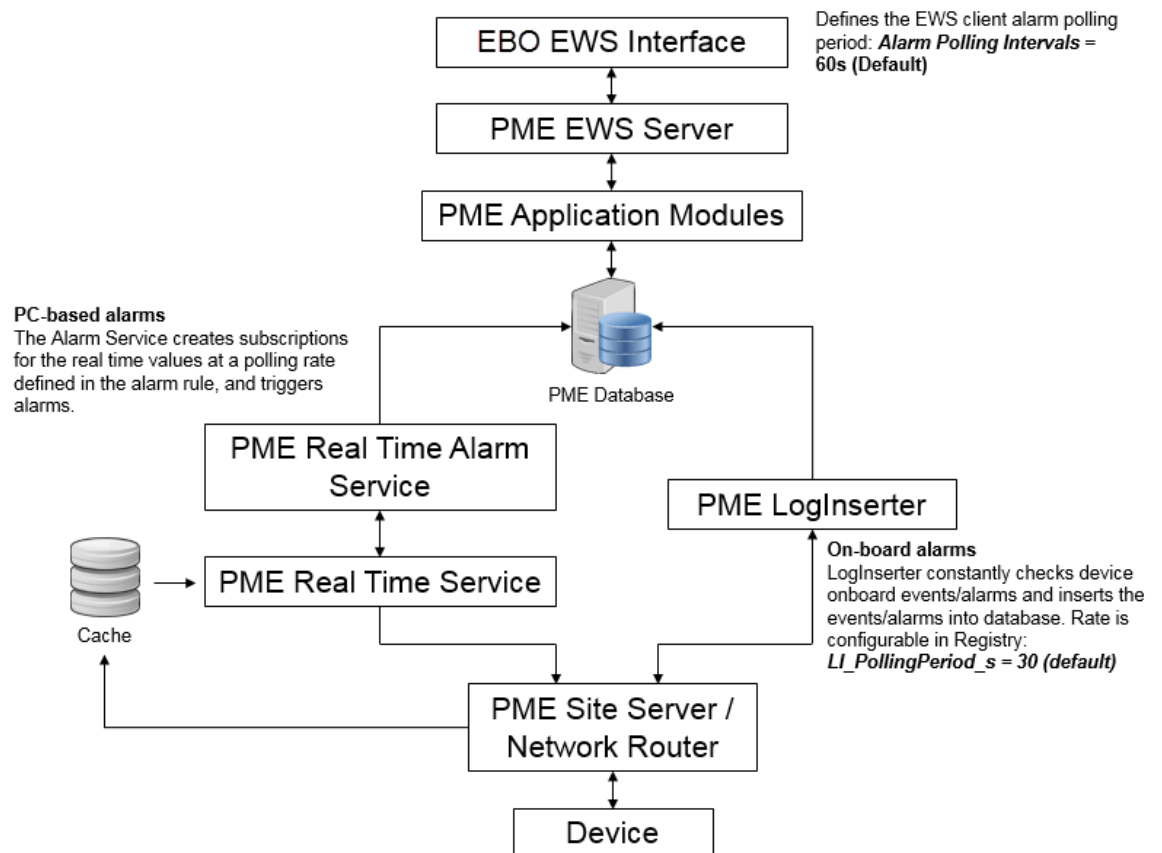
## Software based Alarms

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

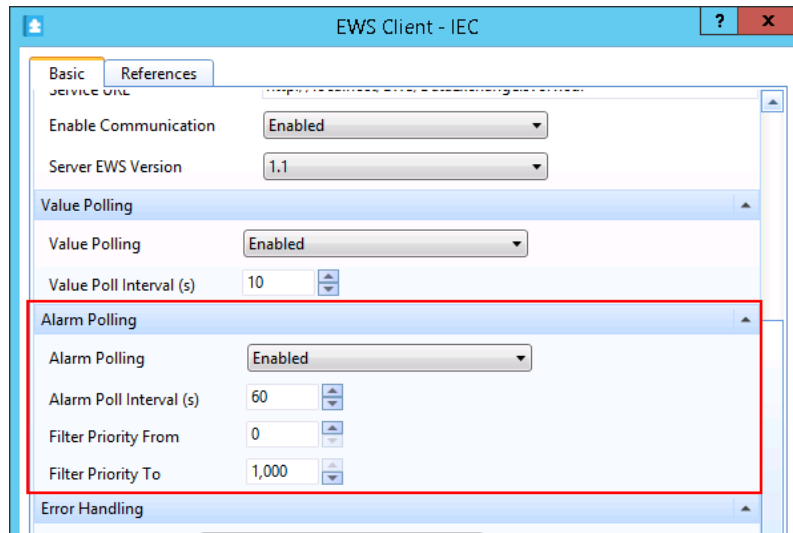
**NOTE:** VIP alarms are not exposed through EWS.

## 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:** The PME EWS server exposes only alarms with a priority between 64 and 255 (not configurable).

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 as same as a regular alarm objects. 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.

## 6. Commissioning time

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 Energy Expert solutions based on Architecture 1:

Architecture 1 Configuration Workflow			Average Time (min)	Standard Deviation (min)
1	<b>Installing and licensing Building Operation *</b>		16.7	1.5
	1.1	Installing and licensing License Server		
	1.2	Installing Enterprise Server		
	1.3	Installing Workstation		
	1.4	Installing <b>Building Operation</b> Connector components, snippets, and binding template		
	1.5	Single-server install only: Changing Building Operation ports		
2	<b>Installing and licensing PME *</b>		54.7	18.4
	2.1	Installing PME		
	2.2	Activating PME licenses		
	2.3	Single-server install only: Changing PME ports		
3	<b>Configure the devices in Building Operation with SmartWidgets</b>		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	<b>ETL</b>		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	<b>Integration Utility and Building Operation Import</b>		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	<b>Setting up Dashboards and Reports *</b>		39.7	21.1
	6.1	Configuring Dashboards		
	6.2	Configuring Reports		
7	<b>Setting up Graphics *</b>		141.7	40.8
	7.1	Setting up Electrical One Line Diagram		
	7.2	Setting up System Network Health screen		
<b>Total</b>			387.3	116.9

\* These steps are identical for both architectures. The timing differences are due to different speed of different validators.

## Architecture 2

Below are commissioning time estimates for Energy Expert solutions based on Architecture 2:

<b>Architecture 2 Configuration Workflow</b>			<b>Average Time (min)</b>	<b>Standard Deviation (min)</b>
1	<b>Installing and licensing Building Operation *</b>		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	<b>Installing and licensing PME *</b>		41.0	8.2
	2.1	Installing PME		
	2.2	Activating PME licenses		
	2.3	Single-server install only: Changing PME ports		
3	<b>Configure the devices in PME</b>		23.0	9.0
	3.1	Adding Devices in PME		
	3.2	Generating a Vista Network Diagram		
	3.3	Update EWS Server		

4	<b>Integration Utility and Building Operation Import</b>		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	<b>Setting up Dashboards and Reports *</b>		29.7	8
	5.1	Configuring Dashboards		
	5.2	Configuring Reports		
6	<b>Setting up Graphics *</b>		138.7	27.7
	6.1	Setting up Electrical One Line Diagram		
	6.2	Setting up System Network Health screen		
<b>Total</b>			<b>261.7</b>	<b>66.8</b>

\* These steps are identical for both architectures. The timing differences are due to different speed of different validators.

## Estimation Guidelines

Below are guidelines for estimating the engineering time required to set up the key components of an Energy Expert 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

Installing the Energy Expert solution includes the following steps:

1. Downloading the Energy Expert Toolkit
2. Installing Building Operation
3. Installing 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 Energy Expert Toolkit

The Energy Expert 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 `Energy Expert 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.

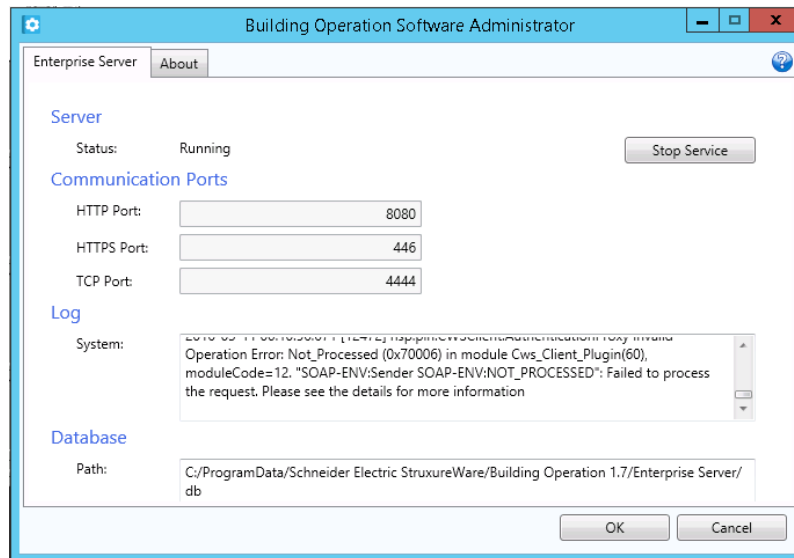
### **Changing Building Operation port settings (for single server installation only)**

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 Energy Expert Toolkit.
2. Navigate to the **Energy Expert 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 **Energy Expert 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.

#### 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 **Energy Expert 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.

## 4. Installing PME

The following describes the installation and licensing of PME.

**NOTE:**

If possible, log on to your Windows system using the built-in local Administrator account for installing PME. If that is not possible, use an account that is a member of the Administrators group. Permissions for the Administrators group can be restricted by system policies which might affect the PME installation. The built-in Administrator account does not have such limitations.

Starting with Microsoft Windows 10 and Windows Server 2016, the Administrator account cannot be used for software installation. For these operating systems use an account that is a member of the Administrators group

### Installing the PME software

To install the PME software:

1. Insert the Energy Expert DVD or mount the Energy Expert ISO. Double-click **MainSetup.exe** to begin the installation. The installation dialog appears.
2. Select a language from the drop down list, and click **Next**. Follow the install pages and instructions until you get to the Setup Type page.
3. For Setup Type, select **Standalone Server**. The other Setup Types are not supported for Energy Expert. Click **Next**.
4. Follow the install pages and instructions, using the default settings where possible, until you get to the Supervisor Account page.
5. For the Supervisor Account, set a strong password for the supervisor user containing at least 8 characters. Click **Next**.
6. Follow the install pages and instructions, using the default settings where possible, until you have completed the installation.
7. Click **Close** when the installation is complete.

For more details on installing PME, see the *EcoStruxure™ Power Monitoring Expert 9.0 System Guide*.

### Activating the Energy Expert licenses for PME

The PME software that is part of the Energy Expert solution, includes a 90-day Energy Expert Trial license for all Energy Expert features. You must activate valid, purchased licenses for Energy Expert within 90 days, or some software functionality is disabled.

#### **NOTICE**

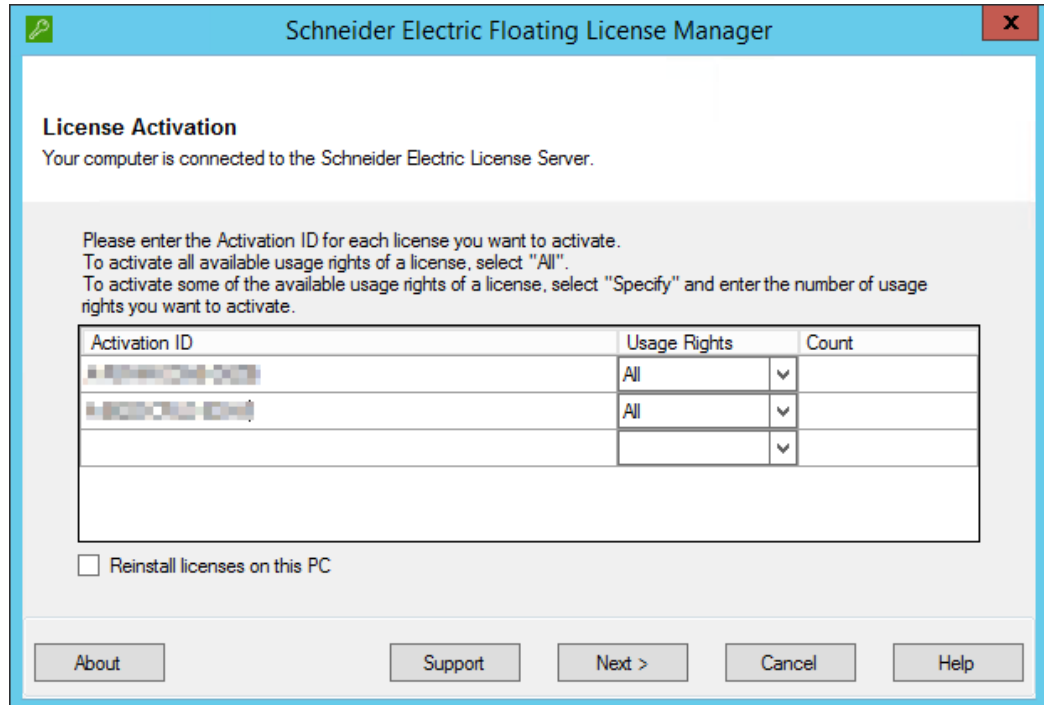
**LOSS OF COMMUNICATION**

- 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.**

To activate the licenses:

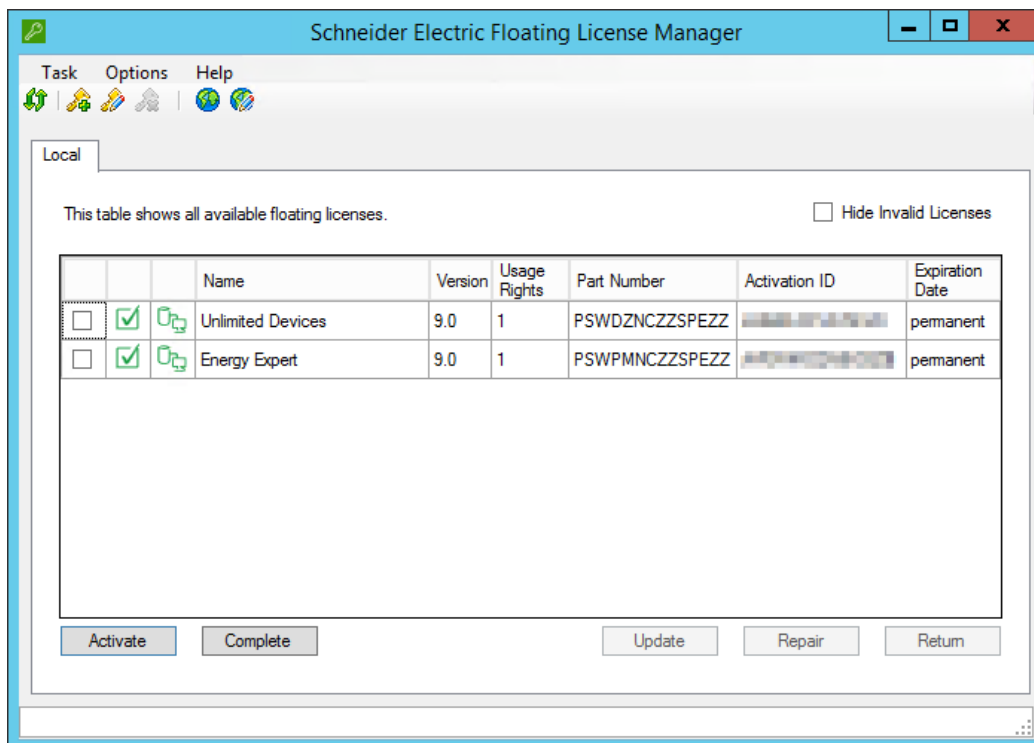
1. On the PME server, open the Floating License Manager.
2. Click **Activate** to open the **License Activation** dialog.
3. Enter the Activation IDs that you received with Energy Expert (for example, device licenses, optional software modules, and so on). Accept the default settings and click **Next** to activate the licenses.



The image shows a screenshot of the "Schneider Electric Floating License Manager" dialog box, specifically the "License Activation" tab. The dialog has a title bar with a green icon on the left and a red close button on the right. The main content area is white with a blue header. Below the header, it says "Your computer is connected to the Schneider Electric License Server." followed by instructions: "Please enter the Activation ID for each license you want to activate. To activate all available usage rights of a license, select 'All'. To activate some of the available usage rights of a license, select 'Specify' and enter the number of usage rights you want to activate." Below this is a table with three columns: "Activation ID", "Usage Rights", and "Count". The table has three rows. The first two rows have "All" selected in the "Usage Rights" column. The third row is empty. Below the table is a checkbox labeled "Reinstall licenses on this PC". At the bottom of the dialog are five buttons: "About", "Support", "Next >", "Cancel", and "Help".

Activation ID	Usage Rights	Count
1-123456789-01234	All	▼
1-123456789-01234	All	▼
		▼

4. When the license activation process finishes, click **Finish**. The licenses appear in the Floating License Manager.



5. Open the PME Management Console and login with the supervisor account to confirm that the license is working.
6. Click **Help > About** to display information about your Energy Expert licenses.

**NOTE:** Device licenses are required for all the devices connected to PME under Architecture 2. The Energy Expert Trial license for PME includes unlimited device license for the first 90 days.

For further instructions on the purchase and activation of licenses, see the *EcoStruxure™ Power Monitoring Expert 9.0 System Guide*.

## 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 Energy Expert 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 Energy Expert Toolkit.
2. Navigate to **Energy Expert 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.





# Configuring

Configuring the Energy Expert 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.

For TLS to function correctly, 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. 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 the *EcoStruxure™ Power Monitoring Expert 9.0 System Guide* 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, navigate to **Tools > Internet Options** and 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

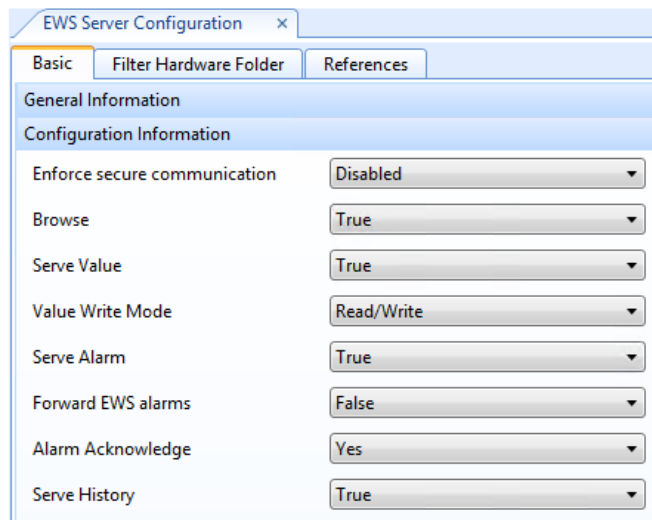
See the following sections for details.

#### 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:



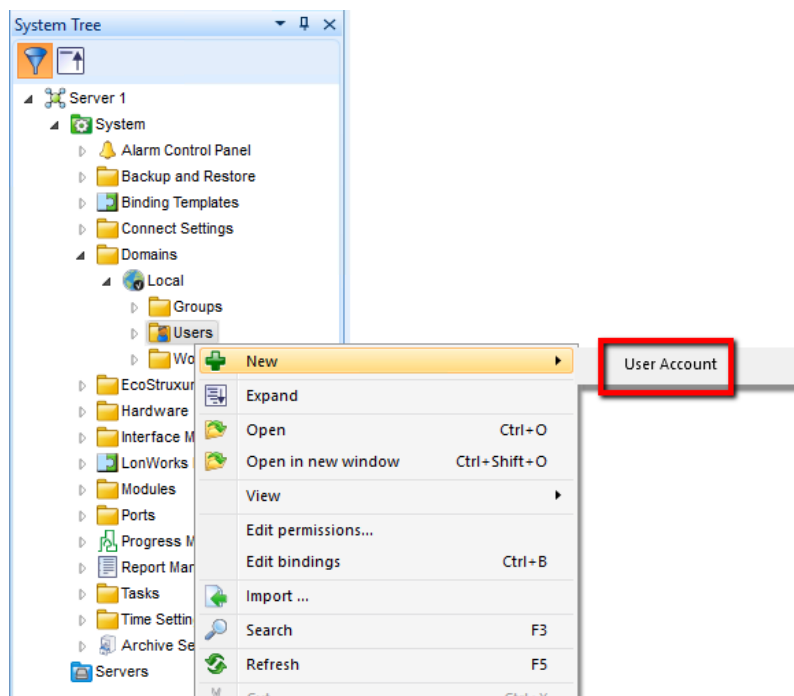
Confirm that:

- **Enable EWS Server** is set to "True"
- **Ensure secure communication** is set to "Disabled"
- **Server Value** is set to "True."

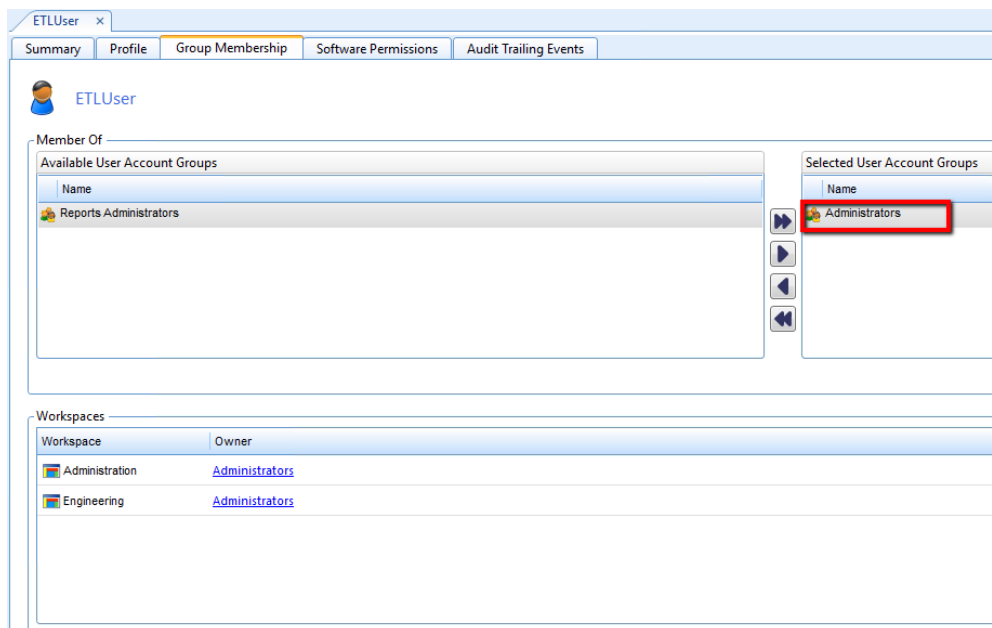
We recommended you setup a dedicated **ETLUser** account for EWS in Building Operation.

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 Energy Expertsolution, Architecture 1 implementation.

### Prerequisites

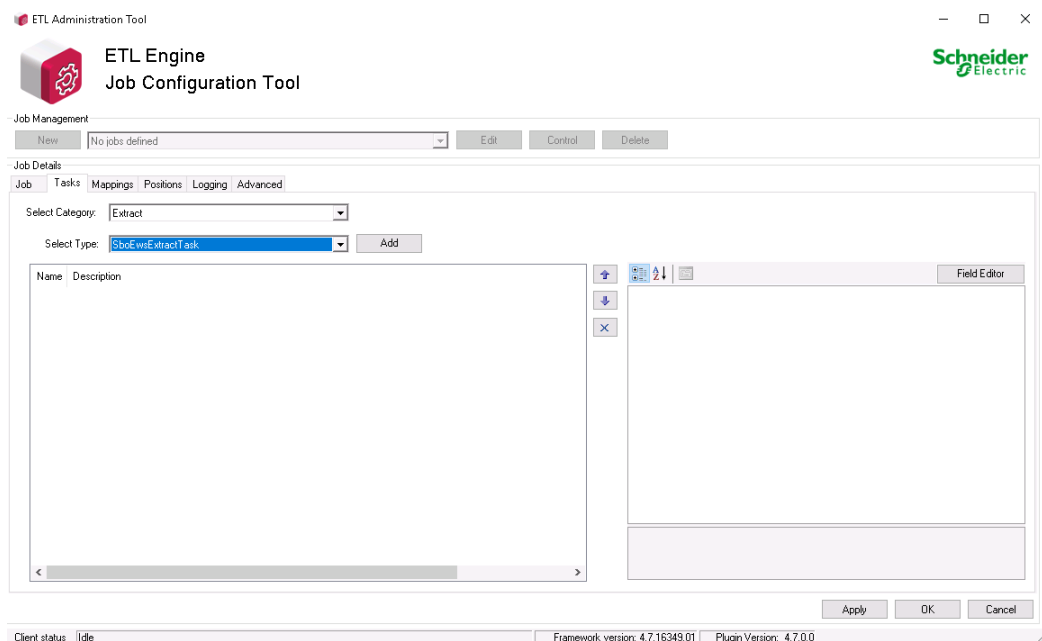
Before configuring the ETL, confirm that:

- 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 4.6 (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 if necessary the Sleep Time Between Execution value. 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.

