

EcoStruxure™

Power Monitoring Expert 9.0

IT Guide

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EcoStruxure™
Power Monitoring Expert

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

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

Safety Information

Important Information

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



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



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

DANGER

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

WARNING

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

CAUTION

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

NOTICE

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

Please Note

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

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

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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.

Introduction

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

This document is intended for IT professionals who support the PME system installation. It provides information on possible deployment architectures, supported operating environments, required access permissions, IT and device network considerations, cybersecurity, the PME installer, as well as general dependencies and prerequisites.

Resources

Download Center

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

The following EcoStruxure™ Power Monitoring Expert 9.0 documents are available on the [Schneider Electric Download Center](#):

- System Guide (English) – Document number 7EN02-0411
- What's New Guide (English) – Document number 7EN12-0314
- OR Isolated Power Interface User Guide (English) – Document number 7EN02-0412
- Web Applications Guide (Multilingual) – Document number 7EN02-0409

Exchange Extranet

- [EcoStruxure Power Monitoring Expert portal](#)
- [Downloads](#) (Software Installers, Service Packs, Device Drivers, and so on)
- Power Monitoring Expert [Design and Quote](#) tools:
 - Daisy Chain Calculator
 - Commissioning Time Calculator
 - Database Growth Calculator
 - Secondary Server Calculator
- Power Monitoring Expert [Install and Maintain](#) documents:
 - IT Guide (English)
 - Before Installing Your Software (English)
 - Using the SQL Server 2016 DVD Guide (English)
 - ETL 5.0 – Installation and Configuration Guide
 - ETL for 3rd Party Billing – Administration Guide
 - ETL for Data Center Operation – Administration Guide
 - EGX300 and Com'X 510 to PME – ETL Data Migration Guide
 - PME Upgrade tools and resources

Other

- [PME Licensing Portal](#)
- [Schneider Data Privacy and Cookie Policy](#)

Technical Support

- Technical Support by country:
 - Use the My Schneider App or contact your local country office.
- [Software Licensing Support](#)
[Offline license activation, license returns]
- [Software Registration Centers](#)
[Global contact information. Contact a Software Registration Center (SRC) if you exceed the license return limit, or if a license has become untrusted. Do not contact a SRC for troubleshooting license issues or to get new licenses. They are not able to help with these issues.]

External Resources

Microsoft® technical documentation:

- [How to choose antivirus software to run on computers that are running SQL Server](#)
- [How to determine which versions and service pack levels of the Microsoft .NET Framework are installed](#)
- [Microsoft .NET Framework 3.5 Deployment Considerations](#)

Overview

This section provides an overview of the PME system.

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

[System Architecture](#)

[Client Types](#)

[Licensing](#)

[System backups](#)

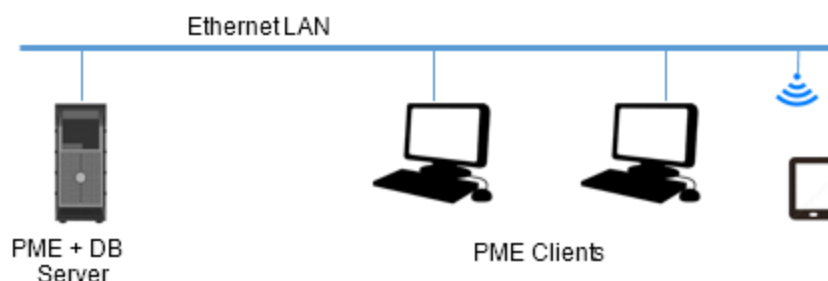
System Architecture

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

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

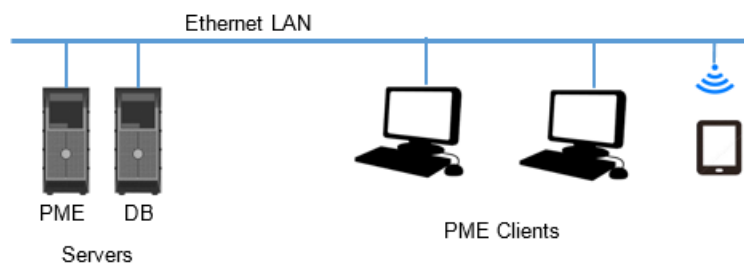
Standalone architecture

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

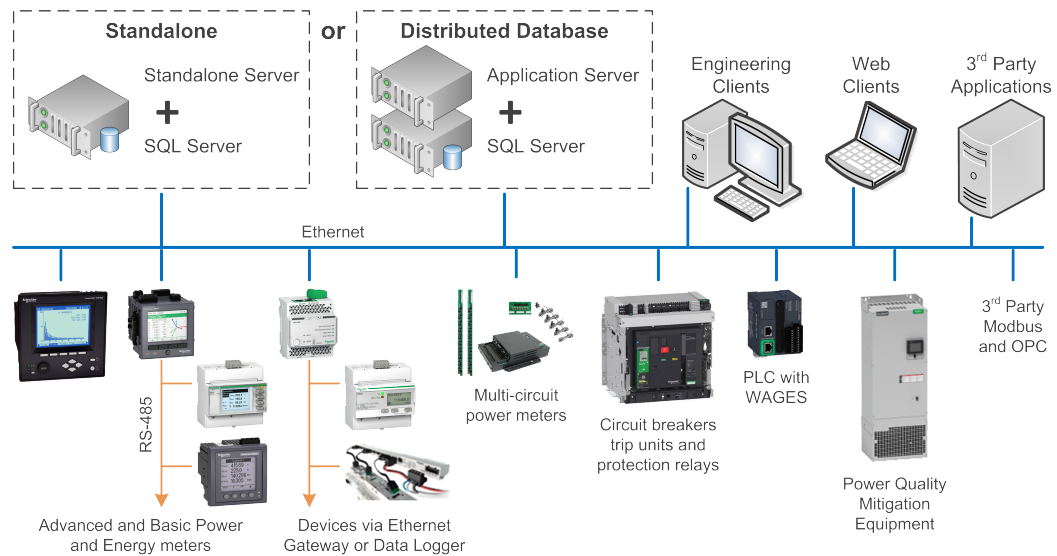


Distributed Database architecture

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



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



Which architecture should you choose?

