



PowerTag Link Gateway

User Guide

EcoStruxure offers IoT-enabled architecture and platform.

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Safety Information

Important Information

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



The addition of this 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 and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

Cybersecurity Safety Notice

⚠ WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

- Change default passwords at first use to help prevent unauthorized access to device settings, controls, and information.
- Disable unused ports/services and default accounts to help minimize pathways for malicious attackers.
- Place networked devices behind multiple layers of cyber defenses (such as firewalls, network segmentation, and network intrusion detection and protection).
- Use cybersecurity best practices (for example, least privilege, separation of duties) to help prevent unauthorized exposure, loss, modification of data and logs, or interruption of services.

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

About the Book

Document Scope

The purpose of this guide is to provide users, installers, and maintenance personnel with the technical information necessary to install and use the PowerTag Link communication system.

Validity Note

The PowerTag Link communication system can be easily integrated into any building management architecture.

It combines monitoring and metering and protection functions designed for energy efficiency solutions. Based on the Modbus protocol, the PowerTag Link communication system allows switchboards and busbar trunking systems data to be exchanged in real time with a supervision system or a PLC.

Online Information

The information contained in this guide is likely to be updated at any time. Schneider Electric strongly recommends that you have the most recent and up-to-date version available on www.se.com/ww/en/download.

The technical characteristics of the devices described in this guide also appear online. To access the information online, go to the Schneider Electric home page at www.se.com.

Related Documents

| Title of Documentation | Reference Number |
|--|--|
| PowerTag Link/PowerTag Link HD Gateways – Release Note | DOCA0180EN |
| PowerTag System – Design and Commissioning Guide | DOCA0194EN |
| HeatTag Wireless Sensor for Early Detection of Overheating Cables – User Guide | DOCA0171EN DOCA0171ES DOCA0171FR DOCA0171ZH |
| PowerTag Link Gateway – Instruction Sheet | PHA81113 |
| PowerTag M63 Energy Sensor – Instruction Sheet | PHA39639 |
| PowerTag P63 Energy Sensor – Instruction Sheet | JYT31928 |
| PowerTag F63 Energy Sensor – Instruction Sheet | JYT32195 |
| PowerTag F160 Energy Sensor – Instruction Sheet | MFR85580 |
| PowerTag Rope Energy Sensor – Instruction Sheet | GDE25175 |
| PowerTag M250 Energy Sensor – Instruction Sheet | QGH46815 |
| PowerTag M630 Energy Sensor – Instruction Sheet | QGH46820 |
| PowerTag M250/M630 on ComPact NSX Plug-in Base – Instruction Sheet | MFR37601 |
| PowerTag C IO 230 V Control and Monitoring Wireless Communication Module – Instruction Sheet | MFR25181 |
| PowerTag C 2DI 230 V Monitoring Wireless Communication Module – Instruction Sheet | MFR25190 |
| PowerTag Link Display – Instruction Sheet | GDE66713 |

| Title of Documentation | Reference Number |
|---|------------------|
| HeatTag Wireless Sensor for Early Detection of Overheating Cables – Instruction Sheet | MFR5173801 |
| PowerTag Energy – Selection Guide | CA908058E |

You can download these technical publications and other technical information from our website at www.se.com/ww/en/download.

PowerTag System

Introduction

EcoStruxure Master Range

EcoStruxure is Schneider Electric's IoT-enabled, plug-and-play, open, interoperable architecture and platform, in Homes, Buildings, Data Centers, Infrastructure and Industries. Innovation at Every Level from Connected Products to Edge Control, and Apps, Analytics and Services.

Overview

The PowerTag system is used to monitor the electrical distribution installation through any supervision system.

The wireless devices in the PowerTag system are used to monitor, and measure the electrical switchboards via a Modbus TCP/IP communication network.

The PowerTag system collects the data from electrical switchboards in real time. This contributes to achieve energy efficient targets or monitoring final loads.

This system consists of:

- PowerTag Link gateway
- PowerTag Energy •63
- PowerTag Energy F160
- PowerTag Energy Rope
- PowerTag Energy M250/M630 for ComPact NSX, ComPact INS, and ComPact INV devices
- PowerTag control modules
- HeatTag sensor
- PowerTag Link display

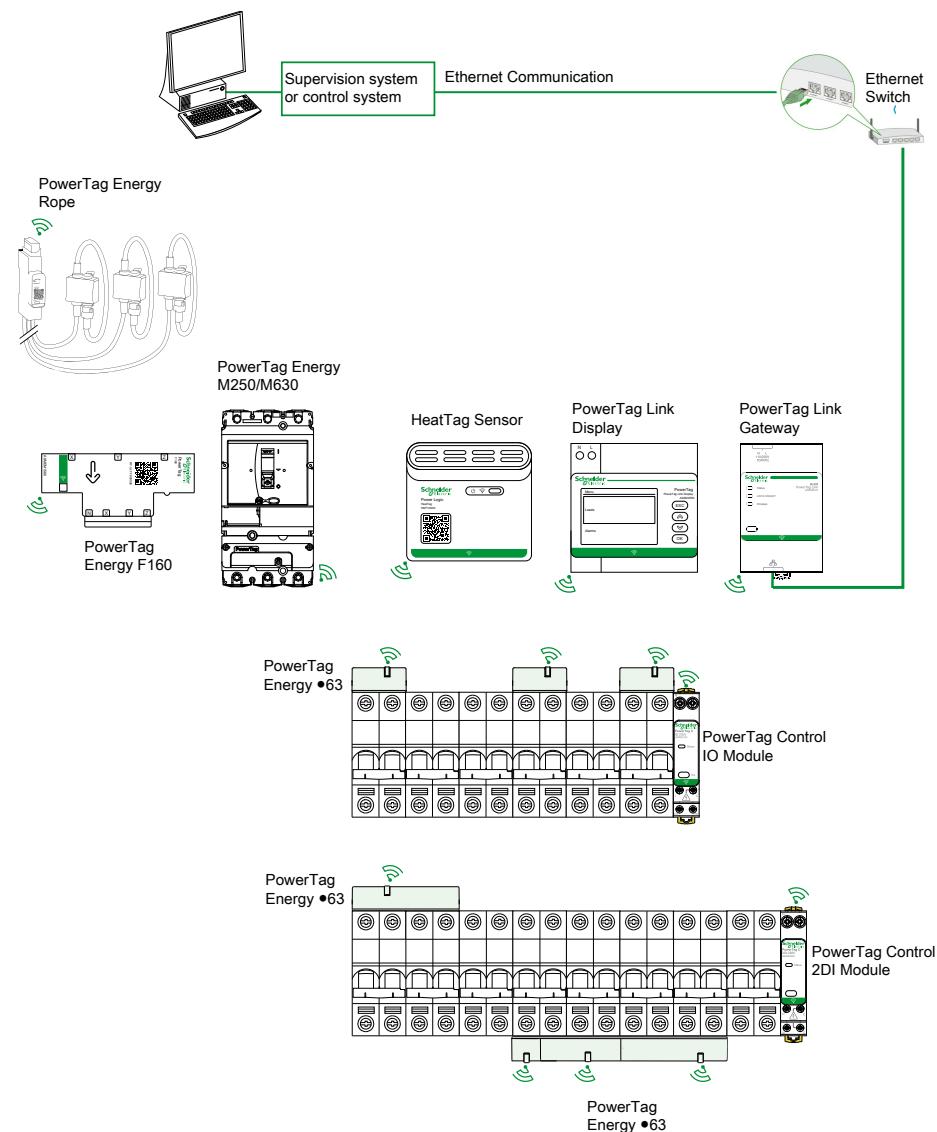
This system offers the following advantages and services:

- Telemetering applications
 - Load unbalance monitoring
 - Power and voltage loss monitoring
- Energy management and regulations

The PowerTag Link gateway is a wireless gateway that exposes over TCP/IP all the Modbus registers of metering and monitoring data to any supervision system.

The PowerTag Link gateway provides monitoring of the switchboard via embedded webpages for local access.

PowerTag System Architecture Diagram



The PowerTag Link gateway also manages webpages to configure settings or to monitor the wireless devices.

The customer shall be responsible for the security of the networks and the facilities into which the PowerTag Link gateway is deployed.

⚠ WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

Change default passwords at first use to help prevent unauthorized access to device settings, controls, and information.

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

Maximum Number of Wireless Devices

The maximum number of wireless devices that can be configured in a PowerTag system depends on the type of the gateway.

- PowerTag Link gateway (A9XMWD20):
The maximum number of devices that be connected to the PowerTag Link gateway is 20. It includes the combination of maximum five wireless devices such as PowerTag control module, HeatTag sensor, and PowerTag Link display.
 - Only one PowerTag Link display can be connected to the gateway.
- PowerTag Link HD gateway (A9XMWD100):
The maximum number of devices that be connected to the PowerTag Link HD gateway depends on the wireless devices type:
 - If only PowerTag Energy sensors are connected to one PowerTag Link HD gateway, the maximum number of PowerTag Energy sensors is 100.
 - If different types of wireless devices are connected to one PowerTag Link HD gateway, the maximum number of wireless devices is 95 with:
 - 94 PowerTag sensors maximum
 - and the combination of maximum 15 wireless devices such as PowerTag Control modules, HeatTag sensors, and one PowerTag Link display.

The maximum configuration of a PowerTag system with a PowerTag Link HD gateway can be as follows:

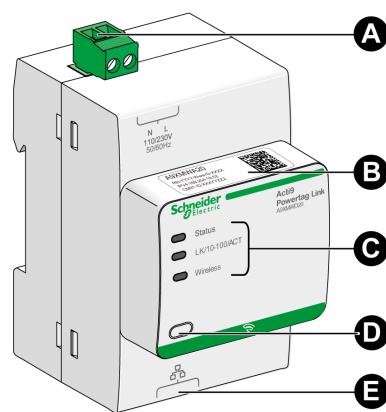
- **Example 1:**
100 PowerTag Energy sensors
- **Example 2:**
 - 94 PowerTag sensors
 - 1 PowerTag Control module
- **Example 3:**
 - 80 PowerTag sensors
 - 13 PowerTag Control modules
 - 1 HeatTag sensor
 - 1 PowerTag Link display

PowerTag Link Gateway

PowerTag Link Gateway Acting as a Concentrator

The wireless communication devices provide compact and high density metering and monitoring solution with rich and accurate data for building systems (that can send energy, power, current, voltage, temperature, and power factor to PowerTag Link gateway).

Description



- A** Power supply connector 110-230 Vac
- B** Default IPv4 address
- C** Communication status indicators
 - Status LED
 - LK/10-100/ACT LED
 - Wireless LED
- D** Reset button
- E** RJ45 Ethernet connection

For more information on installation, refer to [PHA81113 PowerTag Link Gateway – Instruction Sheet](#).

Status LED

| Operating Mode | Status LED | Status |
|----------------------------|------------|--|
| Initialization / Operation | | Green light: The gateway operates normally. |
| Start-up | | Alternate green and red light every second: The gateway is starting. |
| Factory settings | | Orange light: The gateway <ul style="list-style-type: none"> • is in DHCP client mode, or • DHCP server has not assigned IP address |
| Reset (level 1) | | Green blink: While pressing the Reset button between 5 and 10 seconds, IP settings are reconfigured to DHCP mode. |
| Reset (level 2) | | Red blink (Fast, 2 blinks/sec): While pressing the Reset button for more than 10 seconds, the LED stops blinking after the Reset button is released. Do not switch off the gateway until the LED stops blinking in red for at least 30 seconds, as the reset level 2 is still in progress. |
| Duplicate IP address | | Red blink (1 blink per second): The gateway has detected duplicate IP address. Check and change the IP address of the gateway. |

| Operating Mode | Status LED | Status |
|----------------|------------|--|
| Degraded | | Orange blink: Power supply of the gateway is degraded. |
| Failure | | Red light: The gateway is out of order. |

LK/10-100/ACT LED

| LK/10-100/ACT LED | Status |
|-------------------|--|
| | Orange blink: Ethernet activity at 10 Mbps |
| | Green blink: Ethernet activity at 100 Mbps |

Wireless LED

| Operating Mode | Wireless LED | Status |
|----------------|--------------|--|
| Initialization | | Orange light: Not configured |
| Start-up | | Orange blink: Looking for wireless device |
| Operation | | Flash green every five seconds: Networking complete (normal operation) |
| Degraded | | Green blink (1 blink per 5 seconds): Downgraded while boot mode |
| Disabled | | Light off: Wireless disabled |

Reset Button

The Reset button is used to reset the PowerTag Link gateway.

There are two levels of reset:

- Level 1: Press and hold the Reset button between 5 and 10 seconds until Status LED blinks in green. The parameters are retained and the mode of IP acquisition is set to DHCP mode. If you had set up a static IP address and lost your IP address, you can still retrieve your product using DHCP.
- Level 2: Press and hold the Reset button for more than 10 seconds until Status LED blinks in red. The PowerTag Link gateway reboots and its parameters are reset to the factory settings.

NOTICE

HAZARD OF EQUIPMENT DAMAGE

Do not switch off the gateway until the Status LED stops blinking in red for at least 30 seconds, as the reset level 2 is still in progress.

Failure to follow these instructions can result in equipment damage.

IMPORTANT: When performing a reset to factory settings on the PowerTag Link gateway, all wireless devices settings are cancelled and pairing of these devices in the gateway is also cancelled. Before performing reset to factory settings, it is recommended to do the following actions:

1. Perform the backup action to avoid losing data.
2. Unpair all wireless devices from the gateway.

The consequences of reset level 2 are:

- The user application name is set to myPowerTagLink-xxxx (where xxxx are the last four digits of mac address).
- The building name becomes default.
- The mode of IP acquisition is set to DHCP.
- The password is set to the default value.
- The panel information saved in the PowerTag Link gateway is erased.
- The user accounts are erased (only default user accounts are retained).
- The wireless device configurations are deleted.
- The IP related settings are set to default value (date/time, DNS, IP filter, and email service). HTTPS is enabled.
- Generic events are set to default configurations.
- Specific alarm is deleted.

PowerTag Link Display

Presentation

The PowerTag Link display can monitor data from wireless devices paired with the same PowerTag Link gateway. It can only display monitoring data from PowerTag Energy sensors.

Refreshing Period

The maximum refreshing period of the PowerTag Link display is:

- minimum 30 seconds when the wireless communication period of PowerTag Energy sensor is set to less than 30 seconds
- same as the wireless communication period of PowerTag Energy sensor when the wireless communication period is set to more than 30 seconds

NOTE:

- Assign an asset name to the PowerTag Link display to avoid confusion when several PowerTag Link gateways and PowerTag Link displays are used.
- After the PowerTag Link display configuration is finalised, it may take up to 10 minutes to get the asset name displayed on the screen. This feature is achieved using the PowerTag Link webpages.

PowerTag Link Display Paired to PowerTag Link Gateway

The PowerTag Link display paired with a PowerTag Link gateway can monitor:

- Measurements from 19 PowerTag Energy sensors maximum
- Alarms from 19 wireless devices maximum

PowerTag Link Display Paired to PowerTag Link HD Gateway

The PowerTag Link display paired with a PowerTag Link HD gateway can monitor:

- Measurements from 20 PowerTag Energy sensors maximum
- Alarms from 99 wireless devices maximum

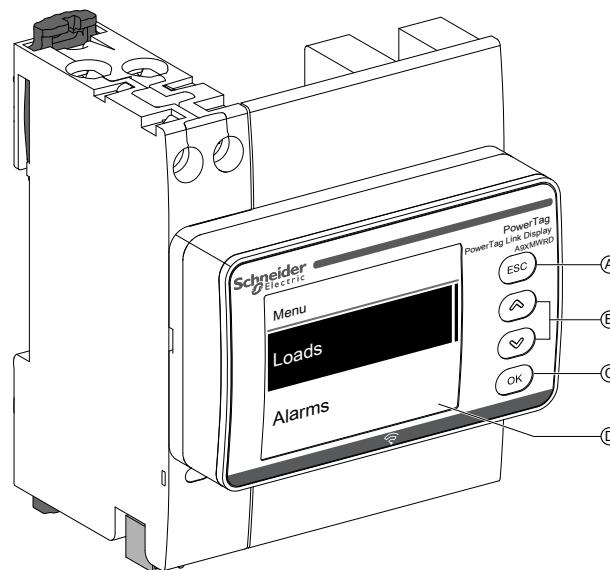
The 20 PowerTag Energy sensors monitored by PowerTag Link display are the sensors with the first 20 Modbus addresses.

To assign the Modbus address of the PowerTag Energy sensors, refer to Wireless Device Configuration with Webpages, page 42.

NOTE:

- The sequence of Modbus address is used to get the same device sorting on the PowerTag Link display, to be considered for system integration such as SCADA and BMS.
- The PowerTag Energy sensors are selected based on the Modbus addresses. The 20 lower Modbus addresses are selected to be displayed.

Description

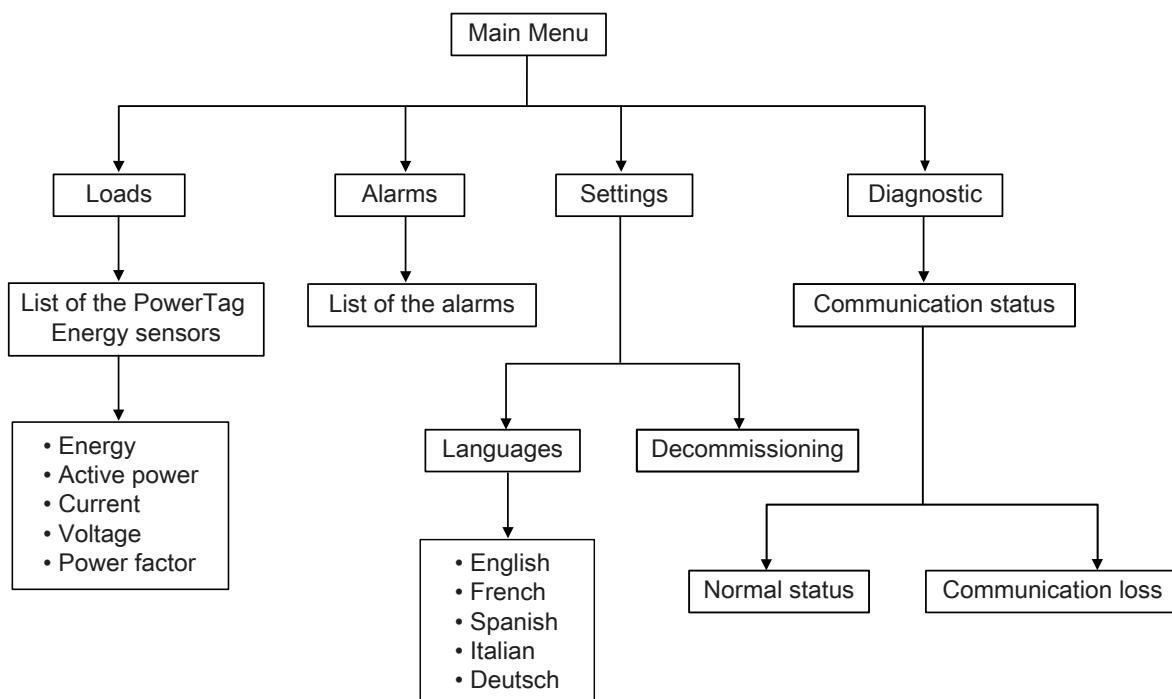


- A ESC button
- B Navigation buttons
- C OK button
- D LCD display

NOTE: If the PowerTag Link display buttons are not used for 5 minutes, the screen will automatically move to Standby mode.

Menu Structure

The below diagram explains the menu structure of the PowerTag Link display:



The **Loads** menu displays the list of the PowerTag Energy sensors identified by the **Asset Name** of the PowerTag Energy sensors being configured.

Alarms on PowerTag Link display

The following table explains the various alarms displayed on the PowerTag Link display:

| Wireless device | Alarm description | Alarm type | Alarm message on display |
|-------------------------|--|------------|--|
| PowerTag Energy sensor | Overcurrent | Generic | Line 1: Asset name Line 2: Overcurrent |
| | Voltage loss | Generic | Line 1: Asset name Line 2: Voltage loss |
| HeatTag sensor | Temperature above threshold | Specific | Line 1: Asset name Line 2: T°>thres |
| | Relative humidity above threshold | Specific | Line 1: Asset name Line 2: RH%>thres |
| PowerTag control module | Alarm generated when the state of a digital input is changed | Specific | Line 1: PTS ID N, where N is the Modbus address of the PowerTag control module Line 2: D-In Switch |

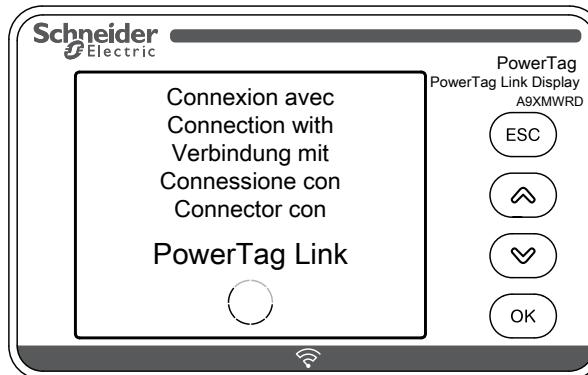
The PowerTag Energy sensors alarms are generated automatically. The PowerTag control modules alarms and the HeatTag sensors alarms must be configured specifically.

For more information on how to configure the specific alarms, refer to Alarm Configuration Page, page 86.

Commissioning Procedure

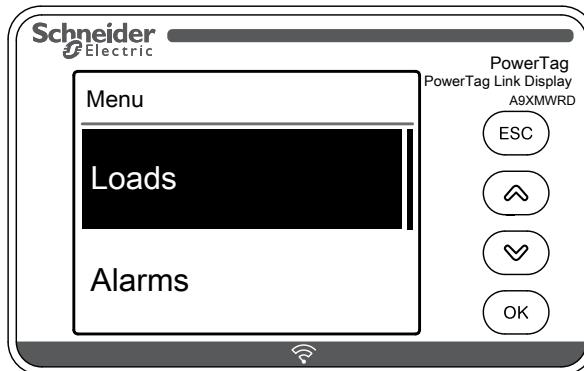
- Supply power to the PowerTag Link display.

Result: The PowerTag Link display is turned on and the following screen is displayed.



2. Pair the PowerTag Link display with the PowerTag Link gateway. Refer to Configuration Procedure of PowerTag Energy •63 and M250/630 with Webpage, page 42.

Result: Once the pairing is done, an empty list of the asset name is displayed in the **Loads** menu.



NOTE: It takes up to 10 minutes to synchronize the asset name list of the PowerTag Energy sensors and to display in the **Loads** menu.

After the synchronization is completed, the PowerTag Link display is ready for use.

Local Decommissioning Procedure

The local decommissioning can be done only when the PowerTag Link display has lost the communication with the gateway.

1. Click **Main Menu > Settings > Decommissioning**.

Result: A screen appears with a wheel spinning, and the device gets unpaired.

2. If the above step is not successful, decommission the display through the PowerTag Link gateway. For more information on decommissioning, refer to Unpairing of Wireless Devices with Webpage, page 47.

NOTE: To know if the PowerTag Link display has lost the communication, click **Main Menu > Diagnostic > Communication status**.

The communication loss is indicated with a virtual red LED. A message **COM.Loss** and the measured value is also displayed on the screen.