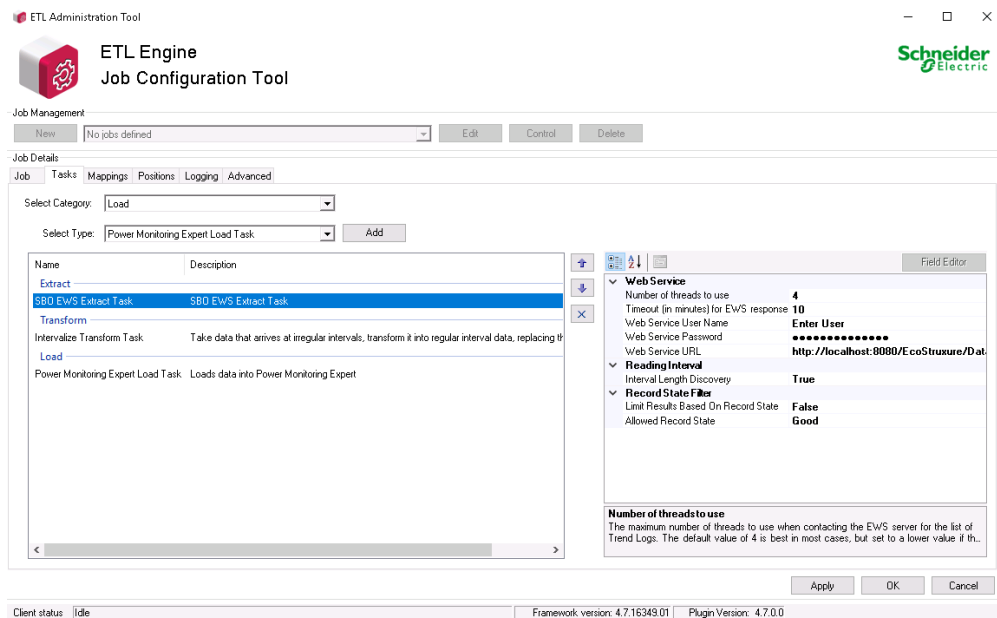


**TIP:** See [ETL tips and tricks](#) for information such as batch edits, sorting and searching data grids, running a job manually or as a service, editing job tasks.

## 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 **EBOEWSEExtractTask**, and then click **Add**. The EBO EWS Extract Task appears in the pane below.

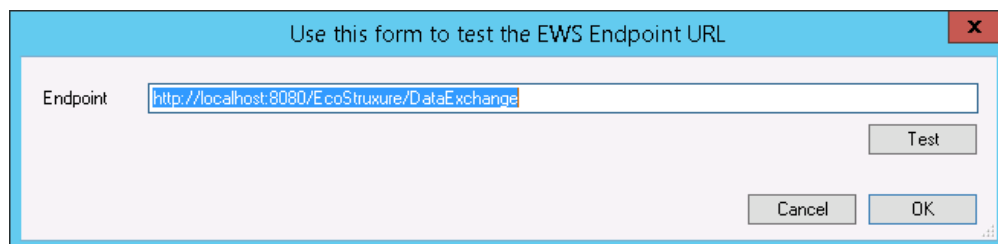


3. Select the task to show the task settings in the right pane.
4. Complete all fields as necessary for the task. Complete at least the following fields:
  - **Web Service User Name** – The Building Operation EWS user name (for example: admin)
  - **Web Service Password** – The Building Operation EWS 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 Energy Expert 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 Energy Expert 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.



ETL Administration Tool

ETL Engine  
Job Configuration Tool

Schneider Electric

Job Management

New Job Edit Control Delete

Job Details

Job Tasks Mappings Positions Logging Advanced

Select Category: Extract

Select Type: CSV File Extract Task Add

Name	Description
Extract	
SBO EWS Extract Task	SBO EWS Extract Task
Transform	
Intervalize Transform Task	Take data that arrives at irregular intervals, tra
Load	
Power Monitoring Expert Load Task	Loads data into Power Monitoring Expert

Field Editor

Transform

Intervalization Method LastKnownValue

Intervalize to present time False

Target Reading Interval FifteenMinutes

Intervalization Method

This outlines the method used when converting the values from an irregular interval into the regular interval.

Apply OK Cancel

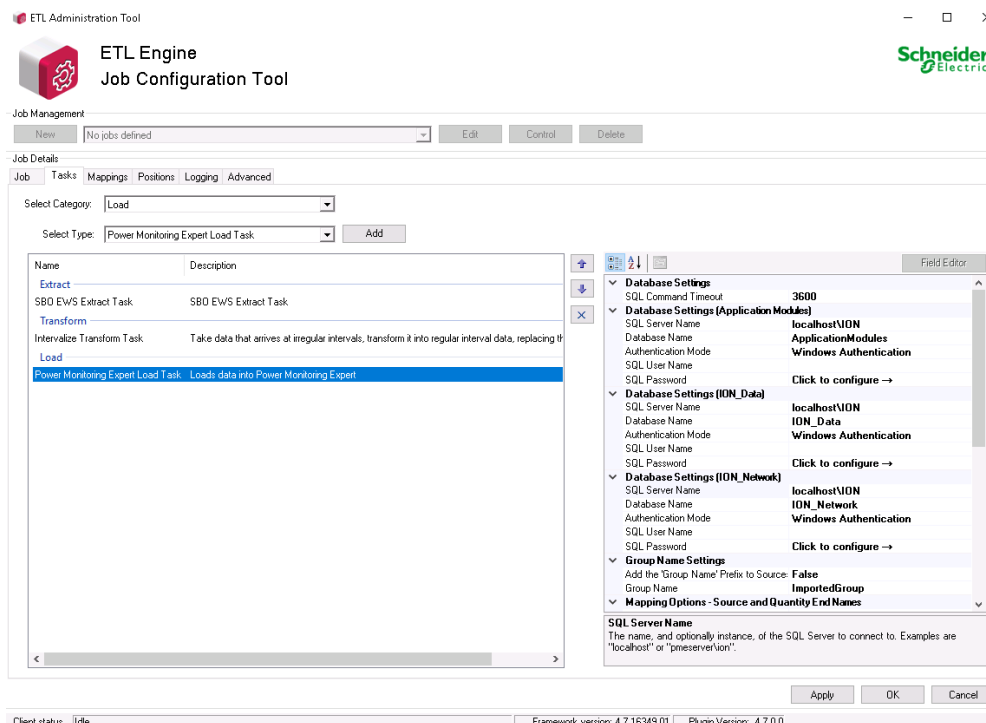
3. Select the task to show the task settings in the right pane.
4. Complete all fields as necessary for the task. Complete at least the following field:
  - **Target Reading Interval** – Set this value to your Trend log logging interval (default is fifteen minutes).

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.

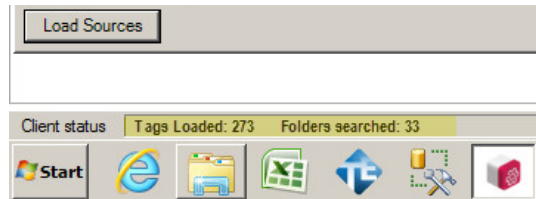
To map tags to measurements:

1. In the ETL tool, select the job you created for the Energy Expert solution.
2. Click the **Mappings** tab. The Mappings dialog appears.

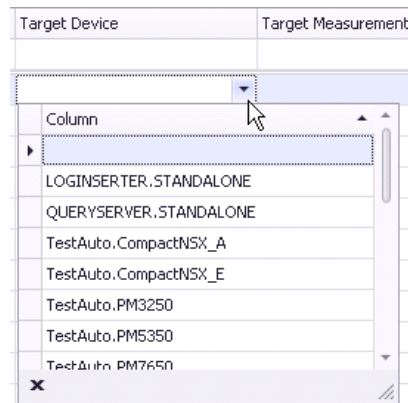
3. Click **Load Sources**. Trend logs from Building Operation load and appear in the Mappings pane.

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.

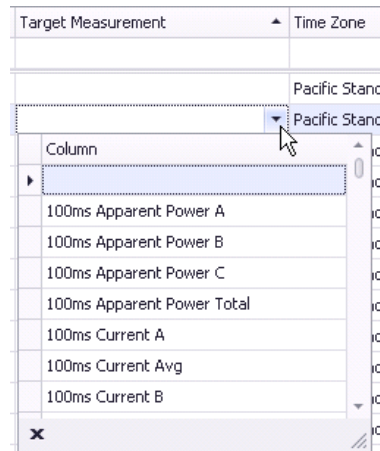


#### NOTE:

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 Energy Expert 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:** Only users with Supervisor or Operator access level in PME can make network changes in the Management Console.

### ***NOTICE***

#### **NETWORK INOPERABILITY**

Do not make unauthorized changes in the network configuration using Management Console.

**Failure to follow these instructions can result in an unstable or unusable network.**

See the following sections for details on how to add devices.

### **Setting up your network in Management Console**

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: \ / : \* ? " < > { } . , ' & @ | % #
- Do not use names such as CON, AUX, COM1, and LPT1 when naming sites and devices.

## 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 *Power Monitoring Expert – System Guide* 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.

### 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 components:

- User Accounts
- Hierarchy Manager
- Modeling Configuration
- Rate Editor
- Diagnostics and Services
- Localization
- Registration Information
- Report Theme
- Theme

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:

1. Configuring Diagrams, Reports, Dashboards, and EWS integration options with the Energy Expert Integration Utility
2. Generating the configuration import file for Building Operation
3. Importing the configuration file into Building Operation
4. Setting up EWS credentials in PME (server) and Building Operation (client)

See the following sections for details.

### Prerequisites

Before using the Energy Expert 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.

**NOTE:** Run the Integration Utility on the PME server, with a Windows account that has sysadmin access to the SQL database instance.

### Configuring Diagrams, Reports, Dashboards, and EWS integration options

You use the Energy Expert 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 Energy Expert Integration Utility is part of the Energy Expert 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 Energy Expert Toolkit](#) for more information.

To configure Diagrams, Reports, , Dashboards, and EWS integration options:

1. Navigate to the Integration Utility folder where you extracted the Energy Expert 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.

- Continue with [Generating the configuration import file for Building Operation](#) for details on how to generate the file.

## ⚠ WARNING

### INACCURATE DATA RESULTS

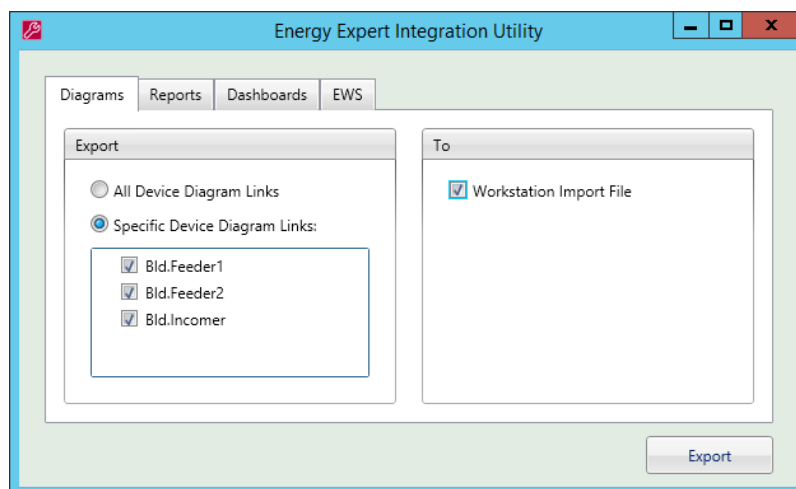
- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable 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.**

### Tab option details:

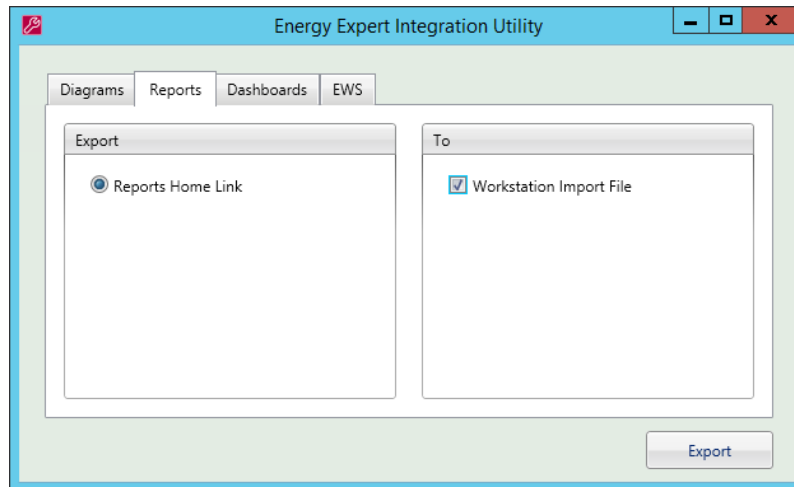
#### Diagrams tab (only for Architecture 2 solutions)

- 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.
- From the To pane, select the **Workstation Import File** option.



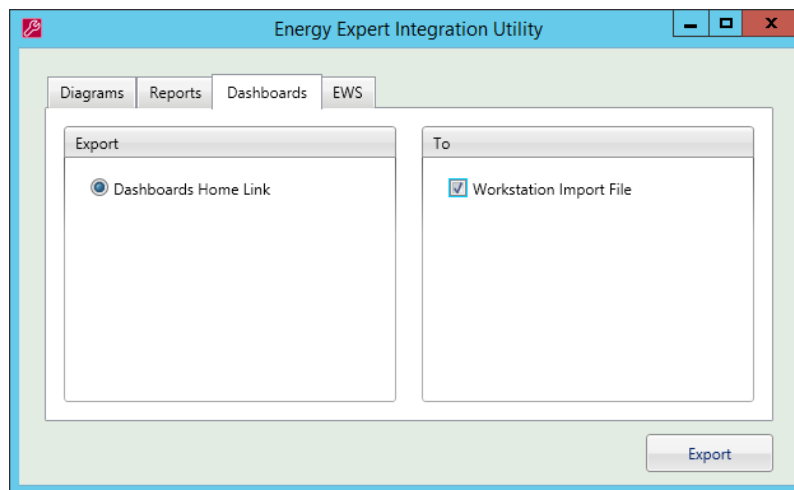
### Reports tab

- From the To pane, select the **Workstation Import File** option.



### Dashboards tab

1. From the To pane, select the **Workstation Import File** option.

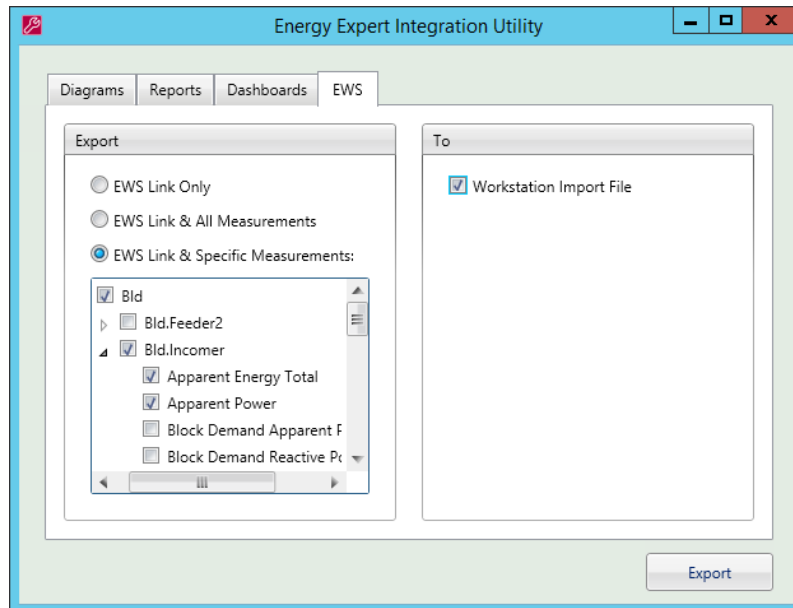


### EWS tab (only for Architecture 2 solutions)

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 Energy Expert 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**

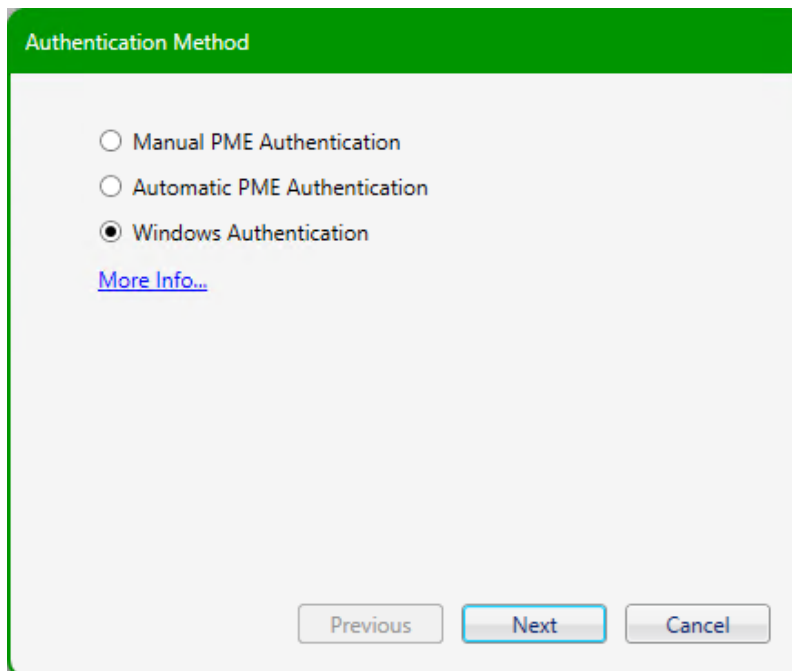
- Personnel setting up Energy Expert third-party authentication must be aware that links to data are not secure.
- Do not setup access links to sensitive or secure data.

**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.

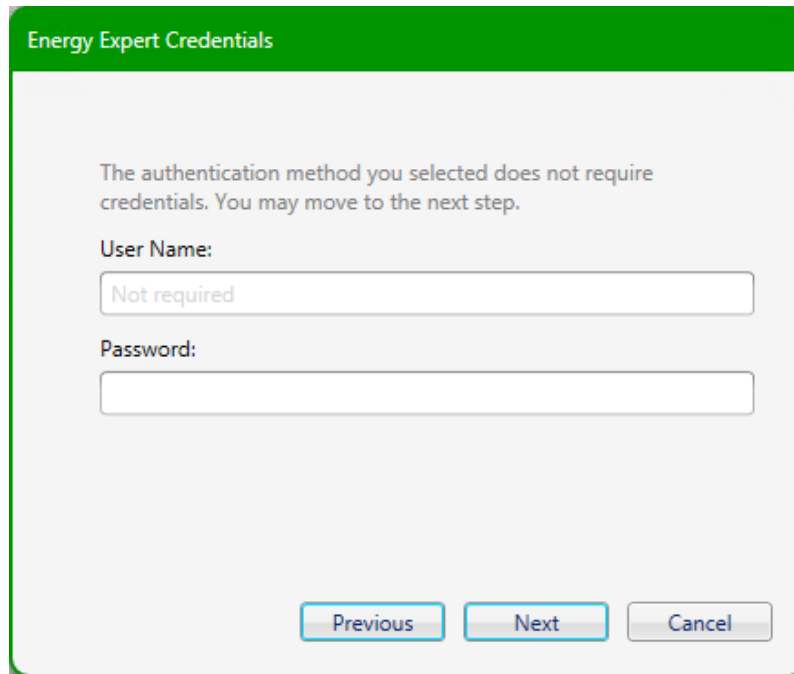
- **Automatic PME Authentication** (least secure) – Creates unique hyperlinks to PME web applications with embedded, encrypted PME credentials. The links open without prompting the user for credentials. This method provides a seamless user experience within Building Operation but it is less secure than 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** (most secure) – Logs the user into PME using their current Windows credentials. This method provides a seamless user experience with Building Operation and is the most secure.

**NOTE:** To use this option, Building Operation and PME must be configured to use Windows Active Directory users and user groups.

The screenshot shows a dialog box titled "Authentication Method" with a green header bar. Inside the dialog, there are three radio button options: "Manual PME Authentication", "Automatic PME Authentication", and "Windows Authentication". The "Windows Authentication" option is selected, indicated by a filled black circle. Below the radio buttons is a blue hyperlink labeled "More Info...". At the bottom of the dialog, there are three buttons: "Previous", "Next", and "Cancel". The "Next" button is highlighted with a blue border.

3. Click **Next**. This opens the Energy Expert Credentials dialog.
4. In Energy Expert 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.





The dialog box is titled "Energy Expert Credentials" in a green header bar. The main area is light gray and contains the following text: "The authentication method you selected does not require credentials. You may move to the next step." Below this, there are two input fields. The first is labeled "User Name:" and contains the text "Not required". The second is labeled "Password:" and is empty. At the bottom of the dialog, there are three buttons: "Previous", "Next", and "Cancel". The "Next" button is highlighted with a blue border.

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.

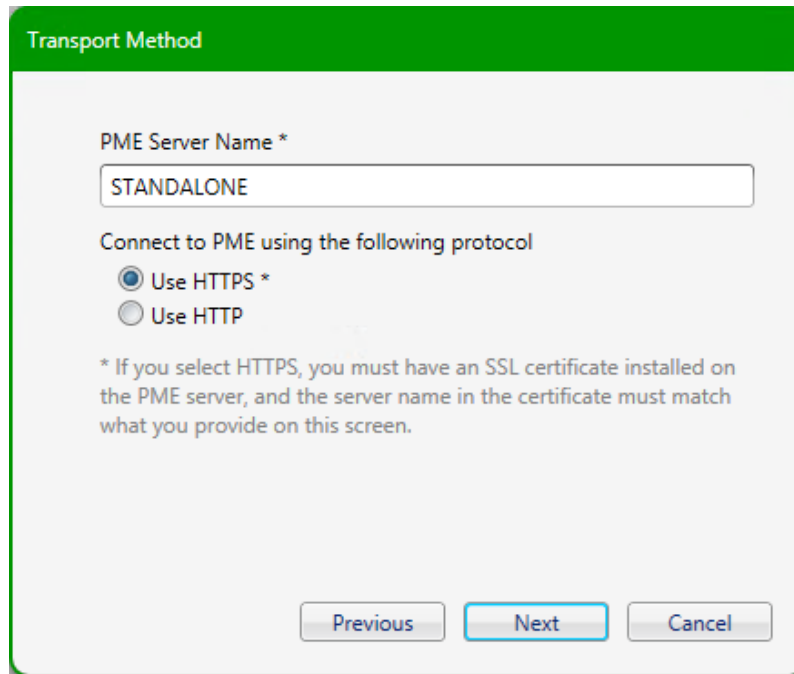
**NOTE:** A name resolution mechanism for the server name must be in place for both the PME and Building Operation servers. If that is not possible, then you must add the necessary entries to the host files on both servers.

- **Use HTTPS** (most 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.

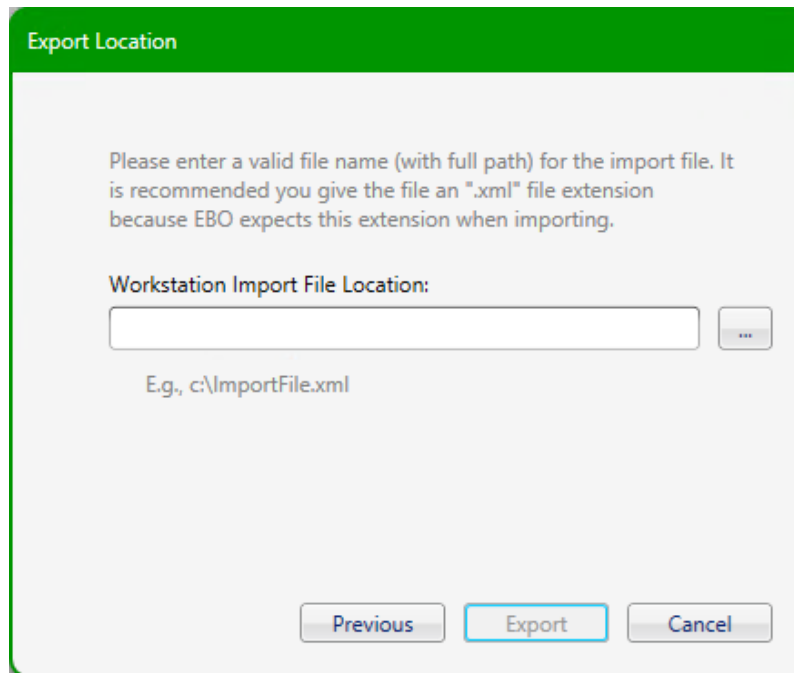
**NOTE:** By default, the EWS server in PME is configured for HTTP client connections. Follow the steps in [Configuring the PME EWS server for HTTPS](#) to enable HTTPS client connections.

- **Use HTTP** (least secure) – This protocol does NOT provide data encryption or identification of the website and Web server it is connecting to.



The "Transport Method" dialog box has a green header. It contains a text field for "PME Server Name \*" with the value "STANDALONE". Below it, the text "Connect to PME using the following protocol" is followed by two radio buttons: "Use HTTPS \*" (selected) and "Use HTTP". A footnote states: "\* If you select HTTPS, you must have an SSL certificate installed on the PME server, and the server name in the certificate must match what you provide on this screen." At the bottom are three buttons: "Previous", "Next" (highlighted with a blue border), and "Cancel".

7. Click **Next**.
8. In the Export Location dialog, click  to navigate to your export location. Enter a file name, and then click **Save**.



The "Export Location" dialog box has a green header. It contains instructional text: "Please enter a valid file name (with full path) for the import file. It is recommended you give the file an \".xml\" file extension because EBO expects this extension when importing." Below this is the label "Workstation Import File Location:" followed by a text field and a browse button (three dots). An example path "E.g., c:\ImportFile.xml" is shown below the text field. At the bottom are three buttons: "Previous", "Export" (highlighted with a blue border), and "Cancel".

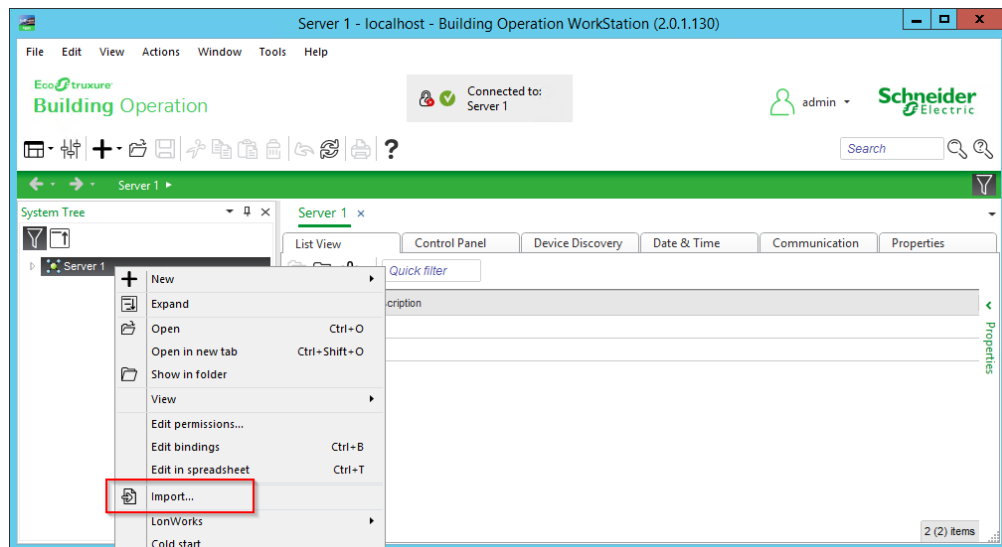
9. Click **Export**. The Integration Utility exports the configuration import file in `.xml` format.

