EcoStruxure™

Power Monitoring Expert 2020

IT Guide

7EN02-0439-01

04/2020

Schneider Electric

Legal Information

Safety Information

Important Information

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

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

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

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

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

NOTICE

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

Please Note

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

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

Contents

Safety Precautions

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

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

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

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

⚠ WARNING

INACCURATE DATA RESULTS

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

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

⚠ WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

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

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

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

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

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

Download Center

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

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

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

Exchange (requires login)

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

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

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

Exchange Community (requires login)

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

Other

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

Technical Support

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

External Resources

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

Microsoft® technical documentation:

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

Overview

This section provides an overview of the PME system.

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

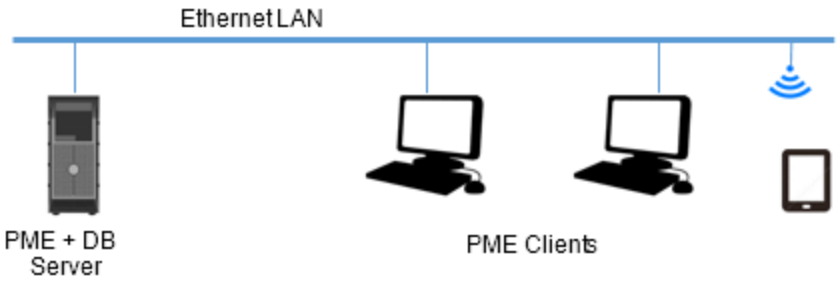
System architecture

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

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

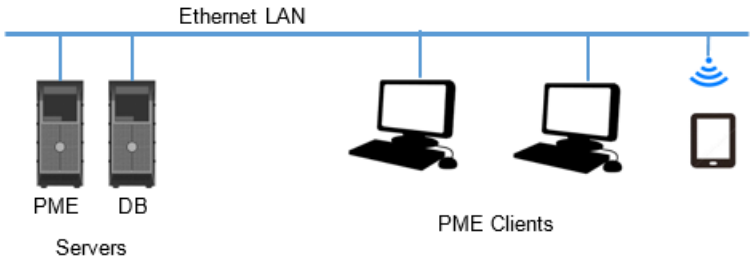
Standalone architecture

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

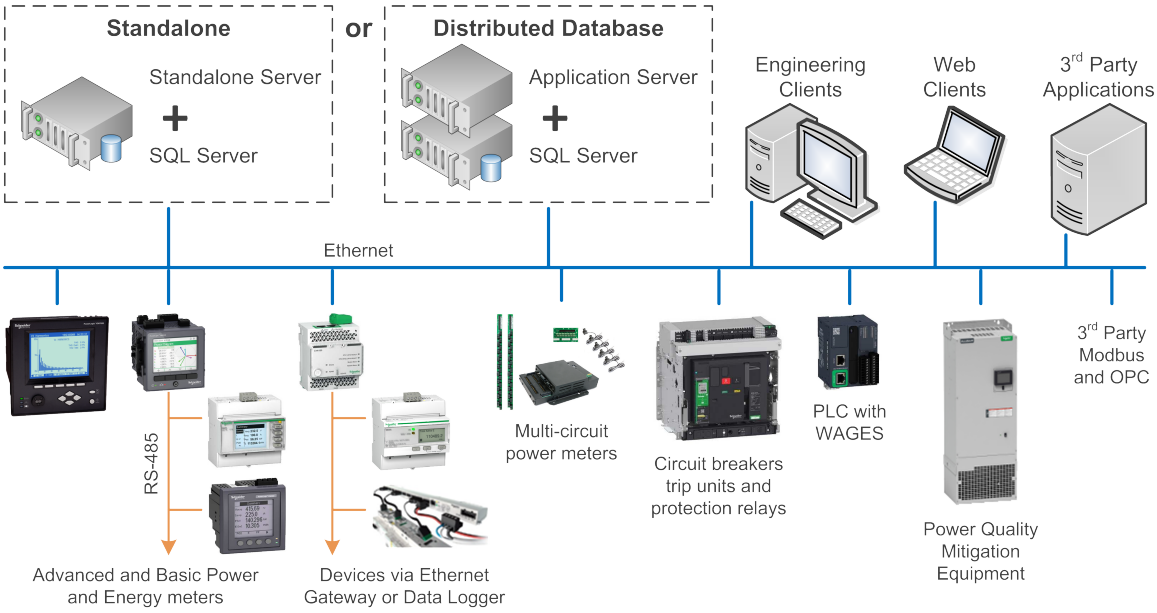


Distributed Database architecture

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



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



Which architecture you should choose

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

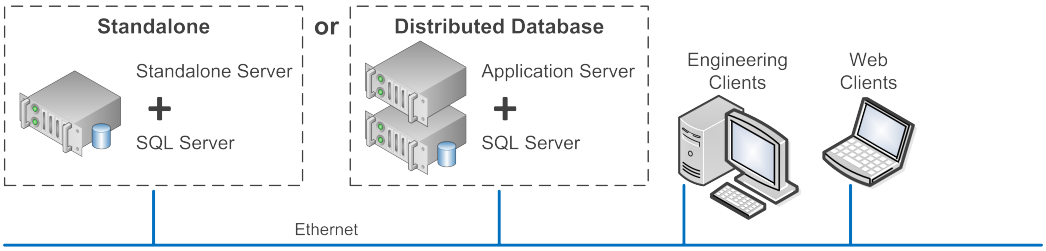
However, in some cases it might be necessary to use the Distributed Database architecture, such as:

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

Client types

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

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



Engineering Client

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

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

Web Client

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

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

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

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

Examples:

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

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

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

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

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

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

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 system. If you have multiple systems, you must purchase separate licenses for each. Multi-system, or enterprise licenses are not available.