HeatTag Sensor

Overview



The HeatTag sensor is a wireless sensor for early detection of overheating wire connections or overheating cables.

The HeatTag sensor helps to prevent electrical distribution switchboards from being damaged by analyzing gas and micro-particles in the air of the switchboard and sending alerts before any smoke or insulator browning.

Features

The HeatTag sensor includes the following features:

- 3 levels of alert according to the criticality of the detected situation
- 11 levels of air quality index (0 to 10)
- Analysis of gas and micro-particles emitted by cable sheaths when overheating
- Measurement of temperature and humidity in the switchboard
- Self-diagnostics
- Communication with PowerTag Link gateway
- Integration in EcoStruxure™ solutions

For more information on the HeatTag sensor, refer to [DOCA0172EN HeatTag Wireless Sensor for Early Detection of Overheating Cables – User Guide](#).

Wireless Communication Devices

Description

Wireless communication devices that can be connected to the PowerTag Link gateway are:

- A9MEM152● or A9MEM154●, PowerTag Energy M63
- A9MEM156● or A9MEM157●, PowerTag Energy F63 and P63
- A9MEM1580, PowerTag Energy F160
- A9MEM159●, PowerTag Energy Rope
- LV43402●, PowerTag Energy M250/M630
- A9XMC●D3, PowerTag control modules
- SMT10020, HeatTag sensor
- A9XMWRD, PowerTag Link display

For more information on wireless communication devices, refer to [CA908058E](#) PowerTag Energy – Selection Guide.

Principle of Wireless Device Installation

The PowerTag Link gateway is installed in such a manner that the wireless communication devices are distributed around the gateway. It is recommended to install the PowerTag Link gateway in the center of the switchboard. The distance between the wireless communication devices and the gateway should be less than 3 meters for installing in simple plastic panels (for example, Kaedra panel) up to multi-columns (non-partitioned, form 2) metallic switchboard (for example, PrismaSet panel).

NOTE: There is a possibility of disruption in the quality of radio frequency signal if wireless communication devices are installed in a different switchboard (particularly if the enclosure has metallic partitions and door).

For more information on wireless device installation, refer to [DOCA0194EN](#) PowerTag System – Design and Commissioning Guide.

Technical Characteristics

Technical Characteristics of the PowerTag Link Gateway

Main Characteristics

| Characteristic | Value | |
|--|-----------------------------|--|
| Supply voltage | Us | 110/230 V AC ± 20 %, 2 A |
| Frequency | | 50/60 Hz |
| Power consumption | | 5 VA |
| Communication interface | | Ethernet 10/100 BASE-T, Cable length ≤ 100 m Cat.6 STP |
| Automatic IP configuration | | DHCP client (Ethernet port) Maximum simultaneous connections: Modbus TCP=8, HTTPS=2, HTTP=5 |
| Communication Network | Modbus TCP connection | 8 |
| | HTTPS | 2 |
| | HTTP | 5 |
| Local indication | Product state | Green, orange, and red LED |
| | Ethernet state (LAN ST) | Green, orange, and red LED |
| Overvoltage category | | III |
| Radio-frequency communication ISM band 2.4 GHz in accordance to IEEE 802.15.4 standard | | 2.4 GHz to 2.4835 GHz |
| Degree of protection (IEC 60068-2-30) | Device only | IP20 |
| | Device in modular enclosure | IP40 Insulation class II |
| Fire resistance | | 650 °C, 30 s |
| Environment | | In compliance with the RoHS directive REACH Regulations |

Additional Characteristics

| Characteristic | Value | |
|----------------------------------|--|---|
| Operating temperature | | -25 °C to +60 °C |
| Storage temperature | | -40 °C to +85 °C |
| Pollution degree | | 2 |
| Tropicalization (IEC 60068-2-30) | | Treatment 2 (relative humidity of 93% at 40 °C) |
| Operating altitude | | 0 to 2000 m |
| Electromagnetic compatibility | Reference standards | |
| | Immunity | EN 55035 |
| | Emissions | EN 55032 |
| | Electromagnetic compatibility and Radio spectrum Matters (ERM) | EN 300328 EN 301489-1 EN 301489-17 |

Mechanical Characteristics

| Characteristic | Value | |
|----------------|--------|---------|
| Dimensions | Height | 85 mm |
| | Width | 54 mm |
| | Depth | 67.5 mm |
| Weight | 133 g | |

General Principle to Commission a PowerTag System

Commissioning Overview

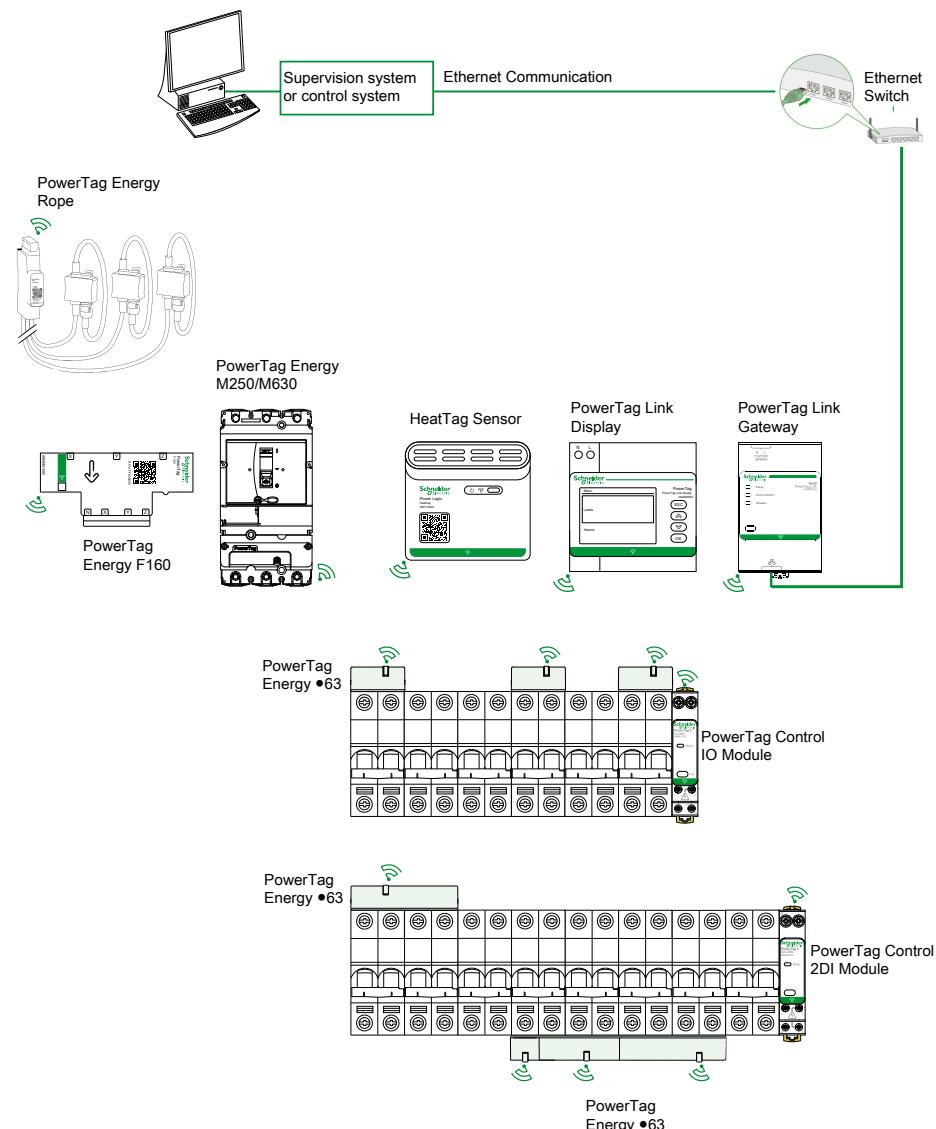
Overview

The commissioning of a PowerTag Link gateway can be performed using:

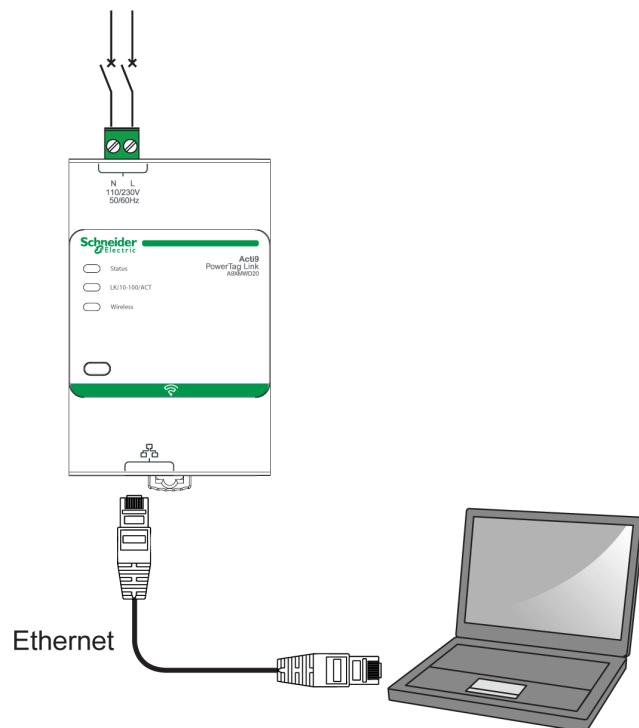
- the EcoStruxure Power Commission (EPC) software. Refer to *EcoStruxure Power Commission Online Help*.
- the PowerTag Link webpages. The webpages are autonomous to configure any devices connected or paired with PowerTag Link gateway.

NOTE:

- Before commissioning the PowerTag Link gateway, upgrade the firmware of the PowerTag Link gateway.
- The firmware upgrade of the PowerTag Link gateway can only be done using the EcoStruxure Power Commission software. Refer to *EcoStruxure Power Commission Online Help*.



Ethernet Connection



PowerTag Link gateway has an embedded web server. A web server is used to set Ethernet parameters or to display wireless devices configured with EcoStruxure Power Commission software or with webpages.

| Step | Action |
|------|--|
| 1 | Disconnect your PC from all your actions. |
| 2 | Connect an Ethernet straight cable between your PC and the Ethernet port on the PowerTag Link gateway. |

Pre-Requisites

Installation of EcoStruxure Power Commission Software

Use the latest version of EcoStruxure Power Commission software to update the PowerTag Link gateway with the latest firmware version available.

The latest version of EcoStruxure Power Commission software is available on www.se.com.

For more information on the use of EcoStruxure Power Commission software, refer to *EcoStruxure Power Commission Online Help*.

Firmware Upgrade

The firmware upgrade of PowerTag Link gateway can only be done using the EcoStruxure Power Commission software.

For more details on how to update the firmware of PowerTag Link gateway, refer to [DOCA0180EN PowerTag Link/PowerTag Link HD Gateways – Release Note](#).

| Firmware Upgrade | | | | | | |
|------------------|----------------|------------------------|--------|----------------|-------------------|---|
| Connection | Modbus address | Module | Status | Device Version | Available Version | Recommended Action |
| 169.254.255.70 | 255 | Acti9 PowerTag Link HD | ✓ | V0.0.6 | V1.0.0 |  UPGRADE None |

NOTE: During the firmware upgrade, the Modbus TCP communication and wireless communication are interrupted.

Firmware Compatibility

You can find a compatibility table **Device Firmware Baseline** in the **Information** menu of EcoStruxure Power Commission software.

| Support | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|--------------|---|--------|--|----------------------|--------|--|----------------------|--------|--|---------------------|--------------|--|------------------------|--------------|--|---------------------------|--------------|--|---------------------|--------------|--|---------------------|--------------|--|----------------------|--------------|--|---------------|--------------|--|---------------|--------------|--|
| <ul style="list-style-type: none"> Zone-Selective Interlocking Test Primary Injection Test Workspace <ul style="list-style-type: none"> Project Information Switchboard View Device View Digital Module Device Check up | <table border="1"> <thead> <tr> <th>A9PS</th> <th>Acti9 Smartlink Modbus RS485 Smart Communication I/O Module</th> <th>V1.3.7</th> </tr> </thead> <tbody> <tr> <td></td><td>Acti9 Smartlink SI B</td><td>V2.3.0</td></tr> <tr> <td></td><td>Acti9 Smartlink SI D</td><td>V2.3.0</td></tr> <tr> <td></td><td>Acti9 PowerTag Link</td><td>V001.006.007</td></tr> <tr> <td></td><td>Acti9 PowerTag Link HD</td><td>V001.006.007</td></tr> <tr> <td></td><td>PowerTag Energy M/P/F 63A</td><td>V003.000.396</td></tr> <tr> <td></td><td>PowerTag Energy NSX</td><td>V001.002.006</td></tr> <tr> <td></td><td>PowerTag Control IO</td><td>V001.016.030</td></tr> <tr> <td></td><td>PowerTag Control 2DI</td><td>V001.016.029</td></tr> <tr> <td></td><td>Easergy TH110</td><td>V001.000.003</td></tr> <tr> <td></td><td>Easergy CL110</td><td>V002.001.003</td></tr> </tbody> </table> | A9PS | Acti9 Smartlink Modbus RS485 Smart Communication I/O Module | V1.3.7 | | Acti9 Smartlink SI B | V2.3.0 | | Acti9 Smartlink SI D | V2.3.0 | | Acti9 PowerTag Link | V001.006.007 | | Acti9 PowerTag Link HD | V001.006.007 | | PowerTag Energy M/P/F 63A | V003.000.396 | | PowerTag Energy NSX | V001.002.006 | | PowerTag Control IO | V001.016.030 | | PowerTag Control 2DI | V001.016.029 | | Easergy TH110 | V001.000.003 | | Easergy CL110 | V002.001.003 | |
| A9PS | Acti9 Smartlink Modbus RS485 Smart Communication I/O Module | V1.3.7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Acti9 Smartlink SI B | V2.3.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Acti9 Smartlink SI D | V2.3.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Acti9 PowerTag Link | V001.006.007 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Acti9 PowerTag Link HD | V001.006.007 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | PowerTag Energy M/P/F 63A | V003.000.396 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | PowerTag Energy NSX | V001.002.006 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | PowerTag Control IO | V001.016.030 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | PowerTag Control 2DI | V001.016.029 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Easergy TH110 | V001.000.003 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Easergy CL110 | V002.001.003 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Getting Started with EcoStruxure Power Commission Software

Non-Selective Pairing of Wireless Devices with EcoStruxure Power Commission Software

Follow the steps given in the table to commission the PowerTag Link gateway with EcoStruxure Power Commission software:

| Step | Action |
|------|--|
| 1 | Connect the PowerTag Link gateway to the PC. |
| 2 | Launch the EcoStruxure Power Commission software. |
| 3 | Click Launch Device Discovery in the Welcome screen. Result: Discover Device(s) window displays all the devices connected in the network. |
| 4 | Select the device in the list and click Find Devices button on the bottom left hand corner to continue Click Add Devices button on the bottom left hand corner to add the PowerTag Link gateway to the new project. Complete project details in next screens and finish by clicking Continue button. Result: A new project with the PowerTag Link gateway is created (Switchboard view / Communication view). |
| 5 | Click Connect to Device button to connect. When the connection is established, select the Configure option. Result: Screen to discover wireless devices is displayed. |
| 6 | Click Scan to discover the wireless devices. Result: The discovered wireless devices are displayed. |
| 7 | Click Locate to find the wireless device in an electrical panel. Result: The Locate Wireless Device dialog box is displayed and the associated wireless device on the electrical panel continuously blinks green. |
| 8 | Click STOP BLINK to stop blinking of the device once it is identified. |
| 9 | Click the down arrow icon. Result: The configuration parameters page is displayed. |
| 10 | Enter the label for the wireless device. |
| 11 | Enter the name of the asset (name of the load), where it is located in the building, in the Asset name field. |
| 12 | Select the usage of the load from the Usage list. |
| 13 | Select the circuit breaker rating from the Associate breaker rating (A) list to calculate the percentage of loads. |
| 14 | Select the phase sequence corresponding to the physical sequence wired in the panel from the Phase sequence list. |
| 15 | Load works when Power is >= (W) (kWh) by moving the slider left or right. |
| 16 | Download PowerTag pairing and filled information to PowerTag Link gateway by clicking Write to Device button. Result: Message write to device successful is displayed when finished. |
| 17 | Save PowerTag Link gateway settings in the project by clicking Write to Project button. Result: Message write to project successful is displayed when finished. |

NOTE:

- In the EcoStruxure Power Commission software, any gateway such as PowerTag Link gateway is defined as a Device.
- By default, the Modbus TCP protocol is enabled in the PowerTag Link gateway to offer the possibility to connect with EcoStruxure Power Commission software. However, if there are any problems connecting to the software, check if the Modbus TCP protocol is enabled using the webpages.

Selective Pairing of Wireless Devices with EcoStruxure Power Commission Software

It is possible to achieve a selective pairing using EcoStruxure Power Commission software. For further details, refer *EcoStruxure Power Commission Online Help*.

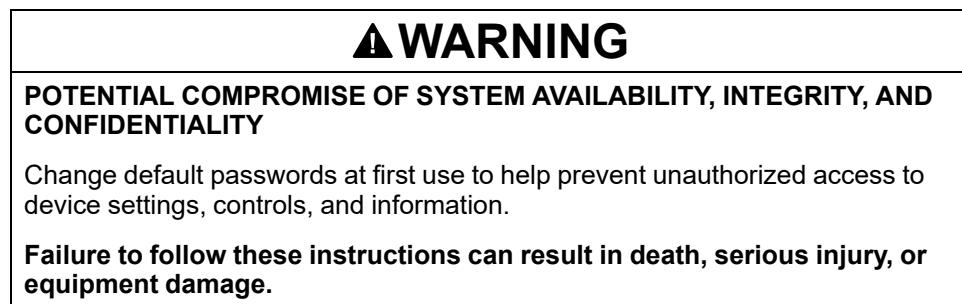
Wireless Devices Configuration with EcoStruxure Power Commission Software

It is possible to configure the wireless device of PowerTag Link gateway using EcoStruxure Power Commission software. For further details, refer *EcoStruxure Power Commission Online Help*.

Getting Started with Webpages

Discovering PowerTag Link Gateway through Web Browser

Default Passwords

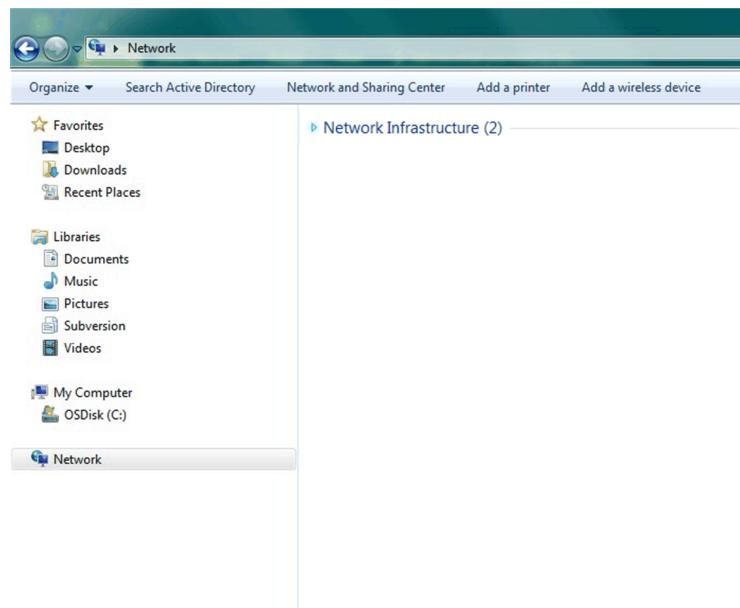


Accessing PowerTag Link Webpage from Windows Operating System

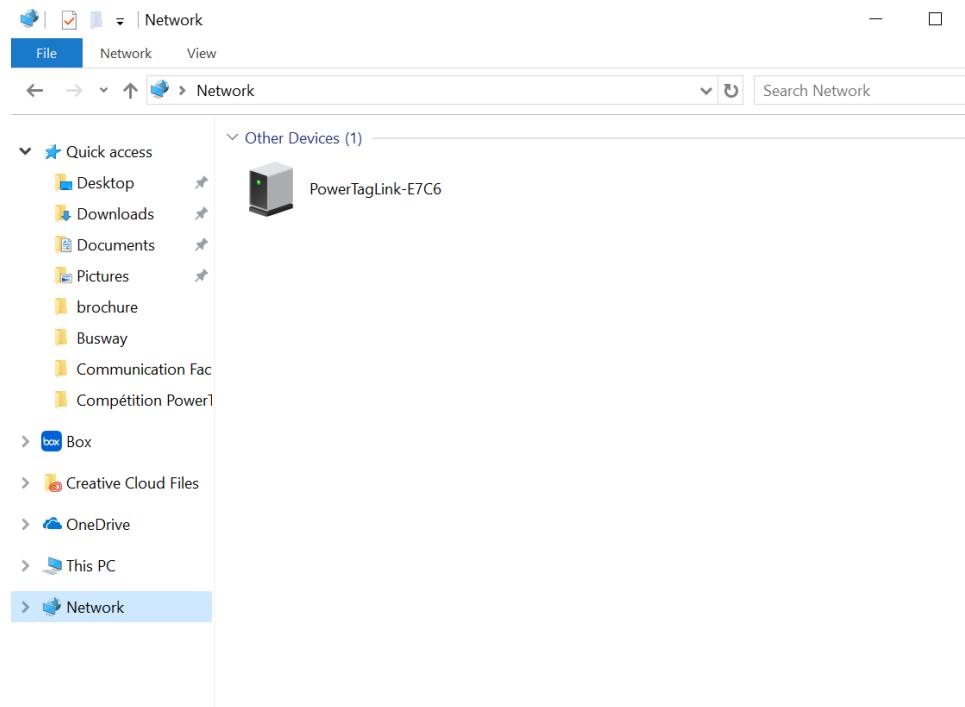
Follow the steps given in the table to access the PowerTag Link webpage through Windows Explorer from Windows operating system:

| Step | Action |
|------|---|
| 1 | Launch the Windows Explorer and click Network to display the PowerTag Link gateway icon in the list of devices. This may take up to 2 minutes after the device is powered on. If the PowerTag Link gateway icon does not appear, check if the PowerTag Link gateway and the PC are connected to the same sub network. |
| 2 | Double-click the PowerTag Link gateway icon. This launches the login page automatically in the web browser. |
| 3 | Type the user name (admin by default) and password (admin by default). NOTE: These identifiers are case-sensitive. |
| 4 | Click OK . |

The following figure shows the Windows Explorer screen without the discovery of PowerTag Link gateway.



The following figure shows the Windows Explorer screen after the discovery of PowerTag Link gateway.



If the PowerTag Link gateway IPV4 is in DHCP mode, the PC must also be in DHCP mode. If PowerTag Link gateway uses a static IP, the PC must also use a static IP in the same network (same Subnet mask).