## 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 “Energy Expert” 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 > EcoStruxure Web Services**.

**NOTE:** 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** and enter a **User name** and **Password**.

3. Click **Save**.

To set the credentials for the Building Operation EWS client:

1. In WorkStation, open the Energy Expert folder.
2. Right-click the EWS Client and click **Properties**.

3. Enter the **user name** and **password** in the Authentication field.
4. Click **OK**.

## 5. Setting up Graphics in Building Operation

### Building Operation Components and Snippets

The Energy Expert 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 Energy Expert 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 Energy Expert 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 Energy Expert Integration Toolkit includes a Building Operation snippet that is designed to be used with the ANSI and IEC components.

##### Advanced Tooltip Snippet

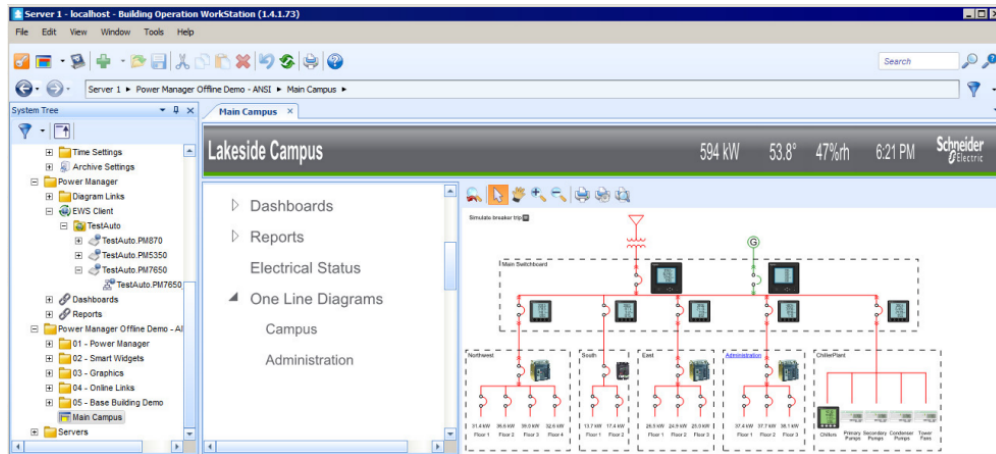
The Advanced Tooltip Snippet provides information regarding a specific device when the pointer hovers over it. The display text of the tool tip can be customized and the following properties can be defined:

- Font size
- Font color
- Number of decimal places to display
- Measurements to show

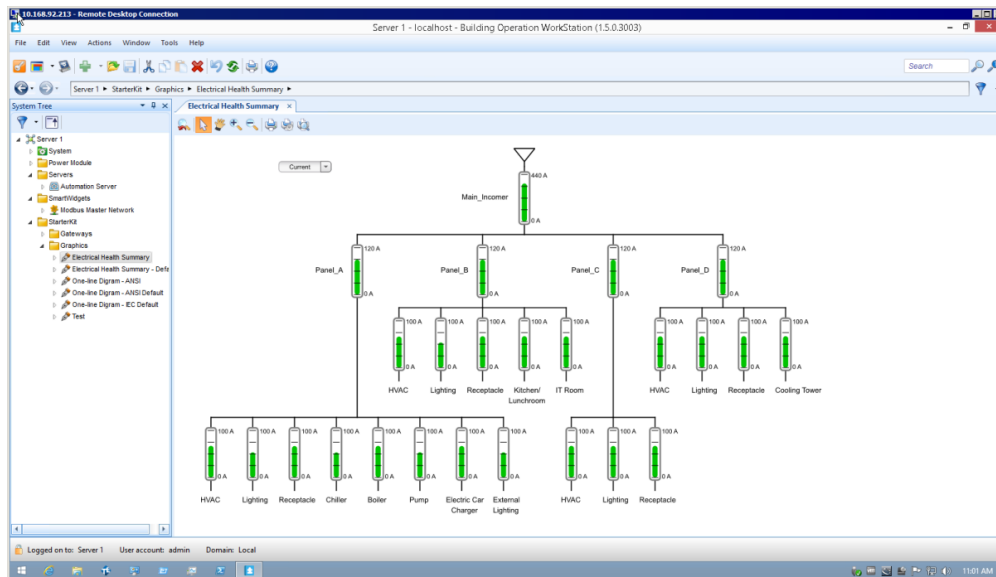
## Setting up Electrical Network Graphics

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**

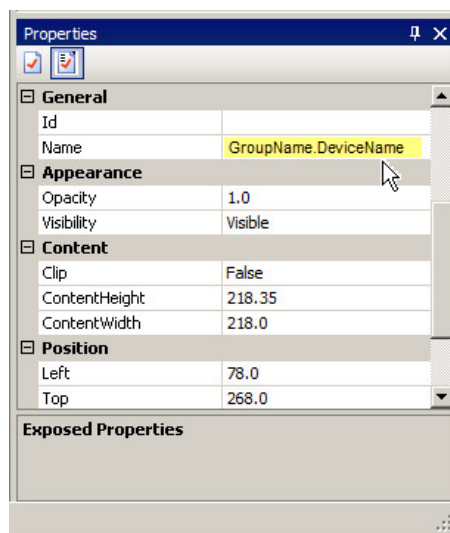
- Do not incorrectly configure the software or the devices.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable 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 Energy Expert Toolkit 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 Energy Expert 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 Energy Expert 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

##### 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 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 Energy Expert 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 Energy Expert binding template can only be used for an English version of the Energy Expert solution. For non-English systems, you need to manually bind the EWS values or create a custom binding template.

## 6. Configuring Dashboards and Slideshows

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 more information on this feature, see the *EcoStruxure™ Power Monitoring Expert 9.0 System Guide*.

## 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).

**NOTE:** Only you and supervisor level Users can view, edit, and delete a Private dashboard.

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.
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.
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.
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](#)

## 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.

**NOTE:** Only you and supervisor level Users can view, edit, and delete a Private dashboard.

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.
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](#)
- [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](#)

## 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.

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](#)
- [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](#)

## 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](#)
- [Moving or resizing a gadget on a dashboard](#)

## 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
- [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](#)

## 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](#)
- [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](#)

## Configuring a slideshow

Use the Slideshow Manager to create, edit, or delete a slideshow.

### 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](#)

## 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.
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:

- Adding a gadget to a dashboard
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- [Moving or resizing a gadget on a dashboard](#)

## 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.
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](#)
- [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](#)

## 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](#)
- [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

# Operating

This chapter includes the following topics:

1. Accessing Dashboards and Slideshows
2. Accessing Reports
3. Accessing Alarms
4. Accessing EWS real-time values (only for Architecture 2 solutions)
5. Accessing device diagrams (only for Architecture 2 solutions)

**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

## ⚠ 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.

For information on how use the Dashboards application, see:

- [Viewing Dashboards](#)
- [Dashboard Slideshows](#)
- [Playing a Slideshow](#)

For more information on this feature, see the *EcoStruxure™ Power Monitoring Expert 9.0 System Guide*.

## 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](#)

## 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](#)

## Playing a Slideshow

Slideshows are a good option for unattended, kiosk type displays.

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

## 2. Accessing Reports

### WARNING

#### INACCURATE DATA RESULTS

- Do not incorrectly configure the software or the devices.
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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.**

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: the Report Library and the 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:

- [Generating a report](#)
- [Downloading a report](#)

## Report templates

The report templates that are included with PME by default cover a wide range of applications. The templates are grouped into folders based on application. Choose the templates that best meet your reporting needs. See the *EcoStruxure™ Power Monitoring Expert 9.0 System Guide* for more information on Report templates.



**NOTE:** Some report templates are part of add-on software modules for PME and are enabled through the module licenses.

## 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.

## Ownership and Sharing

Reports can be made Private or Public. A Private report can only be seen by the person who created it and by users with Supervisor access permissions. A Public report is visible to all users, regardless of their access levels. By default, a report is only visible in the user group where it was created. To make a report visible to other user groups, you have to Share the report with this user group.

For more information on this feature, see the *EcoStruxure™ Power Monitoring Expert 9.0 System Guide*.

## 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 or the report template 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:** If you chose a report, then the saved input parameters are set to their saved values. If you chose a report template, then all input parameters are unselected or have generic default values.

4. The report output is displayed in the Reports Display pane.

Related topics:

- Generating a report
- [Downloading a report](#)

## 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

### 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 **Energy Expert > EWS Client** folder, and then select Properties.

## ⚠ 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.**

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,

State	Count	Priority	Triggered time	Source name	Source	Alarm text	System ala...	Timestamp	Acknowledged by	Category
✓	0	166	10/31/2014 3:48:08 AM	Beltram_Real_AC_Heat_PM870	/Server 1/System/Hardware/EcoStruxure Web Services/Alarms/EWS Client/7	Alarm_1 - Alarm PickUp: 52.4672		10/31/2014 10:48:08 AM		Alarm
✓	0	136	10/31/2014 3:48:08 AM	TestAuto_TripUnit_5A	/Server 1/System/Hardware/EcoStruxure Web Services/Alarms/EWS Client/8	Alarm_2 - Alarm PickUp: 98.6446		10/31/2014 10:48:08 AM		Alarm
✓	0	90	10/31/2014 3:48:08 AM	TestAuto_TripUnit_5A	/Server 1/System/Hardware/EcoStruxure Web Services/Alarms/EWS Client/9	Alarm_3 - Alarm PickUp: 38.4446		10/31/2014 3:48:09 AM		Alarm
✓	0	89	10/31/2014 3:48:08 AM	Beltram_Real_LV_Main_Kitchen_PM820	/Server 1/System/Hardware/EcoStruxure Web Services/Alarms/EWS Client/12	Alarm_7 - Alarm PickUp: 98.1516		10/31/2014 3:48:09 AM		Alarm
✓	0	84	10/31/2014 3:48:08 AM	TestAuto_PM870	/Server 1/System/Hardware/EcoStruxure Web Services/Alarms/EWS Client/13	Alarm_8 - Alarm PickUp: 72.6736		10/31/2014 3:48:08 AM		Alarm
✓	0	141	10/31/2014 3:48:08 AM	Beltram_Real_Tenney_2_PM870	/Server 1/System/Hardware/EcoStruxure Web Services/Alarms/EWS Client/14	Alarm_11 - Alarm PickUp: 1.09766		10/31/2014 3:48:08 AM		Alarm
✓	0	143	10/31/2014 3:48:08 AM	TestAuto_PM350	/Server 1/System/Hardware/EcoStruxure Web Services/Alarms/EWS Client/15	Alarm_12 - Alarm PickUp: 47.3826		10/31/2014 3:48:08 AM		Alarm
✓	0	142	10/31/2014 3:48:08 AM	TestAuto_SEPAMT42	/Server 1/System/Hardware/EcoStruxure Web Services/Alarms/EWS Client/16	Alarm_13 - Alarm PickUp: 10.1792		10/31/2014 3:48:08 AM		Alarm
✓	0	173	10/31/2014 3:48:08 AM	Beltram_Real_LV_Plant_Lighting_PM820	/Server 1/System/Hardware/EcoStruxure Web Services/Alarms/EWS Client/17	Alarm_14 - Alarm PickUp: 92.2067		10/31/2014 10:48:08 AM		Alarm
✓	0	164	10/31/2014 3:48:08 AM	Beltram_Real_RTU2_PM700	/Server 1/System/Hardware/EcoStruxure Web Services/Alarms/EWS Client/18	Alarm_15 - Alarm PickUp: 23.7793		10/31/2014 3:48:09 AM		Alarm
✓	0	153	10/31/2014 3:48:08 AM	Belgium_Real_MV_Main_Admin_SEPAM80	/Server 1/System/Hardware/EcoStruxure Web Services/Alarms/EWS Client/19	Alarm_16 - Alarm PickUp: 25.1579		10/31/2014 3:48:08 AM		Alarm
✓	0	180	10/31/2014 3:48:08 AM	Beltram_Real_RTU2_PM800	/Server 1/System/Hardware/EcoStruxure Web Services/Alarms/EWS Client/20	Alarm_17 - Alarm PickUp: 73.3777		10/31/2014 3:48:08 AM		Alarm
✓	0	160	10/31/2014 3:48:09 AM	Beltram_Real_LV_Plant_Lighting_PM820	/Server 1/System/Hardware/EcoStruxure Web Services/Alarms/EWS Client/21	Alarm_18 - Alarm PickUp: 94.341		10/31/2014 10:48:09 AM		Alarm

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 Energy Expert folder that you imported into Building Operation contains groups, devices and measurements within the EWS Client folder.

### ⚠ WARNING

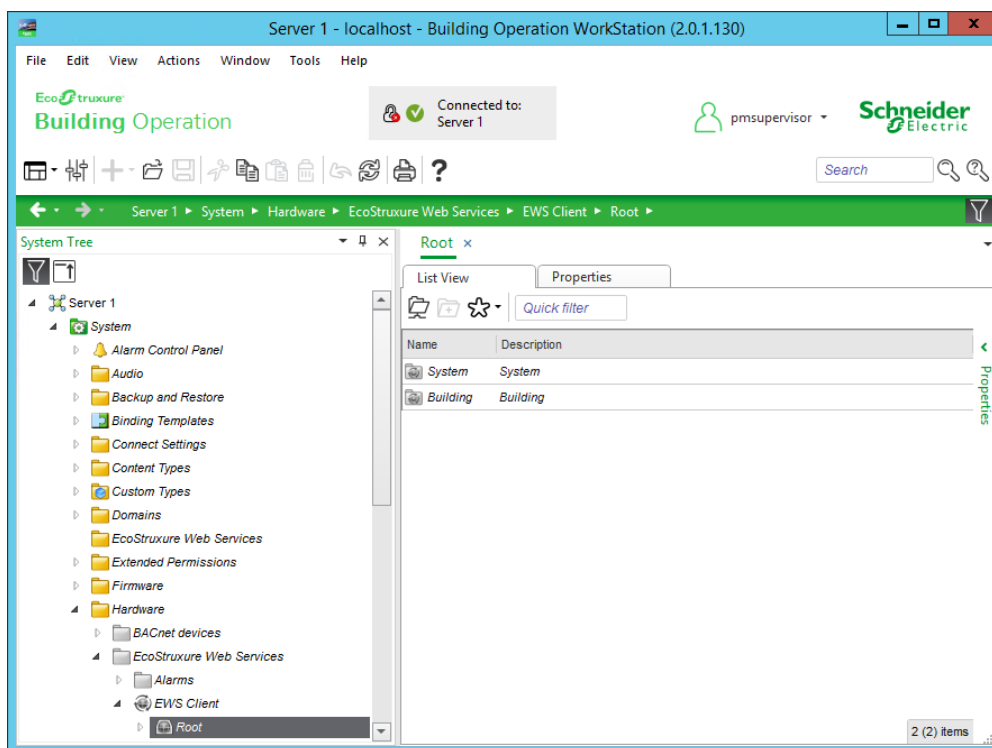
#### INACCURATE DATA RESULTS

- 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.

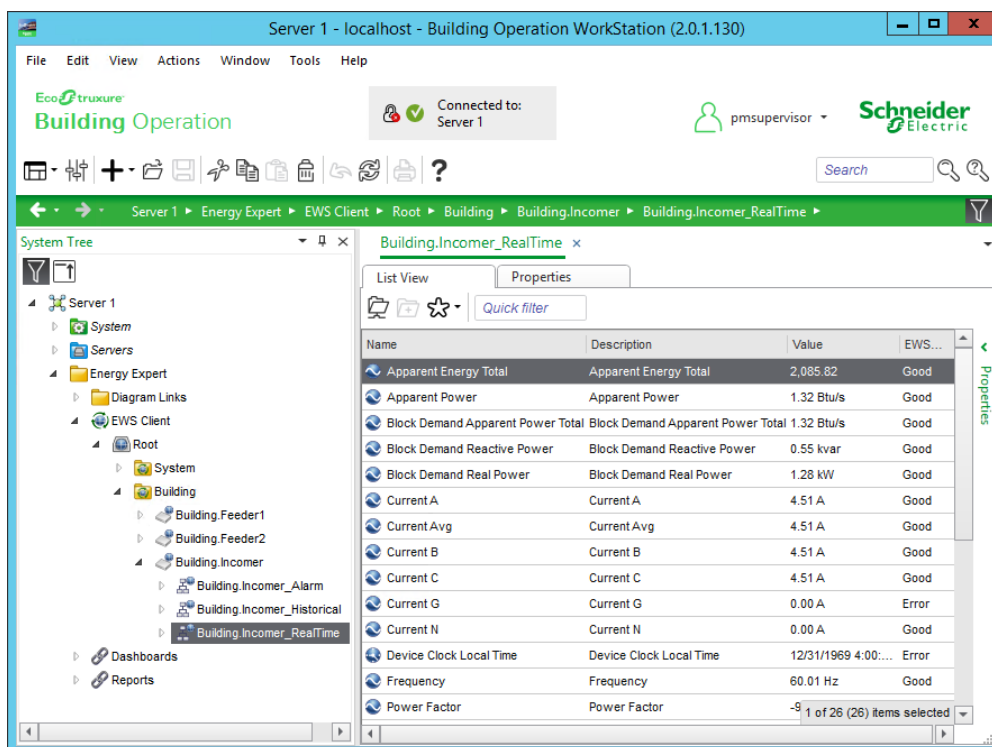
**Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.**

To access EWS real-time values:

1. Log in to Building Operation WorkStation.
2. In the System Tree, navigate to the Energy Expert folder and click the EWS Client folder. The EWS Client tab appears.



- 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.
- Double-click a device to view the complete list of measurements for that device.
- In the EWS Client pane, right-click on a column heading, and then select Add/Remove Columns.
- 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

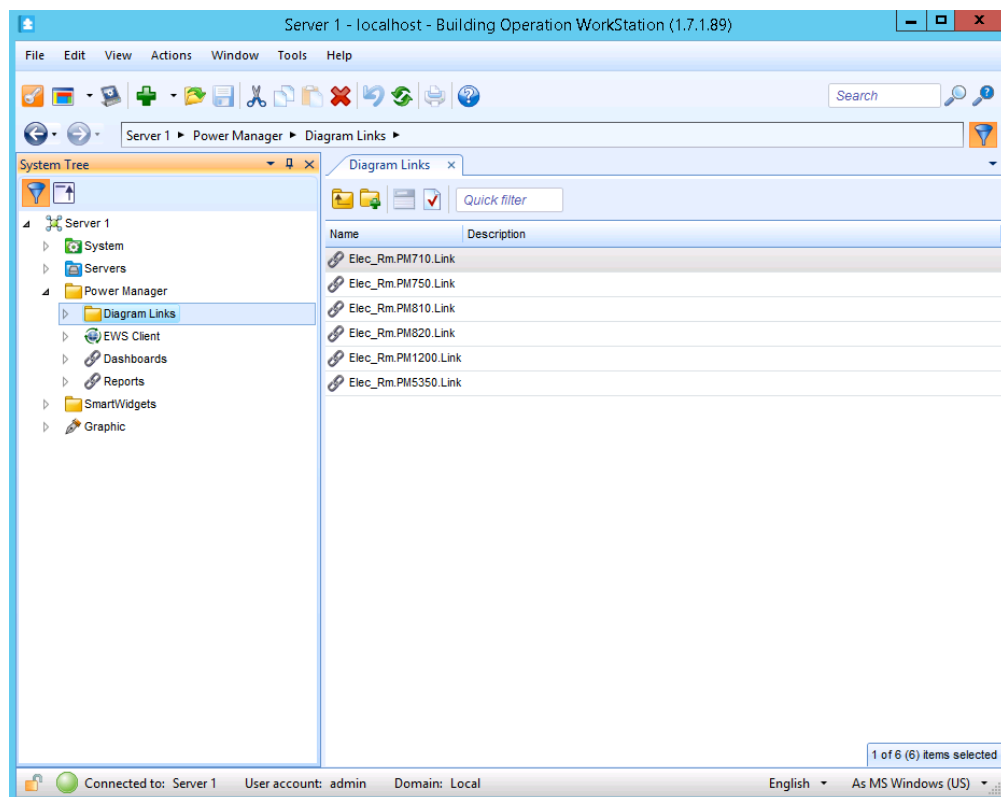
#### INACCURATE DATA RESULTS

- 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.

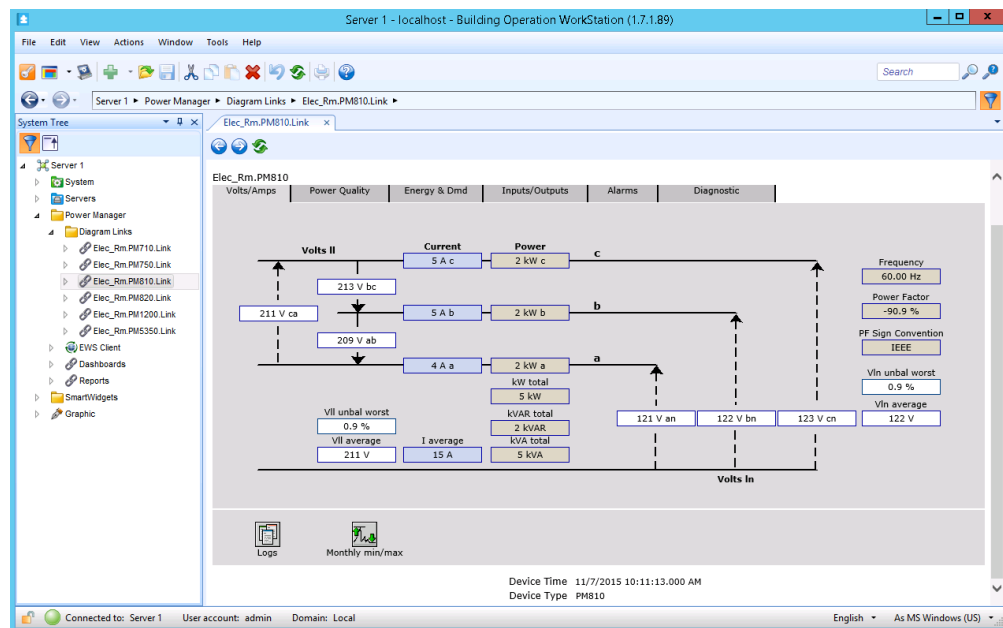
**Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.**

To access device diagrams

1. Log in to Building Operation WorkStation.
2. In the System Tree, navigate to Energy Expert 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.





# Reference

This chapter contains specific information on technical details related to the Energy Expert solution. This information is referenced in the other sections of this document.

Use the links below to find the item you are looking for:

[Add-on device drivers for PME](#)

[Advanced ETL Configuration](#)

[Configuring the PME EWS server for HTTPS](#)

[Database growth calculations](#)

[Default device type support](#)

[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](#)

[PME IP Port Requirements](#)

[Setting SQL Server memory options](#)

[Terms and definitions](#)

[Time synchronization for ION meters](#)

[Web Applications Settings](#)

[Web security changes](#)

## 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 in PME to create custom device drivers. For more information on this feature, see the *EcoStruxure™ Power Monitoring Expert 9.0 System Guide*.

# Advanced ETL Configuration

## 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.

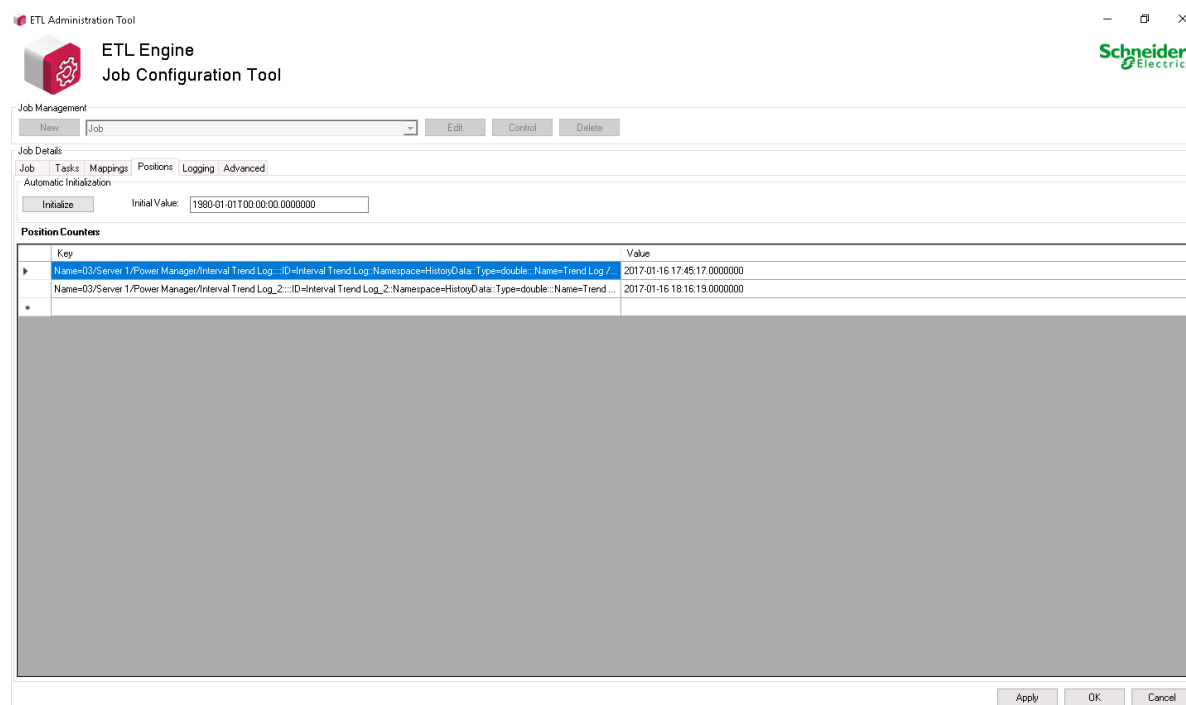
### Resetting and resending the data (optional)

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:

- Enter a specific value in the text box to set all position counters.
- 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 set up

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.