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

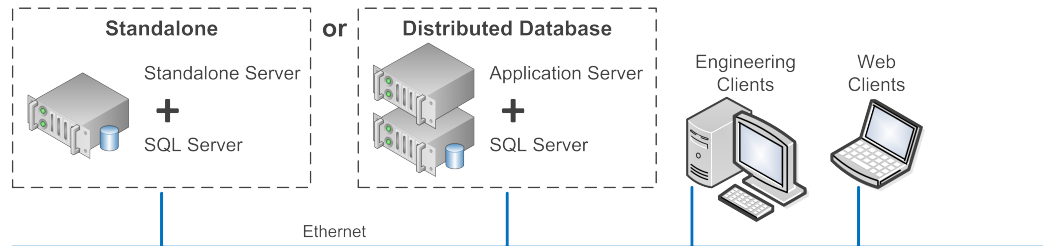
However, in some cases it might be necessary to use the Distributed Database architecture, such as:

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

Client Types

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

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



Engineering Client

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

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

Web Client

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

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

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

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

Examples:

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

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

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

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

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

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

Licensing

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

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

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

License Activation

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

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

License Types

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

Type	Description
Trial license	New system installations include a time limited trial license. The trial license: • enables most of the PME features (see Trial license limitations for details) • includes an unlimited device license • expires after 90 days • cannot be extended or reinstalled • includes client licenses that can only be used on the primary server, not on a client computer • remains active until its expiry even if other licenses have been activated • aggregates together with other active licenses

Base license	This is a required license. It enables the PME server functions. Without the Base license the system is not functional. The same Base license can be used for Standalone or Distributed Database systems. The Base license includes the use of one Engineering Client and two Web Clients.
Device license	This is a required license. It enables the use of monitoring devices in PME. The licenses are sold in bundles of 5, 25, 50, 100, 200, unlimited. At least one license bundle must be activated in the system. The following licenses exist: • Entry DL (for entry-level device types) • Medium DL (for mid-level device types) • Standard DL (for advanced device types)
Client license	This is an optional license. It enables the use of Engineering Clients and Web Clients. The following applies: • Web Client licenses can be purchased independent of Engineering Client licenses. • An Engineering Client license includes one Web Client license. • Unlimited client licenses are available.
Software Module license	This is an optional license. It enables the use of a Software Module. Each Software Module requires its own, specific license. The following Software Modules exist in PME: • Backup Power Management Module • Billing Module • Breaker Performance Module • Capacity Management Module • Energy Analysis Module • Event Notification Module • Insulation Monitoring Module • Power Quality Performance Module (includes Power Quality gadgets)
Gadget Pack license	This is an optional license. It enables the use of Dashboard Gadgets. Each Gadget Pack requires its own, specific license. The following Gadget Packs exist in PME: • Energy Usage Gadget Pack (included gadgets: Sankey, Pareto, Aggregated Pareto, Heat Map, Consumption Ranking, Aggregated Consumption Ranking)
OPC DA Server license	This is an optional license. It enables the use of the OPC server component in PME.

SQL Server license	This is an optional license. This is a license for a Microsoft SQL Server which can be purchased from Schneider Electric. You can also use the free SQL Server Express version that is included with the PME installer, use an existing SQL Server, or purchase a SQL Server license directly from Microsoft.
Developer/Demo license	This is a special license. Contact Schneider Electric for details.

System backups

Database Backups

Backup the PME databases to be able to recover the live databases if they become unusable.

A backup is a copy of a live database, for example ION_Data in PME. By default, PME automatically backs up its databases on a daily (ION_Network) or weekly (ION_Data and ApplicationModules) basis, and **keeps two backups** of each database in the main installation folder:

```
...\Schneider Electric\Power Monitoring Expert\Database\Backup
```

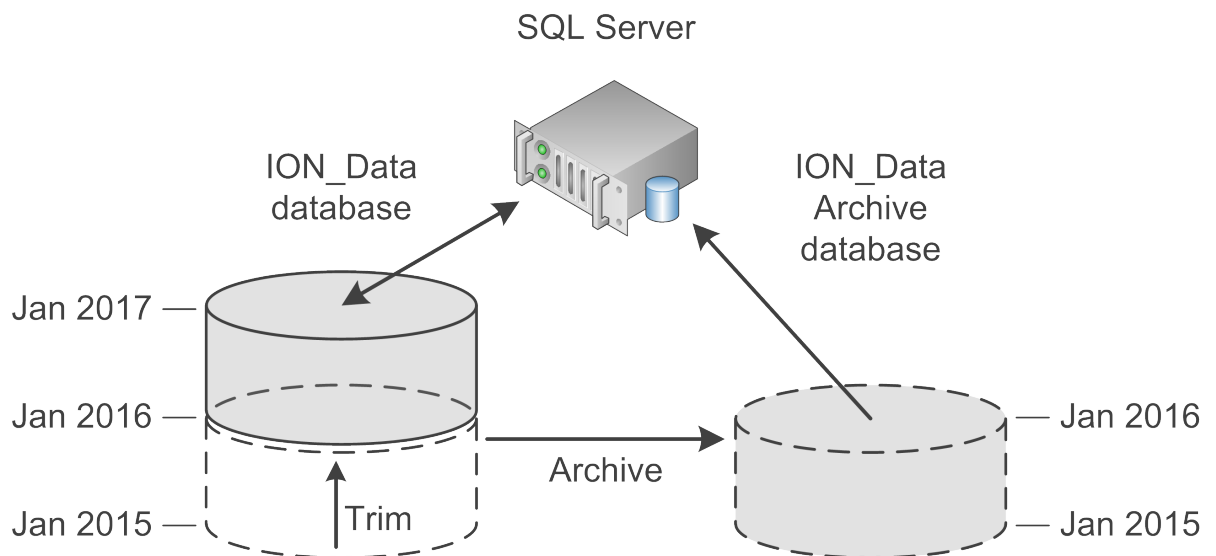
NOTE: Change the folder location if the default location has insufficient free disk space.