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

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

License activation

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

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

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

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

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

<table>
<tr><th>Type</th><th>Description</th></tr>
<tr><td>Express Base license</td><td>The Express Base license is similar to the Base license but with reduced functionality. It is intended for small starter or entry-level systems. The following shows the differences between Base and Express Base licenses:
<table>
<tr><th colspan="2">Feature</th><th>Express Base</th><th>Base</th></tr>
<tr><td colspan="2">Included device licenses</td><td>10</td><td>None</td></tr>
<tr><td colspan="2">PQ Reports</td><td>No</td><td>Yes</td></tr>
<tr><td rowspan="4">Expansion (optional):</td><td>Device Licenses (DL)</td><td>Max of 10 additional</td><td>Yes</td></tr>
<tr><td>Client Licenses (CL)</td><td>Max of 2 additional</td><td>Yes</td></tr>
<tr><td>Unlimited DL</td><td>No</td><td>Yes</td></tr>
<tr><td>Unlimited CL</td><td>No</td><td>Yes</td></tr>
<tr><td rowspan="9">SW Modules (optional)</td><td>Data Exchange Module</td><td>No</td><td>Yes</td></tr>
<tr><td>Energy Billing</td><td>No</td><td>Yes</td></tr>
<tr><td>Energy Analysis Reports</td><td>Yes</td><td>Yes</td></tr>
<tr><td>Energy Analysis Dashboards</td><td>Yes</td><td>Yes</td></tr>
<tr><td>Capacity Management</td><td>No</td><td>Yes</td></tr>
<tr><td>Insulation Monitoring</td><td>No</td><td>Yes</td></tr>
<tr><td>PQ Performance</td><td>No</td><td>Yes</td></tr>
<tr><td>Breaker Performance</td><td>No</td><td>Yes</td></tr>
<tr><td>Backup Power</td><td>No</td><td>Yes</td></tr>
<tr><td colspan="2">Event Notification</td><td>No</td><td>Yes</td></tr>
<tr><td colspan="2">Edition Upgrade</td><td>To Standard Edition</td><td>n/a</td></tr>
</table>
</td></tr>
</table>

Type	Description
Device license	This is a required license. It enables the use of monitoring devices in PME. Depending on the locale, device licenses are sold as: • Bundles of 5, 25, 50, 100, 200, unlimited - for the US, Canada, and India. • Individual licenses, with 3 different license types - for countries other than the US, Canada, and India: – **E** for entry-range device types – **M** for mid-range device types – **S** for high-end device types **NOTE**: Unlimited individual device licenses are available. **NOTE**: At least one device license must be activated in the system for PME to be able to communicate with a device.
Client Access license	This is an optional license. It allow access to Engineering Clients and Web Applications. Engineering Client access: • Client Access licenses are assigned to Windows sessions, not to users. • Each concurrent Windows session requires its own Client Access license. **NOTE**: A remote desktop connection is a separate Windows session. Web Application access: • Client Access licenses are assigned to users. • Each user needs their own Client Access license. • A Client Access license is assigned and bound to a new user when they first log into the PME web applications. • The **supervisor** account also needs a Client Access license. • To free up an assigned Client Access license, the user must be deleted in PME. **NOTE**: An unlimited Client Access license is available that includes unlimited engineering tools and web application use. **NOTE**: Management Console does not require a license.

Type	Description
Software Module license	This is an optional license. It enables the use of a Software Module. Each Software Module requires its own specific license. The following Software Modules exist in PME: • Backup Power Module • Breaker Performance Module • Capacity Management Module • Energy Analysis Dashboard Module • Energy Analysis Reports Module • Energy Billing Module • Event Notification Module • Insulation Monitoring Module • Power Quality Performance Module
Data Exchange Module license	This is an optional license. It enables the use of the following features and functions in PME: • OPC DA Server • Measurement Aggregation Export Report • VIP Modbus Slave functionality • COMTRADE export with ETL **NOTE**: OPC DA Server licenses on older PME systems will automatically be converted to Data Exchange Module licenses on upgrade.
Developer/Demo license	This is a special license. Contact Schneider Electric for details.

Basic administration tasks

Install Windows updates

Apply critical and routine Windows and SQL Server updates to the PME servers and clients; no prior approval by Schneider Electric is required.

Check the scheduled database maintenance tasks

NOTICE
LOSS OF DATA • Back up the database at regular intervals. • Back up the database before upgrading or migrating the system. • Back up the database before trimming it. • Back up the database before making manual database edits. • Verify correct database behavior after making database or system changes. **Failure to follow these instructions can result in permanent loss of data.**

In Standalone PME systems, the database maintenance tasks for backup, archive, maintenance, and trim are pre-configured and scheduled to run automatically by default. For Distributed Database PME systems, we recommend that these scheduled tasks are set up manually.

Check the task outputs regularly and confirm that backups are created as expected. Review and adjust the schedules to meet your application needs, if required.

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

Monitor the database size for systems with SQL Server Express databases

NOTICE
LOSS OF DATA • Back up or archive the database before trimming it. • Trim the SQL Server Express database before it reaches the size limit. **Failure to follow these instructions can result in permanent loss of data.**

SQL Server Express has a maximum database size limit of 10 GB. The database stops logging data when this size limit is reached. The scheduled default database maintenance tasks include a database size notification task. When the size threshold is reached, the task logs a system log event message and triggers a Critical alarm in PME every time the task runs.

Check the PME system log and Alarms on a regular basis for database size notification messages. Check the database size on a regular basis and take action before reaching the database size limit.

Cybersecurity

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

⚠ WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

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

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

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

Cybersecurity awareness

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

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

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

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

Cybersecurity features

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

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

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

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

Recommended actions

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

The different defense in depth layers can be described as:

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

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

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

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

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

For more information on cybersecurity related PME features, functions and configurations, see the *Power Monitoring Expert System Guide*.