In the configuration panel of Windows, click the local network properties and change the IPv4 settings.

| Step | Action |
|------|--|
| 1 | Right-click the Network icon located at the bottom-right corner of the Desktop screen then click Open Network and Sharing Center . |
| 2 | Click Change adapter settings , then right-click the Local Area Connection icon and click Properties . |
| 3 | Select Internet Protocol Version 4 (TCP/IPv4) from the list and click Properties . |
| 4 | Select Obtain an IP address automatically and click OK . |

Accessing PowerTag Link Webpage from Any Operating System

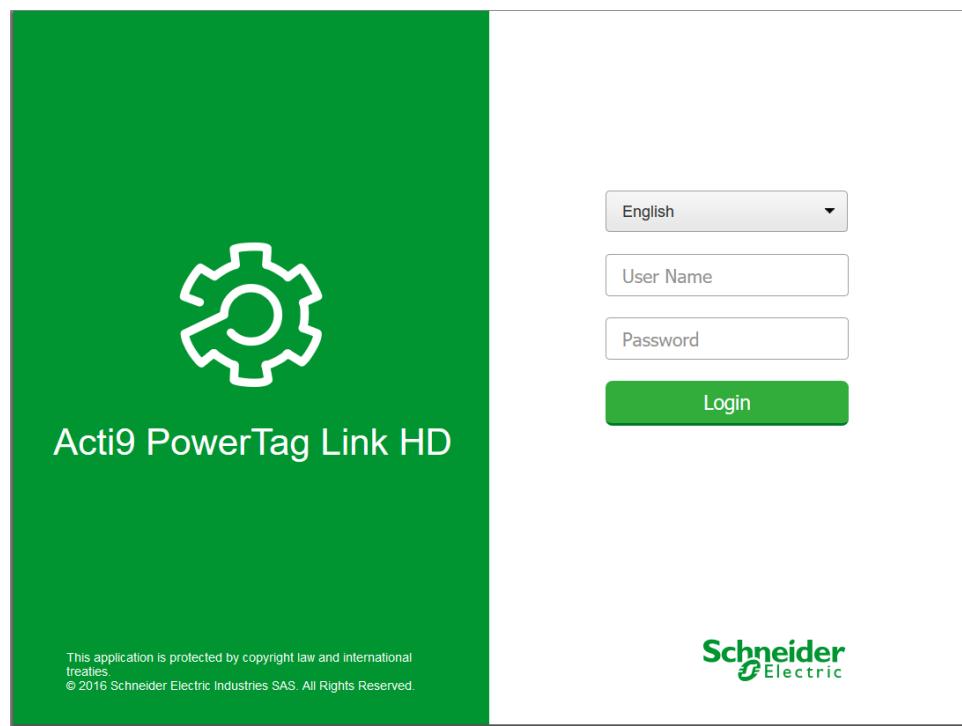
Follow the steps given in the table to access the PowerTag Link webpage from any operating system:

| Step | Action |
|------|---|
| 1 | Launch the web browser. For example: Google Chrome, Safari on desktop, or Firefox. |
| 2 | Type the IPv4 address (encoded into the QR code on the upper side of PowerTag Link webpage) in the Address field of the web browser and press Enter to access the login page. |
| 3 | Type the User name (admin by default) and Password (admin by default) . NOTE: These identifiers are case-sensitive. |
| 4 | Click OK . |

Login into Webpages

Login Page

The **Login** page is used to enter the user credentials and select the preferred language to access the PowerTag Link webpages. When the user connects to the PowerTag Link gateway through a web browser, the **Login** page is displayed as shown in the following figure:



Enter the following details in the **Login** page:

- **Language**
- **User name**
- **Password**

⚠ WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

Change default passwords at first use to prevent unauthorized access to device settings, controls, and information.

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

Enter the user name and password to access the webpages related to PowerTag Link gateway. The default user name and password is **admin** to access the webpage for the first time. You can select the language in the **Login** page so that all the pages are displayed in the selected language.

The top right corner of all the webpages displays the following information:

- User name
- Logout

The **Logout** link is used to logout of the PowerTag Link webpage.

Webpages Layout

Description

The webpages can be used for two main operations:

- Monitoring page allows to check the health of the electrical devices such as HVAC, lighting, pumps, and machines.
- Gateway settings allows
 - setting of Ethernet parameters and wireless devices parameters.
 - diagnosis of exchanges on Ethernet network.
 - adding or removing wireless devices connected to the gateway.
 - management of time setting and time zone selection.
 - IP configuration and IP services
 - IP filtering
 - configuration of email accounts
 - management of user accounts
 - alarm configuration

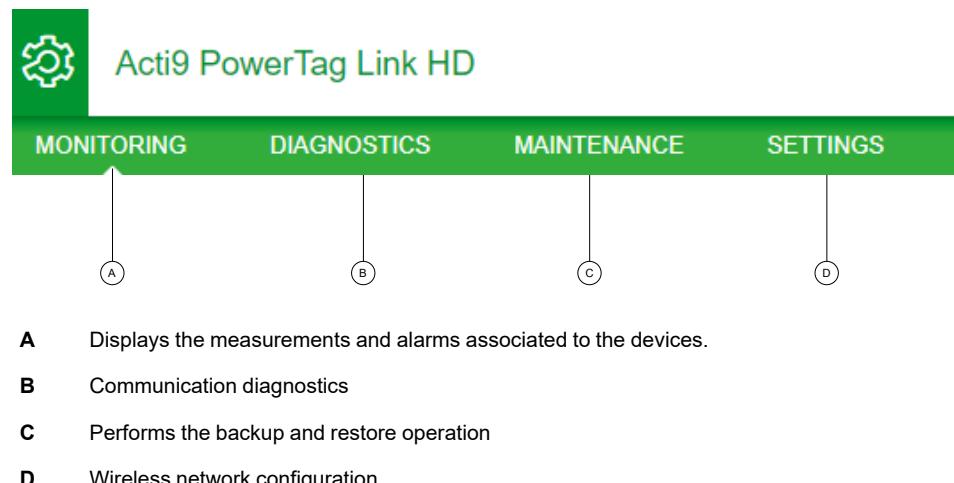
Webpages are accessible to the following three categories of user:

- Administrator can access all information and modify the parameters in the **Settings** menu.
- Operator can access monitoring pages of the connected devices and get access to **Diagnostic** menu.
- Guest can access only **Monitoring** menu.

The scope of products supported in the webpages are:

- PowerTag Link gateway
- Wireless devices

Webpage Organization



Wireless Network Configuration with Webpages

Overview

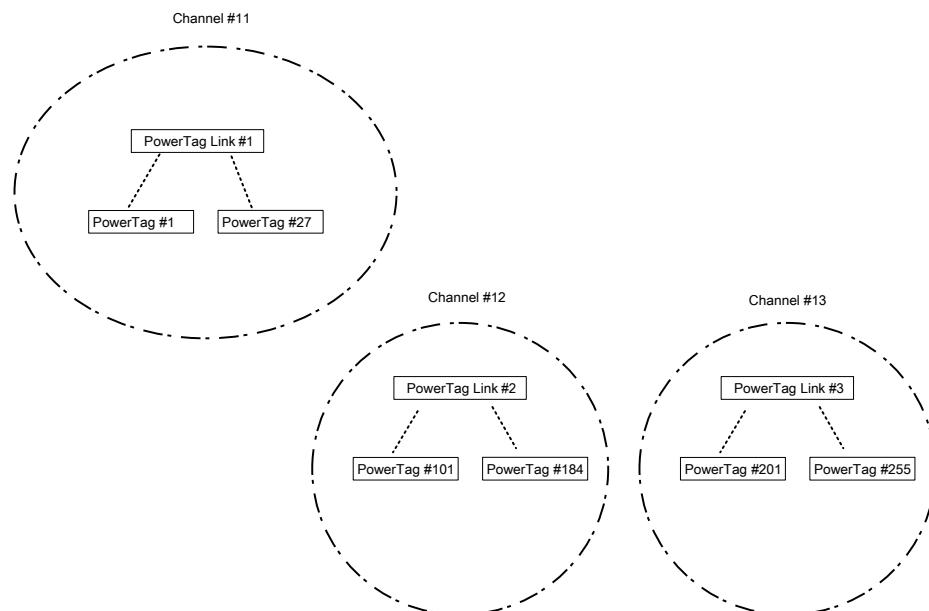
The default wireless network configuration can be modified for special applications such as data centers and high density metering applications. In standard building applications, use the default settings.

For high density applications, thousands of wireless communication devices are placed in the same environment. Therefore, it is necessary to consider the radio frequency plan and bandwidth. For an installation with multiple gateways, it is recommended to assign a dedicated and different channel to each gateway. To increase the radio quality, you can adjust the communication period from 5 to 60 seconds for PowerTag Energy sensors and PowerTag control modules.

For any installation with more than 400 wireless devices, refer to [DOCA0194EN](#) PowerTag System – Design and Commissioning Guide for a detailed study of the radio frequency plan.

NOTE:

- The communication period is used to send regular data from any wireless devices. Events like Voltage loss alarm, or PowerTag system control output order, or PowerTag system control input information are immediately sent, and are not impacted by the defined communication period.
- The radio channel is chosen in the wireless settings of PowerTag Link gateway and is applied to all the wireless communication devices that are commissioned with PowerTag Link gateway.
- A set of PowerTag Link gateways has to be installed and commissioned to concentrate all the needed wireless communication devices.



Both PowerTag Link gateway (A9XMWD20) and PowerTag Link HD gateway (A9XMWD100) must use its own wireless channel that is different from the wireless channels used by the other gateways, if applicable. For any installation with multiple gateways, refer to [DOCA0194EN](#) PowerTag System - Design and Commissioning Guide or contact Schneider Electric customer support.

Minimum Communication Period Recommended

The communication period between the gateway and the wireless devices is adapted depending on the number of wireless devices and their types as follows:

1. Multiply the number of wireless devices by their weight for each type.
2. Make the sum and divide this total by 1000.

The formula to define the preconized minimum communication period to be set on the gateway for wireless devices (in seconds):

$$\sum_{i = Type\ 1}^{Type\ 7} \frac{Number\ of\ wireless\ devices\ of\ type\ i * weight\ of\ type\ i}{1000}$$

The different types of wireless devices and their weight:

| Type of wireless device | Reference | Weight of the wireless device |
|--|-----------|-------------------------------|
| PowerTag Energy •63 | A9MEM1520 | 100 |
| | A9MEM1521 | |
| | A9MEM1522 | |
| | A9MEM1540 | |
| | A9MEM1541 | |
| | A9MEM1542 | |
| | A9MEM1543 | |
| | A9MEM1560 | |
| | A9MEM1561 | |
| | A9MEM1562 | |
| | A9MEM1563 | |
| | A9MEM1564 | |
| | A9MEM1570 | |
| | A9MEM1571 | |
| | A9MEM1572 | |
| | A9MEM1573 | |
| | A9MEM1574 | |
| PowerTag Energy M250/M630 | LV434020 | 140 |
| | LV434021 | |
| | LV434022 | |
| | LV434023 | |
| PowerTag Energy F160/Rope | A9MEM1580 | 160 |
| | A9MEM1590 | |
| | A9MEM1591 | |
| | A9MEM1592 | |
| | A9MEM1593 | |
| PowerTag control module (IO/2DI) (sold before 2021) | A9XMC1C3 | 1680 |
| | A9XMC2D3 | |
| PowerTag control module (IO/2DI) (sold after 2021) | A9XMC1C3 | 160 |
| | A9XMC2D3 | |
| HeatTag sensor | SMT10020 | 40 |
| PowerTag Link display | A9XMWRD | 1680 |

The communication period of the PowerTag Link gateway is set to the next higher value suggested in the gateway webpages or in the EcoStruxure Power Commission software.

Wireless Network Configuration with Webpages

The **Wireless Network Configuration** webpage is used to configure wireless parameters (only with administrator credentials).

| Step | Action |
|------|--|
| 1 | Launch the PowerTag Link webpage in the web browser. |
| 2 | Login with user name and password. |
| 3 | Click Settings > Communication > Wireless Network Configuration . |

The screenshot shows the 'WIRELESS CHANNEL SELECTION MODE' section with 'Manual Channel Selection' selected. It also shows communication period settings for different device types: 5 seconds for energy monitoring, 60 seconds for control, and 120 seconds for ambient devices. A note at the bottom discusses the impact of changing the RF device communication period on system response.

This page allows you to:

- Select the wireless channel either automatically or manually. Click **Automatic Selection of the Best Channel** to select the channel automatically.

Follow the procedure to configure wireless parameters in the manual mode:

| Step | Action |
|------|---|
| 1 | Select the required channel from the Channel list. The default channel is Channel 25 . |
| 2 | Click Apply Changes to save the settings. Click Cancel Changes to revert the settings, as applicable. |

- Define the communication period for each device type. It defines the amount of time each wireless device sends its data to the PowerTag Link gateway.

Follow the procedure to define the communication period:

| Step | Action |
|------|--|
| 1 | Select the required communication period from the Communication Period list. Default period: 5 seconds |
| 2 | Click Apply Changes to save the settings. Click Cancel Changes to revert the settings. |
| 3 | Define the communication period which defines the amount of time each wireless device sends its data to the PowerTag Link gateway. |

Wireless Device Commissioning with Webpages

Commissioning Principle

The principle of wireless device commissioning consists of two steps:

- Pairing the wireless devices with the gateway
- Configuring the wireless devices

Pairing Principle

The scanning feature of the gateway is used to discover the wireless devices present in the gateway environment. The gateway assigns a Modbus address to each wireless device based on the order of discovery.

If you define and upload a pairing list, the gateway will only pair the wireless devices belonging to this list. Refer to Selective Pairing of Wireless Devices with Webpages, page 38.

The available options for pairing process are:

- Free Pairing (refer to Free Pairing of Wireless Devices with Webpages, page 39) is recommended when:
 - no particular Modbus address plan is required.
 - pairing 20 wireless devices maximum.
- Controlled Pairing (refer to Controlled Pairing of Wireless Devices with Webpages, page 40) is recommended when:
 - a Modbus address plan is required.
 - pairing more than 20 wireless devices.

It is applicable when:

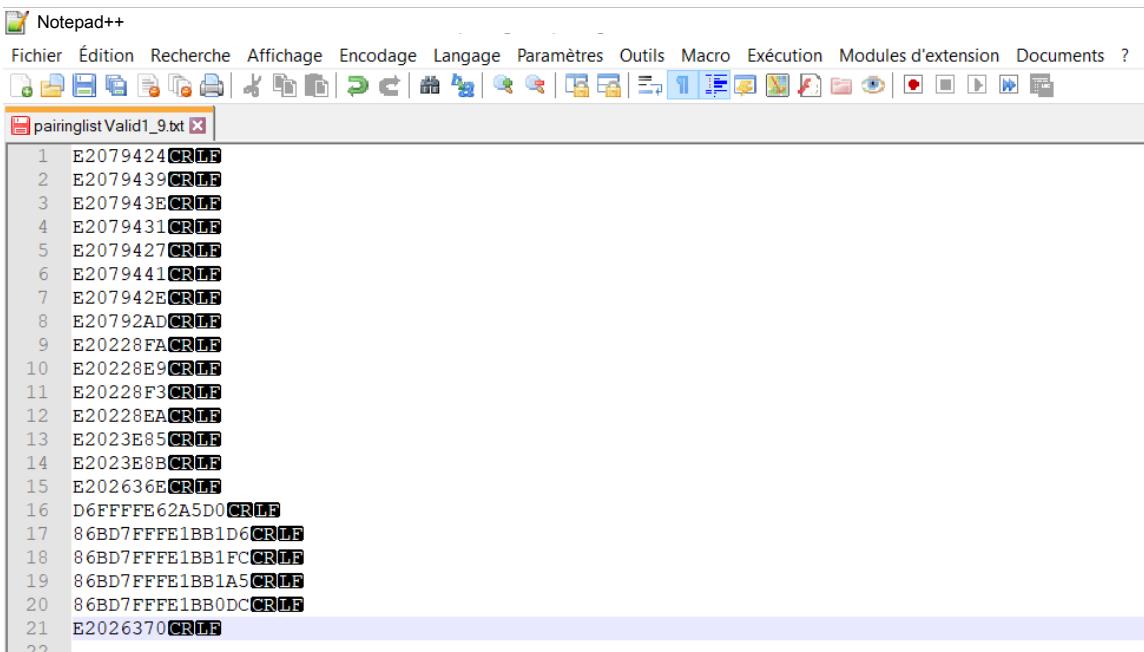
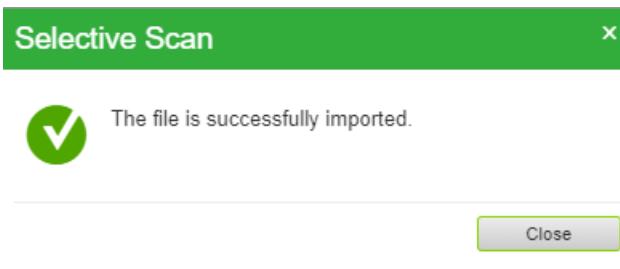
- the wireless devices can be individually powered.
- the power supply of each wireless device is protected individually by a circuit breaker.

NOTE: If you have multiple panels and if each panel has wireless devices, then it is recommended to switch on the power and commission each PowerTag Link gateway one by one, if possible. This helps to discover only the required wireless devices specific to each PowerTag Link gateway, and avoids discovering the long list of devices.

If other PowerTag Link gateways are powered on while you commission a new PowerTag Link gateway, the new PowerTag Link gateway automatically selects the less polluted radio channel, and creates its network on a different channel than the previous PowerTag Link gateways. This avoids having all the wireless devices on the same radio channel.

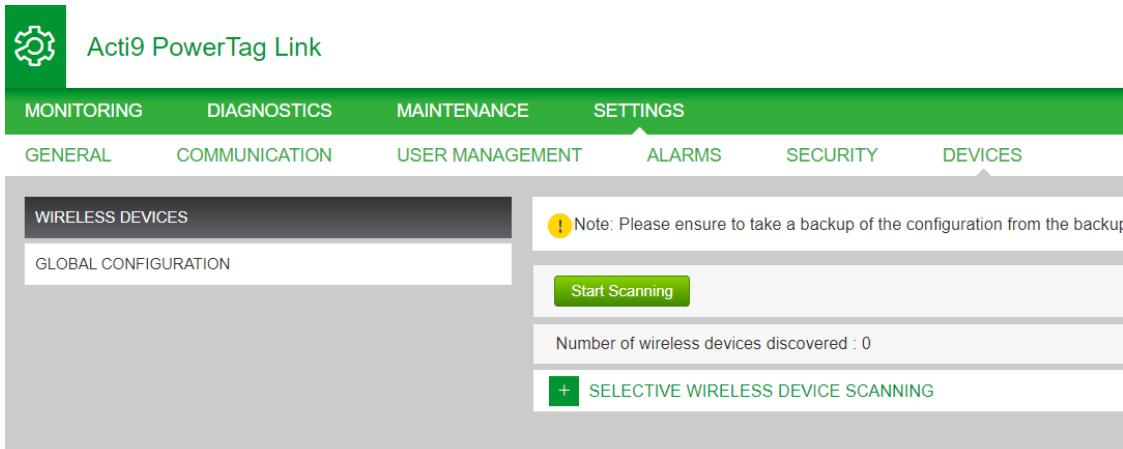
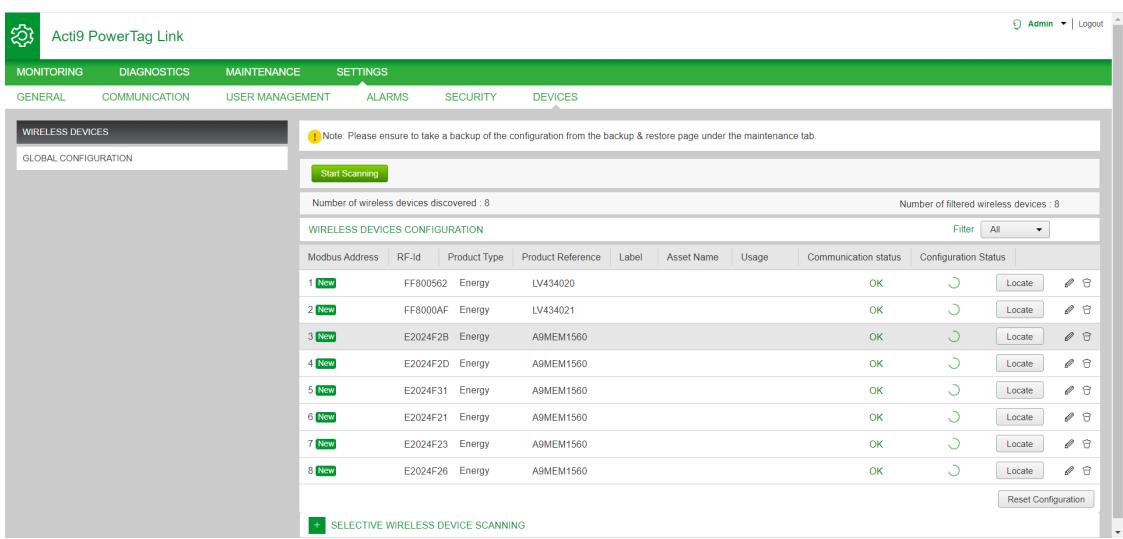
However, if all panels are powered on and commissioned simultaneously, then locate only the required wireless devices in multiple panels and reject the ones that you do not want to configure with the panel currently commissioned. All the rejected wireless devices can be auto-discovered again from another PowerTag Link gateway without any issues.