You can perform additional, manual backups using standard SQL Server backup procedures.

Database Archives

Archive data from the live ION_Data database to reduce the database size.

An archive is a copy of a subset of data from the live ION_Data database based on a date range and the type of data (Data Records, Waveforms and Events). When an ION_Data archive is created it remains attached to the SQL Server database engine so that its data is still accessible to Vista and Diagrams. However, the data is not available to other applications in the Web Applications component.



After you have archived the data, you must trim this same data from the ION_Data database to get the size reduction.

NOTE: When you trim data from an SQL database, the database file size remains unchanged. However, the database will first fill the new free space before growing the database file size again. If you want to reduce the database file size, you must shrink the database after trim, using standard SQL Server tools.

Considerations for Archives

In most cases archiving is **not recommended** since it fractures the data into multiple databases. PME is unable to query multiple databases at the same time to make comparisons in the data. (It is possible to run reports against an archived database, but it can only be done on one database at a time.)

However, the ION_Data database may need to be reduced in size for the following reasons:

- SQL Server Express is used as the database engine, which has a database size limit of 10 GB.
- SQL Server (Standard or Enterprise edition) is used as the database engine and the ION_Data database has become so large that query performance is poor.
- There is not enough free hard drive disk space left and a larger disk cannot be installed.

IT Requirements

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

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

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

Computer Hardware

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

- Computer type (desktop, workstation, or server)
- Central processing unit (CPU)
- Random-access memory (RAM)
- Hard disk drive (HDD)

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

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

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

Choosing Computer Type, CPU, and RAM

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

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

Basic Systems

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

- Factory default measurement logging (logging frequency $\geq$ 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	≤ 100	≤ 5	Desktop Intel Core i5 (2 core) 8 GB (RAM)
Medium	≤ 250	≤ 10	Workstation Intel Xeon W-21xx (4 core) 16 GB (RAM)
	≤ 600	≤ 10	Server Intel Xeon E3-12xx (6 core) 24 GB (RAM)
Large	≤ 2500	≤ 10	Server Intel Xeon E3-12xx (10 core) 32 GB (RAM)

Advanced Systems

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

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

Minimum recommended computer hardware for servers in Advanced Systems:

System Size	Devices	Users	OPC Tags	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)

Client Computers

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

Minimum recommended computer hardware for clients:

- Engineering Client
 - Intel Core i3 (2 core or better)
 - 4 GB of RAM
- Web Client
 - 2 GHz, Dual Core processor
 - 4 GB of RAM
 - Monitor resolution of 1024 x 768

NOTE: To improve the information display, we recommend a minimum monitor resolution of 1440 x 900.

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
Total	(5x) ION_data.mdf size

The estimates above are based on the following assumptions:

- The .ldf file is typically just 10% of the .mdf size, but occasionally expands to 100% during normal operation.
- The system default is to keep two database backups.
- 100% of the .mdf size is required for free space. The tempDB will occasionally expand to 100% of the total .mdf size, but not at the same time as a backup. If the backups and tempDB are on different hard drive groups, 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 HD D	Component	Group 0			
		HDD1 + HDD2			
	OS	✓			
	tempDB	✓			
	MDF	✓			
	LDF	✓			
	Backups	✓			
4x HD D	Component	Group 0	Group 1		
		HDD1 + HDD2	HDD3 + HDD4		
	OS	✓			
	tempDB		✓		
	MDF	✓			
	LDF		✓		
	Backups		✓		
6x HD D	Component	Group 0	Group 1	Group 2	
		HDD1 + HDD2	HDD3 + HDD4	HDD5 + HDD6	
	OS	✓			
	tempDB	✓			
	MDF		✓		
	LDF			✓	
	Backups			✓	
6x HD D	Component	Group 0	Group 1	Group 2	Group 3
		HDD1 + HDD2	HDD3	HDD4 + HDD5	HDD6
	OS	✓			
	tempDB		✓		
	MDF			✓	
	LDF				✓
	Backups				✓
8x HD D	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.

Operating Environment

PME supports the following environments and software:

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

Software	Supported versions
Operating system	Windows 7 Professional/Enterprise (for Engineering clients only) 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.

Windows Updates

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

Localization

PME supports the following languages:

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

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

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

Operating System Considerations

Windows or Windows Server?

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

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

32-bit or 64-bit systems?

PME is a 32-bit software that can run on both 32-bit and 64-bit systems. We recommend you use a 64-bit system (OS + SQL Server) for the following reasons:

- The SQL Server 64-bit performance is higher than the 32-bit version.
- 32-bit operating systems are limited to just 4 GB of RAM, 64-bit versions are not.
- 32-bit systems are a legacy technology for operating environments.

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

SQL Server Considerations

Express Version or Full version?

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

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

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

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

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

Existing or New SQL Server?

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

Type	Description
New SQL Server Standard	PME requires a certain configuration of the SQL Server.
New SQL Server Express	PME includes a free version of SQL Server Express. You have the option to install this Express version during the installation of PME.
Existing SQL Server Standard	To use an existing instance of SQL Server Standard , the SQL Server setup wizard must be rerun to configure the software correctly for use with PME.
Existing SQL Server Express	The PME installer can add a new instance to an existing SQL Server Express for use with PME.

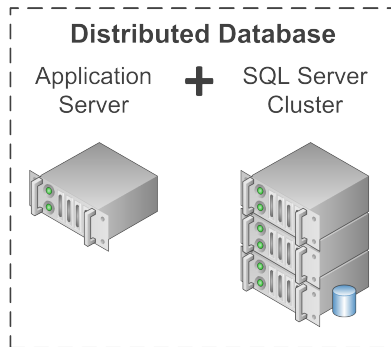
NOTE: The operating system and SQL Server combination you choose must be supported by Microsoft. This applies to edition, version, and 32-/64-bit.

SQL Server Clustering

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

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

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



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

Network Connectivity

Network Communication

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

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

Network Shares

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

Windows Domain Compatibility

Domain membership is not required for PME to function.