Planning

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

Obtain security certificates

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

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

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

Obtain antivirus and application whitelisting software

PME can be used with antivirus software.

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

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

Plan user access

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

Plan your network security

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

This can include:

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

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

Plan to install PME in an intranet environment

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

Plan IP port use

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

Plan your site security

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

This can include:

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

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

Plan for the implementation of cybersecurity standards

Consider implementing cybersecurity standards such as:

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

Installing and Upgrading

This section provides information on how to help secure your system during the Installing and Upgrading phase.

Install antivirus and application whitelisting software

Install the antivirus and application whitelisting software.

NOTE: Application whitelisting software can prevent a legitimate application from executing, if not configured correctly. See Configure application whitelisting software for more information.

Verify install file integrity and authenticity

⚠ WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

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

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

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

Verify the file integrity and authenticity for software updates and other components before installing them in the system. Do not install files for which the integrity and authenticity cannot be confirmed.

For details on how to verify file integrity and authenticity, see Verifying file integrity and authenticity.

Protect the System Key

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

As long as the PME server has the original key stored in the registry, it is possible to use the installer to export a copy at any time. However, if the original key is deleted from the server, it cannot be recreated or exported. In that case, you can use the exported copy to restore the system key in the registry. Without the system key, PME user accounts can no longer be accessed.

NOTE: Protect the exported system key in a location accessible only to authorized users. An unauthorized user might be able to use the system key to gain access to your power monitoring software and devices.

Install latest updates for OS and SQL Server

Install the latest updates for the operating system and the SQL Server.

Check computer for cybersecurity issues

Check the pre-existing computer hardware and software for malware and other potential cybersecurity issues.

For example,

- Scan the system with up-to-date antivirus/antimalware tool
- Check the Windows user accounts and access permissions
- Verify firewall settings to ensure least-access
- Verify computer hardware integrity

Install your network security measures

Install the network security hardware and software measures for your IT and device networks.

Configuring

This section provides information on how to help secure your system during the Configuring phase.

Install security certificate

PME is installed with a self-signed certificate and a self-signed certificate is configured automatically. We recommend that you replace this with a security certificate from a Certificate Authority (CA).

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

Set up encrypted database communication for Distributed Database architectures

We recommend that the connections between PME and the SQL database server, in Distributed Database architecture installations, are encrypted using at least Transport Layer Security (TLS) 1.2. This requires a certificate from a public certification authority for the SQL Server computer and the configuration of both servers to use encrypted connections.

NOTE: Only the communication between the PME application server and the database server will be encrypted, not the data in the database.

NOTE: The use of self-signed certificates is supported but we recommend that you use a certificate from a certification authority.

High level configuration steps:

1. Install a Server Authentication certificate from a public certification authority on the SQL Server computer.
2. Take PME out of service by informing system users of the outage and disabling any automated system control or third-party interactions.
3. Stop all PME services.
4. Configure the SQL server to force encrypted connections.
5. Configure PME to use encryption on database connections. See Configure database connection encryption for more information.
6. Confirm that the PME application server computer can verify the ownership of the certificate used by the SQL Server computer.
7. Restart PME, verify the correct operation of the system, and put the system back into service.

Detailed configuration information:

- See Enable Encrypted Connections to the Database Engine, a Microsoft document, for information on certificate requirements, as well as detailed installation and configuration instructions.
- See TLS 1.2 support for Microsoft SQL Server, a Microsoft document, for information on TLS 1.2 support in different versions of SQL Server.

Configure application whitelisting software

Application whitelisting software, such as McAfee Application Control, is used to prevent unauthorized applications from running on your system.

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

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

Consider the following when using whitelisting software with PME:

- Complete the system configuration before setting up and enabling the whitelisting software.
- Any program or script that should be able to update the system will need to be configured as an updater.
- After solidification, no updates or extensions, such as add-on device drivers, may be installed.
- Disable the whitelisting software when making changes to the PME system. Enable it again after the change.
- Follow the instructions of the software vendor for installing, configuring, and operating the whitelisting software.

NOTE: Verify the correct operation of your PME system after you enable the whitelisting software.

Configure antivirus software on your SQL Server

We recommend that you run antivirus software on your SQL server. Follow the recommendations described in Microsoft Support article (ID: 309422).

NOTE: Antivirus software can have a significant impact on system performance if it is not set up correctly. Consider the following:

- SQL Server performance can be affected if data and log files are not excluded from on-access scans.
- Special configuration of the antivirus software might be required.
- Follow the instructions of the software vendor for installing, configuring, and operating the antivirus and whitelisting software.

Configure PME users and user groups

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

RECOMMENDATION: Use Windows users instead of standard users in your PME system to improve cybersecurity. Windows offers advanced user management functions, such as enforcing password strength and limiting the number of invalid login attempts. These functions are required for IEC 62443 compliance, the global standard for industrial automation control system security.

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

Customize user account privileges

You can configure user account privileges in **Web Applications** > **Settings** > **Users** > **System Users** > **User Manager**.

Restrict Windows login permissions for the PME server

We recommend that you restrict the Windows login permissions for the PME server computer to PME system administrators only. Preventing non-administrator users from logging into the server reduces the risk of unauthorized system changes and increases the cybersecurity of your system.

Change the SQL Server Express sa account password

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

Configure session timeout settings

You can configure session timeout settings in **Web Applications** > **Settings** > **Security** > **Session Timeout**. See Session timeout for information on this feature.

Configure system integration security settings

You can configure system integration settings in **Web Applications** > **Settings** > **Security** > **Authorized Hosts**. See System integration security for information on this feature.

Do not install or use a web browser on the server computer

Using a web browser on a server computer increases the vulnerability of the server and the network. Access PME web clients on client computers only, not on the server.

RECOMMENDATION: Remove the PME Web Applications shortcuts from the server.