Selective Pairing of Wireless Devices with Webpages

| Step | Action |
|------|--|
| 1 | <p>Open a text editor program and create a .csv file containing the RF-id of the wireless devices that you want to pair with the gateway. The Modbus addresses will be assigned to the wireless devices according to the order of their RF-id in the file.</p> <p>For example, as shown in the following screenshot:</p> <ul style="list-style-type: none"> Modbus address 1 will be assigned to the wireless device with RF-id = E2079424 Modbus address 2 will be assigned to the wireless device with RF-id = E2079439, and so on  <pre> 1 E2079424CRLF 2 E2079439CRLF 3 E207943ECRLF 4 E2079431CRLF 5 E2079427CRLF 6 E2079441CRLF 7 E207942ECRLF 8 E20792ADCRLF 9 E20228FACRLF 10 E20228E9CRLF 11 E20228F3CRLF 12 E20228EACRLF 13 E2023E85CRLF 14 E2023E8BCRLF 15 E202636ECRLF 16 D6FFFFFFE62A5D0CRLF 17 86BD7FFFE1BB1D6CRLF 18 86BD7FFFE1BB1FCCRLF 19 86BD7FFFE1BB1A5CRLF 20 86BD7FFFE1BB0DCCRLF 21 E2026370CRLF 22 </pre> |
| 2 | Login to the webpage. Refer to Login into Webpages, page 32. |
| 3 | Navigate to Settings > Communication > Wireless Network Configuration . |
| 4 | If specified in the radio frequency plan, choose the right communication channel in the Communication tab. |
| 5 | Navigate to Settings > Devices > Wireless Devices > Selective Wireless Device Scanning . |
| 6 | <p>Click Import to import the .csv file.</p>  <p>Result: A confirmation message is displayed.</p>  |
| 7 | <p>Scan the environment to discover the imported list of wireless devices.</p> <p>For more information on discovering the wireless devices, refer to Pairing Principle, page 37.</p> |

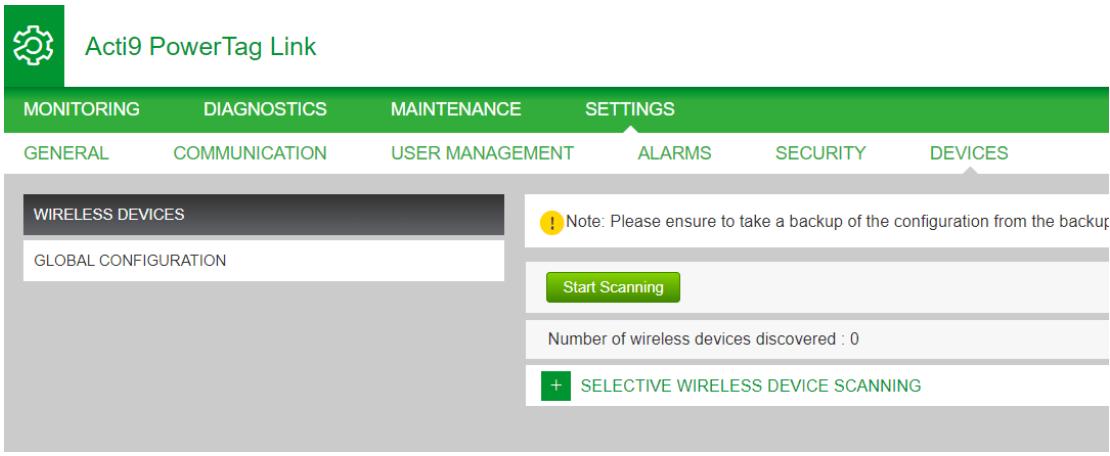
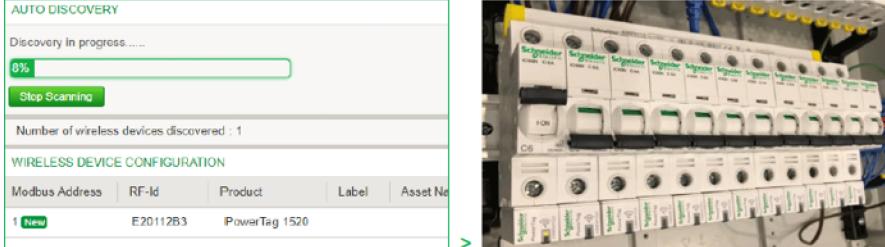
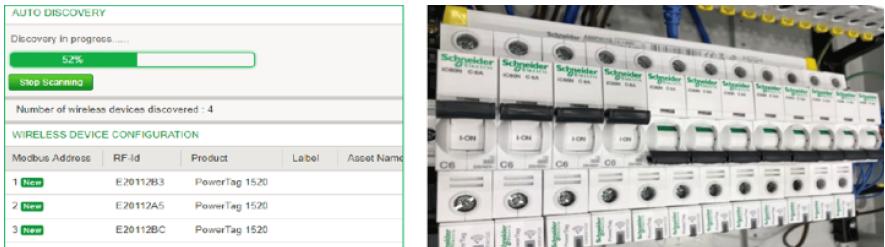
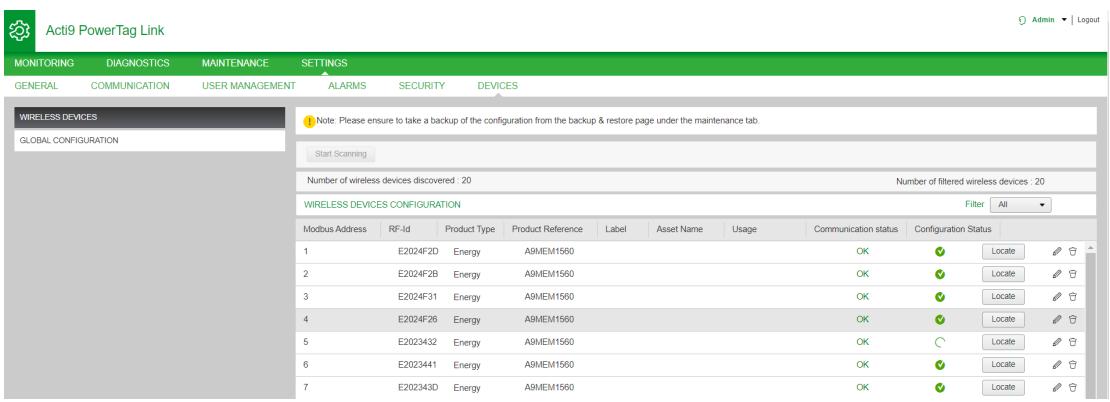
Free Pairing of Wireless Devices with Webpages

All the wireless devices must be powered ON.

| Step | Action |
|------|---|
| 1 | Launch the PowerTag Link webpage in the web browser. |
| 2 | Login to the webpage. Refer to Login into Webpages, page 32. |
| 3 | Navigate to Settings > Devices > Wireless Devices . |
| 4 | Click Start Scanning . |
| |  <p>The screenshot shows the Acti9 PowerTag Link interface. At the top, there's a navigation bar with tabs: MONITORING, DIAGNOSTICS, MAINTENANCE, and SETTINGS (which is active). Below the navigation bar, there are sub-tabs: GENERAL, COMMUNICATION, USER MANAGEMENT, ALARMS, SECURITY, and DEVICES (which is also active). A note says "Please ensure to take a backup of the configuration from the backup & restore page under the maintenance tab." Below this, there are two buttons: "Start Scanning" (highlighted) and "Number of wireless devices discovered : 0". At the bottom, there's a link "+ SELECTIVE WIRELESS DEVICE SCANNING".</p> |
| 5 | <p>Stop scanning when all the devices are discovered, or click Start Scanning again to complete the scanning process.</p> <p>Result: A list of paired devices is displayed.</p>  <p>The screenshot shows the Wireless Devices Configuration page. It displays a table of discovered devices with columns: Modbus Address, RF-Id, Product Type, Product Reference, Label, Asset Name, Usage, Communication status, and Configuration Status. Each row has a "Locate" button, an edit icon, and a delete icon. The table shows 8 devices, all with OK status and green "Locate" icons. A "Reset Configuration" button is at the bottom right. A note at the top says "Please ensure to take a backup of the configuration from the backup & restore page under the maintenance tab." and a filter dropdown is set to "All".</p> |
| 6 | Select the wireless device to configure and click Locate to find the device in the panel. |
| | Result: The status LED of the selected device blinks fast green in the panel. |
| 7 | If one of the located wireless devices is not part of your selection, click Delete to reject the device. |
| 8 | Configure the wireless devices. Refer to Wireless Device Configuration with Webpages, page 42. NOTE: The Modbus address assigned to the wireless devices can be changed after the pairing process is done. |

Controlled Pairing of Wireless Devices with Webpages

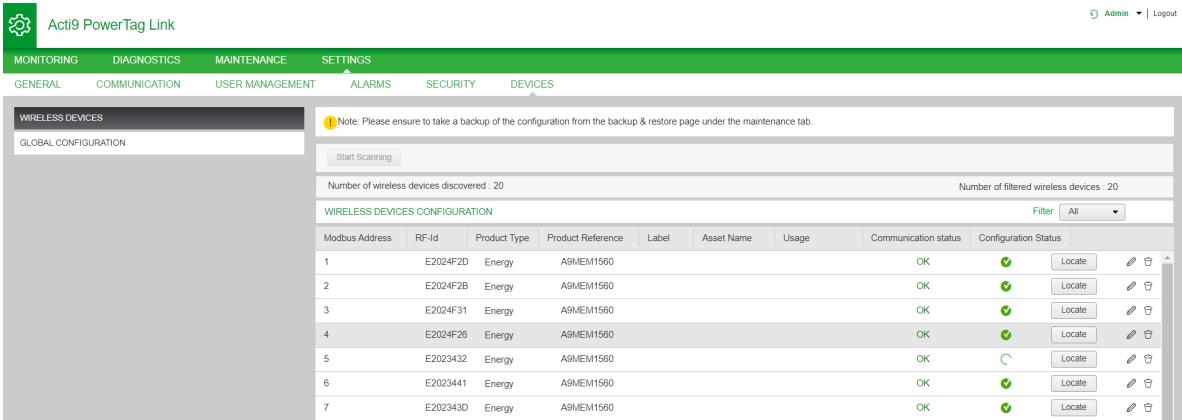
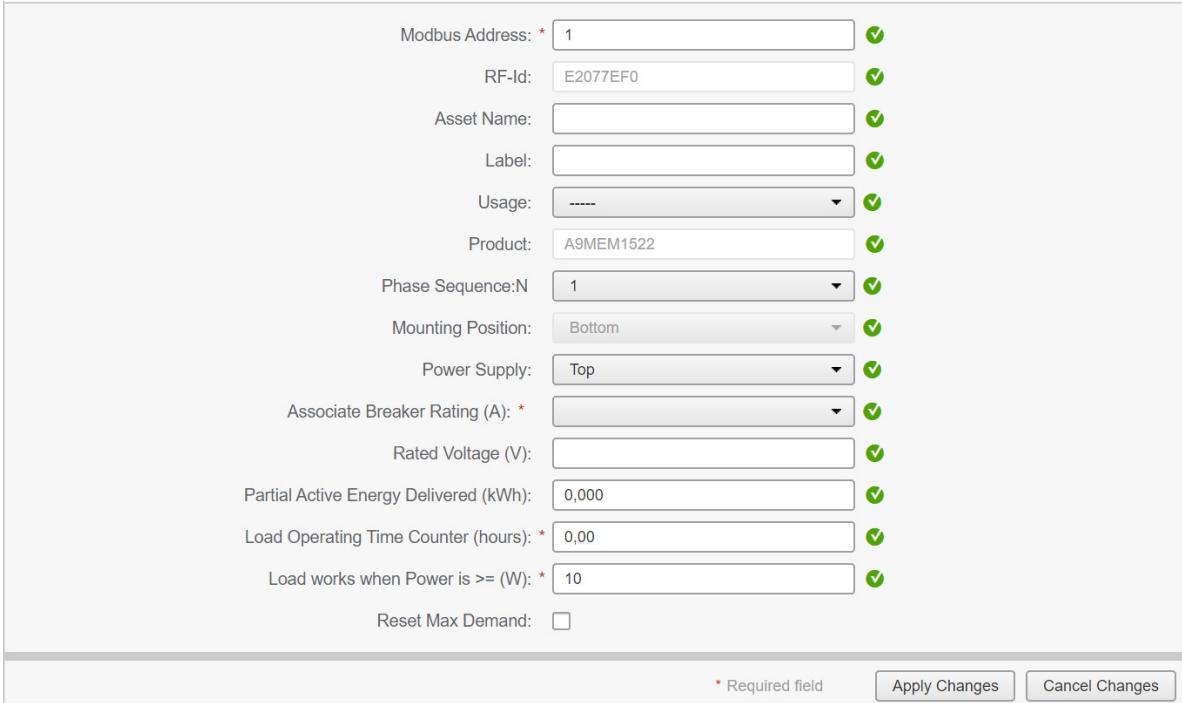
All the wireless devices must be powered OFF.

| Step | Action |
|------|---|
| 1 | Launch the PowerTag Link webpage in the web browser. |
| 2 | Login to the webpage. Refer to Login into Webpages, page 32. |
| 3 | Navigate to Settings > Devices > Wireless Devices . |
| 4 | <p>Click Start Scanning.</p>  |
| 5 | <p>Power on the wireless devices, one by one, in the required order.</p>   |
| 6 | <p>Stop scanning when all the devices are discovered, or click Start Scanning again to complete the scanning process.</p> <p>A list of paired devices is displayed according to the required order (Modbus address plan).</p>  |

| Step | Action |
|------|---|
| 7 | Select the wireless device to configure and click Locate to find the device in the panel. Result: The status LED of the selected device blinks fast green in the panel. |
| 8 | If one of the located wireless devices is not part of your selection, click Delete to reject the device. |
| 9 | Configure the wireless devices. Refer to Wireless Device Configuration with Webpages , page 42. NOTE: The Modbus address assigned to the wireless devices can be changed after the pairing process is done. |

Wireless Device Configuration with Webpages

Configuration Procedure of PowerTag Energy •63 and M250/630 with Webpage

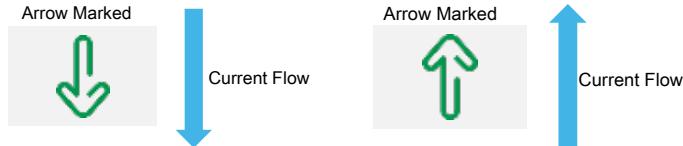
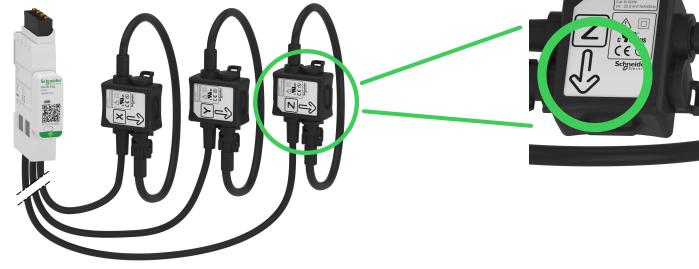
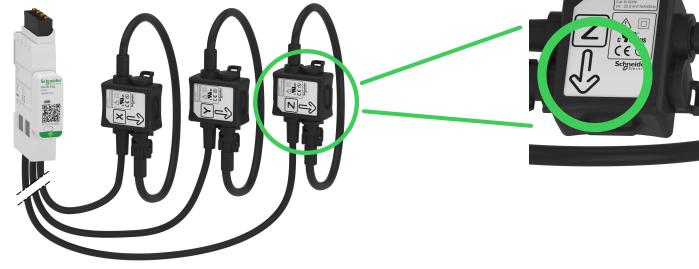
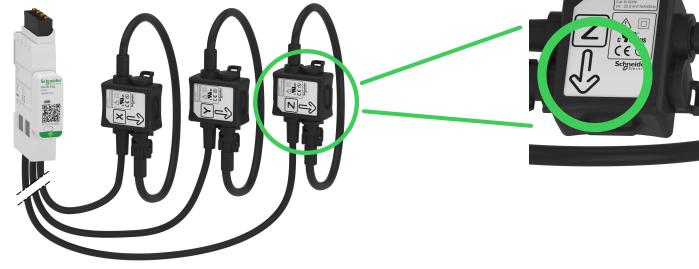
| Step | Action |
|------|--|
| 1 | <p>Navigate to Settings > Devices > Wireless Devices to view the list of the paired wireless devices. For more information on discovering the wireless devices, refer to Pairing Principle, page 37.</p> <p>Result: A list of paired devices is displayed.</p>  |
| 2 | <p>Select any wireless device and click the pencil icon to modify the configuration of the selected energy monitoring device.</p> <p>Result: The parameters of the energy monitoring devices are displayed.</p>  <p>NOTE: The PowerTag Energy F160 and Rope have additional parameters. Refer to Configuration Procedure of PowerTag Energy F160 and Rope with Webpage, page 44.</p> |
| 3 | Enter the Asset Name of the wireless device. |
| 4 | Enter the Label of the wireless device. |
| 5 | Select the Usage . |
| 6 | Select the Phase Sequence to define the phase sequence of the meter depending on the way the physical panel is wired (from left to right). |

| Step | Action |
|------|---|
| 7 | Select the Mounting Position . <ul style="list-style-type: none"> Top: The PowerTag sensor is mounted on the top of the device (circuit breaker or switch-disconnector). Bottom: The PowerTag sensor is mounted at the bottom of the device (circuit breaker or switch-disconnector). |
| 8 | Select the Power Supply position. <ul style="list-style-type: none"> Top: The power supply is connected on the top power terminals of the device (circuit breaker or switch-disconnector). Bottom: The power supply is connected on the bottom power terminals of the device (circuit breaker or switch-disconnector). |
| 9 | Select the breaker rating from the Associate Breaker Rating (A) list to calculate the percentage of loads. |
| 10 | If requested, enter the value for the energy counter in the Partial Energy area. Click Reset or enter the value as 0 to reset the partial energy counter. |
| 11 | Load Operating Time Counter (hours) : The Load Operating Time counter indicates the running operating time of the load in hours. The load is powered and power flows to/from the load above the set threshold value. The default value in this field is 60 seconds. You can set this value between 60 seconds and 1000000 hours. |
| 12 | Load work when Power is >= : The Load Operating Time counter increments only when the power is greater or equal to the value set. You can set the value between 10 W and 15000 W. |
| 13 | Click Apply Changes to save the settings. Click Cancel Changes to revert the settings. |

NOTE: It is recommended to create a backup file saved on your PC using the backup function available in the **Maintenance** menu of the webpage. The file will be automatically saved under the name **backup.dat**. It will be used in case of dysfunction and replacement of the gateway.

For more information, refer to Inoperative Gateway Replacement, page 65.

Configuration Procedure of PowerTag Energy F160 and Rope with Webpage

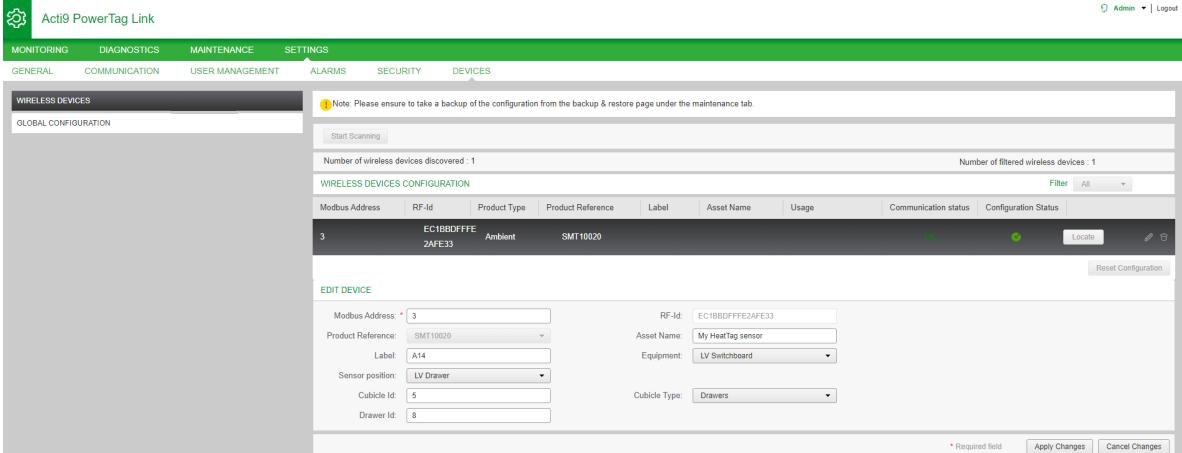
| Step | Action | | | | |
|---|---|----------------------|----------------------|---|--|
| 1 | <p>Navigate to Settings > Devices > Wireless Devices to view the list of the paired wireless devices. For more information on discovering the wireless devices, refer to Pairing Principle, page 37.</p> <p>Result: A list of paired devices is displayed.</p> | | | | |
| 2 | <p>Select the required PowerTag Energy F160 or Rope, and click the pencil icon to modify the configuration of the selected wireless device.</p> <p>Result: The parameters of the PowerTag Energy F160 or Rope are displayed.</p> | | | | |
| 3 | Enter the Modbus Address . | | | | |
| 4 | Enter the Asset Name of the wireless device. | | | | |
| 5 | Enter the Label of the wireless device. | | | | |
| 6 | Select the Usage . | | | | |
| 7 | Select the Phase Sequence for the wireless device from the X Y Z to define the phase sequence of the meter depending on the way the physical panel is wired and according to the marks X-Y-Z printed on the product. | | | | |
| 8 | <p>Select the Mounting Position.</p> <ul style="list-style-type: none"> Top: The PowerTag Energy sensor is mounted on the top of the device. Bottom: The PowerTag Energy sensor is mounted at the bottom of the device. Not Applicable: If the PowerTag Energy sensor is not directly associated to a device (circuit breaker or switch-disconnector). | | | | |
| 9 | <p>Select the Positive Current Direction to define the convention for PowerTag Energy sensor to count energies:</p> <ul style="list-style-type: none"> Direct: If the arrow marked on the PowerTag Energy sensor is on the same direction as the current flow.  <ul style="list-style-type: none"> Reverse: If the arrow marked on the PowerTag Energy sensor is on the opposite direction of the current flow.  <p>The following figures show the location of the arrow marked on the PowerTag Energy F160 and Rope:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">PowerTag Energy F160</th> <th style="text-align: center;">PowerTag Energy Rope</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">  </td> <td style="text-align: center;">  </td> </tr> </tbody> </table> | PowerTag Energy F160 | PowerTag Energy Rope |  |  |
| PowerTag Energy F160 | PowerTag Energy Rope | | | | |
|  |  | | | | |
| 10 | Select the breaker rating from the Associate Breaker Rating Ir (A) list to calculate the percentage of loads. | | | | |
| 11 | <p>Enter the value for the rated voltage in the Rated Voltage (V) area based on your installation:</p> <ul style="list-style-type: none"> LN rated voltage for 3P4W installation. LL rated voltage for 3P3W installation. | | | | |
| 12 | Select the System Type . | | | | |

| Step | Action |
|------|--|
| | <ul style="list-style-type: none"> 3PH4W : 3 phases system with Neutral connected to PowerTag voltage connector. In such case, total and per phase values are available (for example: Total energy, Total power, Per phase energy, and Per phase power). 3PH3W : 3 phases system without Neutral connected to PowerTag voltage connector. In such case, only Total values are available (for example: Total energy and Total power). |
| 13 | Load Operating Time Counter (hours): The Load Operating Time counter indicates the running operating time of the load in hours. The load is powered and power flows to/from the load above the set threshold value. The default value in this field is 0. You can set this value between 0 and 1000000 hours. |
| 14 | Load work when Power is >=: The Load Operating Time counter increments only when the power is greater or equal to the value set. You can set the value between 10 W and 15000 W. |
| 15 | <p>Select the Power Factor Sign from the drop-down list.</p> <p>This setting has an influence on the convention used to sign the power factor.</p> <ul style="list-style-type: none"> IEC: In this setting, <ul style="list-style-type: none"> When active and apparent power received, the Power Factor Sign will be – . When active and apparent power delivered, the Power Factor Sign will be + . IEEE: In this setting, <ul style="list-style-type: none"> When the load is resistive, the Power Factor Sign is + . When the load is inductive, the Power Factor Sign is - . <p>The following graphic summarizes the power factor sign convention:</p> |
| 16 | Click Apply Changes to save the settings. Click Cancel Changes to revert the settings. |

NOTE: It is recommended to create a backup file saved on your PC using the backup function available in the **Maintenance** menu of the webpage. The file will be automatically saved under the name **backup.dat**. It will be used in case of dysfunction and replacement of the gateway.

For more information, refer to Inoperative Gateway Replacement, page 65.

Configuration Procedure of HeatTag Sensors with Webpage

| Step | Action |
|------|---|
| 1 | <p>Navigate to Settings > Devices > Wireless Devices to view the list of the paired wireless devices. For more information on discovering the wireless devices, refer to Pairing Principle, page 37.</p> <p>Result: A list of paired devices is displayed.</p> |
| 2 | <p>Select the required HeatTag sensor and click the pencil icon to modify the configuration of the selected wireless device.</p> <p>Result: The parameters of the HeatTag sensor are displayed.</p>  |
| 3 | Enter the Modbus Address . |
| 4 | Enter the Asset Name of the wireless device. |
| 5 | Enter the Label of the wireless device. |
| 6 | Select the Equipment to define in which environment the HeatTag sensor is mounted. |
| 7 | Select the Sensor position to choose in which position the HeatTag sensor is mounted. |
| 8 | Enter the Cubicle Id to define in which cubicle the HeatTag sensor is installed. NOTE: The value of Cubicle Id ranges between 1 and 20. |
| 9 | Select the Cubicle Type to define the cubicle configuration. NOTE: The options displayed for Cubicle Type depends on the sensor position selected. |
| 10 | Enter the Drawer Id to define in which drawer the HeatTag sensor is installed. NOTE: This option is available only if the Sensor position is selected as LV Drawer . The value of Drawer Id ranges between 1 and 10. |
| 11 | Click Apply Changes to save the settings. Click Cancel Changes to revert the settings. |

NOTE: The above settings are available only for LV Switchboard.