ETL Administration Tool

ETL Engine  
Job Configuration Tool

Job Management

New Job Edit Control Delete

Job Details

Job Tasks Mappings Positions Logging Advanced

Trace Log

☐ Enabled ☐ Data Trace Enabled

Log File: Log\\trace.log Maximum Log File Size: 1 MB Maximum Log Files: 10

Error Log

☒ Enabled

Log File: Log\\error.log Maximum Log File Size: 1 MB Maximum Log Files: 10

Customer Log

☒ Enabled

Log File: Log\\customer.log Maximum Log File Size: 10 MB Maximum Log Files: 10

Email Notifications

☒ Enabled

To Email Address: to@domain.com

From Email Address: from@domain.com

SMTP Server Address: localhost

Windows Event Log

☒ Enabled

Event Log Name: ETL Engine

Apply OK Cancel

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.

Setting Name	Description	Setting Parameters / Recommended Values
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 <a href="http://localhost:8080/EcoStruxure/DataExchange">http://localhost:8080/EcoStruxure/DataExchange</a> . Replace "localhost:8080" with your web server address and port as needed.
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		
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 Setting
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 Setting
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', the null values 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 Setting
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**.

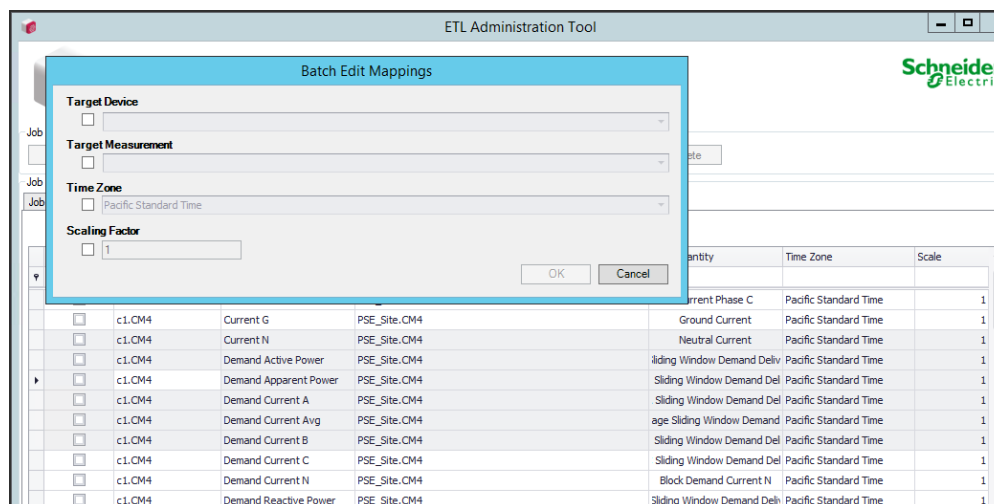
### Batch Edits

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

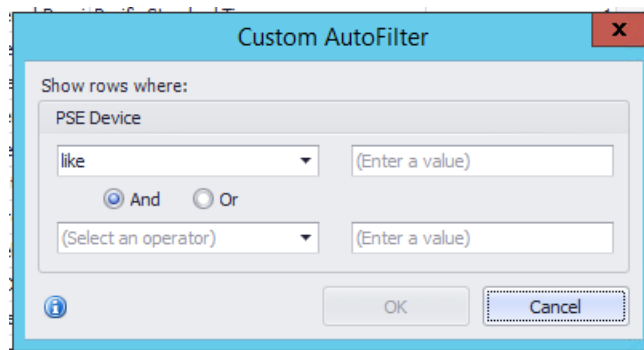
that characters are not case sensitive.

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 then click **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.

## Grant database permissions for ETL job run as a service

By default, when an ETL job is run as a service it runs under the NT AUTHORITY\SYSTEM Windows user account.

With SQL Server 2012 and later, the NT AUTHORITY user does not have database permissions. If an ETL job is run using the NT AUTHORITY user, the ETL cannot connect to the Power Monitoring Expert database and the ETL job fails.

For the ETL job to succeed, you must first grant database permissions to this user.

To grant database permissions to the NT AUTHORITY user, log in to SQL Server Management Studio as an administrator and run the following script:

```
USE [ION_Data]
GO
CREATE USER [NT AUTHORITY\SYSTEM] FOR LOGIN [NT AUTHORITY\SYSTEM]
GO
EXEC sp_addrolemember N'db_owner', N'NT AUTHORITY\SYSTEM'
GO
USE [ION_Network]
GO
CREATE USER [NT AUTHORITY\SYSTEM] FOR LOGIN [NT AUTHORITY\SYSTEM]
GO
EXEC sp_addrolemember N'db_owner', N'NT AUTHORITY\SYSTEM'
GO
```

**NOTE:** If security concerns limit you from using the default NT AUTHORITY user, create a dedicated Windows user to run the ETL job as a service.

To use a dedicated Windows user:

1. Create a Windows user. Note that if the ETL is installed to its default location – C:\Program Files\... – the Windows user must have Administrator access.
2. Set the ETL job to run as a service under the new Windows user.

- Log in to SQL Server Management Studio as an administrator and run the above script, substituting NT AUTHORITY\SYSTEM with the new Windows user

## 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 <sup>2</sup>	
	feet per second squared	ft/s <sup>2</sup>	
	inches per second squared	in/s <sup>2</sup>	
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 <sup>2</sup>	
	square inch	in <sup>2</sup>	
	square foot	ft <sup>2</sup>	
	square yard	yd <sup>2</sup>	
	acre	a.	
	square mile	mile <sup>2</sup>	
Capacitance	farad	F	
Compressibility	meters squared per Newton	m <sup>2</sup> /N	
Conductance	siemens	S	
Conductivity	siemens per meter	S/m	
Corrosion Rate		m/yr	
		in/yr	

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
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/m <sup>2</sup>	Current Density (A/m <sup>2</sup> )
Density	grams per cubic meter	g/m <sup>3</sup>	
	pounds per cubic inch	lb/in <sup>3</sup>	
	pounds per cubic foot	lb/ft <sup>3</sup>	
Diffusivity	meters squared per second	m <sup>2</sup> /s	
	foot squared per second	ft <sup>2</sup> /s	
Dipole Moment		debye	
		coulombmeter	
Electrical Field Strength		V/m	
Energy		J	
		Wh	Active Energy Delivered (kWh) Active Energy Received (kWh) Active Energy Delivered-Received (kWh)

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
		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	m <sup>3</sup> /s	Steam Volume Flow Rate (m <sup>3</sup> /s) Water Volume Flow Rate Supply (m <sup>3</sup> /s) Water Volume Flow Rate Return (m <sup>3</sup> /s) Water Volume Flow Rate (m <sup>3</sup> /s) Air Volume Flow Rate (m <sup>3</sup> /s) Natural Gas Volume Flow Rate (m <sup>3</sup> /s) Wastewater Volume Flow Rate (m <sup>3</sup> /s)

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
	cubic meters per minute	m <sup>3</sup> /min	Steam Volume Flow Rate (m <sup>3</sup> /min) Water Volume Flow Rate Supply (m <sup>3</sup> /min) Water Volume Flow Rate Return (m <sup>3</sup> /min) Water Volume Flow Rate (m <sup>3</sup> /min) Air Volume Flow Rate (m <sup>3</sup> /min) Natural Gas Volume Flow Rate (m <sup>3</sup> /min) Wastewater Volume Flow Rate (m <sup>3</sup> /min)
	cubic meters per hour	m <sup>3</sup> /h	Steam Volume Flow Rate (m <sup>3</sup> /h) Water Volume Flow Rate Supply (m <sup>3</sup> /h) Water Volume Flow Rate Return (m <sup>3</sup> /h) Water Volume Flow Rate (m <sup>3</sup> /h) Air Volume Flow Rate (m <sup>3</sup> /h) Natural Gas Volume Flow Rate (m <sup>3</sup> /h) Wastewater Volume Flow Rate (m <sup>3</sup> /h)
	cubic feet per second	ft <sup>3</sup> /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)



Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
	cubic feet per minute	ft <sup>3</sup> /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	ft <sup>3</sup> /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)
Flow	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)

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
	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)
	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	

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
		Uston/h	
Force		N	
		lbf	
Frequency		Hz	Frequency (Hz) Frequency (MHz) Frequency (kHz) Frequency (MHz)
		cycles/min	
		cycles/h	
		/s	
		/min	
		/h	
Frequency		%/s	
Grammage (GSM)		g/m <sup>2</sup>	Grammage (GSM) (g/m <sup>2</sup> ) Grammage (GSM) (mg/m <sup>2</sup> ) Grammage (GSM) (kg/m <sup>2</sup> ) Grammage (GSM) (Mg/m <sup>2</sup> )
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/m <sup>2</sup>	
		Btu/(s·ft <sup>2</sup> )	
		W/ft <sup>2</sup>	
Heat Transfer Coefficient		W/(m <sup>2</sup> ·K)	Heat Transfer Coefficient (W/(m <sup>2</sup> K))
		Btu/(s·ft <sup>2</sup> ·K)	Heat Transfer Coefficient (BTU 59/(s ft <sup>2</sup> 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

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
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	
	foot	ft	
	yard	yd	
	mile	mile	
Linear Momentum	Newton Second	Ns	
Luminance	candelas per square meter	cd/m <sup>2</sup>	
Luminous Flux		lm	
Luminous Intensity		cd	
Magnetic Dipole Moment		A·m <sup>2</sup>	
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·m <sup>2</sup> ))/ (mol/m <sup>3</sup> )	
		(mol/(s·ft <sup>2</sup> ))/ (mol/ft <sup>3</sup> )	

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
Mass Velocity		g/(s·m <sup>2</sup> )	
		lb/(s·ft <sup>2</sup> )	
Moles	mole	mol	
		lbmol	
Moment of Inertia		g/m <sup>2</sup>	
		lb/ft <sup>2</sup>	
Momentum		g·m/s	
		lb·ft/s	
NoCategory		NoUnit	
		?	
Percent Obscuration		%/m	
		%/ft	
Percentage		%	Damper Position (percent) Valve Position (percent)
		ppm	CO <sub>2</sub> Concentration Indoor (ppm) CO <sub>2</sub> 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 refriger	

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
Power Factor		cosf	Power Factor Signed Phase A Power Factor Signed Phase B Power Factor Signed Phase C
Power Reactive		var	Reactive Power Phase A (kvar) Reactive Power Phase B (kvar) Reactive Power Phase C (kvar)
Pressure		N/m <sup>2</sup>	Air Pressure (N/m <sup>2</sup> ) Natural Gas Pressure (N/m <sup>2</sup> ) Steam Pressure (N/m <sup>2</sup> ) Water Pressure Supply (N/m <sup>2</sup> ) Water Pressure Return (N/m <sup>2</sup> ) Water Pressure (N/m <sup>2</sup> )
		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 <sup>2</sup> ) Steam Pressure (N/m <sup>2</sup> ) Water Pressure Supply (N/m <sup>2</sup> ) Water Pressure Return (N/m <sup>2</sup> ) Water Pressure (N/m <sup>2</sup> )
		inH <sub>2</sub> O	Air Pressure (in H <sub>2</sub> O) Natural Gas Pressure (in H <sub>2</sub> O) Steam Pressure (in H <sub>2</sub> O) Water Pressure Supply (in H <sub>2</sub> O) Water Pressure Return (in H <sub>2</sub> O) Water Pressure (in H <sub>2</sub> O)

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
		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)
Pressure		mH <sub>2</sub> O	Air Pressure (m H <sub>2</sub> O) Natural Gas Pressure (m H <sub>2</sub> O) Steam Pressure (m H <sub>2</sub> O) Water Pressure Supply (m H <sub>2</sub> O) Water Pressure Return (m H <sub>2</sub> O) Water Pressure (m H <sub>2</sub> O)
		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)
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)

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
Resistance	ohm	$\Omega$	Resistance
Resistivity	ohm meter	$\Omega\text{m}$	
Specific Entropy		$\text{J}(\text{g}\cdot\text{K})$	
		$\text{Btu}/(\text{lb}\cdot\text{R})$	
		$\text{J}/(\text{kg}\cdot\text{K})$	
Specific Humidity		$\text{g H}_2\text{O}/\text{kg dry air}$	
Specific Volume		$\text{m}^3/\text{g}$	
		$\text{ft}^3/\text{lb}$	
Surface Energy Density		$\text{J}/\text{m}^2$	
		$\text{J}/\text{ft}^2$	
		$\text{W}/(\text{h}\cdot\text{m}^2)$	
		$\text{W}/(\text{h}\cdot\text{ft}^2)$	
Surface Tension		$\text{N}/\text{m}^2$	
		$\text{lbf}/\text{ft}$	
Temperature		$^{\circ}\text{C}$	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	



Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
		°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	

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
		$\Delta^{\circ}\text{F}$	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		$^{\circ}\text{C}/\text{min}$	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	

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
		°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
Temperature Rate of Change		°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	

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
		°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/(m <sup>2</sup> ·K)	
Thermal Conductivity		W/(m <sup>2</sup> ·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))
		Btu/(h·ft <sup>2</sup> ·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	

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
		ft/F	
Thermal Pressure		psi/°F	
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)
		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		m³	Air Volume (m³) Steam Volume (m³) Wastewater Volume (m³) Water Volume (m³) Natural Gas Volume (m³)

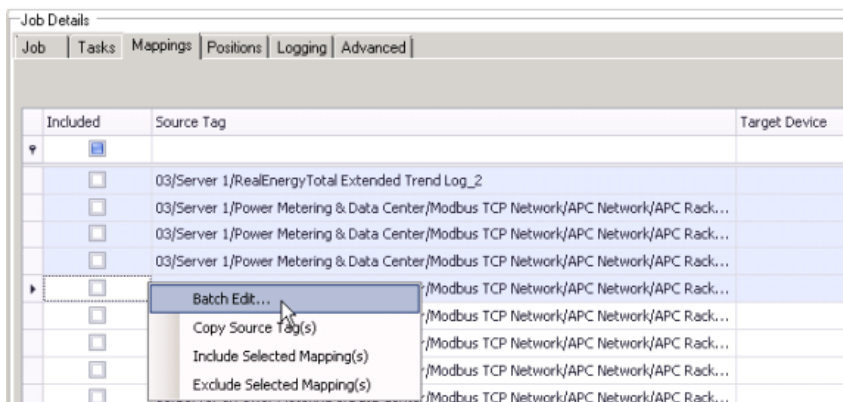
Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
Volume		in <sup>3</sup>	
		ft <sup>3</sup>	Air Volume (cubft) Steam Volume (cf) Wastewater Volume (cf) Water Volume (cf) Gas Volume (cf)
		Usgal	Wastewater Volume (gal) Water Volume (gal)
		litre	Wastewater Volume (L) Water Volume (L)

## ETL tips and tricks

### Performing a Batch Edit for Trend logs

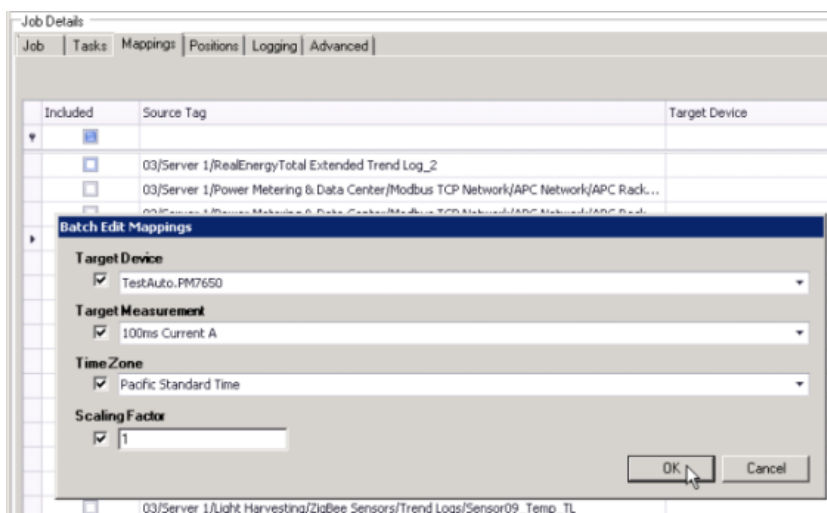
To perform a Batch Edit (map multiple Trend logs at once):

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.



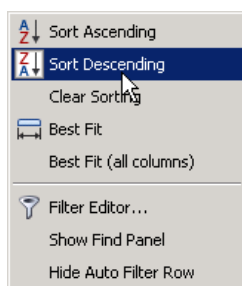
4. While the rows are still highlighted, right-click and select Include Selected Mapping(s). The Included check box is now checked for the selected rows and these Trend logs are now included in the job.
5. Click OK, and then click Apply to save the changes to the job. The Batch Edit values now appear 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.



Job Details		
Job	Tasks	Mappings
Included	Source Tag	Target Device
<input checked="" type="checkbox"/>	sensor08	
<input type="checkbox"/>	03/Server 1/Light Harvesting/ZigBee Sensors/Trend Logs/Sensor08_Temp_TL	
<input type="checkbox"/>	03/Server 1/Light Harvesting/ZigBee Sensors/Trend Logs/Sensor08_Light_TL	
<input type="checkbox"/>	03/Server 1/Light Harvesting/ZigBee Sensors/Extended Trend Logs/Sensor08_Temp_ETL	
<input type="checkbox"/>	03/Server 1/Light Harvesting/ZigBee Sensors/Extended Trend Logs/Sensor08_Light_ETL	

## Searching Target Measurements by column

To search the Target Measurements by column:

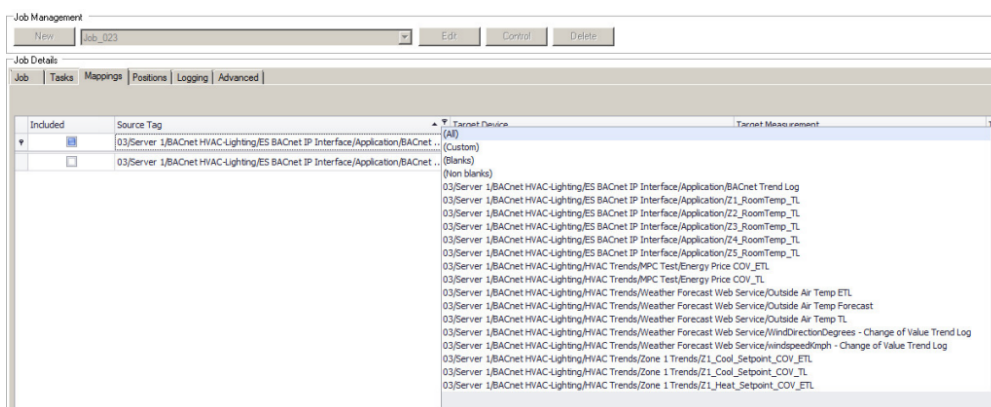
1. Click in the search field below the column heading.
2. Begin typing characters. Only column contents appear based on the search criteria you enter.  
Note that characters are not case sensitive.

See [Measurement mapping for ETL](#) to learn about the most common, supported measurements in use in PME.

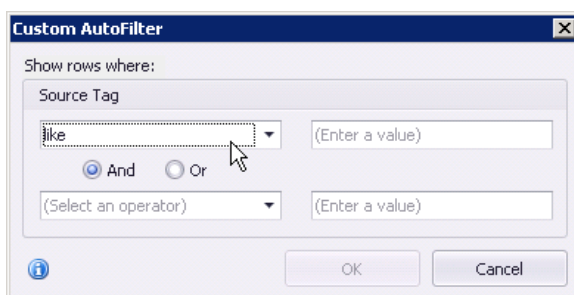
## Filtering content by column

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 also set the 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.

Refer to [Grant database permissions for ETL job run as a service](#) if SQL Server 2012 is installed in your system and you want to run a job as a service.

To set the 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. Click **Start/Continue** to start the service.
5. Click **Stop** to stop the service, or click **Unregister** to unregister the service for this job.
6. 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 <sup>2</sup>	
	feet per second squared	ft/s <sup>2</sup>	
	inches per second squared	in/s <sup>2</sup>	

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
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 <sup>2</sup>	
	square inch	in <sup>2</sup>	
	square foot	ft <sup>2</sup>	
	square yard	yd <sup>2</sup>	
	acre	a.	
	square mile	mile <sup>2</sup>	
Capacitance	farad	F	
Compressibility	meters squared per Newton	m <sup>2</sup> /N	
Conductance	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	

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
Current		A	Current Phase Average Current Phase A Current Phase B Current Phase C Neutral Current Ground Current
Current Density		A/m <sup>2</sup>	Current Density (A/m <sup>2</sup> )
Density	grams per cubic meter	g/m <sup>3</sup>	
	pounds per cubic inch	lb/in <sup>3</sup>	
	pounds per cubic foot	lb/ft <sup>3</sup>	
Diffusivity	meters squared per second	m <sup>2</sup> /s	
	foot squared per second	ft <sup>2</sup> /s	
Dipole Moment		debye	
		coulombmeter	
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)

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
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	m <sup>3</sup> /s	Steam Volume Flow Rate (m <sup>3</sup> /s) Water Volume Flow Rate Supply (m <sup>3</sup> /s) Water Volume Flow Rate Return (m <sup>3</sup> /s) Water Volume Flow Rate (m <sup>3</sup> /s) Air Volume Flow Rate (m <sup>3</sup> /s) Natural Gas Volume Flow Rate (m <sup>3</sup> /s) Wastewater Volume Flow Rate (m <sup>3</sup> /s)
	cubic meters per minute	m <sup>3</sup> /min	Steam Volume Flow Rate (m <sup>3</sup> /min) Water Volume Flow Rate Supply (m <sup>3</sup> /min) Water Volume Flow Rate Return (m <sup>3</sup> /min) Water Volume Flow Rate (m <sup>3</sup> /min) Air Volume Flow Rate (m <sup>3</sup> /min) Natural Gas Volume Flow Rate (m <sup>3</sup> /min) Wastewater Volume Flow Rate (m <sup>3</sup> /min)
	cubic meters per hour	m <sup>3</sup> /h	Steam Volume Flow Rate (m <sup>3</sup> /h) Water Volume Flow Rate Supply (m <sup>3</sup> /h) Water Volume Flow Rate Return (m <sup>3</sup> /h) Water Volume Flow Rate (m <sup>3</sup> /h) Air Volume Flow Rate (m <sup>3</sup> /h) Natural Gas Volume Flow Rate (m <sup>3</sup> /h) Wastewater Volume Flow Rate (m <sup>3</sup> /h)

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
	cubic feet per second	ft <sup>3</sup> /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	ft <sup>3</sup> /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	ft <sup>3</sup> /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)

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
	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)
Flow	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)
	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)



Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
	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	
Frequency		%/s	
Grammage (GSM)		g/m <sup>2</sup>	Grammage (GSM) (g/m <sup>2</sup> ) Grammage (GSM) (mg/m <sup>2</sup> ) Grammage (GSM) (kg/m <sup>2</sup> ) Grammage (GSM) (Mg/m <sup>2</sup> )
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/m <sup>2</sup>	
		Btu/(s·ft <sup>2</sup> )	
		W/ft <sup>2</sup>	
Heat Transfer Coefficient		W/(m <sup>2</sup> ·K)	Heat Transfer Coefficient (W/(m <sup>2</sup> K))

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
		Btu/(s·ft <sup>2</sup> ·K)	Heat Transfer Coefficient (BTU 59/(s ft <sup>2</sup> 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	
	foot	ft	
	yard	yd	
	mile	mile	
Linear Momentum	Newton Second	Ns	
Luminance	candelas per square meter	cd/m <sup>2</sup>	
Luminous Flux		lm	
Luminous Intensity		cd	
Magnetic Dipole Moment		A·m <sup>2</sup>	
Magnetic Field Strength		A/m	
Magnetic Flux		Wb	
Magnetic Flux Density		T	
Mass	gram	g	

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
	pound	lb	
	ounce	oz	
		carat	
		grains	
		USTon	
Mass Transfer Coefficient		$(\text{mol}/(\text{s}\cdot\text{m}^2))/(\text{mol}/\text{m}^3)$	
		$(\text{mol}/(\text{s}\cdot\text{ft}^2))/(\text{mol}/\text{ft}^3)$	
Mass Velocity		$\text{g}/(\text{s}\cdot\text{m}^2)$	
		$\text{lb}/(\text{s}\cdot\text{ft}^2)$	
Moles	mole	mol	
		lbmol	
Moment of Inertia		$\text{g}/\text{m}^2$	
		$\text{lb}/\text{ft}^2$	
Momentum		$\text{g}\cdot\text{m}/\text{s}$	
		$\text{lb}\cdot\text{ft}/\text{s}$	
NoCategory		NoUnit	
		?	
Percent Obscuration		%/m	
		%/ft	
Percentage		%	Damper Position (percent) Valve Position (percent)
		ppm	CO <sub>2</sub> Concentration Indoor (ppm) CO <sub>2</sub> 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	

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
		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 refriger	
Power Factor		cosf	Power Factor Signed Phase A Power Factor Signed Phase B Power Factor Signed Phase C
Power Reactive		var	Reactive Power Phase A (kvar) Reactive Power Phase B (kvar) Reactive Power Phase C (kvar)
Pressure		N/m <sup>2</sup>	Air Pressure (N/m <sup>2</sup> ) Natural Gas Pressure (N/m <sup>2</sup> ) Steam Pressure (N/m <sup>2</sup> ) Water Pressure Supply (N/m <sup>2</sup> ) Water Pressure Return (N/m <sup>2</sup> ) Water Pressure (N/m <sup>2</sup> )
		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)

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
		mHg	Air Pressure (m Hg) Natural Gas Pressure (N/m <sup>2</sup> ) Steam Pressure (N/m <sup>2</sup> ) Water Pressure Supply (N/m <sup>2</sup> ) Water Pressure Return (N/m <sup>2</sup> ) Water Pressure (N/m <sup>2</sup> )
		inH <sub>2</sub> O	Air Pressure (in H <sub>2</sub> O) Natural Gas Pressure (in H <sub>2</sub> O) Steam Pressure (in H <sub>2</sub> O) Water Pressure Supply (in H <sub>2</sub> O) Water Pressure Return (in H <sub>2</sub> O) Water Pressure (in H <sub>2</sub> O)
		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)
Pressure		mH <sub>2</sub> O	Air Pressure (m H <sub>2</sub> O) Natural Gas Pressure (m H <sub>2</sub> O) Steam Pressure (m H <sub>2</sub> O) Water Pressure Supply (m H <sub>2</sub> O) Water Pressure Return (m H <sub>2</sub> O) Water Pressure (m H <sub>2</sub> O)
		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	$\Omega$	Resistance
Resistivity	ohm meter	$\Omega\text{m}$	
Specific Entropy		J(g·K)	
		Btu/(lb·R)	
		J/(kg·K)	
Specific Humidity		g H <sub>2</sub> O/kg dry air	
Specific Volume		m <sup>3</sup> /g	
		ft <sup>3</sup> /lb	
Surface Energy Density		J/m <sup>2</sup>	
		J/ft <sup>2</sup>	
		W/(h·m <sup>2</sup> )	
		W/(h·ft <sup>2</sup> )	
Surface Tension		N/m <sup>2</sup>	
		lbf/ft	

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
Temperature		°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

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
Temperature Diff		$\Delta^{\circ}\text{C}$	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)
		$\Delta\text{K}$	
		$\Delta^{\circ}\text{F}$	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)



Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
Temperature Rate of Change		°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	

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
		°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
Temperature Rate of Change		°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	

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
		°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/(m <sup>2</sup> ·K)	
Thermal Conductivity		W/(m <sup>2</sup> ·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))
		Btu/(h·ft <sup>2</sup> ·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	

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
		ft/F	
Thermal Pressure		psi/°F	
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)
		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		m³	Air Volume (m³) Steam Volume (m³) Wastewater Volume (m³) Water Volume (m³) Natural Gas Volume (m³)

Descriptive Name	Unit Name	Unit Symbol	Suggested Mappings
Volume		in <sup>3</sup>	
		ft <sup>3</sup>	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 `<httpsTransport ... />`.
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.