Set up your network security

Set up the network security measures for your IT and device networks.

Disable unused IP ports

Disable or block IP ports that are not required for the operation of your system. See IP Ports for details on PME port requirements.

Disable unused hardware ports

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

Administering

This section provides information on how to help secure your system during the Administering phase.

Renew security certificate

Renew the security certificate before it expires.

Securely store the system key

See Protect the System Key for details.

Apply PME updates

Install software updates that apply to your system when they become available. Check the PME Exchange Community (requires login) or the Schneider Electric Exchange - EcoStruxure Power Monitoring Expert (Portal) for available updates, or contact your service provider.

Verify update file integrity and authenticity

See Verify install file integrity and authenticity for details.

Apply OS and SQL Server updates

⚠ WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

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

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

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

Consider implementing best practices, such as:

- Establish a reliable process for finding and applying the latest security updates.
- Use systematic procedures governed by corporate policy.
- Use automated scanners for detecting missing patches, misconfigurations, use of default accounts, and so on.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

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

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

⚠ WARNING

INACCURATE DATA RESULTS

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

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

Review user accounts on a regular basis

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

RECOMMENDATION: Use Windows users instead of standard users in your PME system to improve cybersecurity. Windows offers advanced user management functions, such as enforcing password strength and limiting the number of invalid login attempts. These functions are required for IEC 62443 compliance, the global standard for industrial automation control system security.

NOTE: To only use Windows users, replace any existing standard users in the system with Windows users. Disallow logins for standard users in Web Applications, this disables the **supervisor** user.

Keep network security up-to-date

Keep security related networking tools and equipment up-to-date and working as expected.

NOTE: Network security equipment, such as firewalls, are complex devices and must be maintained by trained individuals.

Keep computer hardware secure

See Plan your site security for more information.

Perform security audits

Perform comprehensive system security audits on a regular basis. Regularly scan and verify security.

Consider implementing best practices, such as:

- Check the OS and PME system logs.
- Check performance monitor profiles

Decommissioning

Decommissioning removes PME files to prevent potential disclosure of sensitive, confidential and proprietary data and software from your system. You risk disclosing your power system data, system configuration, user information, and other sensitive information if you don't decommission. We strongly recommend you decommission your system at the end of its life.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Before decommissioning, verify that the system is not performing critical control actions that may affect human or equipment safety.

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

⚠ WARNING

INACCURATE DATA RESULTS

Before decommissioning, verify that the system data results are not used for critical decision making that may affect human or equipment safety.

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

To decommission PME you have two choices, **Destroy** or **Overwrite.**

Destroy: Choose this if you do not need to use your hard drives for any other software.

Overwrite: Choose this if you still need to use your hard drives for other software. This method uses a commercial tool to put random data in place of PME files on your hard drives.

See Decommissioning Reference for detailed instructions.

IT Requirements

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

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

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

Computer Hardware

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

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

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

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

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

Choosing Computer Type, CPU, and RAM

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

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

Basic Systems

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

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

Minimum recommended computer hardware for servers in Basic Systems:

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

Advanced Systems

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

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

Minimum recommended computer hardware for servers in Advanced Systems:

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

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

Client Computers

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

Minimum recommended computer hardware for clients:

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

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

Choosing Data Storage

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

Storage Size

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

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

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

PME historical database

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

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

It can be broken down into the following components:

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

The estimates above are based on the following assumptions:

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

Main Database File Size (ION_data.mdf)

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

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

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

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

Storage Performance and Availability

Storage Type

The two main storage solutions that are available are Hard Disk Drives (HDD) and Solid-State Drives (SSD). HDDs are good at providing cheap, bulk storage for non-performance critical data. SSDs are good at providing strategic storage for high performance data. We recommend that you use SSDs for the Microsoft Message Queuing (MSMQ) storage in medium, large, and extra large PME systems.

Storage Configuration

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

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

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

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

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

RAID Systems

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

Recommended RAID 1 configurations:

2x Drive

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

4x Drive

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

6x Drive

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

8x Drive

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

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

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

Operating Environment

PME supports the following environments and software:

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

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

** 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

⚠ WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

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

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

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

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

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

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

⚠ WARNING

INACCURATE DATA RESULTS

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

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

Localization

PME supports the following languages:

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

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

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

Operating System considerations

Windows or Windows Server?

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

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

32-bit or 64-bit systems?

PME supports 64-bit operating systems only.

SQL Server considerations

Express Version or Full version?

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

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

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

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

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

Existing or new SQL Server?

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

Type	Description
New SQL Server Standard	PME requires a certain configuration of the SQL Server.
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.

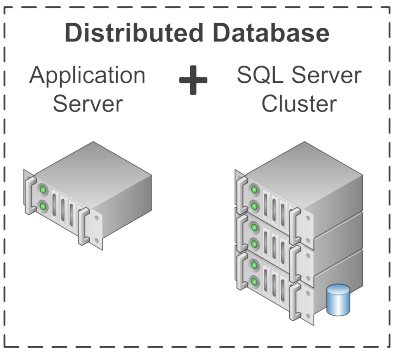
NOTE: The operating system and SQL Server combination you choose must be supported by Microsoft. This applies to edition, version, and 32-/64-bit.

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

Other IT considerations

Internet Information Services (IIS) .NET Trust Level

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

PME Server name limitations

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

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

Display resolution

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

Device Networks

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

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

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

Device networks overview

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

Examples of monitoring devices include:

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

PME supports the following communication protocols:

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

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

Network types

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

Ethernet (TCP) networks

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

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

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

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

Serial device networks

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

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

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

PME also supports communication through telephone modems.