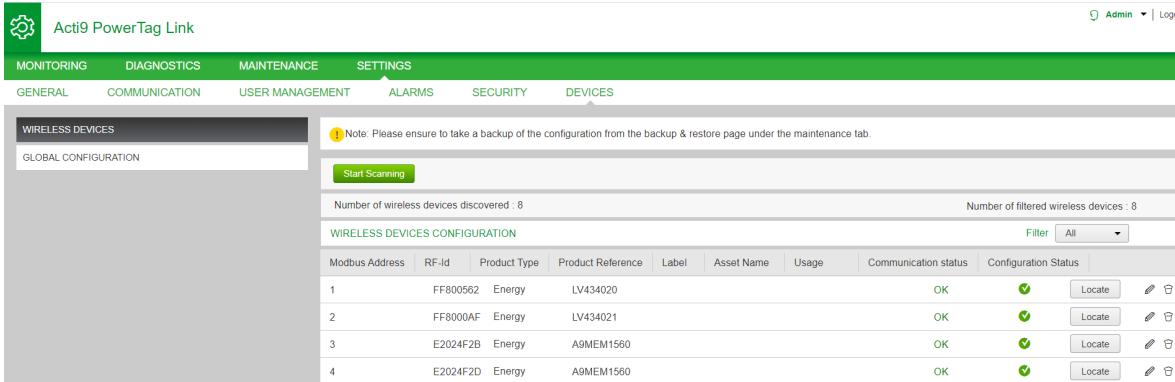
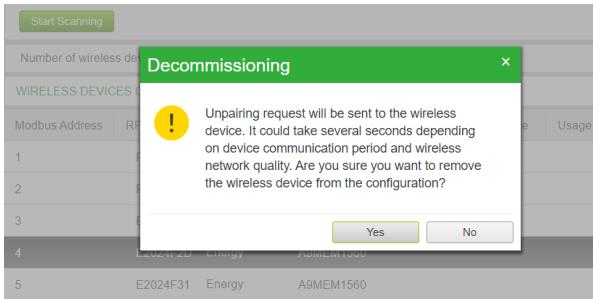
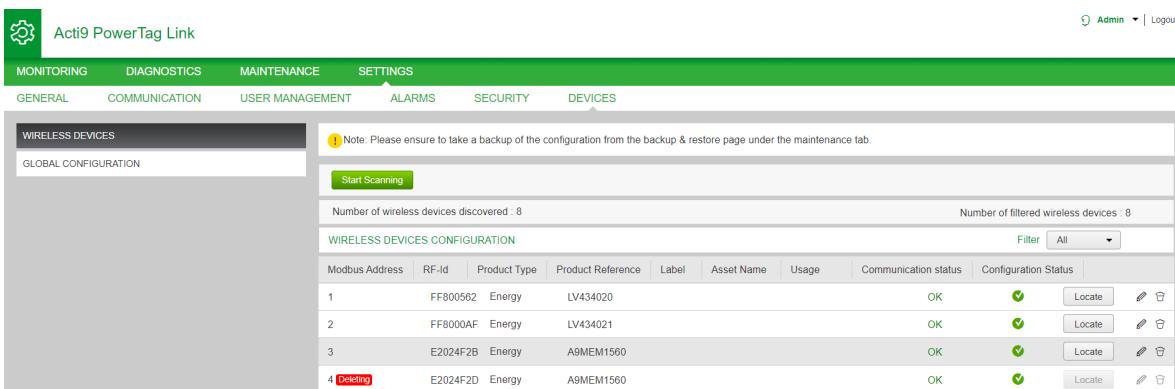
Unpairing of Wireless Devices with Webpage

To unpair a wireless device using the PowerTag Link webpage, follow the steps in the subsequent sections, as applicable.

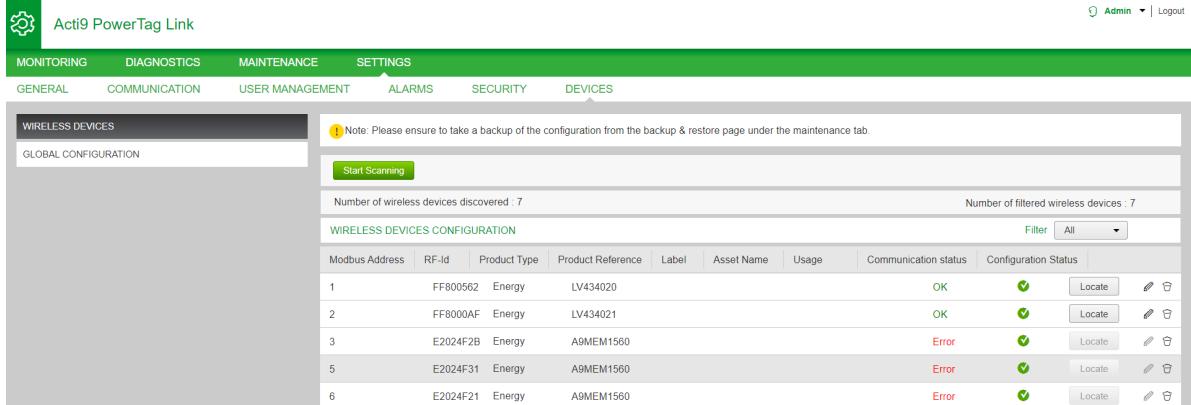
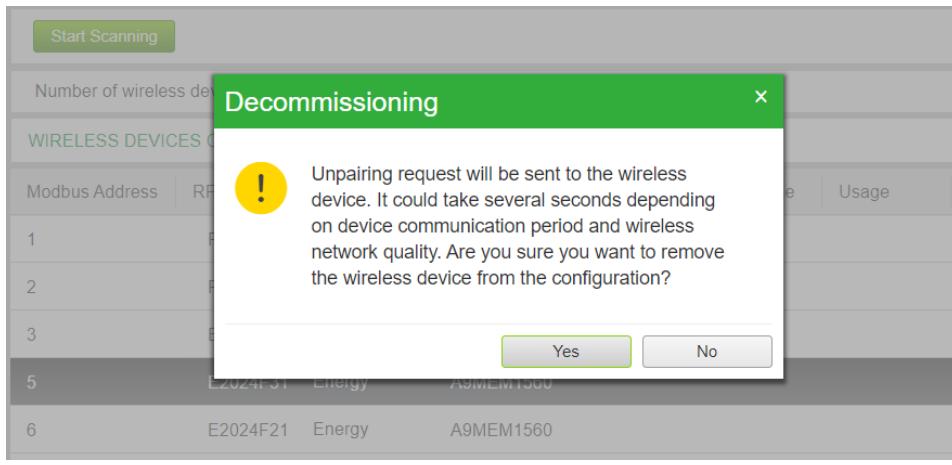
Some wireless devices have a local method to unpair the devices. Refer to the instruction sheet of the specific device.

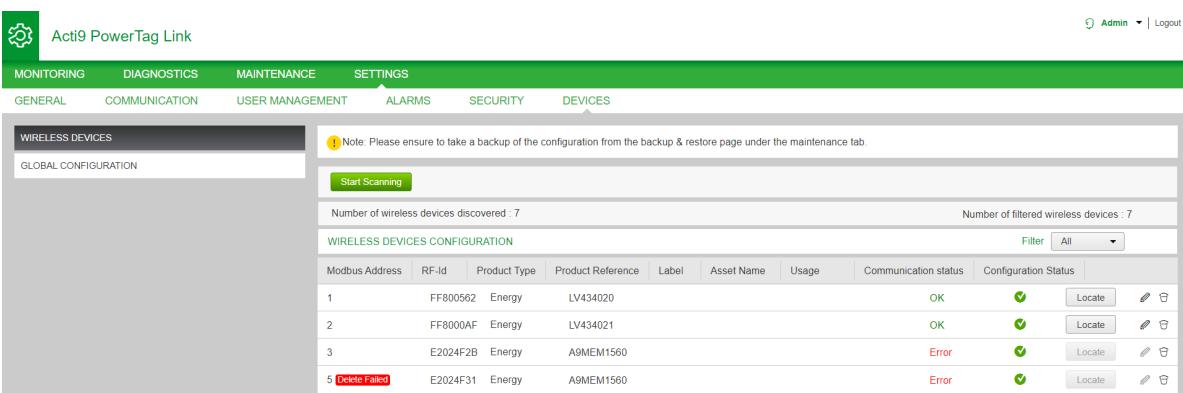
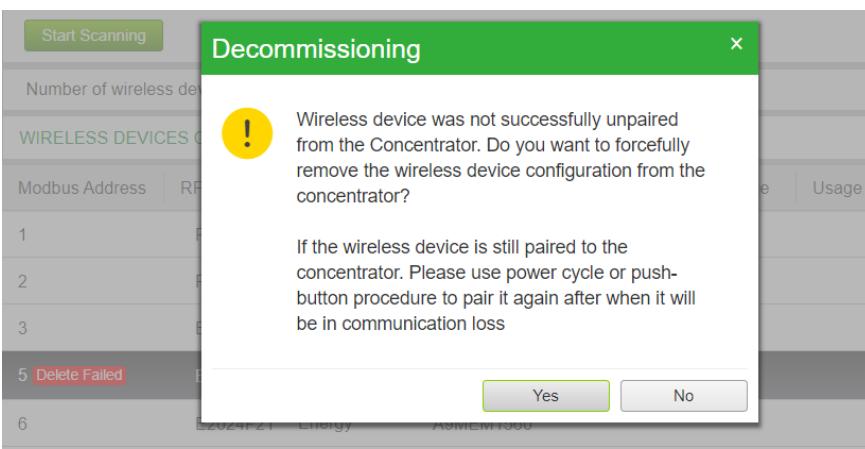
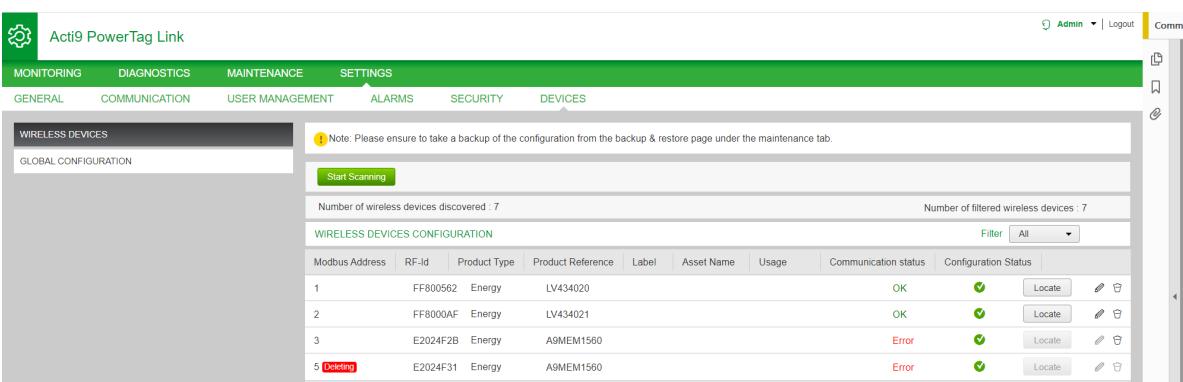
IMPORTANT: When unpairing unpowered wireless devices from the PowerTag Link gateway, the devices are removed from the gateway settings, but, for each of these devices, a reference to the gateway remains stored in the device. To pair the wireless device with a new PowerTag Link gateway, perform a local reset to factory settings of the device: power off the device then the device turns to gateway search mode.

Unpairing Connected Wireless Devices

| Step | Action |
|------|--|
| 1 | <p>Navigate to Settings > Devices > Wireless Devices to view the list of the paired wireless devices.</p> |
| 2 | <p>Click the bin icon of the required wireless device to unpair.</p>  <p>Result: A message appears on the screen to confirm the removal of the wireless device from the configuration.</p>  |
| 3 | <p>Click Yes to initiate the deletion process.</p>  <p>Result: Once the wireless device is successfully deleted, it will not be visible in the list of wireless devices discovered.</p> |

Unpairing Disconnected Wireless Devices

| Step | Action |
|------|---|
| 1 | Navigate to Settings > Devices > Wireless Devices to view the list of the paired wireless devices. |
| 2 | Click the bin icon of the required wireless device to unpair.  <p>Result: A message appears on the screen to confirm the removal of the wireless device from the configuration.</p>  |

| Step | Action |
|------|--|
| 3 | <p>Click Yes.</p> <p>If the device is disconnected or turned off, an error Delete Failed is displayed on the screen.</p>  <p>After few seconds, the below error message is displayed on the screen:</p>  <p>NOTE: If the wireless device is still paired to the PowerTag Link gateway, use the local unpairing method to force the wireless device to unpair. Refer the instruction sheet of the specific wireless device for the local unpairing procedure.</p> |
| 4 | <p>Click Yes to initiate the deletion process.</p>  <p>Result: Once the wireless device is successfully deleted, it will not be visible in the list of wireless devices discovered.</p> |

PowerTag Link Gateway Settings

General Settings

Identification

| Step | Action |
|------|--|
| 1 | Launch the PowerTag Link webpage in the web browser. |
| 2 | Login with user name and password. |
| 3 | Click Settings > General > Identification . |

The **Identification** page is used to edit the gateway name and it displays the following parameters:

| Parameters | Description |
|-------------------------------|---|
| Gateway Identification | |
| User Application Name | You can customize the name of the gateway used by communication services. |
| Product Range | Displays the product range name of the gateway. |
| Product Model | Displays the product model name of the gateway. |
| Serial Number | Displays the serial number of the gateway. |
| Firmware Revision | Displays the firmware version number of the gateway. |
| Unique identifier | Displays the identifier used by communication protocols. |
| Webpage Version | Displays the webpage version of the gateway. |
| Building Information | |
| Building Name | You can customize the name of the gateway place inside the building. |

The **Device Name** is same as the name displayed in Windows Explorer.

NOTE: The **Device Name** should contain only alphanumeric characters and a hyphen (-) character. The '-' character cannot be the last character.

Click **Apply Changes** to save the changes. Click **Cancel Changes** to revert the settings.

The screenshot shows the 'IDENTIFICATION' tab selected in the navigation bar. The 'POWERTAG LINK IDENTIFICATION' section contains the following information:

- User Application Name: PowerTagLinkHD-F635
- Product Range: Acti9
- Product Model: PowerTag Link HD
- Serial Number: RN190411235
- Firmware Revision: 001.008.004
- Unique Identifier: uuid:13814000-1dd2-11b2-0000-000040e1635
- Webpage Version: 001.008.004

The 'BUILDING INFORMATION' section has a 'Building Name' field with the placeholder 'BuildingName'. At the bottom right, there are buttons for 'Required field', 'Apply Changes', and 'Cancel Changes'.

Date/Time

| Step | Action |
|------|--|
| 1 | Launch the PowerTag Link webpage in the web browser. |
| 2 | Login with user name and password. |
| 3 | Click Settings > General > DATE/TIME . |

Manual mode

The **DATE/TIME** page is used to set date and time and SNTP parameters as shown in the following figure:

NOTE: After the power shut down of any gateway, the gateway will reset to a default value of date and time. The default date and time value is 2000/1/1, 00:00:00.

You can reset the date and time manually or automatically.

Follow the procedure to reset the date and time in **Manual** mode:

| Step | Action |
|------|--|
| 1 | Select Manual . |
| 2 | Enter the Date to be set in the format yyyy-mm-dd . |
| 3 | Enter the Time in the format hh:mm:ss . |
| 4 | Click Apply Changes to save the settings. Click Cancel Changes to revert the settings. |

Follow the procedure to reset the date and time in **Automatic** mode:

| Step | Action |
|------|--|
| 1 | Select Network Synchronization via SNTP/NTP to configure the date and time automatically via SNTP/NTP. Or Select Network Synchronization via Modbus TCP to configure the date and time via Modbus TCP. |
| 2 | Click Apply Changes to save the settings. Click Cancel Changes to revert the settings. |

SNTP Mode

Network Time Protocol (NTP) is a networking protocol for clock synchronization between computer systems over packet-switched, variable-latency data networks.

A less complex implementation of NTP, using the same protocol without the storage of state over extended periods of time is known as the Simple Network Time Protocol. It is used in embedded devices and in applications where high accuracy timing is not required.

When automatic time configuration is selected and NTP servers are configured, the PowerTag Link gateway can communicate with NTP and server to synchronize its time.

The PowerTag Link gateway supports time synchronization with remote server using SNTP. When SNTP is activated, time synchronization from one of the

selected time servers can be achieved at every configured interval and also supports Modbus time services Get Date-Time (refer to Function 43-15: Read Date and Time, page 156) and Set Date-Time (refer to Function 43-16: Write Date and Time, page 157). The time is configured in 24-hour format.

Automatic Mode with SNTP Service

The PowerTag Link gateway receives date and time from SNTP server after every poll interval time. Follow the procedure to configure the date and time using **SNTP/NTP** parameters:

| Step | Action |
|------|---|
| 1 | Enter the value for Poll Interval in hours that ranges from 1 through 63. The default value of poll interval is 1. |
| 2 | Select Obtain SNTP/NTP Servers Automatically via DHCP/BOOTP to obtain the server address automatically from SNTP or NTP servers. |
| 3 | Select Manual . |
| 4 | Enter the primary server name or IP address for Primary SNTP/NTP Server parameter. The primary server can be: <ul style="list-style-type: none"> • IPv4 address • IPv6 address • Domain name |
| 5 | Enter the secondary server name or IP address for Secondary SNTP/NTP server parameter. This is an optional parameter. |
| 6 | Click Apply Changes to save the settings. Click Cancel Changes to revert the settings. |

The screenshot shows the Acti9 PowerTag Link HD web interface. The top navigation bar includes links for Admin, Logout, Monitoring, Diagnostics, Maintenance, and Settings. Under Settings, there are tabs for General, Communication, User Management, Alarms, Security, and Devices. The main content area has two tabs: Identification and Date/Time. The Date/Time tab is active, showing fields for Date (2021-02-02) and Time (05:02:08), and radio buttons for Manual, Obtain SNTP/NTP Servers Automatically via DHCP/BOOTP, and Network Synchronization via Modbus TCP. The Network Synchronization via SNTP/NTP option is selected. Below this is the SNTP/NTP tab, which contains fields for Poll Interval (set to 1), Primary SNTP/NTP Server (ntp.midway.ovh), and Secondary SNTP/NTP Server. At the bottom right are buttons for Required Field, Apply Changes, and Cancel Changes.

Time Zone

| Step | Action |
|------|--|
| 1 | Launch the PowerTag Link webpage in the web browser. |
| 2 | Login with user name and password. |
| 3 | Click Settings > General > Time Zone . |

The **Time Zone** page is used to configure the offset and daylight saving time for the selected time zone.

The screenshot shows the Acti9 PowerTag Link HD web interface. The top navigation bar includes links for Monitoring, Diagnostics, Maintenance, and Settings. Under Settings, there are tabs for General, Communication, User Management, Alarms, Security, and Devices. The 'TIME ZONE' tab is currently selected. The main content area is titled 'TIME ZONE SETTINGS'. It contains fields for 'Time Zone Offset' (set to UTC) and a checked 'Enable' checkbox. Below these are dropdown menus for 'Daylight Saving Time Begins' (set to Second, Sunday, March, 02:00) and 'Daylight Saving Time Ends' (set to Second, Sunday, November, 02:00). At the bottom right are buttons for 'Required field', 'Apply Changes', and 'Cancel Changes'.

Follow the procedure to configure the time zone settings:

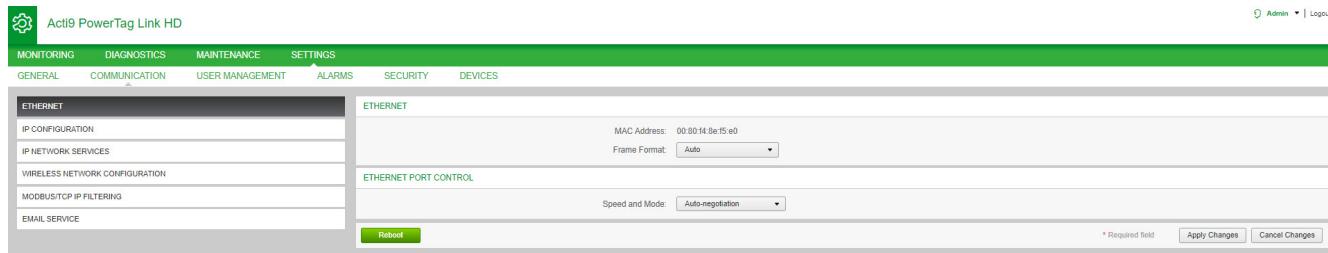
| Step | Action |
|------|--|
| 1 | Click the offset value used by the local time zone from the Time Zone Offset list. |
| 2 | Select the Enable check box to configure the daylight time saving settings. The Enable check box is not selected by default. |
| 3 | Select the day, month, and time to configure the start time of daylight saving time from the respective Daylight Saving Time Begins list. |
| 4 | Select the day, month, and time to configure the end time of daylight saving time from the Daylight Saving Time Ends list. |
| 5 | Click Apply Changes to save the settings. Click Cancel Changes to revert the settings. |

Ethernet Communication of the PowerTag Link Gateway with Webpages

Ethernet Settings

The Ethernet page is used to configure the frame format and speed and mode of the Ethernet port. This page also displays the MAC address of the Ethernet network.

| Step | Action |
|------|--|
| 1 | Launch the PowerTag Link webpage in the web browser. |
| 2 | Login with user name and password. |
| 3 | Click Settings > Communication > Ethernet . |



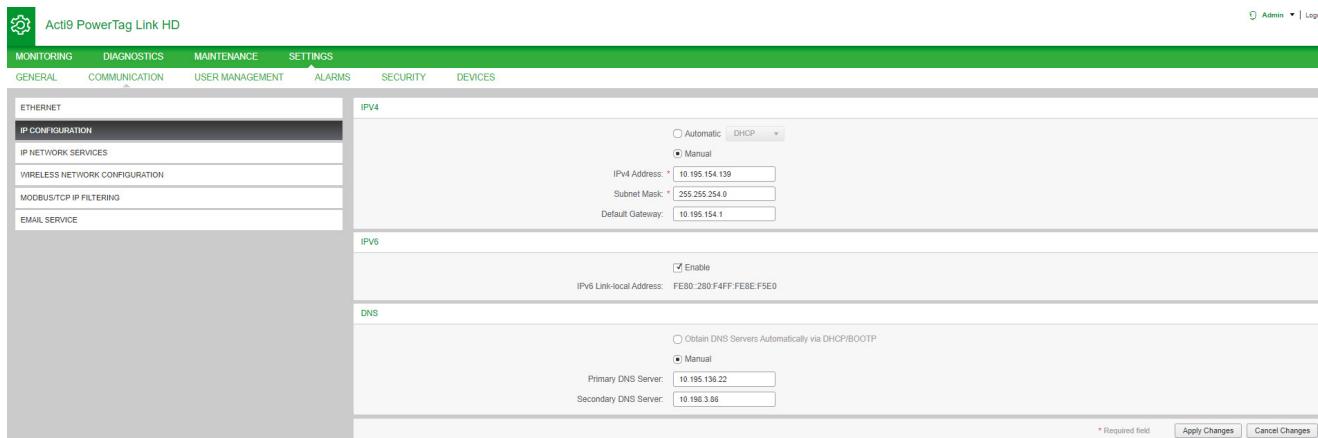
Follow the procedure to configure the Ethernet parameters:

| Step | Action |
|------|--|
| 1 | Select the type of Ethernet frame format from the Frame Format list. It can be Ethernet II , 802.3 , or Auto . The default value of the frame format is Auto . |
| 2 | Select the value for speed and mode of the Ethernet port from the Speed and Mode list. The value of speed and mode can be one of the following: <ul style="list-style-type: none"> • 10 Mbps - Half duplex • 10 Mbps - Full duplex • 100 Mbps - Half duplex • 100 Mbps - Full duplex • Auto-negotiation The default value is Auto-negotiation . |
| 3 | Click Apply Changes and then click Reboot to automatically restart the device to save the settings. Click Cancel Changes to revert the settings. |

IP Configuration

The **IP Configuration** page is used to configure IPv4, IPv6, and DNS parameters.

| Step | Action |
|------|--|
| 1 | Launch the PowerTag Link webpage in the web browser. |
| 2 | Login with user name and password. |
| 3 | Click Settings > Communication > IP Configuration . |



IPv4 parameters can be set either in manual mode or in automatic mode. To configure IPv4 parameter in automatic mode, click **Automatic** and select the type of protocol (DHCP or BOOTP) from the list. The default type is **DHCP** protocol.