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

IPv6 Compatibility

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

IP Port Requirements

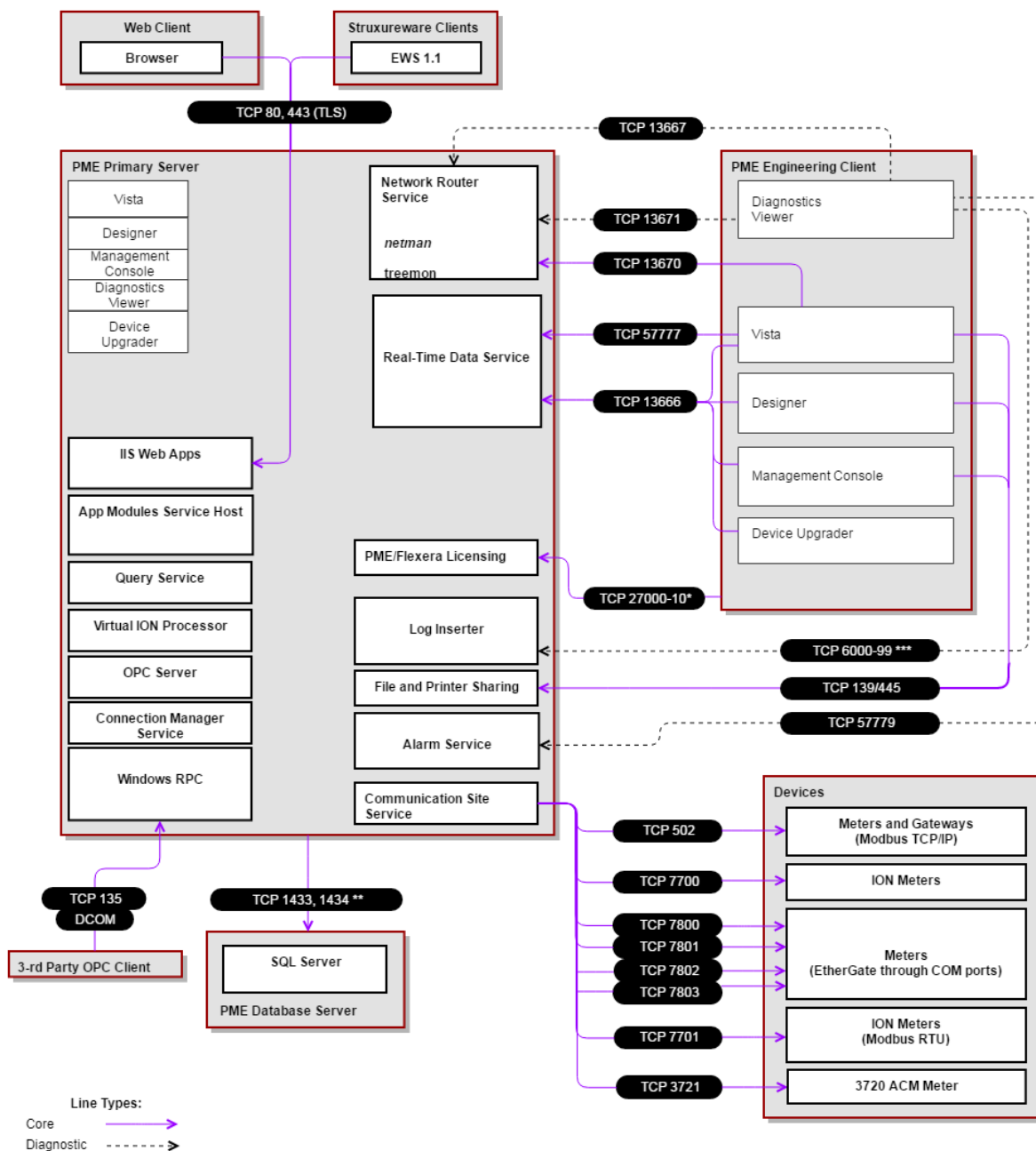
PME depends on certain ports for the communication between its components and the connected devices. Which ports are required for a specific installation depends on the system configuration and the monitoring devices used.

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
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

Device Networks

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

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

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

Device networks overview

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

Examples of monitoring devices include:

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

PME supports the following communication protocols:

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

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

Network Types

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

Ethernet Networks

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

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

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

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

Serial Device Networks

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

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

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

PME also supports communication through telephone modems.

Reasons for using serial networks include:

- The device type only supports serial communications.
- A serial communication network is already in place.
- The existing Ethernet networks do not allow the connection of monitoring devices.

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

Network Performance

Communications between the software and the devices consist of :

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

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

- Real-time data polling periods should be set to meet the user needs. Do not poll with high speed when it is not needed. Real-time data clients include Vista, Diagrams, OPC, VIP, Trends, and EWS.
- Disable devices that are not presently commissioned or functional. This includes devices that are inoperable, or that have a communication error rate >5%.
- Connect high-end devices with power quality monitoring features, such as the ION9000, directly through Ethernet, not serial. These devices can generate large amounts of logged data, such as power quality data, which requires a high bandwidth connection to the monitoring software. If a direct Ethernet connection is not possible, then connect the devices through small serial loops, with one or two devices per loop.
- Setup the devices to only log those measurements that are needed to meet the user needs.
- Schedule the log uploads to occur at times when the system usage is low, for example during night time or off hours.
- Use the Daisy Chain Calculator tool to determine the maximum number of devices in a serial loop for your system. See [Tools](#) for more information.
- In most applications, Ethernet networks will provide a better performance than serial networks.

Time synchronization

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

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

Tools

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

NOTE: The Daisy Chain Calculator is available through the Exchange Community. See [Resources](#) for link information.

Other IT Considerations

PME Server Name Limitations

The computer name for the PME server must have 15 characters or less, and use only letters, numbers, or the "_" (underscore) character.

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

Display Resolution

The minimum display resolution for PME user interfaces is 1024 x 768 pixels.