Reasons for using serial networks include:

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

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

Network performance

Communications between the software and the devices consist of:

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

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

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

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

  NOTE: The ION9000T, a high-end power monitoring device with high speed transient capture, will not upload high speed transient waveform data to the software if it is connected through a serial connection.
- Setup the devices to only log those measurements that are needed to meet the user needs.
- Schedule the log uploads to occur at times when the system usage is low, for example during night time or off hours.
- Use the Daisy Chain Calculator tool to determine the maximum number of devices in a serial loop for your system. See Tools for more information.
- In most applications, Ethernet networks will provide a better performance than serial networks.

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.

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

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.

Reference

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

Cybersecurity Reference

This section contains reference information related to cybersecurity.

Data encryption

At Rest

PME encrypts the passwords of its user accounts, as well as the Windows and SQL Server accounts using SHA-512 and AES-256 cryptography. PME uses a unique encryption key for each installation. The key is generated during the installation of PME. The PME installer offers functionality for exporting/importing encryption keys for the installation of PME clients or system upgrades.

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

In Transit

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

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

PME accounts

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

PME Users

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

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

Windows accounts used by PME

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

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

See Windows accounts for more information.

SQL Database server accounts

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

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

See SQL Server accounts for more information.

EcoStruxure Web Services account

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

PME Services

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

See PME Windows services for more information.

Network shares

PME Engineering Clients and Secondary servers require that the **Power Monitoring Expert** folder on the PME server is shared with change and read permissions. This file share must be manually set up before installing Engineering clients or Secondary servers.

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.

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

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

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

System integration security

Specify which third-party web resources are allowed to either embed (frame) the PME web applications, or to which the PME web applications can redirect requests. This is configurable in the PME Web Applications settings.

Verifying file integrity and authenticity

Verify the file integrity and authenticity for software updates and other components before installing them in the system. Do not install files for which the integrity and authenticity cannot be confirmed.

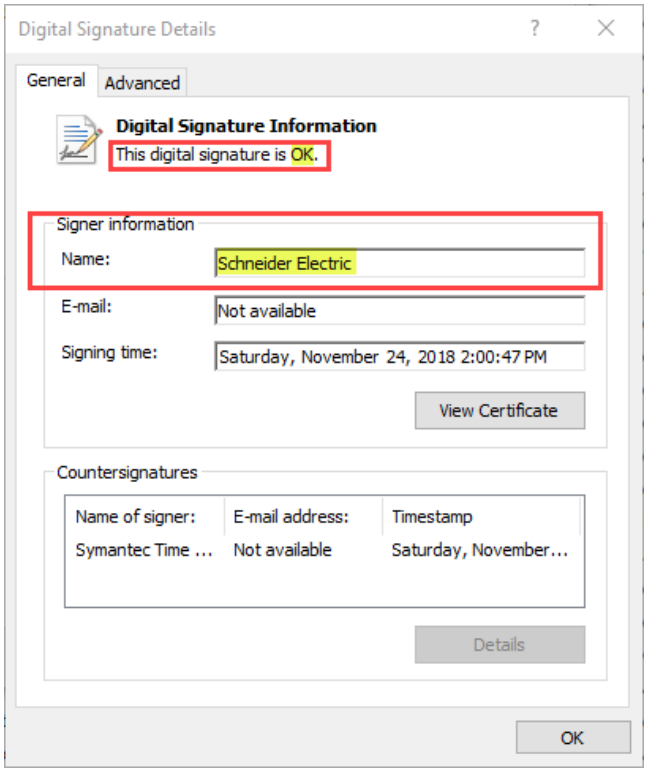
To verify the file integrity and authenticity:

1. Right-click the file and select **Properties**. This opens the Properties dialog.
2. In the Properties dialog, select the **Digital Signatures** tab.
3. In the Signature list, highlight the Name of signer. Click **Details**.

   NOTE: Only Schneider Electric should be shown in the Signature list.

4. Verify that the digital signature is OK and that the signer name shows **Schneider Electric**.

   Example:



5. Close the properties dialog.

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 Database Engine service	NT AUTHORITY\SYSTEM	Must have access to the database folder(s) and the Temp folder of the installer user during installation. Permissions can be lowered after PME is installed.

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

NOTE: For information on which accounts are used to run the PME Windows services, see PME Windows services and IIS Application Pools.

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

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

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

SQL Server accounts

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

For installations with SQL Server Authentication:

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

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

For installations with Windows Integrated Authentication:

Login	Authentication	Server Role	Database	Membership
Account used for Windows Integrated Authentication	Windows	Public	ApplicationModules	db_owner
			ION_Data	db_owner
			ION_Network	db_owner
			ION_SystemLog	db_owner

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

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

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

Other

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

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

PME Windows services

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

Service Name	Startup Type	Log On Account	Description
ION Application Modules Alarm Services Host	Manual	NT AUTHORITY\System *	Allows the Event Notification Module (ENM) to read alarms directly from the ION_Data database. Starts on demand from other services (for example, from the Event Notification Module).
ION Application Modules Core Services Host	Automatic	NT AUTHORITY\System *	Hosts common web services used by the Web Applications component.
ION Application Modules Data Services Host	Automatic	NT AUTHORITY\System *	Hosts web services that provide low-level access to system data (that is, real-time, historical, alarming, and authentication) for the Web Applications component.
ION Application Modules Provider Engine Host	Automatic	NT AUTHORITY\System *	Hosts web services that provide data processing for the Web Applications component.
ION Cloud Agent Service	Automatic	NT AUTHORITY\System *	Manages interaction with cloud services.
ION Component Identifier Service	Manual	Local Service *	Locates local and remote product components. Starts shortly after startup by request of ION Connection Management Service.