## 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
<b>TOTAL</b>	-	<b>100</b>	<b>32.43 MB</b>	<b>11.84 GB</b>

**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:

$$\begin{aligned}
 \text{Single Measurement (MB)} &= \frac{365 \frac{\text{Days}}{\text{Year}} * 24 \frac{\text{Hours}}{\text{Day}} * 4 \frac{\text{Measurement}}{\text{Hour}} * 75 \frac{\text{bytes}}{\text{Measurement}}}{1,048,576 \frac{\text{bytes}}{\text{MB}}} \\
 &= 2.51 \text{ MB / YR}
 \end{aligned}$$

**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 PME9.0 and the license that is required for each type:

Device Type	License	Device Type	License	Device Type	License
3300 ACM	E	3710 ACM	S	3720 ACM	S
3800 RTU	M	ION 6200	E	ION 6200 (MODBUS)	E
ION 7300	E	ION 7330	M	ION 7350	M
ION 7400	M	ION 7500	M	ION 7500 RTU	M
ION 7550	M	ION 7550 RTU	M	ION 7600	S
ION 7650	S	ION 7700	S	PM8000	M
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	ACCESS 9200	E	ACCESS 9200 (MODBUS)	E
ACCESS 9300	E	ACCESS 9330	M	ACCESS 9340	M
ACCESS 9350	M	ACCESS 9360	M	9410	M
ACCESS 9500	M	ACCESS 9500 RTU	M	ACCESS 9510	M
ACCESS 9510 RTU	M	ACCESS 9600	S	ACCESS 9610	S
ACCESS 9700	S	9810	S	AccuSine_PCS	M
AccuSine PCS Plus	M	AccuSine PFV Plus	M	Acti 9 Smartlink	E
Acti 9 Smartlink Ethernet	E	Altivar 61	E	BCPM	E
CM100-200	E	CM2000 Series	M	CM3000 Series	M
CM4000 Series	S	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
ComX (WAGES)	E	DM2000	E	DM6200	E
DM6200 H	E	DM6300	E	EDS151	E
EDS461	E	EM1000 Series	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
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 xD	M	EnerSure BCPM 2.0	M	EnerSure Enkapsis	M
EnerSure iBCPM xD	M	EnerSure iBCPM Enkapsis	M	Galaxy VM	E
Galaxy VX	E	iEM2000 Series	E	iEM3x50 Series	E
iEM3x55 Series	E	IG6	E	LVSMC	E
MGE Galaxy 5000 Series	E	MGE-UPS	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 2.0/5.0/6.0 E	E	Micrologic 2.0/5.0/6.0 E 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	Micrologic 2.0/3.0/5.0/6.0/7.0 X	M	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	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	SER 2408	M
SER 3200	M	Smart-UPS	TBD	Switchgear Monitoring Device	M
Symmetra	TBD	SymmetraMW	TBD	Tesys T	E
Twido Modular PLC (WAGES) D12/28/44	E	Varlogic_NRC_12	E	VarPlus Logic	E
Veeder Root	TBD	BCPM Flex Cct	TBD	Vigilohm IM20_LE	E
VigilohmIM20H	E	WT4000 Series	E		

(\*) 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 device of this type can share one full license.

**E** = Entry-Level Device License

**M** = Mid-Level Device License

**S** = Standard (High-End) Device License

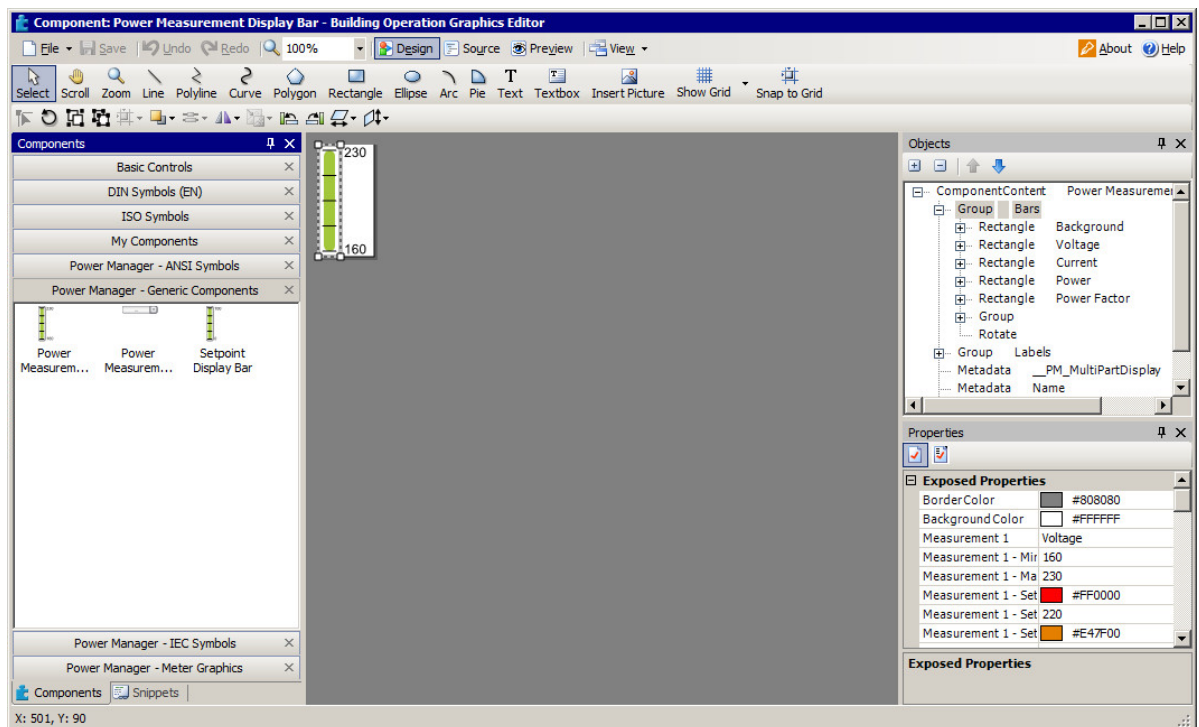
**NOTE:** PME assigns the lowest level required license to a device. If no license of that level is available, then it uses an available next higher level device license. For example, if a system has a PM8000 device, which requires a Mid-Level license, PME will assign a free Standard license to this device, if a Mid-Level license is not available.

## 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:

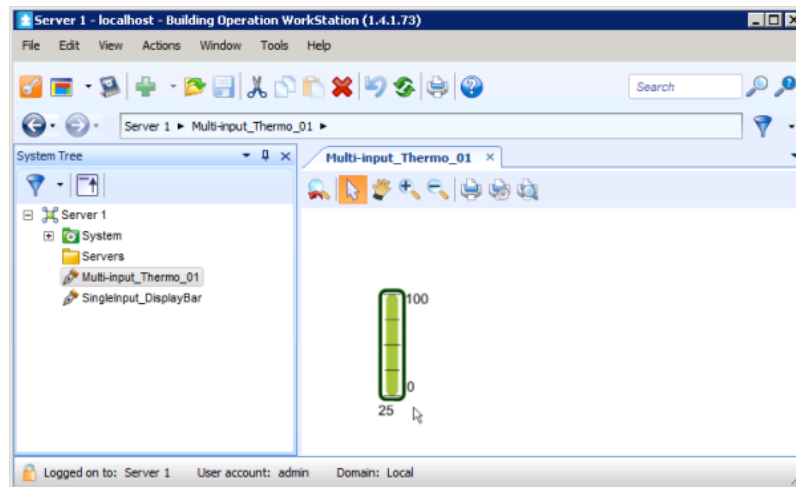
1. Navigate to:  
`<Extract path>\SBO Components\Graphics Editor\Components\` and double-click the "Energy Expert- Generic Components" file. The new thermometer graphic component is added to the Building Operation Graphics Editor library.
2. Open the Building Operation Graphics Editor.
3. From the Energy 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.



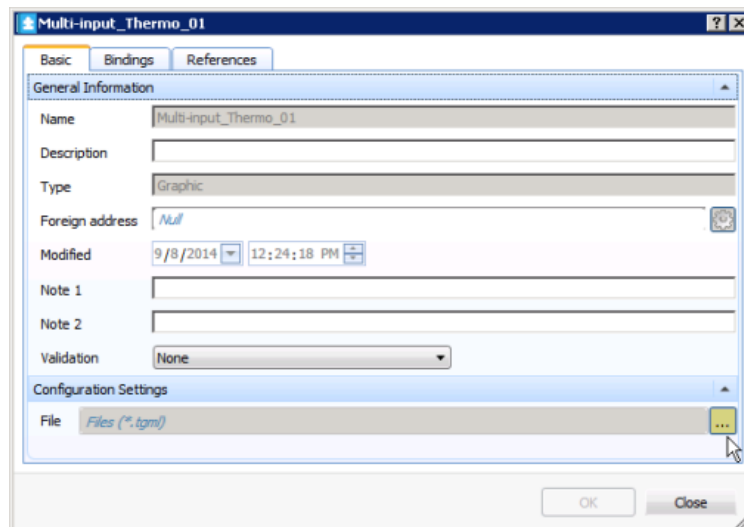
4. Select the component. In the Properties pane at the lower right, change the parameter settings as needed (name, min/max, setpoint values, and so on). Make sure that the settings make logical sense (for example, all setpoints are within the min/max range and in the following order: SP4>SP3>SP2>SP1).
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:

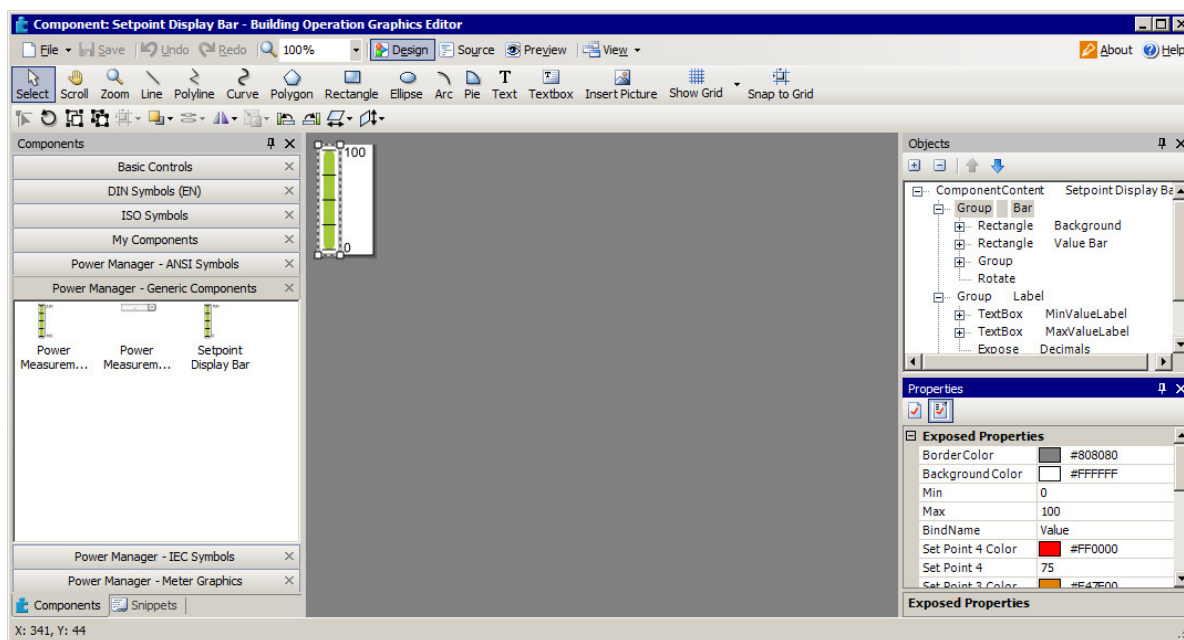
1. In the System Tree, right-click on the new graphic file name and click Edit. The Graphics Editor opens.
2. Revise some graphic component parameters (for example, min/max, setpoint values, or colors), save the file, and return to Building Operation Workstation. Your changes appear on the Graphics page 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.

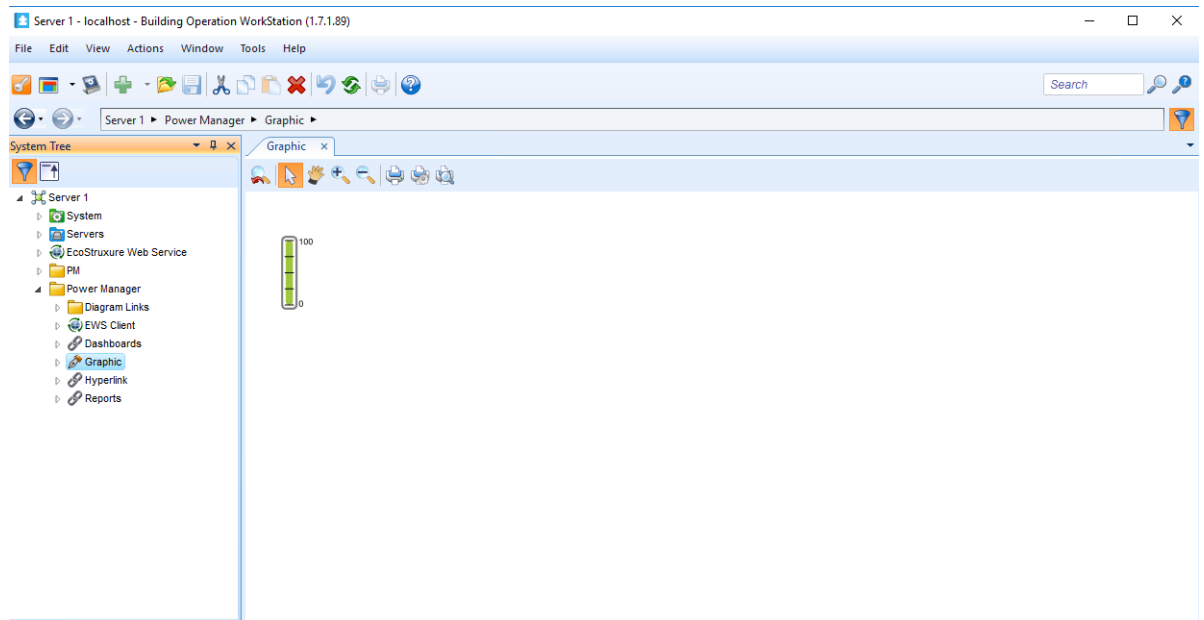


4. Select the component. In the Properties pane at the lower right, change the parameter settings as needed (name, min/max, setpoint values, and so on). Make sure that the settings make logical sense (for example, all setpoints are within the min/max range and in the following order: SP4>SP3>SP2>SP1).
5. Save the new graphic component page as a .tgml file.

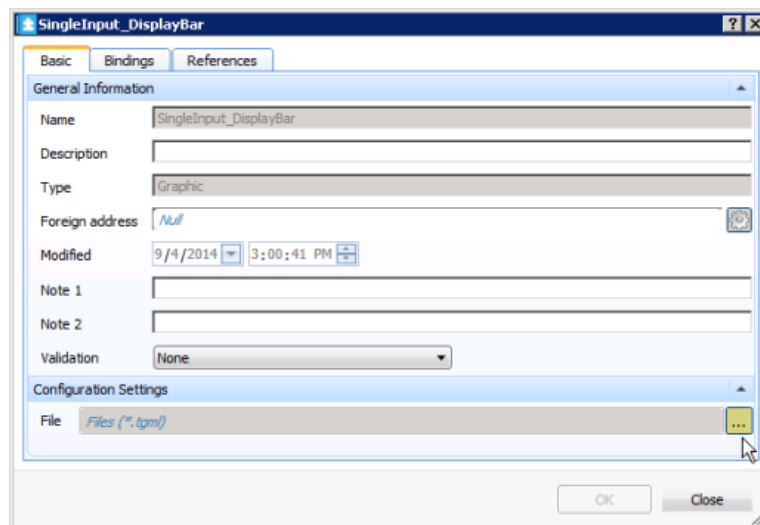
To deploy the graphic component:

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.

Update EWS Server



EWS server configuration updated successfully

OK

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 Energy Expert 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 Energy Expert deployment. When deploying Energy Expert, 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 9.0 System Guide* or the PME Web Applications Help.

### Creating Diagrams, Reports, and Dashboards links in Building Operation

Follow these steps to create links in EBO for all required Diagram, Report, and Dashboard applications:

Enable the Generate Authentication URL page:

1. In PME, navigate to ...\\Applications\\SystemDataService and open Web.config with a text editor, such as Notepad++.
2. In the appSettings tags, locate the line `<add key="IsThirdPartyAuthEnabled" value="false" />` and change the value to 'true', and then save the file.

```
<appSettings>
<add key="webpages:Version" value="1.0.0.0" />
<add key="ClientValidationEnabled" value="true" />
<add key="UnobtrusiveJavaScriptEnabled" value="true" />
<add key="ServiceInventoryEndpoint"
value="http://STANDALONE:23102/CoreServicesHost/Inventory/InventorySer
vice" />
<add key="enableConfigurationView" value="false" />
<add key="enableDiagnosticView" value="false" />
<add key="IsThirdPartyAuthEnabled" value="true" />
```

```
<add key="FrameworkXmlRelativePath" value="..\ApplicationFramework\
Framework.xml" />
<add key="FrameworkSchemaRelativePath"
value="..\ApplicationFramework\Schemas\Framework.xsd" />
</appSettings>
```

3. After the authentication is enabled, use a web browser to navigate to `http://<y-ourservername>/SystemDataService/Auth/GenerateAuthURL`.
4. Provide supervisor-level login information in the dialog and click OK. The Generate Authentication URL page appears.

**NOTE:** If you receive a message indicating that the Generate Authentication URL page is not enabled or that this feature is not licensed, check the Web.config file and make sure the `IsThirdPartyAuthEnabled` line is set to 'true'.

5. Configure and generate the authentication URL by selecting options from the dropdown lists and filling in the applicable fields described below.

Destination URL Type: Select one of the following from the dropdown list:

- **Dashboards:** Provides a link to the PME Dashboard application without the Web Applications banner along the top.
- **Web Reporter - Homepage:** Provides a link to the Web Reporter application without the Web Applications banner along the top.
- **Web Reporter - Opened to Specific Report:** Provides a link to a specific report in the Web Reporter application. To link to a specific report, you must provide the Web Reporter Report ID of the report in the field. To find the report ID, see the `ION_Net-work.dbo.RPT_Report` table. This table contains the report name and corresponding ID number.
- **Web Diagrams - Device Diagram<sup>1</sup>:** Provides a link to the default diagram for a device. To use this feature, you must provide the name of the device in the applicable field. See the device list in the Management Console to find the exact name of the device. You must specify the device name in the formal "Group.Name".
- **Web Diagrams - Network Diagram<sup>2</sup>:** Provides a link to the network diagram for the system.
- **Full Website<sup>2</sup>:** Provides a link to the complete PME Web Applications site

- **Relative Path to Dashboards:** This is the URL to Dashboards. By default, the path name is "/web", however the path name can be changed when installing PME.
- **Destination Protocol:** Select either https (encrypted connection) or http (unencrypted connection) from the dropdown list. Use the https option if PME is configured to use https. Otherwise, use the http option.
- **Destination Host Name:** The name of the PME host system. The name should already be provided in this field.

<sup>1</sup> In Energy Expert, the generated links will work only after you run the Integration Utility once.

<sup>2</sup> Not supported in Energy Expert.

6. Click Generate URL. The application generates a new URL.

Authentication URL: The generated URL appears in this field.

7. Log in to EBO with your credentials.

8. In EBO Workstation, create a new hyperlink and paste into it the newly generated URL.

Repeat the steps above as necessary for all 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\".

```
<appSettings>
<add key=\"ServiceInventoryEndpoint\"
value=\"http://STANDALONE:23102/CoreServicesHost/Inventory/InventoryService\"
/>
<add key=\"EWSRealTimeTimeout\" value=\"45\" />
<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="20" />
<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>

```

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.

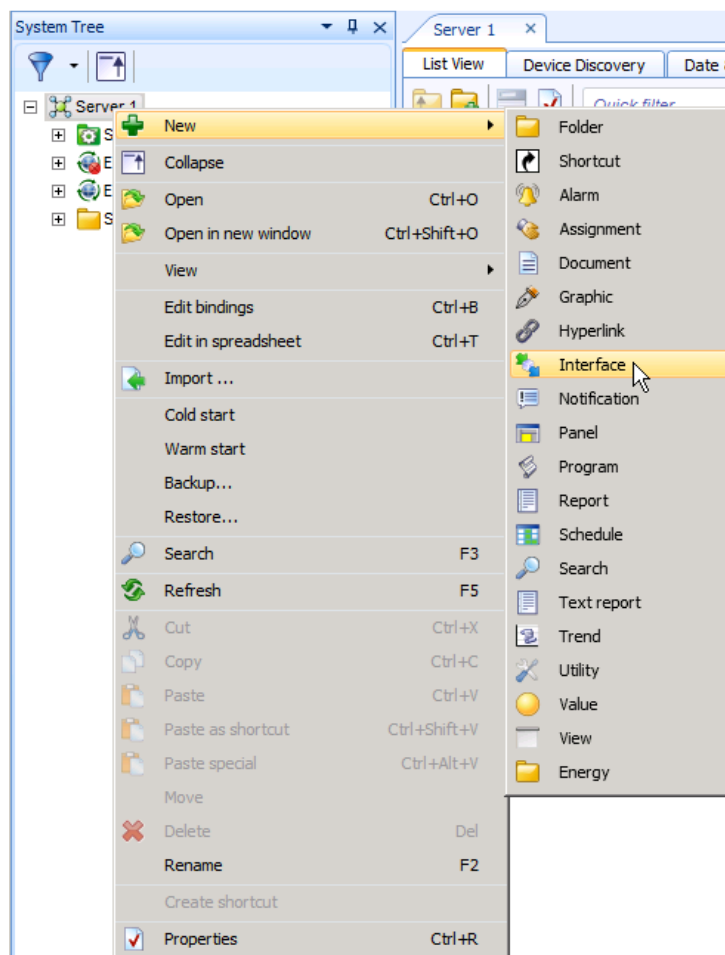
- e. When you finish, select **Tools > System > Update EWS Server** to make the changes.

## Creating and hosting the EWS interface in Building Operation Workstation

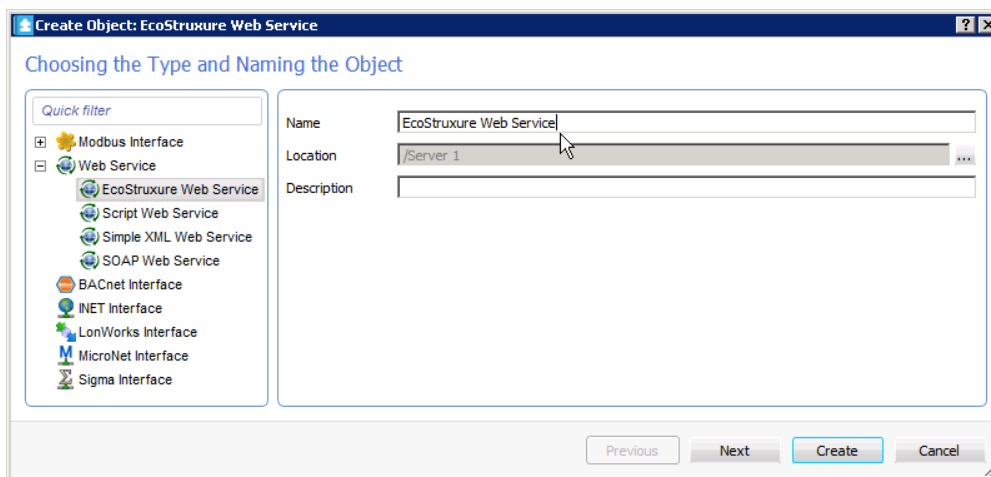
You can manually create the EWS interface in Building Operation Workstation and then host PME values so that you can browse those values from within Building Operation Workstation.