DHCP mode is used to acquire the IPv4 address from the DHCP server in the network to which the PowerTag Link gateway is connected. BOOTP mode is used to acquire the IPv4 address if DHCP server is not present in the network. A BOOTP server is configured in the network to assign the IPv4 address.

Follow the procedure to configure IPv4 parameters in the manual mode:

| Step | Action |
|------|--|
| 1 | Select Manual . |
| 2 | Enter the IPv4 Address of the device. |
| 3 | Enter the Subnet Mask of the device. |
| 4 | Enter the address of the Default Gateway . |
| 5 | Click Apply Changes to save the settings. Click Cancel Changes to revert the settings. |

Follow the below procedure to configure IPv6 parameters:

| Step | Action |
|------|--|
| 1 | Select the Enable check box to enable the IPv6 service. The Enable check box is selected by default. |
| 2 | Display the value of the IPv6 Link Local Address . You cannot modify this parameter. |
| 3 | Click Apply Changes to save the settings. Click Cancel Changes to revert the settings. |

NOTE: A Link Local address is an address that only refers to the subnetwork to which the gateway is connected. It is never transferred by the routers. This address is used to reach the available wireless devices on the same network. All IPv6 interfaces have a Link Local address.

During a direct connection to the PowerTag Link gateway or when you are on the same network, you can discover the gateway irrespective of the network configuration of the gateway. This is possible only when the network discovery service is active. It helps to connect to the Link Local address to modify the gateway configuration.

This type of access is useful when the network configuration of the gateway is not known and you cannot connect to it. This avoids in resetting the gateway to factory settings and losing all the gateway configurations.

The PowerTag Link gateway can acquire the domain name automatically or you can set the DNS server address manually. Click **Obtain DNS Servers Automatically via DHCP/BOOTP** to acquire the DNS server automatically from the network.

Follow the procedure below to configure DNS parameters in manual mode:

| Step | Action |
|------|--|
| 1 | Select Manual . |
| 2 | Enter the Primary DNS Server of the device. |
| 3 | Enter the Secondary DNS Server of the device. |
| 4 | Click Apply Changes to save the settings. Click Cancel Changes to revert the settings. |

IP Network Services

The **IP Network Services** page is used to configure the network protocols and discovery services.

| Step | Action |
|------|---|
| 1 | Launch the PowerTag Link webpage in the web browser. |
| 2 | Login with user name and password. |
| 3 | Click Settings > Communication > IP Network Services . |

The PowerTag Link gateway supports HTTPS/HTTP, Modbus/TCP, DNS, SNTP, and discovery services.

The default value of the HTTP port number is 80.

Follow the procedure to configure HTTPS parameters:

| Step | Action |
|------|---|
| 1 | Select the Enable check box to enable the HTTPS service. The Enable check box is selected by default. |
| 2 | Display the port number of the HTTPS. The default value is 443. |
| 3 | Click Apply Changes to save the settings. Click Cancel Changes to revert the settings. |

NOTE: Disabling the HTTPS mode is a risk against cybersecurity best practices. The new values of HTTP/HTTPS port must be defined in accordance with the recommendations of Internet Assigned Numbers Authority (IANA). Failure to follow this recommendation can disconnect the webpage, which can only be resolved by a reset level2 procedure to restore the factory settings of PowerTag Link gateway.

Follow the procedure to configure the Modbus/TCP parameters:

| Step | Action |
|------|--|
| 1 | Select the Enable check box to enable the Modbus/TCP service. The Enable check box is selected by default. |
| 2 | Display the port number of the Modbus/TCP network. The default value is 502. |
| 3 | Click Apply Changes to save the settings. Click Cancel Changes to revert the settings. |

Follow the procedure to configure the discovery services:

| Step | Action |
|------|---|
| 1 | Select the Enable check box to enable the discovery service. The Enable check box is selected by default. |
| 2 | Select the Silent Mode check box. The Silent Mode check box is selected by default. |
| 3 | Display the port number of the discovery network. The default value is 5357. |
| 4 | Click Apply Changes to save the settings. Click Cancel Changes to revert the settings. |

Display the port value of the DNS and SNTP network. The default value of the port number is 53 and 123 respectively.

Email Service

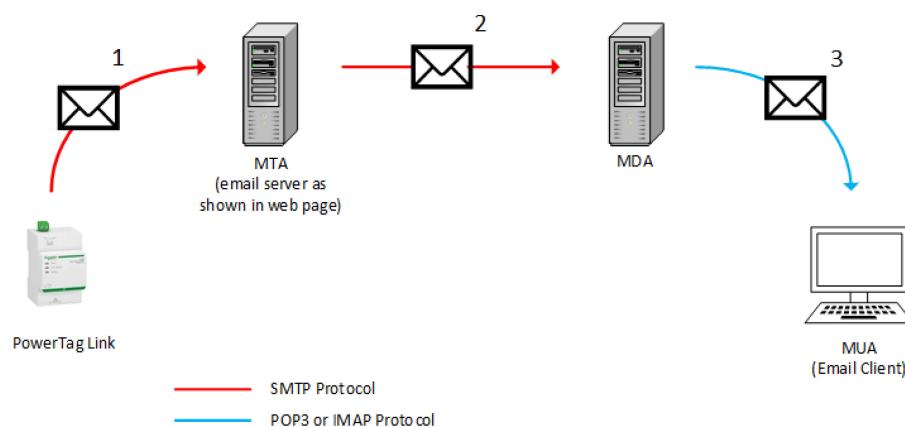
Description

The event notification is used to send emails when the wireless devices trigger an alarm. The alarms are configured by the administrator and can be sent to many users.

Prerequisite

Consult the administrator to get the right IT connection to access the port, Internet, and e-mail server.

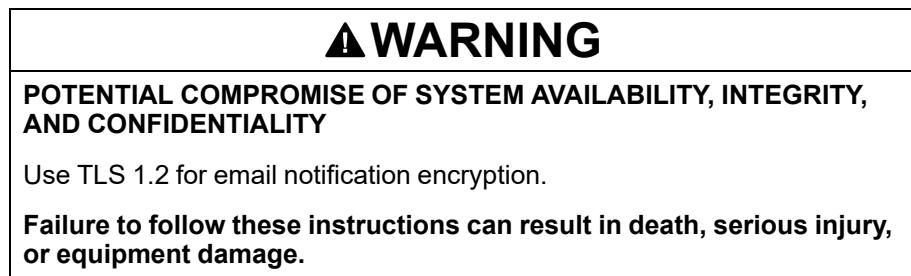
Principle



| Step | Action |
|------|--|
| 1 | The PowerTag Link gateway sends an email to the configured email server / MTA (Mail Transfer Agent) using SMTP protocol. |
| 2 | MTA forwards the message to the email client MDA (Mail Delivery Agent). |
| 3 | MDA delivers email to the client/ MUA (Mail User Agent) using POP3 or IMAP protocol. |

Recommendations

- To ensure secure delivery of the email to the MTA, the PowerTag Link gateway must be updated to the last available firmware to use recent security email transfer mechanisms. However, this will not guarantee a full compatibility with the latest version of Internet email service provider. Schneider Electric is not liable for these policies and their impact in email deliverability.
- When possible, Schneider Electric recommends using an on-premise email server (instead of Internet email service provider) with stable and clear security policy defined by the client IT department.
- Schneider Electric recommends selecting **TLS/SSL** or **STARTTLS** for the connection security mode between the PowerTag Link gateway and the Email SMTP server. Consequently, it is recommended to use an Email SMTP server that supports at least one of these two modes. The **None** option is provided only for compatibility with older Email SMTP servers. Since the **None** option does not provide a secure communication, its usage is not recommended and should be avoided.



- To secure your email from sniffing, verify that your email server supports TLS 1.2. Under certain circumstances, notifications can be sent using SSL, TLS 1.0, or TLS 1.1. However, this is not recommended.
- Each Internet email service provider has its own security policy and data protection mechanisms to check sender's reputation, detect spam messages, and so on. Schneider Electric is not liable for these policies and their impact on email deliverability.

Settings

The **Email Service** page is used to configure the email server settings.

| Step | Action |
|------|---|
| 1 | Launch the PowerTag Link webpage in the web browser. |
| 2 | Login with user name and password. |
| 3 | Click Settings > Communication > Email Service . |

Click the **Enable** check box to configure the email server settings (enabled by default). The PowerTag Link gateway allows you to define your own SMTP server.

Follow the steps given in the table to configure the email server settings:

| Step | Action |
|------|--|
| 1 | Enter the email server name or IP address in the SMTP Server Address area. |
| 2 | Select the type of security mode from the Connection Security Mode list. The following are the available connection security modes: <ul style="list-style-type: none"> • None • TLS/SSL • STARTTLS |
| 3 | Enter the server port value in the SMTP Server Port area. The value ranges from 1 to 65535. |
| 4 | Select Authentication if the server requires login information. This option is disabled by default. |
| 5 | Enter the user name in the SMTP Account Login area. |
| 6 | Enter the password to authenticate the SMTP login in the SMTP Account Password area. |

| Step | Action |
|------|---|
| 7 | <p>Enter the email address of the administrator who is administering the gateway in the From Address area.</p> <p>The From Address can be used in different ways:</p> <ul style="list-style-type: none">Use the From Address as a context provider: If you want to notify and does not want to receive a reply, use a From Address as contextual information. The From Address syntax includes “no-reply”, “gateway name”, “site name”, @a validated domain .com, .net, and so on.Create an alias in the From Address to allow replies to be sent to the person in charge of an alarm: An email can be sent to multiple people who are responsible for a specific appliance. This feature allows the receivers to reply to follow up with the responsible person. <p>For example, if the facility manager receives an email from an alarm, the facility manager can send a reply email to the Maintenance Contractor to follow up on the action.</p> |
| 8 | Select the language of the email body from the Language list: French or English . |
| 9 | Click Apply Changes to save the settings. If you do not want to save the changes, click Cancel Changes . |
| 10 | <p>Enter the email address of the recipient to test the delivery of the email in the Recipient Address for Test area.</p> <p>The test email feature enables connection from the gateway to the service. If the test emails are not received, the Internet connection needs to enable the email ports (port 25 or 587). The port settings are configured in accordance between the gateway that sends the email and the site router settings.</p> |
| 11 | Click Test to deliver the email to the added recipient. |

Modbus TCP/IP Filtering

The Modbus TCP/IP filtering is a security feature that lists the IP addresses that the gateway can accept. This function is used only with Ethernet static addressing mode. This page is used to configure the IP address to enable the write access.

| Step | Action |
|------|---|
| 1 | Launch the PowerTag Link webpage in the web browser. |
| 2 | Login with user name and password. |
| 3 | Click Settings > Communication > Modbus TCP/IP Filtering . |

Acti9 PowerTag Link HD
Admin
Log Out

MONITORING
DIAGNOSTICS
MAINTENANCE
SETTINGS

GENERAL
COMMUNICATION
USER MANAGEMENT
ALARMS
SECURITY
DEVICES

ETHERNET

IP CONFIGURATION

IP NETWORK SERVICES

WIRELESS NETWORK CONFIGURATION

MODBUS/TCP IP FILTERING

EMAIL SERVICE

MODBUS/TCP IP FILTERING

Enable Modbus/TCP IP Filtering

IP FILTERING GLOBAL ACCESS LIST

| IP Range | Access Level |
|--------------------------------------|--------------|
| Any [IPv4 (***.***.***.***)] | Read-Only |
| Any [IPv6 (*****:*****:*****:*****)] | Read-Only |

IP FILTERING EXCEPTION LIST

| IP Address / IP Range | Access Level |
|-----------------------|---------------|
| | Add Exception |

Follow the procedure to configure the IP address to enable the write access:

| Step | Action |
|------|--|
| 1 | Select the Enable Modbus TCP/IP Filtering check box. |
| 2 | Click Add exception to add the IP address and access level. A maximum of 10 IP address can be added. The IP address added has a write access. |
| 3 | Enter the IP address in the IP Address/Range area and select the Access level for the entered IP address. |
| 4 | Click Apply Changes to save the settings. Click Cancel Changes to revert the settings. |

NOTE: You can only edit the global IP address range, but you cannot delete the global IP address range. You can edit and delete the added exceptions.

User Management

User Accounts Page

The **User Management** is used to manage the user profiles. The **Users Accounts** page displays the existing user accounts. This page is used to add a new user account and edit the password of the existing user account.

NOTE: The email associated to each declared user is significant, as it is used during an alarm creation to send an email if there is an occurrence of an alarm.

The following table lists the three types of user account supported by PowerTag Link gateway and their access rights:

| User Accounts | Access |
|---------------|--|
| Administrator | Access all information and modify the parameters in the Settings menu |
| Operator | Access monitoring pages of the connected devices and get access to diagnostic menu |
| Guest | Access only monitoring pages |

One Administrator account and one Guest account are the first level of access to the webpage by default. The maximum number of user accounts is five. It can be in combination of administrator, operator, and guest. However there should be one administrator account which should not be deleted.

⚠ WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

Change default passwords at first use to help prevent unauthorized access to device settings, controls, and information.

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

- Default Administrator account: User name **admin** and password **admin**
- Default Guest account is: User name **admin** and password **admin**

Follow the steps given in the table to create more accounts:

| Step | Action |
|------|---|
| 1 | Launch the PowerTag Link webpage in the web browser. |
| 2 | Login with user name and password. |
| 3 | Click Settings > User Management > User Accounts . |

The screenshot shows the PowerTag Link Gateway's User Management section. At the top, there's a navigation bar with links for MONITORING, DIAGNOSTICS, MAINTENANCE, SETTINGS, GENERAL, COMMUNICATION, USER MANAGEMENT, ALARMS, SECURITY, and DEVICES. The SETTINGS link is currently selected. On the left, there's a sidebar with 'USER ACCOUNTS' and 'USER POLICY' sections. The main area is titled 'USER ACCOUNTS' and contains a table with two rows: 'admin' (Role: Administrator, Email: admin@example.com) and 'guest' (Role: Guest, Email: guest@example.com). Below this is a 'ADD USER' form with fields for 'User Name', 'Password', 'Confirm Password', 'Role' (set to 'Guest'), and 'Email'. There are also 'Required field' and 'Apply Changes' buttons.

Follow the procedure to add a new user profile:

| Step | Action |
|------|--|
| 1 | Click Add User . |
| 2 | Enter the authentication information in the Username and Password area for a user. |
| 3 | Select the type of user from the Role list. |
| 4 | Enter the email of the user in the Email area. |
| 5 | Click Apply Changes to save the settings. Click Cancel Changes to revert the settings. |

The **Username** and **Password** must meet the following criteria:

- The **Username** must have minimum of four characters.
- The **Username** must not exceed 16 characters.
- The **Password** must contain minimum of eight characters with one special character, one number, and one alphabet in upper case.
- The **Password** must not exceed 16 characters.

Follow the procedure to edit the details of an existing user profile:

| Step | Action |
|------|--|
| 1 | Select the user account from the User Accounts list and click the edit icon. |
| 2 | Select the type of user from the Role list. |
| 3 | Modify the Password for the selected user account, if required. |
| 4 | Enter the email of the user in the Email area. |
| 5 | Click Apply Changes to save the settings. Click Cancel Changes to revert the settings. |

Click the delete icon to delete the user profile from webpage. The user profile with **admin** account cannot be deleted.

User Account Lockout

An Administrator may configure account lockout on the PowerTag Link gateway. This feature enhances security of the gateway by blocking the account access for a particular period of time, in case of too many invalid attempts to login.

- Maximum login attempts:
 - Default value: 3
 - Configurable: Yes (1 to 3)
- Blocking time duration:
 - Default value: 60 seconds
 - Configurable: Yes (0 to 3600 seconds)

Reboot of gateway removes the enabled account lockout.

Account lockout feature is enabled by default in the PowerTag Link gateway and it cannot be disabled from the webpage. An invalid login attempt refers to incorrect password and not an incorrect user name. The configuration of blocking time duration with the value 0 will disable the locking mechanism. To activate the account locking, at least 1 second should be configured.

When the blocking time is blocked for a duration, you can login only after the blocking period is elapsed or PowerTag Link gateway is restarted. When the account gets locked, all the active sessions for that user will be deleted.

When a user is blocked, then there will be no option to retrieve the **password** / **Forgot password**. The user should wait for the blocking duration to get elapsed or should restart the gateway.

The screenshot shows the Acti9 PowerTag Link HD web interface. The top navigation bar includes links for MONITORING, DIAGNOSTICS, MAINTENANCE, and SETTINGS. Under SETTINGS, there are sub-links for GENERAL, COMMUNICATION, USER MANAGEMENT, ALARMS, SECURITY, and DEVICES. The main content area is titled "USER ACCOUNTS" and "USER POLICY". A sub-section titled "ACCOUNT LOCK POLICY FOR COMMUNICATION INTERFACES" contains fields for "Communication interface account lock status" (checkbox), "Communication interface account number of wrong attempt" (input field set to 3), and "Communication interface account lock period" (input field set to 60). Below these fields is a note: "seconds) default: 60 , range: 0 to 3600 , 0 is unlimited". At the bottom of the form are buttons for "Required field", "Apply Changes", and "Cancel Changes".

Follow the procedure to modify the parameters:

| Step | Action |
|------|--|
| 1 | Launch the PowerTag Link webpage in the web browser. |
| 2 | Login with user name and password. |
| 3 | Click Settings > User Management > User Policy . |
| 4 | Enter the maximum number of wrong login attempts. |
| 5 | Enter the duration of account locking period. |
| 6 | Click Apply Changes to save the settings. Click Cancel Changes to revert the settings. |

Inoperative Gateway Replacement

Overview

Inoperative gateway replacement is a feature that allows you to download the configuration of the gateway. If the gateway breaks down, you can upload the old configuration that was saved in the new gateway.

NOTICE

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

- Encrypt the file and protect it with a password to make sure that the configuration file integrity and confidentiality is preserved. Most compression utilities can perform such an operation.
- Store the encrypted archive in a location on a PC or a network directory where access controls are enforced to prevent any unauthorized access to the file.

Failure to follow these instructions can result in equipment damage.

NOTE: The configuration file generated by the PowerTag Link gateway contains sensitive information about the security of the PowerTag Link gateway.

Backup Generation

After finishing the commissioning, it is highly recommended to back up the configuration. This will save information that are mandatory in case of replacement of the PowerTag Link gateway.

If the back up is not done, and if the PowerTag Link gateway is malfunctioning or inoperative and needs to be replaced, then all sensors which are connected to the PowerTag Link gateway should be replaced or unpaired. This will lead to:

- Over cost (for the installation of the replacement sensors)
- Shut down of the switchboard to access the sensor

Follow the steps given in the table to generate the Backup file:

| Step | Action |
|------|--|
| 1 | Launch the PowerTag Link webpage in the web browser. |
| 2 | Login with user name and password. |
| 3 | Click Maintenance > Backup & Restore. |
| 4 | Click Backup button to generate the file. Result: The backup file with name backup.dat will be automatically saved on your PC. |

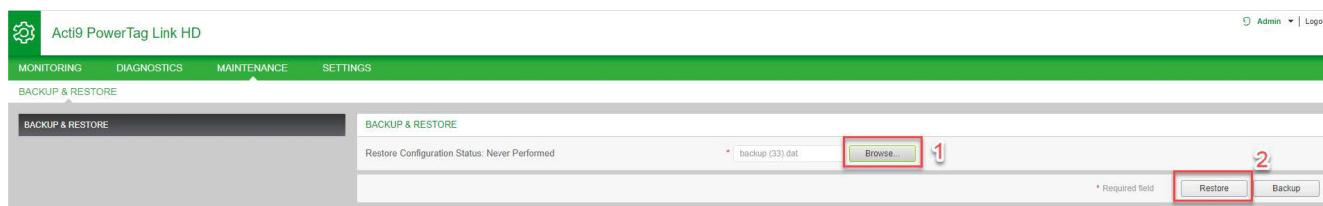
The screenshot shows the 'BACKUP & RESTORE' section of the web interface. It includes fields for 'Restore Configuration Status' (set to 'Never Performed') and a 'Browse...' button. At the bottom right, there are 'Restore' and 'Backup' buttons, with the 'Backup' button being the one highlighted by a red box.

Restore Operation

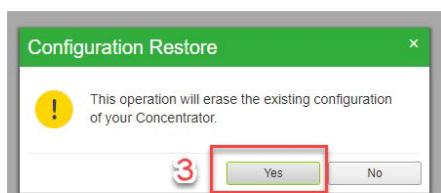
It is possible to replace a malfunctioning or inoperative PowerTag Link gateway with a new one, and to restore the setup if the backup file has been previously generated at the end of the commissioning process.

Follow the steps given in the table to restore and configure the setup:

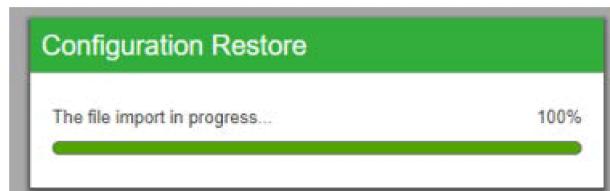
| Step | Action |
|------|--|
| 1 | Launch the PowerTag Link webpage in the web browser. |
| 2 | Login with user name and password. |
| 3 | Click Maintenance > Backup & Restore . |
| 4 | Click Browse to select the backup file. |
| 5 | Click Backup button to restore the configuration. |



- Validate the restore operation in the confirmation pop-up window and click **Yes**.



- Wait till the end of the restoration process.



NOTE: The **Backup and Restore** function works only for the same PowerTag Link gateway reference. It means that you can only apply a backup file from a A9XWD20 to a A9XWD20 and not from a A9XMWD20 to a A9XMWD100.