Cybersecurity

The information in this section is organized by the following life-cycle stages:

- [Planning](#)
- [Installation and upgrade](#)
- [Configuration](#)
- [Operation](#)
- [Administration](#)

Planning

Network security

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

Data encryption

At Rest

PME protects the passwords of its user accounts, as well as the Windows and SQL Server accounts using SHA-256 and AES-256 cryptography. PME uses a unique encryption key for each installation. The key is generated during the installation of PME. The PME installer offers functionality for exporting/importing encryption keys for the installation of PME clients or system upgrades.

The power monitoring data that is collected by PME, and system configuration data are not encrypted.

In Transit

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

The communication between PME and connected monitoring devices is not encrypted.

Malware detection

PME can be used with antivirus (AV) software. AV software can have a significant impact on system performance if not set up correctly. In particular, SQL Server performance can be affected if data and log files are not excluded from on-access scans. We have seen issues during the installation of PME, where AV scan delays caused timeouts and failures in the installation process.

PME can be used with whitelisting software products such as McAfee Application Control software. See [Application control \(whitelisting\) software](#) for more information.

Anti-virus software on your SQL Server

We recommend that you run anti-virus software on your SQL server. Follow the recommendations described in Microsoft Support article (ID: 309422). See [Resources](#) for link information.

NOTE: Special configuration of the AV and whitelisting software might be required. Follow the instructions of the software vendor for installing, configuring, and operating the AV and whitelisting software.

Account and password management

The following types of accounts are required for a PME system:

PME Users

A user account in PME provides access to the system. There are 3 different types of users - standard users, Windows users, and Windows groups. Each user has an access level, which determines the actions the user is allowed to perform in PME. There are no pre-configured user accounts or user groups in the system. One supervisor account is created with a user defined password during the installation of the software. Additional user accounts and groups must be created manually after installation. PME supports Windows Active Directory integration for Windows users and groups.

TIP: Use Windows users and groups to take advantage of Windows account security features such as maximum login attempts or minimum password requirements.

Windows accounts used by PME

PME uses Windows accounts for report subscriptions and database maintenance. The accounts are created automatically during the installation of the software. The accounts share the same password, which is set at install time and can be changed at any time through the installer.

If PME is configured to use SQL Integrated Authentication, then an additional Windows account is required for database access. This Windows account is also used to run the PME services and the IIS Application Pools. This account must be created manually and account details must be provided during the installation of the software.

See [Windows accounts](#) for more information.

SQL Database server accounts

If PME is configured to use Mixed Mode database authentication, then SQL server accounts are required for database access. The accounts are created automatically during the installation of the software. The accounts share the same password, which is set at install time and can be changed at any time through the installer.

If SQL Server Express is installed, with Mixed Mode authentication, through the PME installer, a sa account with a unique, default password is created automatically during install. The password can be changed at any time through SQL Server Management Studio.

See [SQL Server accounts](#) for more information.

EcoStruxure Web Services account

If EcoStruxure™ Web Services (EWS) are used, data exchange credentials must be defined. The credentials consist of a single username and password. The EWS credentials are set manually in the **Web Applications > SETTINGS** area of the software.

PME Services

PME uses a number of services to perform the background server tasks. The services use the Local System account, or the Windows account used for SQL Integrated Authentication if that is configured.

See [PME Windows services](#) for more information.

Hardware Ports

Computer ports and inputs, such as USB ports or DVD drives are not required for PME to function correctly. These inputs can be permanently disabled if necessary. The same applies to the AutoRun and AutoPlay functionality which can also be disabled without affecting the operation of the software.

Diagnostics and Usage Feature

Diagnostics and Usage is a feature in PME, that collects basic usage statistics and anonymously sends this data to a secure server. Schneider Electric uses this data to help improve our software by understanding how you use it. This operation is enabled by default.

To disable the sending of data:

1. Open Web Applications, click **Settings > Diagnostics and Usage**.
2. Select **Disable** in the dropdown list and click **Save** to apply the change.

The following diagnostic and usage data is collected when it is enabled.

Diagnostic data	Usage data
• Power Monitoring Expert version • Operating system version and type (32- or 64-bit) • Number of CPU cores • System memory (RAM) • .NET Framework version • SQL Server version • Distributed or local database • City or region • Number of monitors in use • Client screen resolution • Screen DPI	• Total number of devices • Device type count • Number of users

The diagnostics and usage service collects and sends data to Schneider Electric weekly on Monday at 2:00 a.m. (server time), over HTTPS at port 443. Each time the service runs, it creates a log file in the `system\bin` folder in the Power Monitoring Expert install location.

NOTE: All diagnostics and usage data is sent to Schneider Electric anonymously. None of the collected information identifies you or your company. For more information on Schneider Electric's Privacy Policy, see the Schneider Data Privacy and Cookie Policy. See [Resources](#) for link information.

Network Shares

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

Installation and upgrade

Keep the PME System Key secure

During the installation of PME, a system key is generated and a copy of this key is exported as a `.key` file. This system key is the encryption key used by the software to encrypt user and system credentials. A PME server securely retains the original key in the registry. The exported copy is needed for the installation of Engineering clients and Secondary servers. It is also needed in case of a future side-by-side system upgrade or migration.

As long as the PME server has the original key stored securely in the registry it is possible to export a copy at any time using the installer. However, should the original key get deleted from the server somehow, it cannot be recreated or exported. Keep the exported system key in a safe location, protected from unauthorized access.

Do not use a Web Client on the server computer

Using a Web Client on a server computer increases the vulnerability of the server and the network. Configure Web Clients on client computers only, not on the server.

Change the Share permissions on the product directory

All share permissions are automatically set to "Read" permissions for the "Everyone" group; this includes the PME share (the product's installation directory).

Change the product directory's share permission to Read/Write for users of Engineering Client computers who need to modify files, such as Vista diagrams.

Configuration

Configure PME users and user groups

There are no pre-configured user accounts or user groups in a newly installed system. One supervisor account was created, with a user defined password, during the installation of the software. Create additional user accounts and groups after installation. PME supports Windows users and groups for integration with Windows and Active Directory.

For information on creating users and user groups, and on setting user access levels, see User Manager help.

Change the SQL Server Express sa account password

If SQL Server Express is installed, with Mixed Mode authentication, through the PME installer, change the sa account password after the installation is complete.