To manually create a new EWS web service interface:

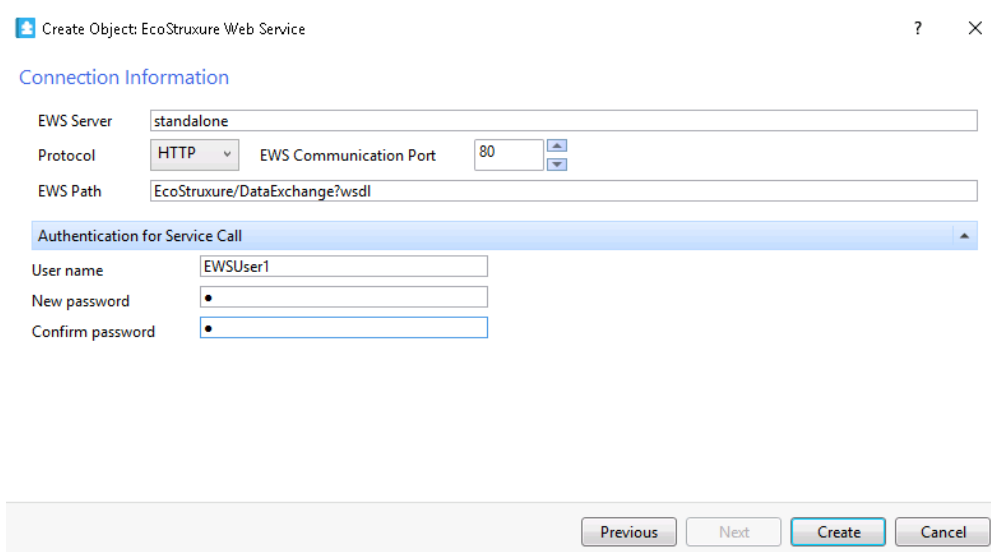
1. Log in to Building Operation.
2. In the System Tree, right-click on Server, and then click New > Interface.



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.

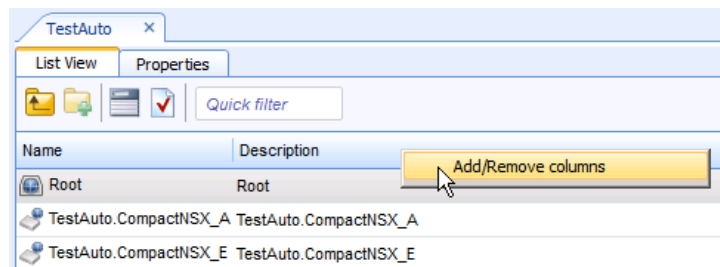
To manually host the new EWS web service:

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.

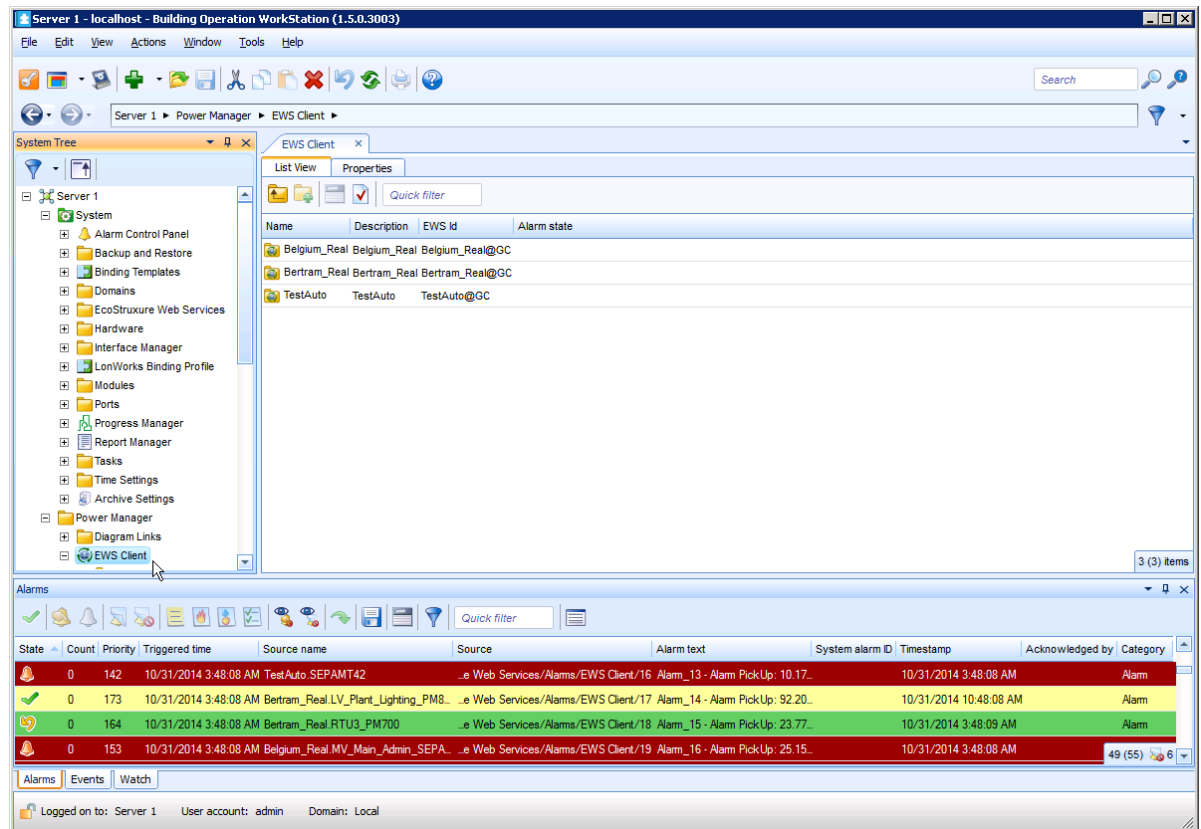
**NOTE:** If you find that some measurements for a device are missing from the list of measurements, do the following:

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”](#).

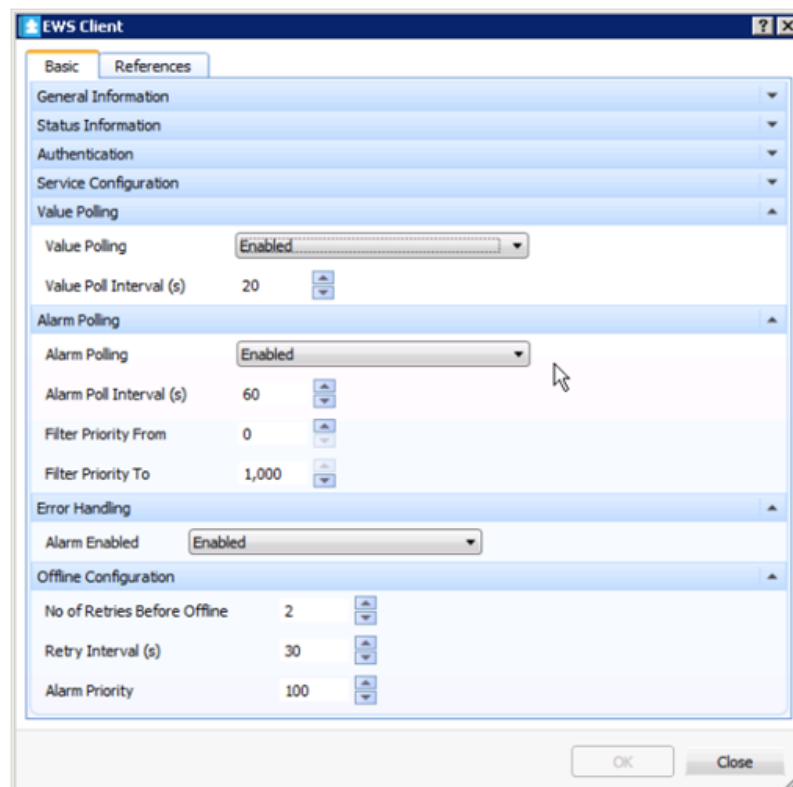
If all of the measurements you want for the device are exposed but still do not appear in the list of measurements, and then you will need to repeat the procedure to create and host the EWS interface. (PME takes some time between enabling the EWS server and when the EWS client shows the exposed measurements.) See [“Creating and hosting the EWS interface in Building Operation Workstation”](#).

## Configuring Alarms

1. Log in to Building Operation.



- 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.
- 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.

## PME IP Port Requirements

PME depends on 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.

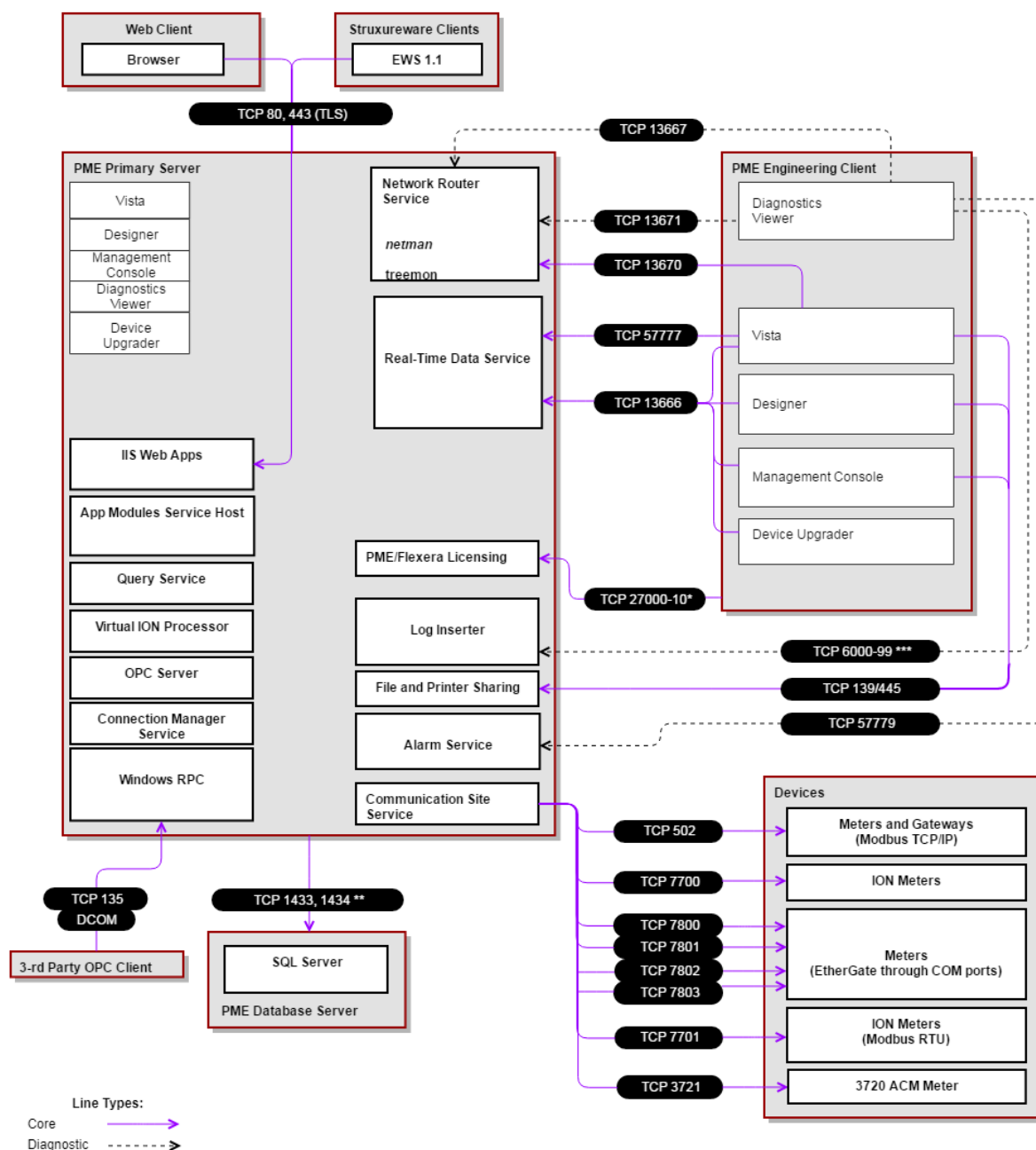
The following table lists all relevant ports and their functions:

Location	Function	Protocol	Ports	Configurable	Direction*
Database Server	SQL Server instance	TCP	1433	No	Inbound
	SQL Server Browser	UDP	1434	No	Inbound
PME Server	IIS Server	HTTP	80	Yes	Inbound
		HTTPS	443	No	Inbound
	Application Module Web Services	TCP	23102	No	Inbound
	PME Diagnostics Viewer (on Engineering client)	TCP	13667 13671 6000-99 57779	No	Inbound
	PME Vista (on Engineering client)	TCP	13666 13670 57777	No	Inbound
	PME Designer (on Engineering client)	TCP	13666	No	Inbound
	PME Management Console (on Engineering client)	TCP	13666	No	Inbound
	PME OPC Client	OPC	135	No	Inbound
	File and Printer Sharing for Engineering client	NetBIOS/SMB	139/445	No	Inbound
	Ecostruxure Web Services	HTTP	80	No	Inbound
	Licensing Vendor Daemon	TCP	27010	Yes	Inbound

Location	Function	Protocol	Ports	Configurable	Direction*
Power Meter	Power Meter communication	Modbus TCP	502	No	Inbound
		Modbus RTU	7701	No	Inbound
		ION	7700	No	Inbound
		PML	3721	No	Inbound
	Power Meter access	Telnet	23	No	Inbound
		FTP	20/21	No	Inbound
		TFTP	69	No	Inbound
		SMTP	25	No	Outbound
		HTTP	80	No	Inbound
		HTTPS	443	No	Inbound
Gateway	Ethergate communication gateway	Modbus/ION/PML	7800-03	No	Inbound

\* The direction of a port is determined by the communication initiation request which will establish the communication socket.

The following image shows the ports and the components they are associated with:



\* The port can be changed to avoid conflicts.

\*\* By default, named instances (including SQL Server Express) use dynamic ports.

\*\*\* Depends on the number of ION software nodes



## Setting SQL Server memory options

Note the following recommendations for setting SQL Server 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

Backup 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**.

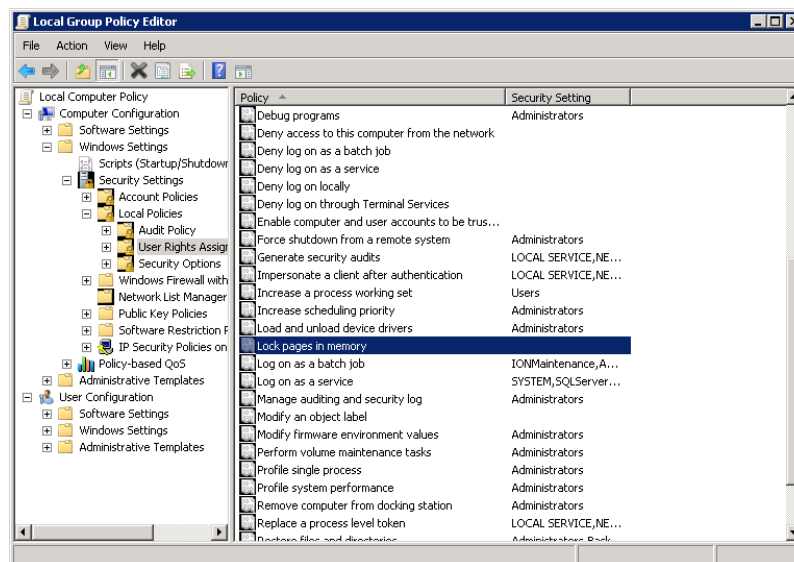
A server reboot or a restart of the SQL Server service is not required.

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.

## 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 "ladminSchneider".

**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.

## 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.

## 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 configuration tools and Web Application settings.

**NOTE:** Only users with Supervisor, Operator, and Controller access level can access the configuration tools. Only users with Supervisor access level can configure the Web Application settings.

The Settings page consists of a Settings Library and a configuration area. The Settings Library provides access to the following configuration tools and settings:

Configuration Tools	<a href="#">Hierarchy Manager</a>
	<a href="#">Modeling Configuration</a>
	<a href="#">Rate Editor</a>
	<a href="#">User Manager</a>
Settings	<a href="#">Diagnostics and Services</a>
	<a href="#">Localization</a>
	<a href="#">Registration Information</a>
	<a href="#">Report Theme</a>
	<a href="#">Theme</a>

**NOTE:** The availability of the Rate Editor and Modeling Configuration are subject to licensing. EcoStruxure Web Services (EWS) appears in the **Settings** pane only if it is enabled in the system.

## Settings

### Diagnostics and Services

#### 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 AM (server time). Each time the service runs, it creates a log file in the `system\bin` folder in the Power Monitoring Expert install location. All diagnostics and usage data is sent to Schneider Electric anonymously. None of the collected information identifies you or your company.

This operation is enabled by default.

To disable the sending of data, select **Disable** in the dropdown list and click **Save** to apply the change.

The following diagnostic and usage data is collected:

Diagnostic data	Usage data
<ul style="list-style-type: none"><li>• Power Monitoring Expertversion</li><li>• Operating system version and type (32- or 64-bit)</li><li>• Number of CPU cores</li><li>• System memory (RAM)</li><li>• .NET Framework version</li><li>• SQL Server version</li><li>• Distributed or local database</li><li>• Location and locales</li><li>• Number of monitors in use</li><li>• Client screen resolution</li><li>• Screen DPI</li></ul>	<ul style="list-style-type: none"><li>• Total number of devices</li><li>• Device type count</li><li>• Number of users</li></ul>

### 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.

To disable the collecting of operational data, select **Disable** in the dropdown list and click **Save** to apply the change.

### Localization

Use the **Localization** configuration page to select the language, region, and currency symbol. The setting for **Region** determines date, time, number, and currency formats.

1. Select the system **Language** from the drop-down list.
2. Select the **Region** from the drop-down list.

Instructions indicate that the application must be reloaded before your changes take effect.

3. Select the **Currency Symbol** you want to use from the drop-down list.
4. When you complete your localization settings, click **Save**.

### Registration Information

Registration Information will be used by Schneider Electric to help provide support and to enhance the service we provide to you. Schneider Electric will never sell nor 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 System 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**, choose to **Use Theme Colors**, or to **Override Theme Colors**.  
The theme colors are defined by the Theme settings for the Web Applications. See [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.

## Theme

Use the **Theme** configuration page to:

- Change the image and text that is displayed in the top left corner of the Web Applications window.
- Change the color for the borders and other elements of the user interface.
- Specify if you want to display the vendor logo in the top right corner of the Web applications window.
- Choose the location of the side panel to be on the right or left side of the user interface.
- Specify if you want to use compact mode navigation.
- Reset the theme to system defaults.


To change the top left logo and text:

1. Under **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 **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.

3. Click **Save** to apply the changed settings.

To specify the display of the vendor logo:


1. Under **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 choose the location of the side 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.

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.

To reset the theme to the system defaults:

1. Click **Default Theme**.
2. Click **Save** to apply the changed settings.

## 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 application from the Configuration Tools section on the **Settings** page in the Web Applications banner. You can also open Hierarchy Manager from the **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. In situations where 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, you 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 you must add this building information into 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 several meters. In Hierarchy Manager, you must swap the old devices with the new by changing the end date for the existing devices to the day they were removed. New devices must be associated with their correct areas and their start dates must correspond to the date they were installed.

### Open Hierarchy Manager

You need an access level of Supervisor, Controller, or Operator to use the application.

1. Open Hierarchy Manager in one of the following ways:
  - Click **Settings** in Web Applications, and then click Hierarchy Manager in the **Configuration Tools** panel.
  - Open Management Console and click **Tools > Hierarchy Manager**.
2. Type a user name and password in the Log In dialog, if required, and click **OK** to open Hierarchy Manager.

**Site**, **Buildings**, and **Areas** tabs represent each Node type.

In the following steps, devices have already been added to the system through Management Console, and the hierarchy has been populated with site, building, and area information. For additional information regarding adding devices to the system, refer to the "Management Console" section of the *Power Monitoring Expert System Guide*.

Name	Building
Faber College	Building Two, Building One

## Add Building Three 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.

The screenshot shows the 'Hierarchy Manager' application with the 'Buildings' tab selected. The interface includes a header with 'Show Views | Help' and a sub-header with tabs for 'Site', 'Buildings', 'Areas', and 'Virtual Meter'. Below the tabs, there are 'Add', 'Edit', and 'Delete' buttons. The main area displays a table with columns 'Name', 'Site', and 'Areas'. Each column has a filter input field. The table contains two rows: 'Building One' associated with 'Faber College' and 'Room 1B, Room 1A, Room 1C, Room 1D'; and 'Building Two' associated with 'Faber College' and 'Room 2A, Room 2C, Room 2B'.

Name	Site	Areas
Building One	Faber College	Room 1B, Room 1A, Room 1C, Room 1D
Building Two	Faber College	Room 2A, Room 2C, Room 2B

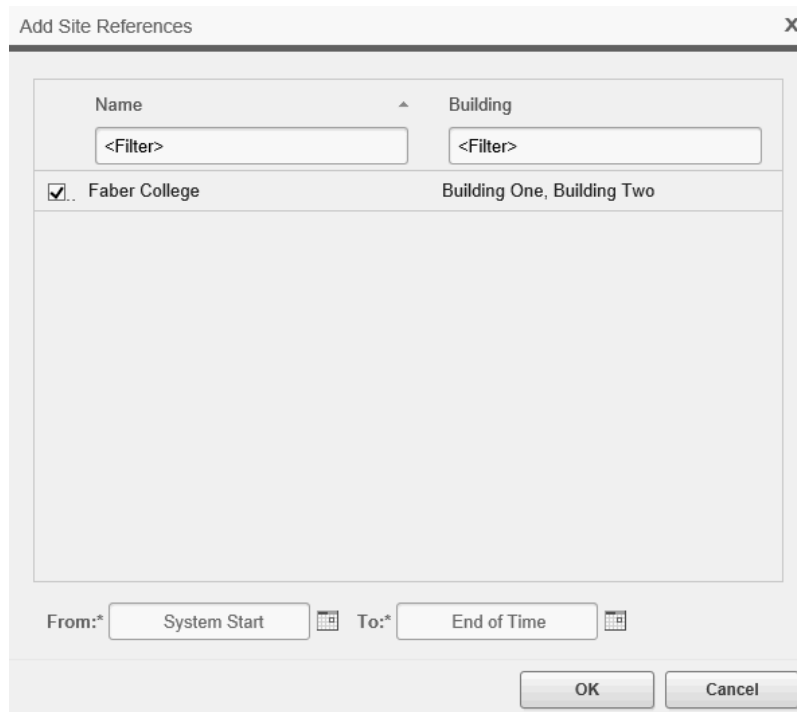
2. To add Building Three, click **Add** above the Buildings grid to open the **Properties** dialog for the Buildings node, then type Building Three in the **Name** field.

The screenshot shows the 'Properties' dialog box. It has a 'Name' field containing 'Building Three'. Below it is a 'Site' section with an 'Add' button and 'Edit' and 'Delete' buttons. To the right is an 'Areas' section with 'Add', 'Edit', and 'Delete' buttons. Below the 'Areas' buttons is a table with columns 'Name', 'Start Date\*', and 'End Date\*'. At the bottom of the dialog are 'OK' and 'Cancel' buttons.

Name	Start Date*	End Date*
------	-------------	-----------

3. Click **Add** above the Site grid to open the **Add Site References** dialog and select the Faber College site name in the grid.



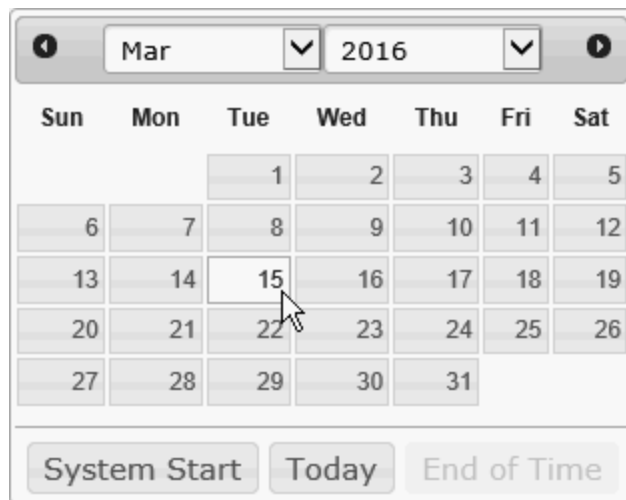


The "Add Site References" dialog box contains the following elements:

- Name** and **Building** filter fields, each with a "<Filter>" placeholder.
- A list of site references with a checked entry:
 

Name	Building
<input checked="" type="checkbox"/> Faber College	Building One, Building Two
- From:** System Start (with a calendar icon) and **To:** End of Time (with a calendar icon).
- OK** and **Cancel** buttons.

- Click the **From** date field or click the calendar icon beside it. Select a start date of March 15 in the calendar.



The calendar shows the month of March 2016. The date 15 is selected, indicated by a mouse cursor. Below the calendar grid are three buttons: "System Start", "Today", and "End of Time".

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

When you select the date, the calendar closes.

- Confirm that the date has changed in the **Start Date** column under **Sites**, then click **OK**.