PowerTag Link Web Server Certificate Management

Overview

The PowerTag Link gateway embeds an internal self-signed certificate compliant with the X.509v3 certificate (as specified in RFC 5280) to support secure communications with HTTPS. This certificate relies on Elliptic Curves cryptographic keys (256 bits). It has a validity period of 365 days and it is automatically renewed by the PowerTag Link gateway before its expiration.

The PowerTag Link gateway has the ability to use a product certificate supplied by the end user (customer). The certificate format and content must comply with the general certificate specification. If the certificate is not imported into the product by any user, the PowerTag Link gateway will use its internal self-signed certificate.

Commissioning

- The PowerTag Link gateway uses an internal self-signed certificate by default.
- During the commissioning phase, user intervention is not required when dealing with product certificate management.
- User can configure the device to use the product certificate which is provided by the end-user.
- User can delete a certificate which he uploads and he cannot delete a **self certificate**.

Certificate regeneration is automatic, and is activated in two cases:

- When the certificate has expired or when imported certificate has been deleted.
- During the deletion of the imported certificate.

The screenshot shows the Acti9 PowerTag Link HD web interface. At the top, there is a navigation bar with a gear icon, the text "Acti9 PowerTag Link HD", and user status "Admin". Below the navigation bar, there is a secondary menu with tabs: MONITORING, DIAGNOSTICS, MAINTENANCE, and SETTINGS. Under SETTINGS, there are sub-tabs: GENERAL, COMMUNICATION, USER MANAGEMENT, ALARMS, SECURITY, and DEVICES. The main content area is titled "PRODUCT CERTIFICATE". On the left, there is a sidebar with a "PRODUCT CERTIFICATE" tab. The main panel displays certificate details: Certificate Type: Self Signed, Subject: Schneider Electric., Issuer: Schneider Electric., and Expiration Date: 2000/12/31. At the bottom right of the main panel, there are "Import Certificate" and "Delete Certificate" buttons.

The features of Imported Certificate Obligatory are:

- **File:** PCKS12 (see following Note)
- **Encryption:** RSA≥2048 bit or ECC≥256 bit
- **Signature:** RSA256
- **Key Usages:** Digital Signature and Key Encryption
- **Extended Key Usages:** Server Authentication
- **Format:** X509 v3

NOTE: For firmware versions lower than 002.002.002, .pfx or .p12 format is supported. For firmware versions 002.002.002 and above, only the .pem format is supported when importing a user-signed certificate. If you have the .pfx format, convert it to .pem (for example by using a tool such as OpenSSL) before importing it.

If a user-signed certificate has already been imported into the previous firmware version, it is automatically deleted when the firmware is updated and a self-signed certificate is generated. You are informed via a pop-up message.

Decommissioning

- If a user supplied certificate has been provided, it is recommended to delete this certificate from the product, to ensure that the certificate and associated cryptographic keys are removed from the product memory.
- The product internal self-signed certificate cannot be manually deleted. It can be deleted through a factory reset operation. In all cases, it is recommended to perform such a factory reset to ensure that all credentials and cryptographic elements (including certificates) are removed from the product.
- During factory reset process, a new certificate will be automatically regenerated.

Signed Firmware

The firmware designed for the PowerTag Link gateway is signed using the Schneider Electric Public Key Infrastructure (Schneider Electric PKI). The digital signatures are authenticated using the public certificate present in EcoStruxure Power Commission software.

When the firmware is upgraded to the PowerTag Link gateway through EcoStruxure Power Commission software, the PowerTag Link gateway also automatically verifies the digital signature of the upgraded firmware. This verification is done using the public certificate present in the PowerTag Link gateway.

For security reasons, the public certificates are subject to change. Therefore, you must check the latest version of EcoStruxure Power Commission software to make sure that the public certificates used to sign the firmware are up-to-date. The certificates that are no longer valid are published on a certificate revocation list (CRL) and are available on www.se.com.

PowerTag Link Gateway Security

Security Capabilities

Security Features

Security features have been built in the PowerTag Link gateway to make sure that the PowerTag Link gateway operates properly and behaves accordingly to its intended purpose.

The key features are:

- User account management
- Authentication and authorization controls of user access when accessing to the product resources from EcoStruxure Power Commission (EPC) software or from the webpages
- Secure communications between the PowerTag Link gateway and its associated wireless sensors and devices (supporting confidentiality and integrity)
- Configurable security services and settings
- Firmware update mechanism

These features will provide security capabilities which will protect the product from potential security threats, that could disrupt the product operation (availability), modify information (integrity) or disclose confidential information (confidentiality).

The security capabilities features are intended to mitigate the inherent threats which are linked with the usage of the PowerTag Link gateway in an Operational Technology environment.

However, the effectiveness of these capabilities will depend on the adoption and application of the:

- Recommendations provided in this chapter to cover the commissioning, operation, maintenance, and decommissioning of the PowerTag Link gateway
- [Recommended Cybersecurity Best Practices](#)

Supported Protocols

The PowerTag Link gateway supports the following protocols:

- HTTPS for configuration through configuration tools and embedded webpages
- Modbus TCP for communications with other OT devices
- DHCP for network IP addressing
- DNS for network name resolution
- SNTP for time synchronization
- DPWS for network discovery
- SMTPS for email sending
- Wireless communications using radio frequency communication ISM band 2.4 GHz

Potential Risks and Compensation Controls

| Area | Issue | Risk | Compensating controls |
|------------------|---|---|--|
| User accounts | Default account settings are often the source of unauthorized access by malicious users. | If you do not change the default password, unauthorized access can occur. | Change the default password to help reduce unauthorized access. |
| | User credentials are stored as unencrypted text in the device. | If a malicious user gained access to your device, they could extract user credentials from storage media. | Store devices that are not in service in an access-controlled or monitored location. |
| Secure protocols | Modbus and some IT protocols (SNTP, DHCP, DNS, SNTP, and DPWS) are unsecure. The device does not have the capability to transmit data encrypted using these protocols. | If a malicious user gained access to your network, they could intercept communications. | For transmitting data over an internal network, physically or logically segment the network. For transmitting data over an external network, encrypt protocol transmissions over all external connections using an encrypted tunnel, TLS wrapper or a similar solution. |
| | HTTP is unsecure. | If a malicious user gained access to your network, they could compromise the security of your local network. | Configure meter to use these web protocol settings: <ul style="list-style-type: none">• HTTPS• HTTPS with HTTP Redirect. |
| | During paring window, unauthorized radio devices may try to join the network | If a rogue device gained access to your network, they could eavesdrop the communication of your wireless network or create a Denial of Service. | Reduce commissioning window to limit the exposure. Once the pairing is performed, consult the list of paired devices in the PowerTag Link gateway configuration and to make sure that the listed devices contains no unexpected or rogue devices. |

Security Recommendations for PowerTag Link Gateway Commissioning

Default User Accounts

Default user accounts are provided for supporting the initial connections with product which is needed to perform the commissioning steps.

⚠ WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

Change default passwords at first use to help prevent unauthorized access to device settings, controls, and information.

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

The accounts and the associated passwords are described in the user documentation. It is not safe to keep on using these accounts during operation.

During the commissioning step, these accounts should be replaced by the new accounts, which is intended for the product operation and maintenance. The account should be secured by a strong password.

Product Configuration of Security Services

Most product services are disabled by default to reduce the attack surface and exposure to a minimum. Consequently, it is recommended to only enable the services that are strictly required for the product operation. When HTTPS is enabled, all communications done on the HTTP port are automatically redirected to the HTTPS port.

Some security services such as HTTPS can be configured to disable the security layer and use plain HTTP with no secure communication for instance. This capability is only provided for interoperability reasons with legacy products or network devices. It is strongly recommended not to disable security options. When HTTPS is enabled, all communications done on the HTTP port are automatically redirected to the HTTPS port.

Modbus TCP Communications

The PowerTag Link gateway supports Modbus TCP network communications. When Modbus TCP service is enabled, it is strongly recommended to secure the protocol usage by activating and configuring Modbus IP filtering.

This feature allows you to restrict the access of the PowerTag Link Modbus service to the sole network endpoints that are explicitly configured in the filters.

Product Web Server Certificate

To support HTTP secure communications as soon as the product is installed, the PowerTag Link gateway is equipped with a self-signed X.509v3 certificate by default.

This certificate allows you to setup a HTTPS communication supporting integrity and confidentiality but lacks some enforcements supporting the full

communication authenticity (as indicated by most web browsers through a security warning message).

For most sensible installations, it is recommended to replace this certificate and to import the PowerTag Link gateway with a certificate signed by a well-known certificate authority.

Secure Communications with Wireless Sensors and Devices

The use control of wireless communications between the PowerTag Link gateway and wireless sensors and devices is enforced through a pairing mechanism. Only wireless sensors and devices that have been paired with the PowerTag Link gateway can join its wireless network.

In addition, the wireless communications are secured by cryptographic mechanisms supporting the integrity and confidentiality of data exchanged through the wireless network.

Once the pairing is performed, it is recommended to periodically verify the list of paired devices configured in the PowerTag Link gateway to make sure that the listed devices contains no unexpected or rogue devices.

Security Recommendations for PowerTag Link Gateway Operation

Maintain the Firmware up-to-date

Security updates and patches are published on a regular basis. To confirm the appropriate level of security in the PowerTag Link gateway, verify periodically that the PowerTag Link gateway firmware is the latest one available and you are using the latest version of EcoStruxure Power Commission software.

For more information on the firmware upgrade of PowerTag Link gateway, refer to Firmware Upgrade, page 27.

Product Web Server Certificate Renewal

The PowerTag Link gateway features a HTTPS web server relying on a X.509v3 certificate for setup secure communications with either EcoStruxure Power Commission (EPC) software or a web browser. This certificate has a validity period and will expire at the end of the period.

The default PowerTag Link gateway certificate is valid for 10 years starting from the first start-up (or last reset to factory) date and this certificate must be renewed periodically (at least a few days or weeks before its expiration date). For certificates provided by the certificate authority, check for the validity period and expiration date with the certificate provider authority.

Passwords Renewal

It is recommend to update the passwords on a regular basis, for instance every three to six months.

User Accounts Management

The organization or people operating or maintaining the product may change from overtime. It is recommend to verify the list of user accounts configured with the PowerTag Link gateway periodically to make sure that all the configured user accounts are still representing the valid product users. Keeping the user accounts up-to-date will make sure that the user accounts are set up with the correct roles and also helps in removing the unused ones.

Secure Communication with Wireless Sensors and Devices

It is recommended to periodically verify the list of paired devices configured in the PowerTag Link gateway to make sure that the listed devices are up-to-date and contains no unexpected or rogue devices.

Security Recommendations for PowerTag Link Gateway Decommissioning

The product is configured with the sensible information, which includes user account identifiers and passwords, and cryptographic keys.

When disposing the product, it is required to perform a reset level 2 of the product (Refer to [Reset Button, page 16](#)) to make sure that no sensible or confidential information can be disclosed or reused.

Load Monitoring and Control

Load Monitoring

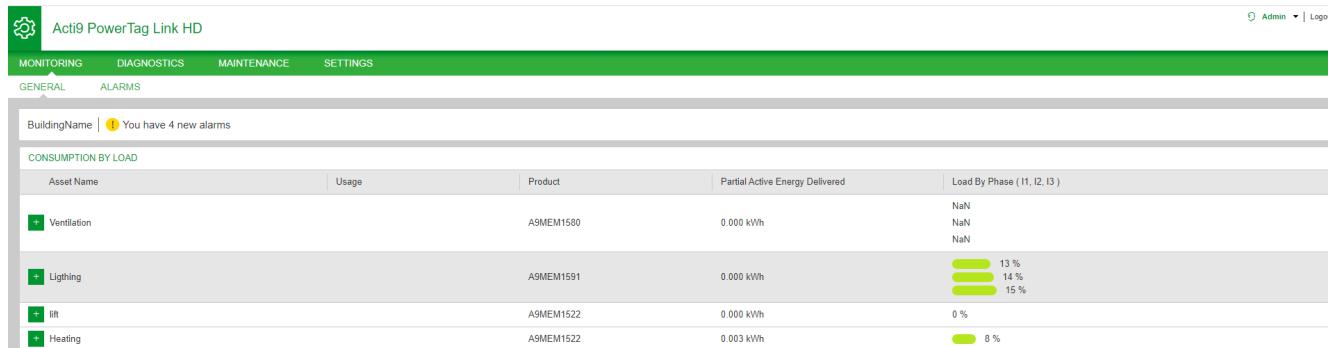
Description

The **Monitoring** page is used to monitor the electrical loads. The facility managers can check the health of the electrical loads such as HVAC, lighting, pumps, and machines.

General Page

The **General** page displays the status of the load.

| Step | Action |
|------|--|
| 1 | Launch the PowerTag Link webpage in the web browser. |
| 2 | Login with user name and password. |
| 3 | Click Monitoring > General . |



The following information is displayed for the load:

| Parameter | Description |
|-----------------------|--|
| Asset Name | Displays the name of the equipment or load name that the PowerTag Link gateway tracks. |
| Usage | Displays the usage of the energy of the equipment or load (for example, cooling, lighting, and IT loads.) |
| Product | Displays the type of PowerTag Link gateway associated to a circuit breaker. |
| Gateway | Displays the gateway connected to the PowerTag Link gateway. |
| Partial Energy | Displays the partial counter of energy for the given electrical asset. |
| Load by Phase | <p>Displays the percentage of the load of the feeder connected to the PowerTag Link gateway. The percentage indicates how far an user is away from the tripping of a circuit breaker. It is the ratio of the actual current to breaker rating.</p> <p>Green: Indicates the circuit is loaded up to 50% in regards to circuit breaker rating.</p> <p>Orange: Indicates the circuit is loaded between 50% and 80%.</p> <p>Red: Indicates the circuit is loaded above 80% versus circuit breaker rating.</p> |

Click the expand button to see the real-time data for each device.

For example, the following screenshot shows all the real-time data available for each wireless device:

The screenshot displays the Acti9 PowerTag Link HD web interface. At the top, there's a navigation bar with tabs for MONITORING, DIAGNOSTICS, MAINTENANCE, and SETTINGS, with GENERAL selected under MONITORING. A banner indicates 'BuildingName | You have 4 new alarms'. Below this is a section titled 'CONSUMPTION BY LOAD' with a table:

| Asset Name | Usage | Product | Partial Active Energy Delivered | Load By Phase (I1, I2, I3) |
|---------------|-------|-----------|---------------------------------|----------------------------|
| + Ventilation | | A9MEM1580 | 0.000 kWh | NaN NaN NaN |
| + Lighting | | A9MEM1591 | 0.000 kWh | 10 % 12 % 12 % |
| + Lift | | A9MEM1522 | 0.000 kWh | 0 % |
| - Heating | | A9MEM1522 | 0.003 kWh | 7 % |

Below the table, there's a 'Real time data:' section with various parameters:

- Total Active Power : 0.014 kW
- Total Apparent Power : 0.034 kVA
- Demand Total Active Power : NaN kW
- Max Demand Total Active Power : 0.014 kW (Date/Time: 2000-01-01 at 00:13:33)
- Load Operating Time Counter : 0.10 hour (Last Set/Reset: 2000-01-01 at 01:03:19)
- PF : 0.42
- I : 0.14 A
- V : 235.00 V
- P : 0.014 kW
- Total Active Energy Delivered : 0.943 kWh
- Partial Active Energy Delivered : 0.003 kWh

NOTE: The voltage and current measurements displayed in the PowerTag Link webpages are the RMS values.

Status Monitoring and Load Control

PowerTag Control IO 230 V Module

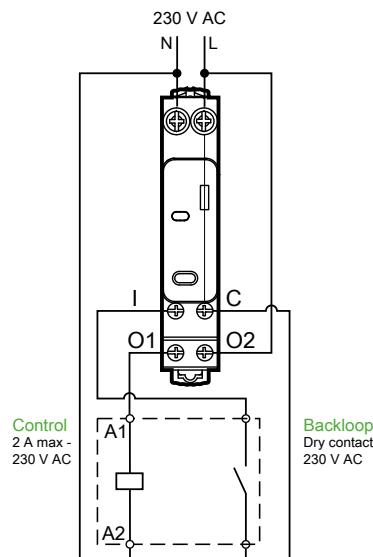
Load control with feedback loop can be achieved with PowerTag control IO 230 V module (reference A9XMC1D3).

⚠ WARNING

UNEXPECTED START OF OPERATION

Only use PowerTag control IO 230 V module (reference A9XMC1D3) and PowerTag control 2DI 230 V module (reference A9XMC2D3) to control electrical loads that can be safely left unattended.

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

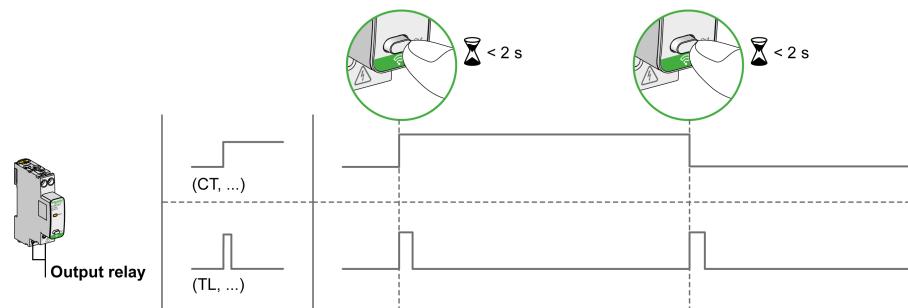


NOTE: It is not possible to use the input of the PowerTag control IO module as an independent input from the control circuit of the output. This input is dependent on the output and used as backloop.

With this solution, it is possible to easily control remotely a contactor (CT) or an impulse relay (TL) with or without the information of the load circuit contact using the associated input.

Local Output Control

During the commissioning phase, you will select whether the output order should be a pulse (for impulse relay) or a latch order (for contactor). Once the IO module has been commissioned, the front face push button allows to change the status of output control circuit.



Commissioning and decommissioning are done through webpages.

NOTE: The push button is not active when the LED is yellow or Off.

The push button can also be used for decommissioning in case of communication loss (>240 s)

To commission or decommission the PowerTag control IO 230 V module, refer to *Wireless Device Commissioning with Webpages*, page 37 or refer to *EcoStruxure Power Commission Online Help*.

To configure the PowerTag control IO 230 V module, refer to the following procedure or *EcoStruxure Power Commission Online Help*.

| Step | Action |
|------|--|
| 1 | Click Start Scanning to discover the wireless devices connected to the PowerTag Link gateway. Result: Displays the discovered wireless devices and assigns Modbus address to each device. |
| 2 | Select any wireless device and click the pencil icon to modify the configuration of the selected wireless device. |
| 3 | Enter the Asset Name of a wireless device. |
| 4 | Enter the Label of a wireless device. |
| 5 | Enter the Usage from the drop-down list. |
| 6 | Enter the Configuration Type from the drop-down list. |
| 7 | Enter the Output Contact type from the drop-down list. |
| 8 | Check the Feedback Loop box if necessary. |
| 9 | Enter the Feedback Loop Contact type from the drop-down list. |
| 10 | If necessary, enable the Local Control by ticking the associated box. |
| 11 | Click Apply Changes to save the settings. Click Cancel Changes to revert the settings. |

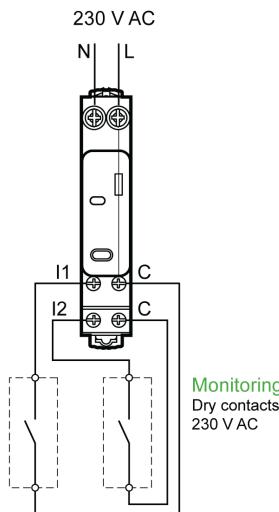
EDIT DEVICE

| | |
|--|--------------------------|
| Modbus Address: * | 1 |
| RF-Id: | D6FFFFE62A66E |
| Asset Name: | |
| Label: | |
| Usage: | ---- |
| Product: | A9XMC1D3 |
| Configuration Type: | Contactor |
| Output Contact: | NO |
| Feedback Loop: | <input type="checkbox"/> |
| Feedback Loop Contact: | ---- |
| Local Control Enabled: | <input type="checkbox"/> |
| <small>* Required field</small> <input type="button" value="Apply Changes"/> <input type="button" value="Cancel Changes"/> | |

Status Monitoring

PowerTag Control 2DI 230 V Module

Status monitoring alone is achieved with PowerTag control 2DI 230 V module (reference A9XMC2D3).



With this solution, you can easily know the status of two contacts or achieve OF/SD daisy chain.

Commissioning and decommissioning are done through webpages.

NOTE: In case of communication loss, the push button is used for decommissioning (>240 s).

To commission or decommission the PowerTag control 2DI 230 V module, refer to [Wireless Device Commissioning with Webpages](#), page 37 or refer to [EcoStruxure Power Commission Online Help](#).