Service Name	Startup Type	Log On Account	Description
ION Connection Management Service	Manual	NT AUTHORITY\System *	Determines the connection status of sites and devices in the system, and handles allocation of resources such as modems. This service manages the state of site and device connectivity for the system. In order to establish the most appropriate state for the system, each connection and disconnection request is evaluated against the overall state of the system and availability of communications channels. Starts shortly after startup by request of ION Network Router Service.
ION Diagnostics and Usage Service	Automatic	Local Service *	Collects basic, non-identifying information from the Power Monitoring Expert system and uploads it to a secure location on the cloud for data mining by Schneider Electric. Customers can opt-in or opt-out at any time.
ION Event Watcher Service	Automatic	Local Service *	Monitors system events for conditions specified in Event Watcher Manager.
ION Log Inserter Service	Automatic	NT AUTHORITY\System *	Provides historical data collection for the power monitoring system (that is, devices and Virtual Processor), and stores it in the ION_Data database.
ION Log Subsystem Router Service	Automatic (Delayed Start)	NT AUTHORITY\System *	Transfers data received from power monitoring devices to storage and processing.
ION Managed Circuit Service	Automatic	Local Service *	This service is used to create individual real-time and historical data sources for multi-circuit meters.

Service Name	Startup Type	Log On Account	Description
ION Network Router Service	Automatic	NT AUTHORITY\System *	Routes all ION requests between the software components, such as client workstations, the Real Time Data Service, Log Inserter, and the Query Server. The service dynamically detects changes to the network configuration, including the addition of new servers. It can also recognize new software nodes, such as Vista, that are added to an existing server.
ION OPC Data Access Server	Manual	NT AUTHORITY\System *	Serves real-time OPC data (OPC DA) to OPC client applications. Starts on an OPC client request for data, if the Data Exchange Module license has been activated.
ION PQDIF Exporter Service	Manual	Local Service *	Translates power quality data from the ION_Data database into PQDIF file format and manages scheduled PQDIF exports.
ION Query Service	Automatic	NT AUTHORITY\System *	Provides historical data retrieval from the ION_Data database for client applications (for example, Vista and Diagrams).
ION Real Time Data Service	Automatic	Local Service *	Manages and provides access to real-time data for all client applications (Vista, Diagrams, Trends, and so on).
ION Report Subscription Service	Automatic (Delayed Start)	Local Service *	Runs Reports subscriptions according to user-defined schedules. Starts several minutes after the server starts.
ION Site Service	Automatic	NT AUTHORITY\System *	Manages communication links to and from the product. ION Site Service is responsible for handling packet communications to system devices and controlling direct device communications. The service reacts to changes in network configuration: for example, changes to certain channels, configuration parameters, ports, or device parameters can often interrupt a connection.

Service Name	Startup Type	Log On Account	Description
ION Software Data Processing Service	Automatic (Delayed Start)	Local Service *	Performs evaluations based on real time data from the power monitoring system.
ION Software Modbus Gateway Service	Manual	Local Service *	Enables software data services via ModbusTCP/IP, and is treated like a device in the system. For example, the Circuit Breaker Aging Service uses this service.
ION Virtual Processor Service - NVIP.DEFAULT	Automatic	Local Service *	Provides aggregation, control, and mathematical analysis of power monitoring system data.
ION Virtual Processor Service – NVIP.PQADVISOR	Automatic	Local Service *	Serves up data for the Power Quality Performance diagrams. Functions only when the Power Quality Performance module is licensed and configured.
ION Virtual Processor Service – NVIP.DDD	Automatic	Local Service *	Serves up data for the Disturbance Direction Indicators application. Functions only when the Disturbance Direction Indicators application is configured.
ION XML Subscription Service	Automatic	Local Service *	Manages subscriptions to XML data for Vista user diagrams. This service is used only by the Diagrams application. When you open a Vista user diagram in a web browser, the ION XML Subscription Service creates a subscription and delivers the real-time data in XML format.
ION XML Subscription Store Service	Automatic	Local Service *	Stores XML data subscriptions for the power monitoring devices on the network. This service is used only by the Diagrams application.
ImadminSchneider	Automatic	Local Service	This service runs the FlexNet Publisher License Server Manager.
SQL Server (ION)	Automatic	Local System	Provides storage, processing and controlled access of data, and rapid transaction processing for the ION_ Data, ION_Network, ION_SystemLog, and the ApplicationModules databases.

* When PME is installed with Windows Integrated Authentication, the Windows account that is used to access the database is also used to run the PME services.
** This service only exists on systems with SQL Server, not SQL Server Express.

IIS Application Pools

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

Application Pool	Identity	Application
Application Modules App Pool	NetworkService *	Dashboards EWS (EcoStruxure Web Services) Slideshow System Data Service Web
ION App Pool	NetworkService *	ION ION Report Data Service Web Services
Web Reporter App Pool	NetworkService *	ModelingConfig reporter

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

NOTE: The .NET Trust Level for PME web applications and Default Web Site must be set to **Full (internal)**, in IIS Manager.

Databases

PME Databases

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

ION_Network database

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

ION_Data database

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

Application Modules database

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

ION_System log database

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

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

Database maintenance task definitions

The following are high level definitions of PME relevant database maintenance tasks.

Archive

Database archiving copies older data from the operational database into a separate, new database. The goal of archiving is to keep data safe for future reference. Data is typically archived based on calendar time intervals, for example by month or by year.

The PME archive task creates a new archive database each time the task is run. Each new archive database is attached to SQL server and is available to be accessed by PME.

NOTE: The PME archive task does not trim data from the operational database; it only makes a copy of the archived data, leaving the original data in the operational database. See Considerations for trimming archived data from ION_Data for important information on this topic.

Backup

Backing up a database creates a copy of the operational database. The goal of a backup is to have an identical duplicate of the operational database that can be used to restore the system in case the operational database becomes nonfunctional. Database backups should be created on a regular basis, for example daily or weekly.

Maintenance

The PME database Maintenance task defragments the database and updates the database statistics. The goal of these activities is to maintain database performance. Maintenance tasks should be run on a regular basis, for example daily.