Properties

Name  
Building Three

Site

Add Edit Delete

Name	Start Date*	End Date*
Faber College	3/15/2016	End of Time

Areas

Add Edit Delete

Name	Start Date*	End Date*
------	-------------	-----------

OK Cancel

### Associate areas and devices to Building Three

1. Click the **Areas** tab.

Four new areas need to be created: Room 3A to Room 3D. You need to associate these areas with the new building, and assign devices to each area. Set the start date for all of these to March 15.

2. Click **Add** above the **Areas** grid to open the **Properties** dialog for the Areas node, then type Room 3A in the **Name** field.

Properties

Name  
Room 3A

Building

Add Edit Delete

Name	Start Date*	End Date*
------	-------------	-----------

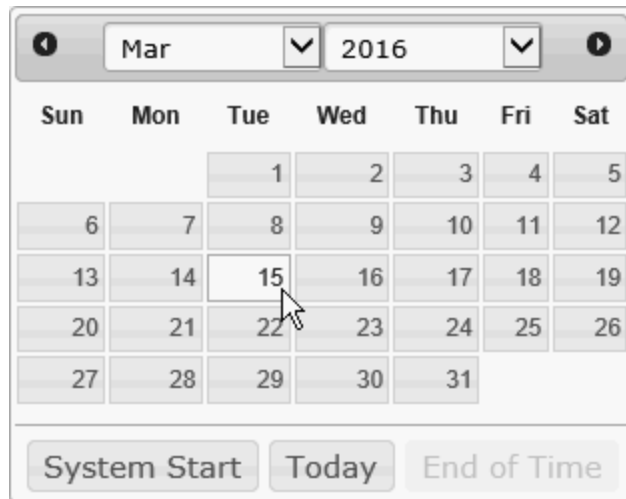
Device

Add Edit Delete

Name	Start Date*	End Date*
------	-------------	-----------

OK Cancel

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 beside it. Select the start date of March 15 in the calendar.

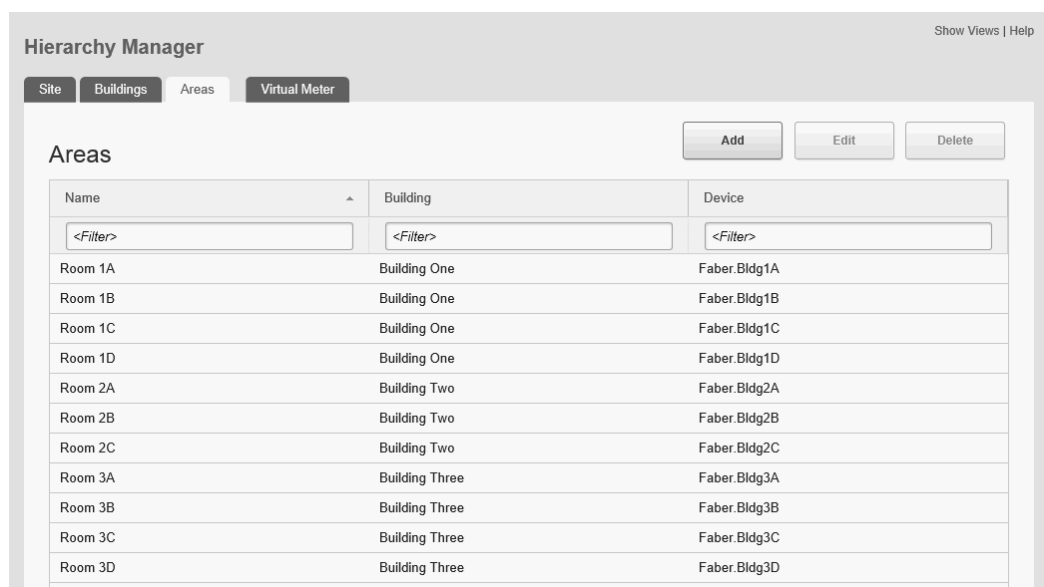


When you select the date, the calendar closes.

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 Faber.Bldg3A to assign it to the Room 3A.
9. Click the **From** field or click the calendar icon beside it. Select the start date of March 15 in the calendar.

When you select the date, the calendar closes.

10. Confirm that the date has changed in the **Start Date** column under **Device**, then click **OK**.
11. Follow the same steps to create Room 3B, 3C, and 3D as areas, and assign the respective devices Faber.Bldg3B, Faber.Bldg3C, and Faber.Bldg3D to them. 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**. 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 two devices in Building Two after a renovation. Set the end dates for the devices you are replacing to the date they are removed. Then assign new devices to the areas with their start dates set to the day the devices are installed.

The devices that you are replacing are associated with Room 2B and 2C in Building Two.

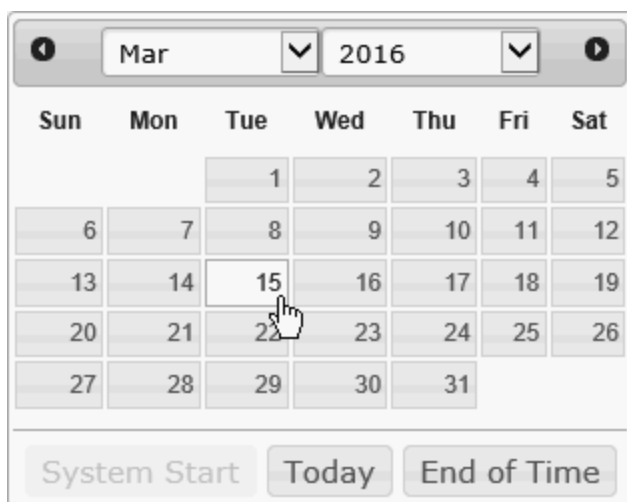
When this task is complete:

- The entry for each device is grayed-out and italicized in the hierarchy if the **End Date** is the current date or earlier.
- Any reports that include these areas only includes data collected by these devices 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 Room 2B in the grid, or select it and click **Edit** to open the **Properties for Room 2B** dialog.

3. Double-click Faber.Bldg2B 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. Select the end date of March 15 in the calendar.



When you select the date, the calendar closes.

5. Confirm that the date has changed in the **End Date** column under **Device**, then click **OK**.  
You can now associate the new device with this area. For the purposes of this example the new device has already been added to the system through Management Console.
6. Click **Add** above the **Device** grid to open the **Add Device References** dialog.
7. Select the new device, Faber.Bld2BN.
8. Click the **From** field, or click the calendar icon beside it. Select the start date of March 15 in the calendar.

When you select the date, the calendar closes.

9. Confirm that the date has changed in the **Start Date** column under **Device**, then click **OK**.
10. Perform the same steps for Room 2C.

When you complete these tasks, any reports that include these areas with a date range that extends beyond the device start date includes data collected by these new devices as of their start date. The reports do not include any data for the removed devices 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.

**NOTE:** You cannot edit the percentage for an apportioned device after you set it. To change the percentage, you need to change the end date and add the device with a new start date and updated apportionment percentage, or delete it from the hierarchy and add it again as new entry with the required percentage.

To create an apportioned meter:

1. Select the device you want to apportion in the Add Device References dialog.
2. Change the value in the **Percentage** field.
3. If required, click the **From** or **To** fields to change the start and end dates for the apportioned meter.
4. Click **OK**.

The following image shows that Faber.Bldg2A has an apportioned value of 75 percent as of March 15.

The screenshot shows the 'Add Device References' dialog box. It contains a table with the following data:

Full Name	Group	Name
<input type="checkbox"/> Faber.Bldg1A	Faber	Bldg1A
<input type="checkbox"/> Faber.Bldg1B	Faber	Bldg1B
<input type="checkbox"/> Faber.Bldg1C	Faber	Bldg1C
<input type="checkbox"/> Faber.Bldg1D	Faber	Bldg1D
<input checked="" type="checkbox"/> Faber.Bldg2A	Faber	Bldg2A
<input type="checkbox"/> Faber.Bldg2B	Faber	Bldg2B
<input type="checkbox"/> Faber.Bldg2C	Faber	Bldg2C
<input type="checkbox"/> Faber.Bldg3A	Faber	Bldg3A
<input type="checkbox"/> Faber.Bldg3B	Faber	Bldg3B
<input type="checkbox"/> Faber.Bldg3C	Faber	Bldg3C

Below the table, the 'Percentage' field is set to 75. The 'From' date is 3/15/2016, and the 'To' date is 'End of Time'. The 'OK' and 'Cancel' buttons are at the bottom.

### 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.

Name	Start Date*	End Date*
Faber.Bldg2A	3/15/2016	End of Time
Faber.Bldg2C	3/15/2016	End of Time

Time intervals of the attached devices operate in the same manner as time intervals 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.

## 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.

## 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 > Configuration Tools** 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 > Configuration Tools** 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](#).

## Create Model Report

**NOTE:** This report is part of the Energy Analysis Module. This Module requires a separate license.

This 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 the model has been created, you do not need to run this report again, unless you want to create a new model.

### 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*

Type a title for the report in the text box.

#### *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 measurements 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.

### *Independent Variable(s)*

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 maximum 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.

### *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 whether you want to view timestamps in either Server Local Time, UTC (Universal Coordinated Time), or in the timezone of the source.

### *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 > Configuration Tools > Modeling Configuration.

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.

#### *Use Exception Periods*

Choose to use exception periods or not by selecting **Yes** or **No** for **Use Exception Periods**.

#### *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.

#### *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**.

#### **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>

## **Use Model Report**

**NOTE:** This report is part of the Energy Analysis Module. This Module requires a separate license.

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 a graphical representation of the modeled data, the actually measured data, and the delta between the two. It also includes tables with numeric data.

Use this report to compare expected consumption to actual consumption in order to identify unexpected changes in your consumption, or to identify 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*

Type a title for the report in the text box.

#### *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.

#### *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.

#### *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 whether you want to view timestamps in either Server Local Time, UTC (Universal Coordinated Time), or in the timezone of the source.

#### *Include Measured Data*

Choose to include the actual data with the modeled data or not by selecting **Yes** or **No** for **Include Measured 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.

### *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**.

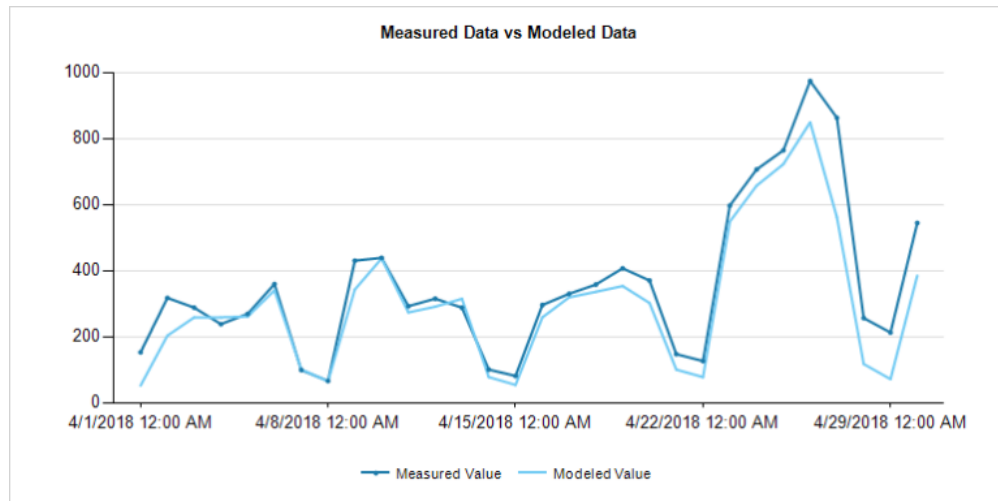
**TIP:** Setup a subscription to run the model report weekly for the last 7 days and save the output into the database. This will ensure you have a complete data set for modeled data for use in Dashboards and Trends.

### **Example:**

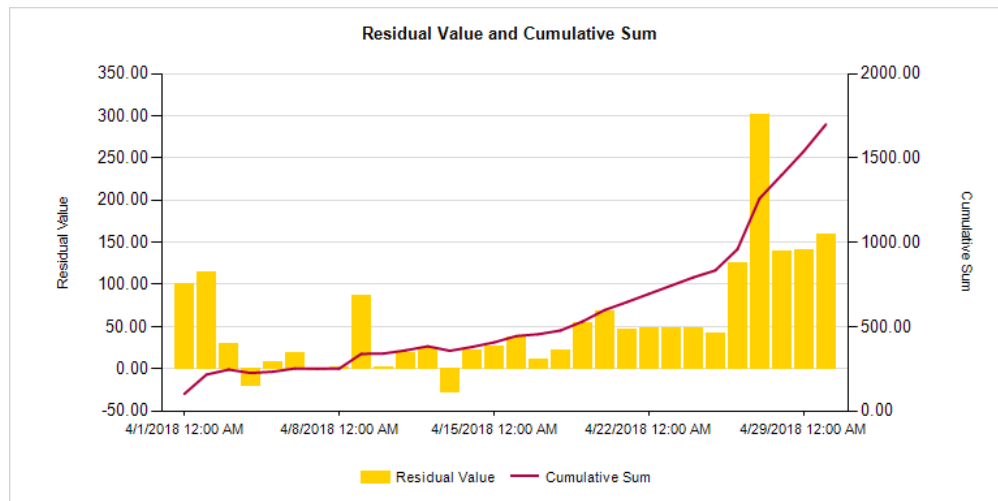
Display Mode : Forecast  
Sum of measured data for the reporting period : 10674.28  
Sum of modeled data for the reporting period : 8975.22  
CuSum value at the end of the reporting period : 1699.06 or 18.93%

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 pages 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>

## 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.

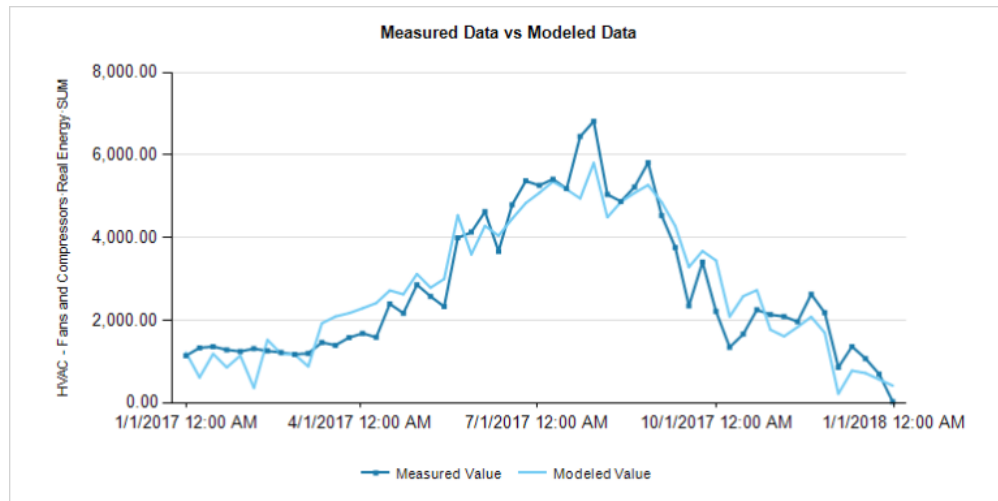
We use the following inputs for the Create Model report:

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

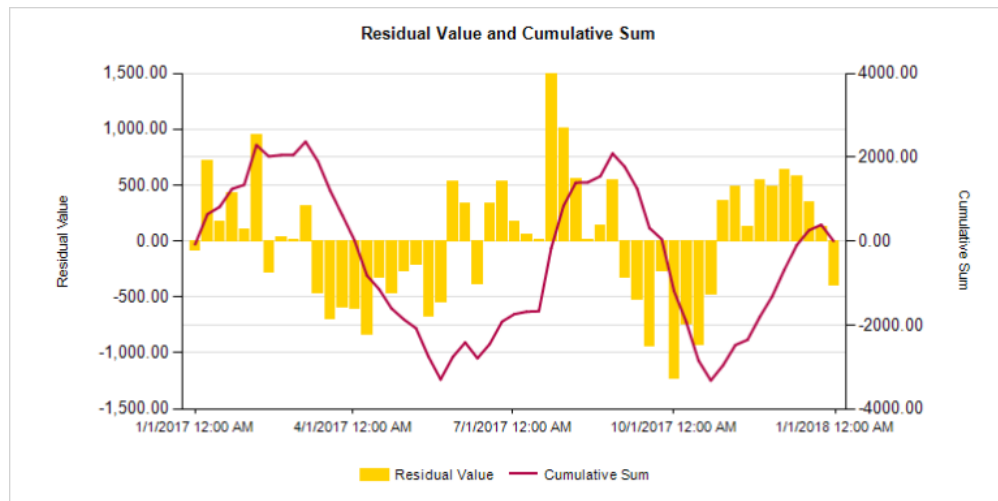
For the first run we choose an interval of **Week**, only to see if there is a strong relationship between consumption and the independent variables. Later we change this to **Day** to get a Daily Model.

Results:

Interval :	Week
Sub-Model :	No Sub-Model
Calculated R <sup>2</sup> :	0.894
<b>Errors</b>	
No errors or warnings detected.	



**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 shows that there is a 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.

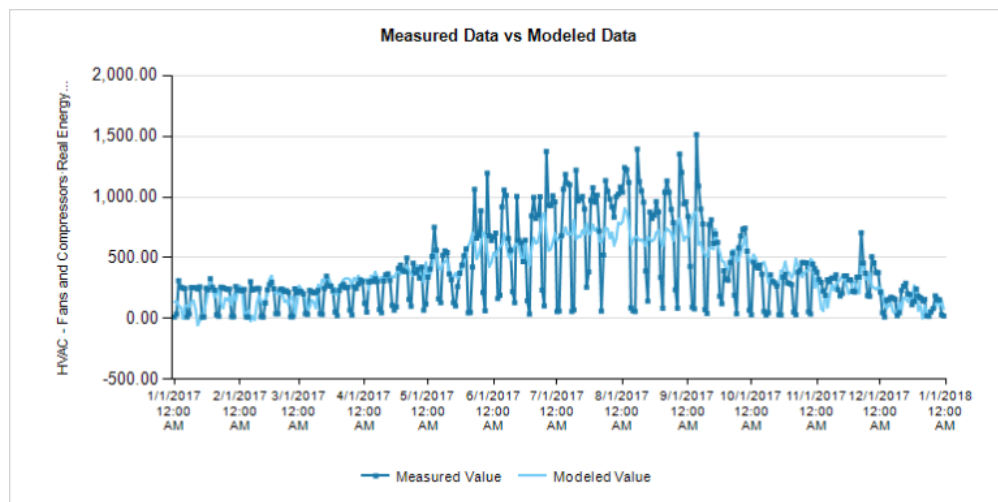
We use the following inputs for the Create Model report:

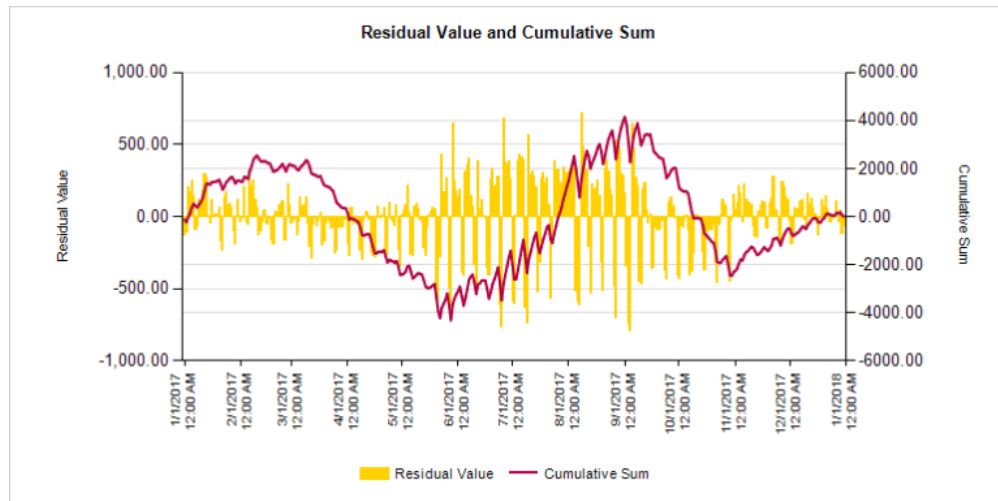
Title	Create Model Report
Dependent Variable	Source = HVAC - Fans and Compressors Measurement = Real Energy (kWh) Aggregation Method = SUM

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 = <b>Day</b> 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 <sup>2</sup> :	0.431
<b>Errors</b>	
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

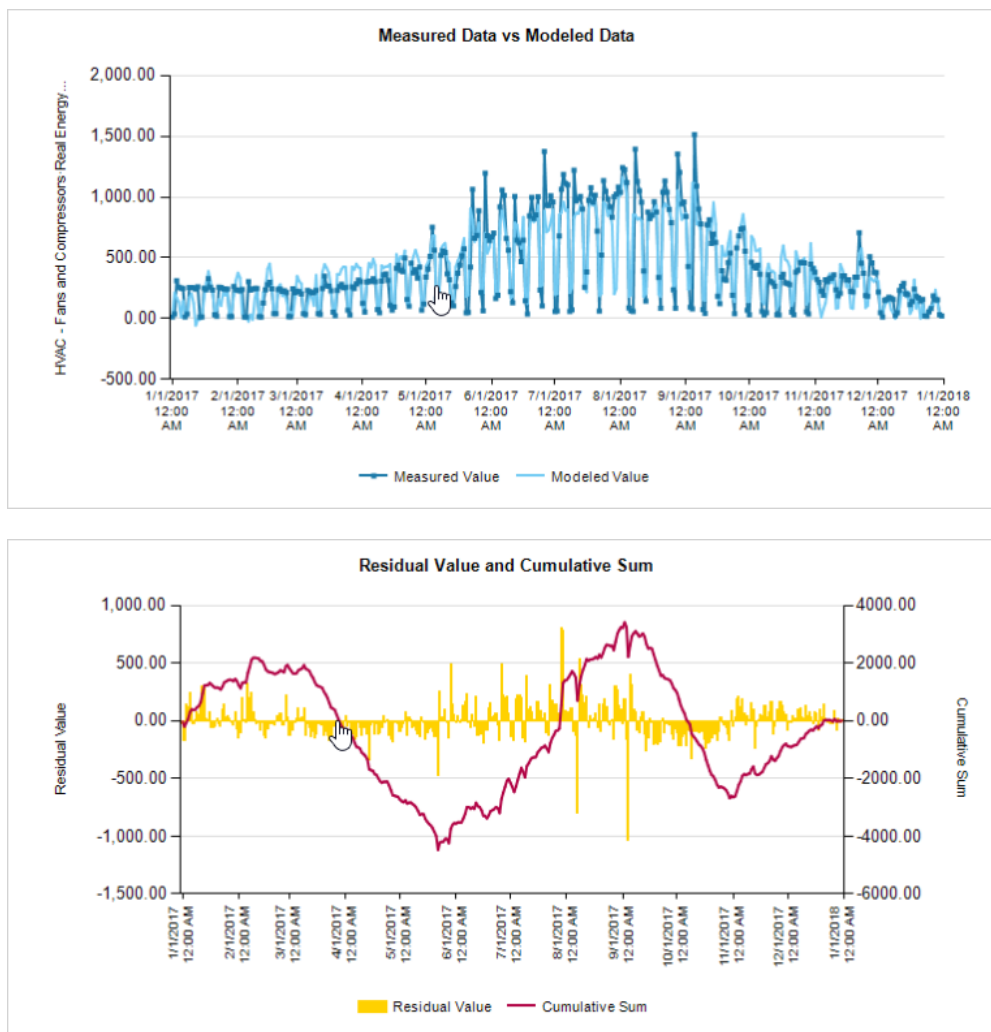
We use a Weekday vs Weekend sub-model.

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 = <b>Weekday vs Weekend</b>
Use Exception Periods	No
Show Detailed Results	No
Save Model Configuration	No

### Results:

Interval :	Day
Sub-Model :	Weekday vs Weekend
Calculated $R^2$ :	0.78
<b>Errors</b>	
No errors or warnings detected.	



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.