Application control (whitelisting) software

McAfee Application Control is a dynamic whitelisting program that is used to prevent unauthorized applications from running on your system.

When you deploy Application Control to protect a system, it scans the system and creates a whitelist of all executable binaries and scripts present on the system. The whitelist also includes hidden files and folders.

The whitelist lists all authorized files and determines trusted or known files. In Enabled mode, only files that are present in the whitelist can execute. All files in the whitelist are protected and cannot be changed or deleted. An executable binary or script that is not in the whitelist is said to be unauthorized and is prevented from running.

Consider the following when using application control software with PME:

- Complete the system configuration before setting up and enabling application control software.
- Any program or script that should be able to update the system will need to be configured as an updater.
- After solidification, no driver packs or summary report packs may be installed.
- Disable Application Control to make changes to the system. Enable it again after the change.
- Follow the instructions in the Application Control product guide.

Operation

Session timeout

PME automatically times out inactive client sessions. Web Applications clients are logged out and Windows application clients (Vista, Designer, Management Console) are locked after a period of inactivity. The timeout period is configurable, it is set to 20 minutes by default. See [Configuring session timeout settings](#) for details.

To restart or unlock the session you must enter the login credentials. A session is considered inactive, if none of the following actions are detected:

- Mouse movement
- Mouse click
- Keyboard activity
- Touch screen activity

NOTE: If custom content links are added to the Web Applications framework, then the custom content must either implement the idle detection, or activity on that content is not registered and the Web client session can time out unexpectedly. See [Adding idle detection to custom Web Application links](#) for details.

Administration

Windows and SQL Server Updates

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

User account maintenance

Review PME user accounts on a regular basis. Update passwords and user permissions, and remove unused accounts as required.

Reference

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

[Accounts and services](#)

[Databases](#)

[Trial license limitations](#)

[Database growth calculations](#)

[Configuring session timeout settings](#)

[Adding idle detection to custom Web Application links](#)

Accounts and services

Windows accounts

The following tables provide information on the Windows accounts used by Power Monitoring Expert (PME):

User/Account	Role/Group/Permissions	Notes
IONUser (account)	- No group membership. - Has List/Read/Write/Execute permissions on the PME share folder.	- Automatically created during the installation of PME. - Used to run report subscriptions. - Needs access to the folder where subscriptions are saved.
IONMaintenance (account)*	Member of Users group	- Automatically created during the installation of PME. - Used to run database maintenance jobs in Windows Task Scheduler.
Login used to run the PME installer	Needs to be a member of local Administrators group	- Manually created by the user. - Used to log into Windows to run the PME installer - If possible, the local Administrator account should be used.
Login used to access PME applications	Needs to be a member of Users group	- Manually created by the user. - Used to log into Windows to run the PME Web Applications or Engineering Client applications.
Login to run application engineering tools	Needs to be a member of local Administrators group	- Manually created by the user. - Used to log into Windows to run PME application engineering tools. An example is the Configuration Manager Tool, used for system upgrades.
Login to run the Database Manager tool	Needs sysadmin permissions on SQL database instance.	- Manually created by the user. - Used to log into Windows to run the PME Database Manager tool. - This Windows account needs to be added to the SQL server database.
SQL Server Agent service	NT AUTHORITY\SYSTEM	Must have access to the database folder(s) and the installer user's Temp folder during installation. Permissions can be lowered after PME is installed.
SQL Server Database Engine service	NT AUTHORITY\SYSTEM	Must have access to the database folder(s) and the installer user's Temp folder during installation. Permissions can be lowered after PME is installed.

* This account is only created on standalone servers where the SQL Server software and PME are installed on the same computer.

For installations using SQL Integrated Authentication, the following additional accounts and permissions are required.:

User/Account	Role/Group/Permissions	Notes
--------------	------------------------	-------

Account used for SQL Integrated Authentication	- Needs to be a member of local Administrators group - Needs 'Log on as a service' privilege on application server	- Manually created by the user. - Used by PME to access the SQL server databases.
Login used to access PME Engineering Client applications	Needs sysadmin server role for the PME databases.	This is not an additional user account. It is just an added requirement for the Logins used to access the Engineering Client applications (Vista, Designer, Management Console, Management Console tools). The PME databases are: ApplicationModules, ION_Data, ION_Network, ION_Systemlog

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

SQL Server accounts

The database server hosts several databases for Power Monitoring Expert (PME). The following tables lists the SQL Server logins and permissions created for PME:

For installations with Mixed Mode Authentication:

Login	Authentication	Server Role	Database	Membership
AMUser	SQL	Public	ApplicationModules	AMApplicationRole
ION	SQL	Public	ApplicationModules	db_owner
			ION_Data	db_owner
			ION_Network	db_owner
			ION_SystemLog	db_owner
			msdb *	SQLAgentOperatorRole, SQLAgentReader Role, SQL AgentUserRole
ionedsd	SQL	Public	ION_Data	ION_DSD_Reader
			ION_Network	NOM_DSD_Reader
IONMaintenance**	Windows	Public	ApplicationModules	db_backupoperator, db_ddladmin, Maintenance
			ION_Data	db_backupoperator, db_ddladmin, Maintenance
			ION_Network	db_backupoperator, db_ddladmin, Maintenance
			ION_SystemLog	db_backupoperator, db_ddladmin, Maintenance

* In SQL Standard version only.

** This account is only created on standalone servers where the SQL Server software and PME are installed on the same computer.

For installations with SQL Integrated Authentication:

Login	Authentication	Server Role	Database	Membership
Account used for SQL Integrated Authentication	Windows	Public	ApplicationModules	db_owner
			ION_Data	db_owner
			ION_Network	db_owner
			ION_SystemLog	db_owner
			msdb*	SQLAgentOperatorRole, SQLAgentReader Role, SQL AgentUserRole

IONMaintenance **	Windows	Public	ApplicationModules	db_backupoperator, db_ddladmin, Maintenance
			ION_Data	db_backupoperator, db_ddladmin, Maintenance
			ION_Networks	db_backupoperator, db_ddladmin, Maintenance
			ION_SystemLog	db_backupoperator, db_ddladmin, Maintenance

* In SQL Standard version only.