Size Notification

The size notification task is used to monitor the size of the database and to notify users when a certain size threshold is reached. When the size threshold is reached, the task logs a system log event message and triggers a Critical alarm in PME every time the task runs.

NOTE: The Size Notification task is only configured for systems using SQL Server Express, which has a maximum database size limitation of 10 GB.

Trim

Trimming a database deletes data from the database. The goal of trimming is to prevent the database from growing to a size that could affect system performance. Databases should be trimmed on a regular basis, for example daily or weekly. For PME only the system log databases are trimmed.

Considerations for trimming archived data from ION_Data

When archiving and then trimming data from the ION_Data database, you are moving this data from the operational database into an archive store for long-term retention. This data is then no longer available in the ION_Data database for analysis in PME. PME has very limited access to archived data.

We recommend that you only trim archived data from the ION_Data operational database, when:

- It approaches its size limit, for example 10 GB for a SQL Server Express database.
- It reaches a size that impacts query performance.
- The database drive is low on available free space and you cannot switch to a larger drive.

When you trim data from an SQL database, the database file size remains unchanged. After the trim, the database will first fill the new free space before growing the database file size again. To reduce the database file size after trimming, Shrink the database, using standard SQL Server tools.

NOTE: The PME archive task does not trim the database; it only copies data to the archive.

Archive data access in PME:

Application	Archive Data Access
Vista	Yes
Reports	Can access either data from the operational database or from an archive database but not both at the same time.
Dashboards	No
Diagrams	Yes
Trends	No
Alarms	No

Database maintenance account requirements

PME uses Task Scheduler in Windows for the scheduling and execution of database maintenance tasks. Task Scheduler requires a Windows account to run the tasks. In Standalone PME systems, an account, **IONMaintenance**, is created by the installer and automatically assigned to the Task Manager tasks. In Distributed PME systems you need to create an account manually. This account must meet the following minimum requirements:

In Windows on the computer where the database server is installed, the account:

- must be a member of the Users group.
- must have the following Windows policy settings: **Log on as a batch**; **Deny log on locally**.

In SQL Server, the account:

- must have a **public** server role
- (for archive task only) must have a **sysadmin** server role
- must have the following role memberships for the PME databases (ION_Data, ION_Network, ION_SystemLog, ApplicationModules):
  - db_backupoperator
  - db_ddladmin
  - Maintenance
  - public

NOTE: You will need the password for this account during the initial task setup, and later if you want to edit the tasks in Task Manager in the future.

Configure database connection encryption

You can configure PME to use encryption for the communication between the application server and the database server. You can also specify if PME trusts self-signed server certificates on the database server or not. For more information on setting up encryption for database connections, see Set up encrypted database communication for Distributed Database architectures.

To enable or disable encryption for database connections:

NOTE: Before editing the settings in the registry, confirm that your PME system has been taken out of service and that all system services have been stopped.

1. Open the Windows Registry Editor.
2. Navigate to the following registry key:`Computer\HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Schneider Electric\Power Monitoring Expert\9.1\Databases`
3. Set the `UseEncryption` value to 1, to enable encryption, or to 0, to disable encryption.

To configure the software to trust or not trust self-signed certificates on the database server:

1. Open the Windows Registry Editor.
2. Navigate to the following registry key:`Computer\HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Schneider Electric\Power Monitoring Expert\9.1\Databases`
3. Set the `TrustServerCertificate` value to 1, to trust self-signed certificates, or to 0, to not trust self-signed certificates.

Database growth calculations

Factory default measurement logging

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

Example

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

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

Custom measurement logging

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

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

$$Single\ Measurement\ (MB) = \frac{365\ \frac{Days}{Year} * 24\ \frac{Hours}{Day} * 4\ \frac{Measurement}{Hour} * 75\ \frac{bytes}{Measurement}}{1{,}048{,}576\ \frac{bytes}{MB}}$$

$$= 2.51\ MB\ /\ YR$$

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

Power quality event logging

Power quality (PQ) events and waveform capture recording is event driven, which makes it impossible to accurately predict their impact on database growth. In our experience, power quality data accounts for approximately 10% - 20% of the total database size.