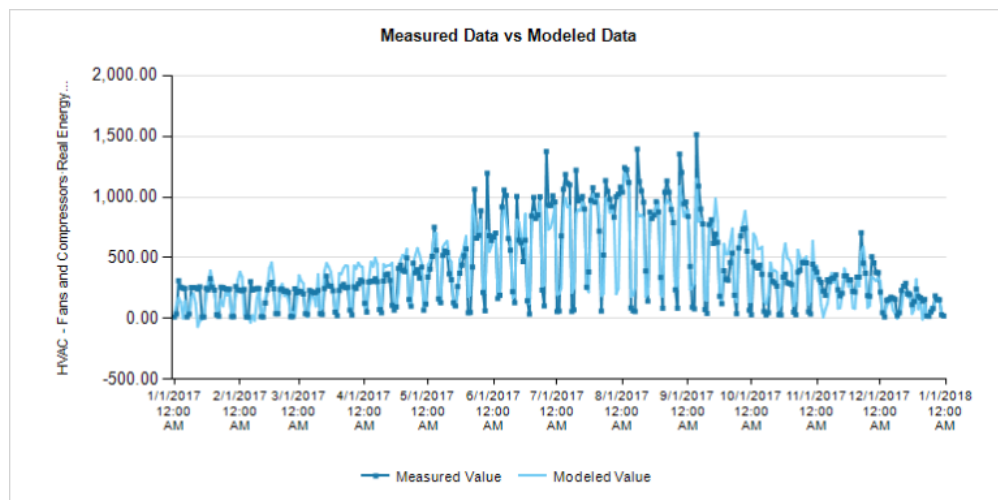
We use the following inputs for the Create Model report:

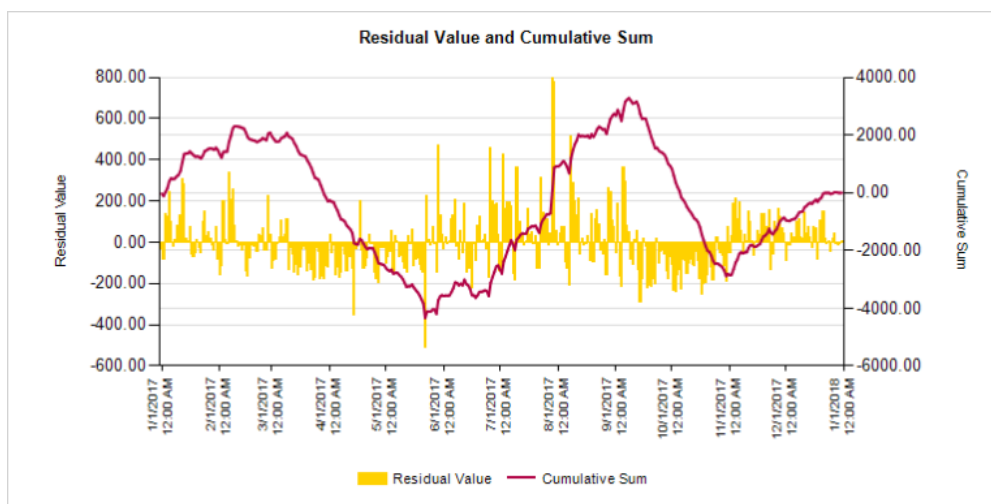
Title	Create Model Report
Dependent Variable	Source = HVAC - Fans and Compressors Measurement = Real Energy (kWh) Aggregation Method = SUM

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	<b>Yes</b>
Show Detailed Results	No
Save Model Configuration	No

## Results:

Interval :	Day
Sub-Model :	Weekday vs Weekend
Calculated R <sup>2</sup> :	0.82
<b>Errors</b>	
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 = <b>CDD</b>  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

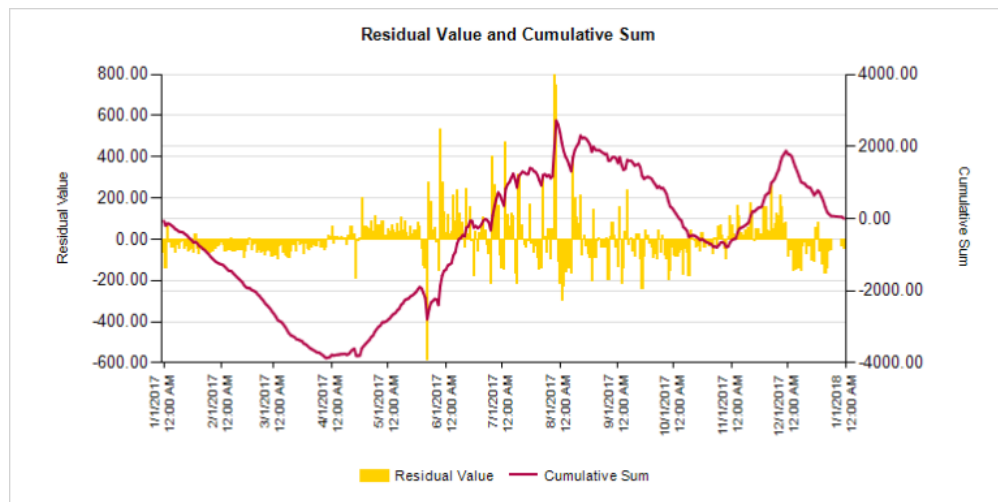
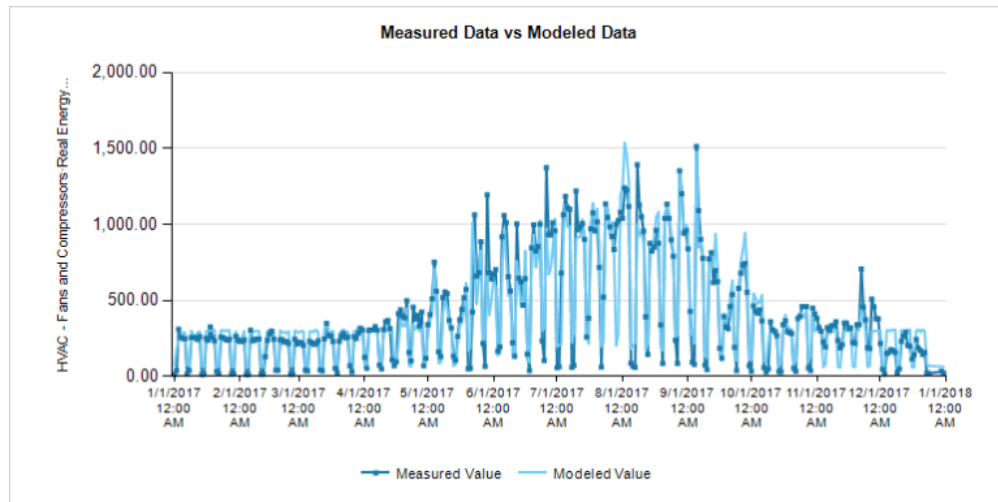
Results:



Interval : Day  
 Sub-Model : Weekday vs Weekend  
 Calculated R<sup>2</sup> : 0.866

#### Errors

Matrix is rank deficient.



We now have a pretty accurate model of our energy consumption based on outside temperature and humidity.

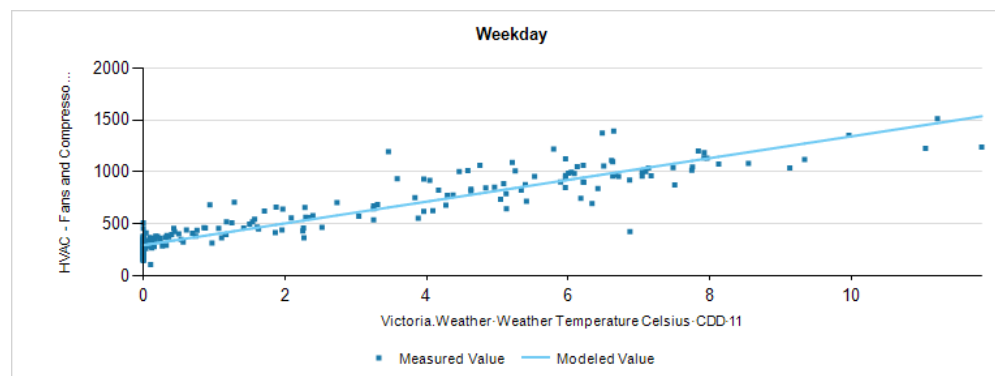
**TIP:** Choose to include model creation details in the report.

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.

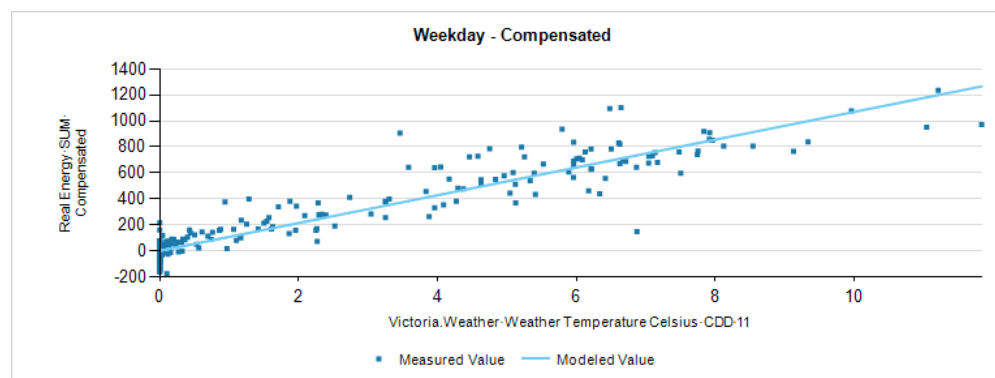
## Statistical information:

Errors									
Matrix is rank deficient.									
Sub Model	Sub Model R <sup>2</sup>	Formula							
Weekday [n=246]	0.879	$Y = 211.998 + 107.012 * [\text{Victoria.Weather.Weather Temperature Celsius-CDD-11}] + 0.987 * [\text{Victoria.Weather.Weather Relative Humidity-AVG}]$							
Weekend [n=105]	0.203	$Y = 111.64 + 22.516 * [\text{Victoria.Weather.Weather Temperature Celsius-CDD-11}] - 0.534 * [\text{Victoria.Weather.Weather Relative Humidity-AVG}]$							
Holiday [n=9]	0.005	$Y = 143.787 + 1.705 * [\text{Victoria.Weather.Weather Temperature Celsius-CDD-11}] + 0.882 * [\text{Victoria.Weather.Weather Relative Humidity-AVG}]$							
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 %	

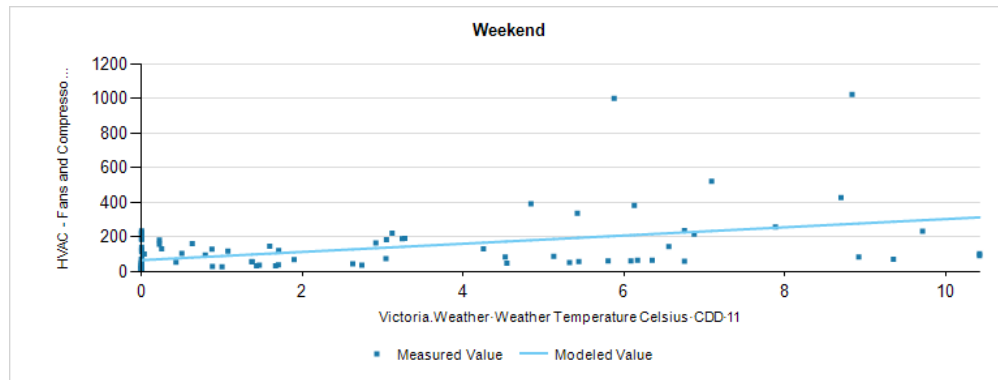
## Weekday sub-model data driven by outside temperature vs measured data:



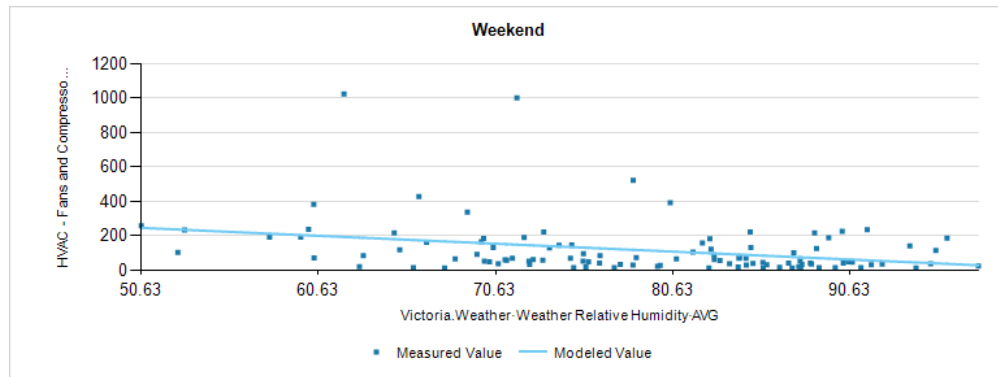
## Weekday sub-model data driven by outside temperature with influence of humidity removed vs measured data:



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](#).

## Rate Editor

The Rate Editor is a Web-based application that lets you change cost values for items included in a billing report.

Open the Rate Editor application from the Configuration Tools section on the **Settings** page in the Web Applications banner. You can also open Rate Editor from the **Tools** menu in the Management Console.

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).

## User Manager

**TIP:** You can open User Manager from the Configuration Tools folder on the **SETTINGS** page in the Web Applications banner. You can also open User Manager from the **Tools > Web Tools** menu in the Management Console.

**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. Power Monitoring Expert (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. User Manager also gives information about the Web Application user licenses for the system.

### 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 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 reference information see:

- [User Manager user interface](#)
- [User access levels and permissions](#)

## 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	<p>This is a PME native user account. The username, password, and details are defined in the PME User Manager.</p> <p>Note: The email addresses defined for a user can be used for report subscriptions.</p>

User Type	Characteristics
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 [User access levels and permissions](#).

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, < > : " / \ | ? \* , ; @ # % ' ^ & ( ) ! = + - ~ . \$
- Passwords cannot contain a 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](#)
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#### User groups

- [User Groups](#)
- [Adding a user group](#)
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- [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 reference information see:

- [User Manager](#)
- [User Manager user interface](#)
- [User access levels and permissions](#)

### **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.

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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- [Changing a user access level](#)
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- [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 reference information see:

- [User Manager](#)
- [User Manager user interface](#)
- [User access levels and permissions](#)

## 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 group](#)

For information on the Web Application user licenses, see:

- [Viewing Web Applications user license information](#)

For reference information see:

- [User Manager](#)
- [User Manager user interface](#)
- [User access levels and permissions](#)

### **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](#)
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For information on the Web Application user licenses, see:

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For reference information see:


- [User Manager](#)
- [User Manager user interface](#)
- [User access levels and permissions](#)

## 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
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- [Changing a user access level](#)
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- [User Groups](#)
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For information on the Web Application user licenses, see:

- [Viewing Web Applications user license information](#)

For reference information see:

- [User Manager](#)
- [User Manager user interface](#)
- [User access levels and permissions](#)

## 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 passwords vary from site to site. Work with the facility IT System Administrator to ensure that password management adheres to the site-specific cyber security 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
- [Changing a user access level](#)
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For information on the Web Application user licenses, see:

- [Viewing Web Applications user license information](#)

For reference information see:

- [User Manager](#)
- [User Manager user interface](#)
- [User access levels and permissions](#)

## 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.

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](#)

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For information on the Web Application user licenses, see:

- [Viewing Web Applications user license information](#)

For reference information see:


- [User Manager](#)
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- [User access levels and permissions](#)

## 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](#)
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For information on the Web Application user licenses, see:

- [Viewing Web Applications user license information](#)

For reference information see:


- [User Manager](#)
- [User Manager user interface](#)
- [User access levels and permissions](#)

## 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.

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](#)
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User groups

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For information on the Web Application user licenses, see:

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For reference information see:

- [User Manager](#)
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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 with Supervisor access.
- 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](#)
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- [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 reference information see:

- [User Manager](#)
- [User Manager user interface](#)
- [User access levels and permissions](#)

## 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 from the list of available users, and then click **Next**.

**NOTE:** Supervisor level users are not included in the available users list. 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](#)
- [Changing a username](#)
- [Changing a user password](#)
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For information on the Web Application user licenses, see:

- [Viewing Web Applications user license information](#)


For reference information see:

- [User Manager](#)
- [User Manager user interface](#)
- [User access levels and permissions](#)

## 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. 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](#)
- [Changing a username](#)
- [Changing a user password](#)
- [Changing a user access level](#)
- [Changing user details](#)
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#### User groups

- [User Groups](#)
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- [Adding sources to a user group](#)
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- [Removing a user from a user group](#)
- [Removing sources from a user group](#)
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For information on the Web Application user licenses, see:

- [Viewing Web Applications user license information](#)


For reference information see:

- [User Manager](#)
- [User Manager user interface](#)
- [User access levels and permissions](#)

### 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](#)
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For reference information see:


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- [User access levels and permissions](#)

### 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](#)
- [Adding a Windows user](#)
- [Adding a Windows group](#)
- [Changing a username](#)
- [Changing a user password](#)
- [Changing a user access level](#)
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For information on the Web Application user licenses, see:

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For reference information see:

- [User Manager](#)
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- [User access levels and permissions](#)

## 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](#)
- [Changing a username](#)
- [Changing a user password](#)
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For information on the Web Application user licenses, see:

- [Viewing Web Applications user license information](#)



For reference information see:

- [User Manager](#)
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- [User access levels and permissions](#)

## 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

- [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:

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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](#)
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For information on the Web Application user licenses, see:

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For reference information see:

- [User Manager](#)
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- [User access levels and permissions](#)

## 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:

### 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 information on the Web Application user licenses, see:

- [Viewing Web Applications user license information](#)


For reference information see:

- [User Manager](#)
- [User Manager user interface](#)
- [User access levels and permissions](#)

## 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

- [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](#)
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- [Deleting a user group](#)

For information on the Web Application user licenses, see:

- [Viewing Web Applications user license information](#)

For reference information see:

- [User Manager](#)
- [User Manager user interface](#)
- [User access levels and permissions](#)

### 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](#)
- [Adding a standard user](#)

- [Adding a Windows user](#)
- [Adding a Windows group](#)
- [Changing a username](#)
- [Changing a user password](#)
- [Changing a user access level](#)
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For information on the Web Application user licenses, see:

- [Viewing Web Applications user license information](#)

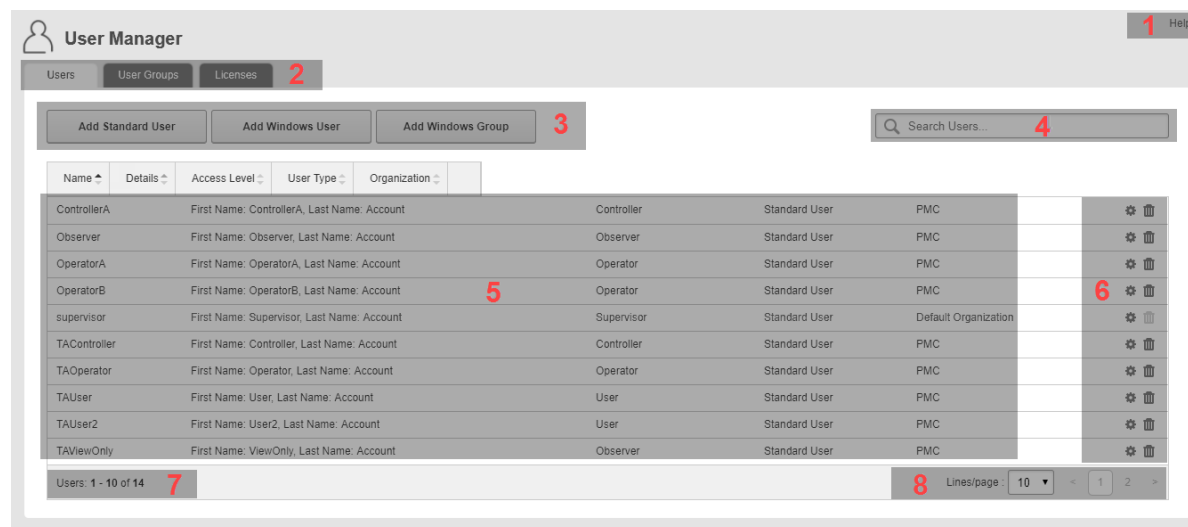
For reference information see:



- [User Manager](#)
- [User Manager user interface](#)
- [User access levels and permissions](#)



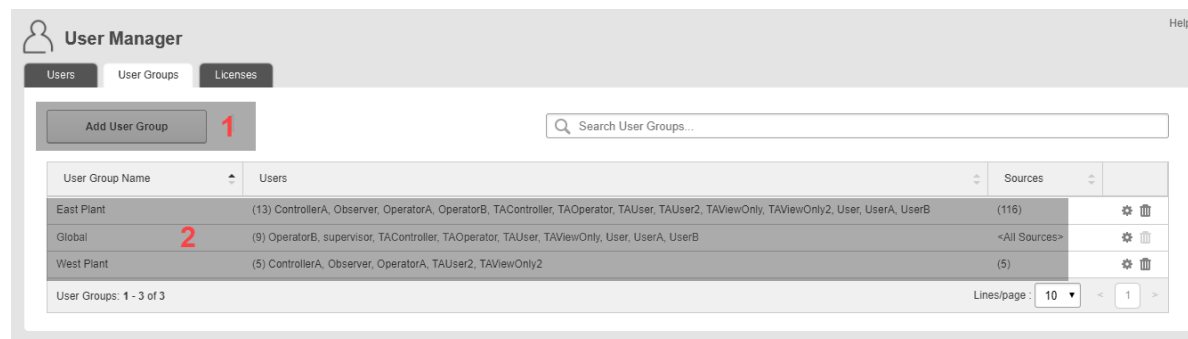
## User Manager user interface

### Users user interface (UI)



1	<b>User Manager Help.</b> Click Help to open the online help.
2	<b>Users, User Groups, and Licenses tabs.</b> Click a tab to open the associated screen.
3	<b>Add Standard User, Add Windows User, and Add Windows Group function buttons.</b> Click a button to activate its function.
4	<b>Search Users box.</b> Enter a search string to find users in the users table.
5	<b>Users table.</b> Shows the existing users in the system.
6	<b>Edit and Delete icons.</b> Click Edit  to make changes to this user. Click Delete  to delete this user.
7	<b>Number of displayed users.</b> Shows the number of items visible on this page, and the total number of items in the system.
8	<b>Page selector.</b> Navigate between pages. Set the number of items that are displayed on a page.

### User Groups UI



1	<b>Add User Group button.</b> Click the button to add a new user group.
2	<b>User Group table.</b> This table shows the existing user groups in the system.

## Licenses UI

1	<b>Web Applications User Licenses Summary.</b>
2	<b>Licenses table.</b>

## User access levels and permissions

The access level that is assigned to a user in Power Monitoring Expert determines the permissions this user has in the system. The following tables, Table 1 and Table 2, show the permissions granted by the different access levels. Both tables show the same information, presented in different formats. Table 1 is organized by access level, Table 2 is organized by application.

**NOTE:** Web Application access 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.

**Table 1: Permissions by access level**

Supervisor	Operator	Controller	User	Observer	Permissions	Application
✓	✓	✓	✓	✓ (Not Alarm Views)	View public content	<ul style="list-style-type: none"> <li>- Dashboards</li> <li>- Diagrams</li> <li>- Trends</li> <li>- Alarms (Viewer)</li> <li>- Reports</li> </ul>

✓	✓	✓	✓	✓	View diagrams	Vista
✓	✓	✓	✓	✓	View diagrams	Designer
✓	✓	✓	✓	✓	Run the application	<ul style="list-style-type: none"> <li>- Logical Device Type Editor</li> <li>- DB Manager</li> <li>- Diagnostics Viewer</li> <li>- Device Type Editor</li> <li>- Remote Modem Setup</li> <li>- VIP Setup</li> <li>- Update EWS</li> <li>- PQDIF Exporter</li> <li>- TOU Editor</li> <li>- Configure Managed Circuits</li> </ul>
✓	✓	✓	✗	✗	View alarms	Alarms (Viewer)
✓	✓	✓	✓ (Not Diagrams or Alarm Views)	✗	Create private content	<ul style="list-style-type: none"> <li>- Dashboards</li> <li>- Diagrams</li> <li>- Trends</li> <li>- Alarms (Viewer)</li> <li>- Reports</li> </ul>
✓	✓	✓	✗	✗	Acknowledge alarms	Alarms (Viewer)
✓	✓	✓	✗	✗	View all private content in own user groups Edit/delete public content in own user groups	<ul style="list-style-type: none"> <li>- Dashboards</li> <li>- Diagrams</li> <li>- Trends</li> <li>- Alarms (Viewer)</li> <li>- Reports</li> </ul>

✓	✓	✓	✗	✗	Run the application	- Hierarchy Manager - Rate Editor - Alarm Configuration
✓	✓	✓	✗	✗	Connect/disconnect sites and devices	Management Console
✓	✓	✗	✗	✗	Modify device network configuration Add devices to the system	Management Console
✓	✓	✗	✗	✗	Run the application	Update OPC
✓	✗	✗	✗	✗	View/edit/delete any content	- Dashboards - Diagrams - Trends - Alarms (Viewer) - Reports
✓	✗	✗	✗	✗	Create/edit users Create/edit user groups	User Manager
✓	✗	✗	✗	✗	Create/edit diagram links	Diagrams
✓	✗	✗	✗	✗	Run the application	- Web Apps Settings - User Manager
✓	✗	✗	✗	✗	Create/edit diagrams	Vista
✓	✗	✗	✗	✗	Create/edit diagrams	Designer
✓	✗	✗	✗	✗	Run the application	- Event Watcher - Reports Configuration - Diagrams Configuration - Deactivate Alarms - Configure Managed Circuits

**Table 2: Permissions by application**

Application	Permissions	Supervisor	Operator	Controller	User	Observer
- Dashboards - Diagrams - Trends - Alarms (Viewer) - Reports	View public content	✓	✓	✓	✓	✓ (Not Alarm Views)
	Create private content	✓	✓	✓	✓ (Not Diagrams or Alarm Views)	✗
	View all private content in own user groups Edit/delete public content in own user groups	✓	✓	✓	✗	✗
	View/edit/delete any content	✓	✗	✗	✗	✗
Alarms (Viewer)	Acknowledge alarms	✓	✓	✓	✗	✗
	View alarms	✓	✓	✓	✗	✗
User Manager	Create/edit users Create/edit user groups Run the application	✓	✗	✗	✗	✗
Diagrams	Create/edit diagram links	✓	✗	✗	✗	✗
Web Apps Settings	Run the application	✓	✗	✗	✗	✗
- Hierarchy Manager - Rate Editor - Alarm Configuration	Run the application	✓	✓	✓	✗	✗
Vista	View diagrams	✓	✓	✓	✓	✓
	Create/edit diagrams	✓	✗	✗	✗	✗
Designer	View diagrams	✓	✓	✓	✓	✓
	Create/edit diagrams	✓	✗	✗	✗	✗

Management Console	Connect/disconnect sites and devices	✓	✓	✓	✗	✗
	Modify device network configuration	✓	✓	✗	✗	✗
	Add devices to the system					
Update OPC	Run the application	✓	✓	✗	✗	✗
- Event Watcher - Reports Configuration - Diagrams Configuration - Deactivate Alarms - Configure Managed Circuits	Run the application	✓	✗	✗	✗	✗
- Logical Device Type Editor - DB Manager - Diagnostics Viewer - Device Type Editor - Remote Modem Setup - VIP Setup - Update EWS - PQDIF Exporter - TOU Editor - Configure Managed Circuits	Run the application	✓	✓	✓	✓	✓

## 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:** (least 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:** (most secure) Logs the user into PME using their current Windows credentials. This method provides a seamless user experience and is the most secure.

**NOTE:** The Windows Authentication option is the most 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.

## User authentication with Windows Active Directory

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 check the windows login button (forget what it's called)





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