** This account is only created on standalone servers where the SQL Server software and PME are installed on the same computer.

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

Other

PME must have access to the master and tempdb System Databases.

The PME Database Manager tool requires that the Windows account that is used to run it has sysadmin permissions on the PME SQL Server instance. The Database Manager is an optional tool, used for managing the PME databases.

PME Windows services

All PME applications without a user interface run as Windows services. The following table lists all PME services:

Service Name	Startup type	Log on Account	Description
ION Alert Monitor	Manual	Local System *	Receives and processes high-priority alarm and event notifications coming from modem connected meters on remote power monitoring locations. When this happens, the Alert Monitor initiates a communications connection to the remote modem site to download additional logged data (for example, data, events, and waveforms).
ION Application Modules Alarm Services Host	Manual	Local System *	Allows the Event Notification Module (ENM) to read alarms directly from the ION_Data database. Starts on demand from other services (for example, from the Event Notification Module).
ION Application Modules Core Services Host	Automatic	Local System *	Hosts common web services used by the Web Applications component.
ION Application Modules Data Services Host	Automatic	Local System *	Hosts web services that provide low-level access to system data (that is, real-time, historical, alarming, and authentication) for the Web Applications component.

ION Application Modules Provider Engine Host	Automatic	Local System *	Hosts web services that provide data processing for the Web Applications component.
ION Cloud Agent Service	Automatic	Local System *	Manages interaction with cloud services.
ION Component Identifier Service	Manual	Local System *	Locates local and remote product components. Starts shortly after startup by request of ION Connection Management Service.
ION Connection Management Service	Manual	Local System *	Determines the connection status of sites and devices in the system, and handles allocation of resources such as modems. This service manages the state of site and device connectivity for the system. In order to establish the most appropriate state for the system, each connection and disconnection request is evaluated against the overall state of the system and availability of communications channels. Starts shortly after startup by request of ION Network Router Service.

ION Diagnostics and Usage Service	Automatic	Local System *	Collects basic, non-identifying information from the Power Monitoring Expert system and uploads it to a secure location on the cloud for data mining by Schneider Electric. Customers can opt-in or opt-out at any time.
ION Event Watcher Service	Automatic	Local System *	Monitors system events for conditions specified in Event Watcher Manager.
ION Log Inserter Service	Automatic	Local System *	Provides historical data collection for the power monitoring system (that is, devices and Virtual Processor), and stores it in the ION_Data database.
ION Log Subsystem Router Service	Automatic (Delayed Start)	Local System *	Transfers data received from power monitoring devices to storage and processing.
ION Managed Circuit Service	Automatic	Local System *	This service is used to create individual real-time and historical data sources for multi-circuit meters.

ION Network Router Service	Automatic	Local System *	Routes all ION requests between the software components, such as client workstations, the Real Time Data Service, Log Inserter, and the Query Server. The service dynamically detects changes to the network configuration, including the addition of new servers. It can also recognize new software nodes, such as Vista, that are added to an existing server.
ION OPC Data Access Server	Manual	Local System *	Serves real-time OPC data (that is, OPC DA) to OPC client applications. Starts on an OPC client request for data, if the OPC DA server license has been activated.
ION PQDIF Exporter Service	Manual	Local System *	Translates power quality data from the ION_Data database into PQDIF file format and manages scheduled PQDIF exports.
ION Query Service	Automatic	Local System *	Provides historical data retrieval from the ION_Data database for client applications (for example, Vista and Diagrams).
ION Real Time Data Service	Automatic	Local System *	Manages and provides access to real-time data for all client applications (Vista, Diagrams, Trends, and so on).

ION Report Subscription Service	Automatic (Delayed Start)	Local System *	Runs Reports subscriptions according to user-defined schedules. Starts several minutes after the server starts.
ION Site Service	Automatic	Local System *	Manages communication links to and from the product. ION Site Service is responsible for handling packet communications to system devices and controlling direct device communications. The service reacts to changes in network configuration: for example, changes to certain channels, configuration parameters, ports, or device parameters can often interrupt a connection.
ION Software Data Processing Service	Automatic (Delayed Start)	Local System *	Performs evaluations based on real time data from the power monitoring system.
ION Software Modbus Gateway Service	Manual	Local System *	Enables software data services via ModbusTCP/IP, and is treated like a device in Management Console. For example, the Circuit Breaker Aging Service uses this service.
ION Virtual Processor Service - NVIP.DEFAULT	Automatic	Local System *	Provides aggregation, control, and mathematical analysis of power monitoring system data.

ION Virtual Processor Service – NVIP.PQADVISOR	Automatic	Local System *	Serves data for the Power Quality Performance diagrams. Functions only when the Power Quality Performance module is licensed and configured.
ION XML Subscription Service	Automatic	Local System *	Manages subscriptions to XML data for Vista user diagrams. This service is used only by the Diagrams application. When you open a Vista user diagram in a web browser, the ION XML Subscription Service creates a subscription and delivers the real-time data in XML format.
ION XML Subscription Store Service	Automatic	Local System *	Stores XML data subscriptions for the power monitoring devices on the network. This service is used only by the Diagrams application.
ImadminSchneider	Automatic	Local Service	This service runs the FlexNet Publisher License Server Manager.
SQL Server (ION)	Automatic	Local System *	Provides storage, processing and controlled access of data, and rapid transaction processing for the ION_Data, ION_Network, ION_SystemLog, and the ApplicationModules databases.
SQL Server Agent (ION)**	Automatic	Local System *	Provides scheduling for report subscriptions in non-SQL Server Express systems. (This service is not part of SQL Server Express.)

* When PME is installed with SQL Integrated Authentication, then the Windows account that is used to access the database, is also used to run the PME services, instead of the Local System account.