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

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>
```

Diagnostics and Usage Services

Diagnostics and Usage anonymously sends data to a secure server. Schneider Electric uses this data to help improve our software by understanding how you use it.

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

This operation is enabled by default.

NOTE: All diagnostics and usage data are sent to Schneider Electric anonymously. None of the collected information identifies you or your company. For more information on the Schneider Electric Privacy Policy, see the Schneider Data Privacy and Cookie Policy.

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

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

To disable the sending of data:

1. Open Web Applications and click **Settings > Registration & Analytics > Diagnostics and Services**.
2. Select **Disable** in the dropdown list and click **Save** to apply the change.

Decommissioning Reference

This section contains detailed instructions for decommissioning your system. For an overview, see Decommissioning.

NOTICE
UNINTENDED DATA LOSS OR LOSS OF SOFTWARE FUNCTION • Only decommission PME systems that are no longer needed. • Archive important PME data and files before decommissioning. You cannot recover, reinstall, or otherwise retrieve any part of PME after decommissioning. **Failure to follow these instructions can result in irreversible damage to software and databases.**

Choose **Destroy** or **Overwrite** to decommission your system.

You must decommission PME on all PME Servers, Database Servers, and PME Clients.

Decommissioning does not completely restore your computers to the state they were in before PME was installed. Decommissioning does not remove third-party software used by PME (for instance, the .NET framework), even if this software was installed using the PME installer.

NOTE: Decommissioning will not remove PME data that has been exported from PME or PME information in third-party software. This includes, but is not limited to:

- Data exported to other systems using EcoStruxure Web Services (EWS), OPC DA server, ETL, ODBC, PQDIF or VIP.
- Registration information shared with Schneider Electric.
- Diagnostics and Usage data sent to Schneider Electric.
- System information sent to Schneider Electric for licensing.
- Schneider Electric License Manager and Floating License Manager.
- Archived configurations created with the Configuration Manager.
- PME System Key exported from the Installer.
- PME information configured in third-party whitelisting software.
- Files or data copied, backed-up, exported, or otherwise saved to a file location other than the PME folder.

Destroy

⚠ WARNING
HAZARD OF PHYSICAL INJURY • Do not destroy hard drives without the proper safety training. • Never burn a hard drive, put a hard drive in a microwave, or pour acid on a hard drive. **Failure to follow these instructions can result in death or serious injury.**

NOTE: If you do not have the proper safety training, consult your IT department to select an asset disposal company.

To destroy hard drives:

1. Identify all computers where PME is installed. In a Distributed Database architecture, this includes all PME Servers, Database Servers, and PME Clients.
2. Remove all hard drives from the computers identified in the previous step.
3. Destroy each hard drive:
   a. Puncture, shatter, or sand the hard drive plates. Follow local regulations for proper disposal of the hard drive.
   b. or, provide the hard drive to an asset disposal company.

Overwrite

NOTICE
UNINTENDED DATA LOSS OR LOSS OF SOFTWARE FUNCTION • Only overwrite files and folders from PME. • Back up important files from other software before overwriting PME. **Failure to follow these instructions can result in irreversible damage to software and databases.**

To overwrite PME:

1. Open the Windows Control Panel and select Programs and Features.
2. Uninstall PME.
3. Select and install a data destruction tool. There are many commercial and open-source data destruction tools available. Consult your IT department if you are unsure about which tool to choose.
4. Detach PME database archives:
   a. Open **SQL Server Management Studio**, enter your password if required and click **Connect** to access your SQL Server.
   b. In the **Object Explorer** pane on the left, expand **Databases**, right-click the database archive you want to detach and click **Tasks > Detach**… to open the **Detach Database** dialog.
   c. In the **Detach Database** dialog, click **OK**.
   d. Repeat the above steps for all PME database archives.
5. Locate your PME folder under Program Files. The PME folder contains the following subfolders:
   - `\applications`
   - `\config`
   - `\Database`

- \Floating License Manager
- \License Manager
- \Setup Logs
- \system
- \web

6. Follow instructions provided with your data destruction tool to overwrite the entire PME folder located in the previous step.
7. Locate any custom PME files in folders outside of the PME folder. This may include, but is not limited to, following file types:
   - Vista and Designer files: .cfg, .dgm, .wsn, .wsg
   - ION databases and archives: .LDF, .MDF
   - ION database backups: .bak
   - Custom report packs: .rdlc
   - PMESystem Key: .key
8. Follow instructions provided with your data destruction tool to overwrite the files located in the previous step.
9. Repeat the steps above on all PME Servers, Database Servers, and PME Clients.

IP Ports

The following table lists the ports used by PME for the communication between its components and the connected devices:

Port	Protocol	Location	Function	Configurable
20/21	FTP	Power Meter	Power meter access	No
23	Telnet	Power Meter	Power meter access	No
25	SMTP	Power Meter	Power meter access	No
69	TFTP	Power Meter	Power meter access	No
80	HTTP	(1) PME Server (2) Power Meter	(1) IIS server, EWS (2) Power meter access	(1) Yes (2) No
135	OPC	PME Server	OPC client	No
139/445	NetBIOS/SMB	PME Server	Engineering client (File and Printer Sharing)	No
443	HTTPS	(1) PME Server (2) Power Meter	(1) IIS Server, EWS, Cloud Agent (2) Power meter access	No
502	Modbus TCP	Power Meter	Power meter communication	No
1433	TCP	Database Server	SQL Server instance	No
1434	UDP	Database Server	SQL Server Browser	No
3721	PML	Power Meter	Power meter communication	No
6000-6099	TCP	PME Server	Log Inserter	No
7176	TCP	PME Server	Diagnostics Viewer (LogSubsystem.Service.exe)	No
7700	ION	Power Meter	Power meter communication	No
7701	Modbus RTU	Power Meter	Power meter communications	No
7800	Modbus/ION/PML	Gateway	Ethergate (All meter COM ports)	No
7801	Modbus/ION/PML	Gateway	Ethergate (Meter COM1)	No
7802	Modbus/ION/PML	Gateway	Ethergate (Meter COM2 and COM 4)	No
7803	Modbus/ION/PML	Gateway	Ethergate (Meter COM3)	No
8090	TCP	PME Server	Web client browser	Yes
8523	TCP	PME Server	Logical devices (LogicalDevice.AutoConfig.ServiceHost.exe)	Yes
13666	TCP	PME Server	PMLNetman.exe	No
13667	TCP	PME Server	Diagnostics Viewer (Server access from client machine)	No
13668	TCP	PME Server	Secondary server	No
13666 13670 13671	TCP	PME Server	Services (Vista and Designer access from client machines)	No
23102	TCP	PME Server	Application Modules web services	No
27010	TCP	PME Server	Licensing (Vendor Daemon)	Yes
27011	TCP	PME Server	Licensing (License server)	Yes

Port	Protocol	Location	Function	Configurable
57777	TCP	PME Server	(1) Real-time data service (to send data to clients) (2) SQL Server (for default instance)	Yes
57778	TCP	PME Server	DataProcessorService.exe	Yes
57779	TCP	PME Server	Diagnostics Viewer (Alarm Service)	Yes
57780	TCP	PME Server	Diagnostics Viewer (Log Subsystem)	Yes
57781	TCP	PME Server	Diagnostics Viewer (Cloud Agent)	Yes

Schneider Electric
35 rue Joseph Monier
92500 Rueil Malmaison – France

Phone: +33 (0) 1 41 70 00
www.se.com

7EN02-0439-01 04/2020