** This service only exists on systems with SQL Server, not SQL Server Express.

IIS Application Pools

The Power Monitoring Expert installer enables and configures IIS to host the different Web applications. The following table lists the application pools and applications:

Application Pool	Identity	Application
Application Modules App Pool	Local System *	Dashboards EWS (Ecostruxure Web Services) Hierarchy Manager Slideshow System Data Service Trends Web
ION App Pool	Local System *	Alarm Configuration ION ION/diagrams ION Report Data Service Web Services
Web Reporter App Pool	Local System *	Rate Editor Reporter

* When PME is installed with SQL Integrated Authentication, then the Windows account that is used to access the database, is also used to run the IIS Application Pools, instead of the **Local System** account.

Databases

PME Databases

Power Monitoring Expert (PME) uses four databases to store device communication parameters, system configuration settings, and logged historical data.

ION_Network database

Sometimes called the NOM (Network Object Model), the ION_Network database stores device information, such as, device name, device type and connection address (for example, IP address and TCP/IP port or device/Modbus ID). It also contains information about the optional Application Module settings, other ION Servers, Sites, Dial Out Modems, and Connection Schedules. There is only one ION_Network per system.

ION_Data database

The ION_Data database contains the historical data, events and waveforms from devices connected to the system. This includes: onboard logging configured on devices; and, PC-based logging configured in the device translators and the Virtual Processors.

Application Modules database

The Application_Modules database contains configuration settings (for example, layouts, colors, application events, and so on) and cached historical data for some of the Web Applications (for example, Dashboards and Trends).

ION_System log database

The ION_SystemLog database holds system events and their timestamps, which is accessible to view in Management Console. Event priorities can range from 0-255 and are grouped into Diagnostic (0 - 5), Information (6 - 20), Warning (21 - 63), Error (64 - 191), and Critical (192 - 255) categories. System events can include:

- ION Service stopped or is starting or user connection to an ION Service is lost.
- Device has been declared offline / online.
- ION Site Service connected, disconnected or failed to a Site in Management Console.
- ION User logs on / off Vista or Designer.
- ION User saves a Vista or Designer node diagram.
- Plus many other Warnings and Errors relating to PME system functions.

Trial license limitations

The following features and functions are not enabled by the trial license:

Reports:

- Generator Test EPSS Report
- Generator Battery Health Report
- Generator Battery Health Export
- Generator Activity Report
- UPS Auto Test Report
- UPS Battery Health Report
- Generator Load Summary Report
- Consumption Ranking Report
- PUE Summary Report
- Isolated Power Report (ANSI)
- Isolated Power Report (IEC)
- Energy by IT Customer
- Branch Circuit Power
- Generator Capacity Report
- UPS Power Report
- Equipment Capacity Report
- Generator Power Report
- Power Losses Report

Database growth calculations

Factory default measurement logging

A measurement record in the database uses approximately **75 bytes** of disk space. Based on the factory default data logging configurations, we can calculate the database growth for data logged from different device types.

Example

Device Type	Daily Growth Rate (kB)	Number of Devices	Total Daily Growth (MB)	Total Annual Growth (GB)
ION7650	780	10	7.62	2.72
PM8000	950	20	19.00	6.94
PM3200	85	70	5.81	2.07
TOTAL	-	100	32.43 MB	11.84 GB

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

Custom measurement logging

Custom measurement logging can be configured in the monitoring devices and, as software based logging, in PME. A measurement record in the database uses approximately **75 bytes** of disk space.

The following shows the database growth estimate for logging of a single measurement every 15 minutes:

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

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.

Configuring session timeout settings

PME automatically times out inactive client sessions. Web Applications clients are logged out and Windows application clients (Vista, Designer, Management Console) are locked after a period of inactivity. The timeout period is configurable, it is set to 20 minutes by default.

To configure the session timeout settings:

1. From a PME Web client, browse to `https://<PME host-name>/systemdataservice/timeoutsettings`, to open the Session Timeout Settings page.
2. On the Session Timeout Settings page, enter the timeout period for Web clients and Windows clients.
3. Click **Save**.
4. Restart Internet Information Services (IIS) on the PME server.
5. Restart any Web Applications client browser sessions.

Related Topic:

- [Adding idle detection to custom Web Application links](#)

Adding idle detection to custom Web Application links

PME automatically times out inactive client sessions. If custom content links are added to the Web Applications framework, then the custom content must implement the idle detection, or activity on that content is not registered and the Web client session can time out unexpectedly.

Prerequisite: The custom application must be in the same Application Pool as the regular PME applications, and must use the same authentication configuration.

To add idle detection to custom content:

1. In the custom Web application, Add references to jquery and jquery.idle.js.
2. Create an IdleDetection object when the document has loaded.

NOTE: If you want your application to take part in keeping PME non-idle, but you do not want your application to log itself out after the idle period, you can add the following JSON as a parameter to the idle() method: {enableLogoutRedirection: false;}

Example web.config for an application in the PME Application Pool:

```
<?xml version="1.0" encoding="UTF-8"?>
<configuration>
  <system.web>
    <compilation debug="true" targetFramework="4.6" />
    <httpRuntime targetFramework="4.6" requestValidationMode="2.0"
enableVersionHeader="false" />
    <authentication mode="Forms">
      <forms name=".APPLICATIONFRAMEWORK"
loginUrl="/SystemDataService/Auth"
defaultUrl="/SystemDataService/Auth/GenerateAuthUrl" timeout="2880"
protection="All" enableCrossAppRedirects="true" />
    </authentication>
    <machineKey decryption="AES" decryptionKey="AutoGenerate"
validation="HMACSHA256" validationKey="AutoGenerate" />
    <authorization>
      <deny users="?" />
    </authorization>
  </system.web>
</configuration>
```

Example minimal page that has idle detection added to it:

test.html

```
<!DOCTYPE html>
<html>
<head>
  <title>Example Application for Idle Detection</title>
  <script src="/SystemDataService/Content/External/jquery/jquery-2.1.4.modified.js"></script>
  <script src="/SystemDataService/Content/External/jquery/jquery.idle.js"></script>
  <script>
    $(document).ready(function() {
      $(document).idle();
    });
  </script>
</head>
<body>
  Example Application
</body>
</html>
```

Related Topic:

- [Configuring session timeout settings](#)

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