To configure the PowerTag control 2DI 230 V module, refer to the following procedure or [EcoStruxure Power Commission Online Help](#).

| Step | Action |
|------|--|
| 1 | Click Start Scanning to discover the wireless devices connected to the PowerTag Link gateway. Result: Displays the discovered wireless devices and assigns Modbus address to each device. |
| 2 | Select any wireless device and click the pencil icon to modify the configuration of the selected wireless device. |
| 3 | Enter the Asset Name of the Input 1 . |
| 4 | Enter the Label of the Input 1 . |
| 5 | Select the Usage from the drop-down list. |
| 6 | Select the Configuration Type from the drop-down list. |
| 7 | Select the Contact type from the drop-down list. |
| 8 | Repeat these actions for the Input 2 . |
| 9 | Click Apply Changes to save the settings. Click Cancel Changes to revert the settings. |

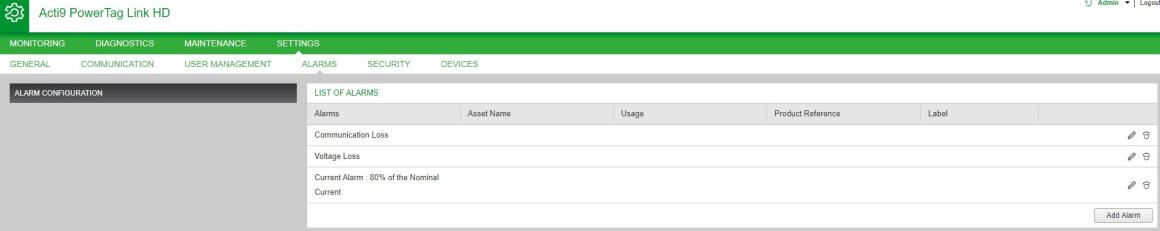
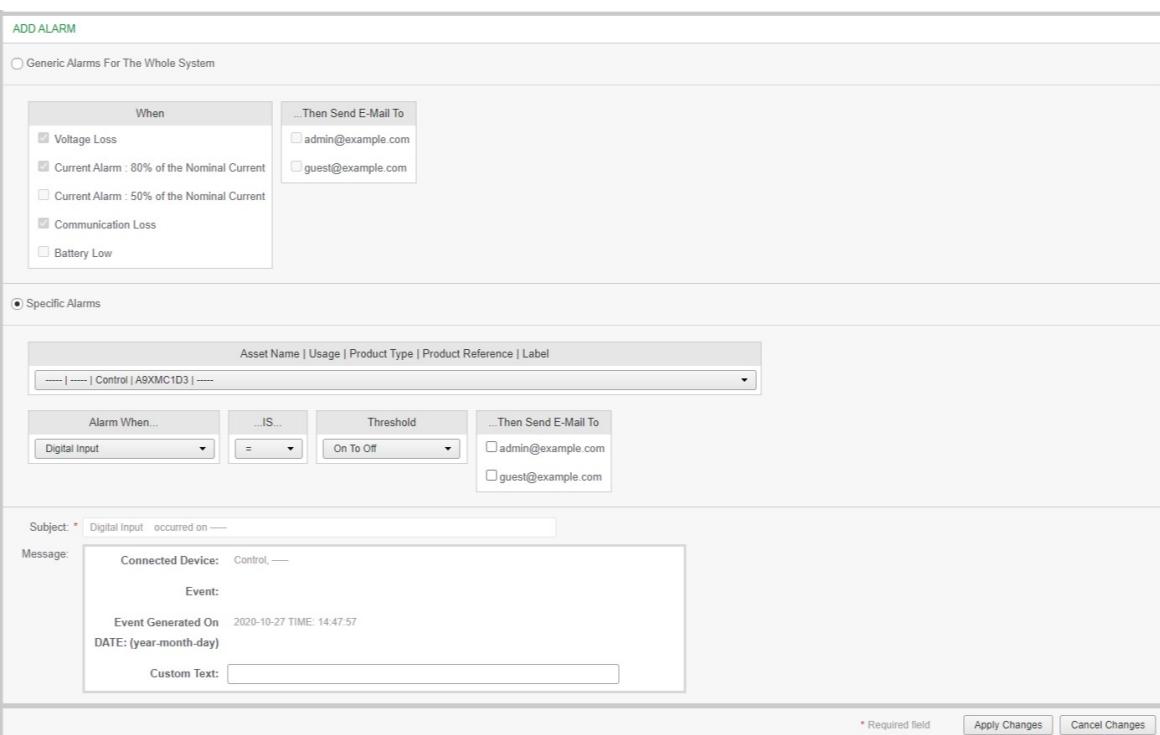
EDIT DEVICE

| | | |
|---------------------|----------------------|---|
| Modbus Address: | * | 2 |
| RF-Id: | D6FFFFE62A71C | |
| Product: | A9XMC2D3 | |
| Input1 | | |
| Asset Name: | <input type="text"/> | |
| Label: | <input type="text"/> | |
| Usage: | <input type="text"/> | |
| Configuration Type: | <input type="text"/> | |
| Contact: | <input type="text"/> | |
| Input2 | | |
| Asset Name: | <input type="text"/> | |
| Label: | <input type="text"/> | |
| Usage: | <input type="text"/> | |
| Configuration Type: | <input type="text"/> | |
| Contact: | <input type="text"/> | |

* Required field

Alarm Configuration for PowerTag Control Module

Follow the steps given in the table to setup an alarm for PowerTag control module:

| Step | Action |
|------|--|
| 1 | Launch the PowerTag Link webpage in the web browser. |
| 2 | Login with user name and password. |
| 3 | Click Settings > Alarms > Alarm Configuration . |
| 4 | Click Add Alarm . |
| |  |
| 5 | Select Specific Alarms . |
| |  |
| 6 | Select Asset Name as PowerTag control. |
| 7 | Set the alarm conditions depending on when you want to trigger the alarm. For example, when the Digital Input is On To Off or when Digital Input is Off To On . |
| 8 | Select the required email address from the ...Then Send E-mail to to send the notification in case of an alarm. |
| 9 | Click Apply Changes to save the settings. Click Cancel Changes to revert the settings. |

Energy Management

Energy Counter

Total Active Energy Delivered

Displays the total counter of energy for the given electrical asset. It is not possible to reset this value.

Partial Active Energy Delivered

Displays the partial counter of energy for the given electrical asset. It is possible to clear all active energy accumulated since the last reset. This does not reset the total active energy accumulation.

Active Power Demand

Power Demand

PowerTag Link/PowerTag Link HD gateway provides:

- Total active power demand calculated on a sliding block interval.
- Maximum of the total active power demand.
- Date and time of occurrence of that maximum.

Power Demand Calculation

Power demand is calculated using arithmetical integration of the power value during a period of time (interval) divided by the length of the interval. The result is equivalent to the energy accumulated during the interval divided by the length of the interval.

Interval for Power Demand Calculation

Power demand is calculated over a sliding block interval. Navigate to **Settings > Devices > Global Configuration** to set the interval duration from 1 to 60 minutes. The default value is 10 minutes.

The screenshot shows the Acti9 PowerTag Link web interface. The top navigation bar includes links for MONITORING, DIAGNOSTICS, MAINTENANCE, SETTINGS, GENERAL, COMMUNICATION, USER MANAGEMENT, ALARMS, SECURITY, and DEVICES. The left sidebar has sections for WIRELESS DEVICES and GLOBAL CONFIGURATION, with GLOBAL CONFIGURATION currently selected. The main content area is titled 'GLOBAL CONFIGURATION' and contains two sections: 'MODBUS ADDRESS' and 'DEMAND'. In the 'DEMAND' section, there is a field labeled 'Demand Calculation Interval Time(minutes):' with the value '10' entered. Below this field is a note '(default: 10, range: 1 to 60)'. At the bottom of the 'DEMAND' section are buttons for 'Reset all Max Demands', 'Required field', 'Apply Changes', and 'Cancel Changes'.

Maximum Power Demand

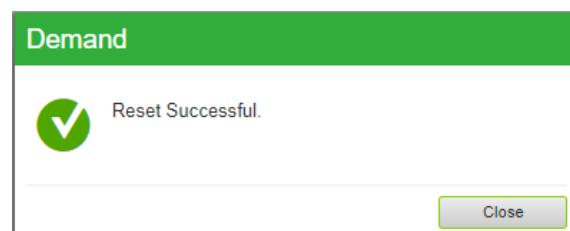
The maximum power demand is the highest value calculated since the beginning of the measurement or the last reset. The PowerTag Link/PowerTag Link HD gateway time stamps (date and time) the maximum power demand occurrence.

The PowerTag Link/PowerTag Link HD gateway stores the maximum power demand and the associated date and time.

Resetting the Maximum Power Demand

1. Navigate to **Settings > Devices > Global Configuration**
2. Click **Reset all Max Demands** to reset the maximum power demand.

Once the reset is done, the below message appears on the screen.



NOTE: The active power demand is only available for the PowerTag Energy sensors with firmware version 003.000.386 or later.

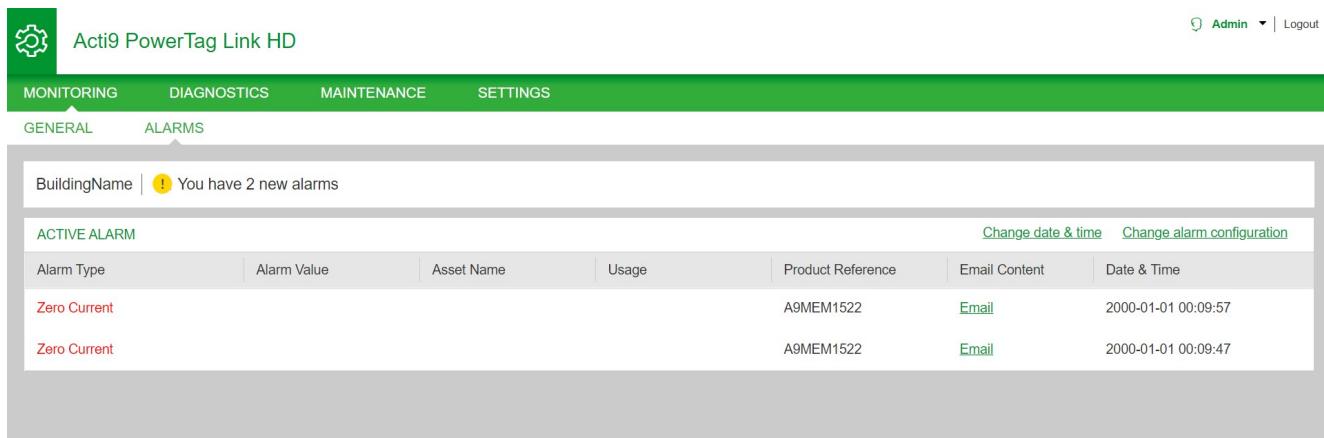
Alarms

About Alarms

Description

The **Alarms** page displays the active alarms. When an alarm is displayed, a notification is sent to the user by email (if the email service is enabled). An active alarm disappears when conditions of this alarm are not met anymore.

| Step | Action |
|------|--|
| 1 | Launch the PowerTag Link webpage in the web browser. |
| 2 | Login with user name and password. |
| 3 | Click Monitoring > Alarms . |



The screenshot shows the Acti9 PowerTag Link HD monitoring interface. At the top, there is a header with a gear icon, the text "Acti9 PowerTag Link HD", a user dropdown menu ("Admin"), and a "Logout" link. Below the header is a navigation bar with tabs: MONITORING (which is selected and highlighted in green), DIAGNOSTICS, MAINTENANCE, and SETTINGS. Under the MONITORING tab, there are two sub-tabs: GENERAL and ALARMS (which is also highlighted in green). The main content area displays a message "BuildingName | ! You have 2 new alarms". Below this, there is a table titled "ACTIVE ALARM" with two rows of data. The columns in the table are: Alarm Type, Alarm Value, Asset Name, Usage, Product Reference, Email Content, and Date & Time. The first row shows "Zero Current" under Alarm Type and "A9MEM1522" under Product Reference. The second row also shows "Zero Current" under Alarm Type and "A9MEM1522" under Product Reference. There are also "Change date & time" and "Change alarm configuration" links at the top of the table.

| Parameter | Description |
|------------------------|--|
| Alarm Type | Displays the type of an alarm when an alarm is occurred. |
| Alarm Value | Displays the threshold value of an alarm. |
| Asset Name | Displays the user-defined name of the alarm. |
| Usage | Displays the type of the usage. |
| Product | Displays the device type for which an alarm is configured. |
| Gateway | Displays the user-configured gateway of the device. |
| Email Content | Click Email to view the custom text of the email defined during an alarm configuration. |
| Date & Time | Displays the date and time of the configured alarm in yyyy/mm/dd hh:mm:ss format. |

Click **Change date & time** to modify the date and time parameters in the **Settings > General > Date and Time** page.

Click **Change alarm configuration** to modify an existing alarm or to configure a new alarm in the **Settings > Alarms > Alarm Configuration** page.

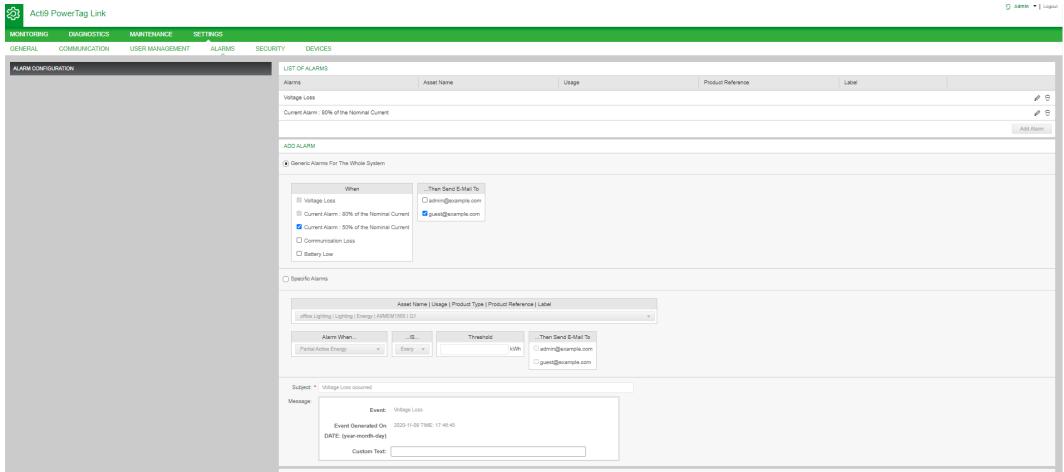
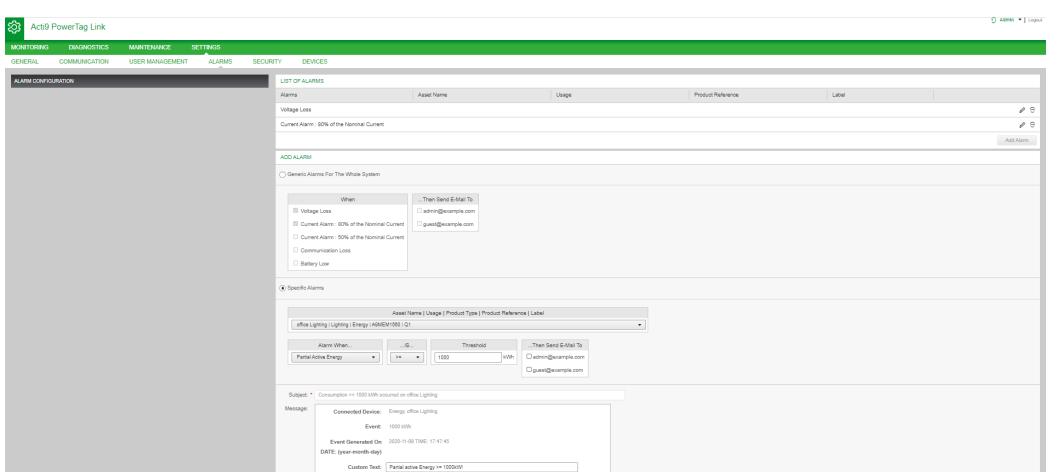
Alarm Configuration Page

The **Alarm Configuration** page is used to configure alarms when there is an electrical event and communication loss.

| Step | Action |
|------|--|
| 1 | Launch the PowerTag Link webpage in the web browser. |
| 2 | Login with user name and password. |
| 3 | Click Settings > Alarms > Alarm Configuration . |

This page allows you to add a new alarm and edit the selected alarm from the list of events.

Follow the steps given in the table to add a new alarm:

| Step | Action |
|------|---|
| 1 | Click Add Alarm to add a new event. You can create either generic alarm for the whole system or specific alarms to a selected device. |
| 2 | <p>a</p> <p>Select Generic Alarms for the Whole System, select when an alarm to occur, and then select the users to whom an alarm notification to be sent through email (optional).</p>  <p>b</p> <p>Select Specific Alarms, select the required parameters, enter the threshold value that indicates for an alarm to occur, and then select the users to whom an alarm notification to be sent through email (optional). It is possible to add up to 25 specific alarms maximum.</p>  |
| 3 | Enter the Subject and Message of the email event (if necessary). |
| 4 | Click Apply Changes to save the settings. Click Cancel Changes to revert the settings. |

NOTE: The email with custom text that uses characters such as à, è, û, é, â, ê, î, ô, û, ë, ï, ü, ý, and ç are not shown correctly in the email but the generic text message is shown correctly.

Alarms Output Table

Alarms Output

| Alarm description | Wireless device | | | Alarm output | | |
|----------------------------------|-------------------------|--------------------------|----------------|-----------------|---------------------|----------|
| | PowerTag Energy sensors | PowerTag control modules | HeatTag sensor | Modbus register | Email notifications | |
| | | | | | Generic | Specific |
| Communication loss | ✓ | ✓ | ✓ | ✓ | ✓ | |
| Voltage loss | ✓ | | | ✓ | ✓ | |
| Overcurrent at voltage loss | ✓ | | | ✓ | ✓ | |
| 80% of nominal current | ✓ | | | | ✓ | |
| 50% of nominal current | ✓ | | | | ✓ | |
| 45% of nominal current | ✓ | | | ✓ | | |
| Zero current | ✓ | | | ✓ | | |
| Undervoltage (80%) | ✓ | | | ✓ | | |
| Oversupply (120%) | ✓ | | | ✓ | | |
| Partial active energy delivered | ✓ | | | | | ✓ |
| Partial active energy received | ✓ | | | | | ✓ |
| Current I | ✓ | | | | | ✓ |
| Voltage phase-to-neutral | ✓ | | | | | ✓ |
| Voltage phase-to-phase | ✓ | | | | | ✓ |
| Total active power | ✓ | | | | | ✓ |
| Phase active power | ✓ | | | | | ✓ |
| Power factor | ✓ | | | | | ✓ |
| Load operating time counter | ✓ | | | | | ✓ |
| Digital input switch | | ✓ | | | ✓ | ✓(1) |
| Temperature | | | ✓ | | ✓ | ✓(1) |
| Relative humidity | | | ✓ | | ✓ | ✓(1) |
| HeatTag alarm | | | ✓ | ✓ | | |
| Preventive maintenance on device | | | ✓ | ✓ | | |
| Device replacement | | | ✓ | ✓ | | |

(1) The alarm is displayed on the PowerTag Link display, only if specific alarm is configured in the PowerTag Link gateway.

NOTE: It is possible to create up to 25 additional specific email notifications. These notifications are sent based on measures or status analysis. For example, Alarm trip for PowerTag control 2DI module.

Communication Loss

This alarm indicates that the gateway has lost the communication with a wireless device.

The communication loss happens if the gateway has not received packets for a period of time equal to 6 times the communication period of the device.

The alarm will automatically disappear as soon as the wireless device is connected to the RF network.

Voltage Loss

This alarm indicates that the circuit on which wireless device is installed is no longer under voltage. The cause of the voltage loss can be a manual opening of the circuit, a mains power outage, a circuit breaker tripping. Wireless device sends the Voltage Loss alarm to the gateway as soon as it happens, and before being fully de-energized, i.e the alarm response-time does not depend on the wireless communication period. The alarm will automatically disappear as soon as the wireless device is powered again.

Overcurrent at Voltage Loss

This alarm indicates that an overcurrent occurred during the time of voltage loss. This alarm occurs only if the option is activated. The alarm is managed only if the nominal current or the breaker rating (I_r) of the associated protection device has been set.

NOTE: The RMS value of the current during the voltage loss is available in the Modbus table. For more details, refer to Modbus Register Tables, page 93. These measurements help to diagnose the root cause of the overcurrent.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Make sure that the cause of the overcurrent is identified and is fixed before closing the circuit.

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

80% of Nominal Current

This alarm indicates that the load current exceeded 80% of the nominal current or exceeded 80% of the associated circuit breaker rating (I_r). On polyphase circuits, the alarm triggers if the current of one of the phases meets the above conditions. The gateway manages the alarms based on the values of the currents sent by the wireless device. The response time of the alarm depends on the communication period set into the PowerTag system wireless network (default = 5 seconds). The alarm automatically disappears when the load current remains below the threshold value for 15 minutes.

NOTE: Hysteresis of 10% is applied on the threshold value.

50% of Nominal Current

This alarm indicates that the load current exceeded 50% of the nominal current or exceeded 50% of the associated circuit breaker rating (I_r). On polyphase circuits, the alarm triggers if the current of one of the phases meets the above conditions. The gateway manages the alarms based on the values of the currents sent by the wireless device. The response time of the alarm depends on the communication period set into the PowerTag system wireless network (default = 5 seconds). The alarm automatically disappears when the load current remains below the threshold value for 15 minutes.

NOTE: Hysteresis of 10% is applied on the threshold value.

45% of Nominal Current

This alarm indicates that the load current exceeded 45% of the nominal current or exceeded 45% of the associated circuit breaker rating (I_r). On polyphase circuits, the alarm triggers if the current of one of the phases meets the above conditions. The gateway manages the alarms based on the values of the currents sent by the wireless device. The response time of the alarm depends on the communication period set into the PowerTag system wireless network (default = 5 seconds). The alarm automatically disappears when the load current remains below the threshold value for 15 minutes.

NOTE: Hysteresis of 10% is applied on the threshold value.

Zero Current

This alarm indicates that the load current value is 0 A. On polyphase circuits, the alarm happens if the current of one of the phases meets the above condition. The gateway manages the alarms based on the values of the currents sent by the wireless device. The response time of the alarm depends on the communication period set into the PowerTag system wireless network (default = 5 seconds). Zero current alarm allows the monitoring of full time running loads. The alarm automatically disappears when the load current is greater than 0 A on all phases.

Undervoltage (80%)

This alarm triggers when a phase-to-neutral voltage or a phase-to-phase voltage falls below the threshold of 80% of the nominal value. The alarm automatically disappears when the voltage remains greater than 88% of the nominal value (a hysteresis of 10% is applied).

Overvoltage (120%)

This alarm triggers when a phase-to-neutral voltage or a phase-to-phase voltage exceeds the threshold of 120% of the nominal value. The alarm automatically disappears when the voltage remains lower than 108% of the nominal value (a hysteresis of 10% is applied).

Partial Active Energy Delivered

This alarm indicates that the **Partial Active Energy Delivered** has reached the configured threshold value. The alarm can be set with the following conditions:

- Greater than: The alarm is triggered when the **Partial Active Energy Delivered** exceeds the configured threshold value.
- Every: The alarm is triggered every time the **Partial Active Energy Delivered** has reached the time configured in the threshold value.

Partial Active Energy Received

This alarm indicates that the **Partial Active Energy Received** has reached the configured threshold value. The alarm can be set with the following conditions:

- Greater than: The alarm is triggered when the **Partial Active Energy Received** exceeds the configured threshold value.
- Every: The alarm is triggered every time the **Partial Active Energy Received** has reached the time configured in the threshold value.

Current I

This alarm indicates that the **Current I** is greater or lower than the configured threshold value. The alarm will become inactive if the **Current I** remains under or over (as defined by the comparator) 90% of the threshold value.

Voltage Phase-to-Neutral

This alarm is triggered when the voltage between phase and neutral is greater or lower than the threshold value.

Voltage Phase-to-Phase

This alarm is triggered when the voltage between phase and phase is greater or lower than the threshold value.

Total Active Power

This alarm indicates that the **Total Active Power** is greater or lower than the configured threshold value. The alarm will become inactive if the **Total Active Power** remains under or over (as defined by the comparator) 90% of the threshold value.

Phase Active Power

This alarm is triggered when the active power of a phase is greater or lower than the threshold value.

Power Factor

This alarm indicates that the **Power Factor** is greater or lower than the configured threshold value. The alarm will become inactive if the **Power Factor** remains under or over (as defined by the comparator) 90% of the threshold value.

Load Operating Time Counter

This alarm indicates that the load operating time counter has reached the configured threshold value. The time is only taken into account when the current has been above the threshold value for one minute. The alarm can be set with the following conditions:

- **Greater than:** The alarm is triggered when the **Load Operating Time Counter** value exceed the configured threshold value.
- **Every:** The alarm is triggered every time the **Load Operating Time Counter** value has reached the time configured in the threshold value.

When an alarm is triggered, the system manager receives the email notification and he commissions the loop of the alarm.

Digital Input Switch

This alarm is applicable only for PowerTag control 2DI module. It is triggered when the circuit breaker being monitored is in open or tripped position.

Temperature

This alarm is triggered when the ambient temperature measured by the HeatTag sensor exceeds the threshold value.

Relative Humidity

This alarm is triggered when the relative humidity measured by the HeatTag sensor exceeds the threshold value.

HeatTag Alarm

This alarm is triggered when the HeatTag sensor detects any overheating. For more information, refer to [DOCA0172EN HeatTag Wireless Sensor for Early Detection of Overheating Cables – User Guide](#).

Preventive Maintenance on Device

This alarm is triggered when fan clogging is detected in the HeatTag sensor. For more information, refer to [DOCA0172EN HeatTag Wireless Sensor for Early Detection of Overheating Cables – User Guide](#).

Device Replacement

This alarm is triggered when HeatTag sensor is inoperative and must be replaced.
For more information, refer to [DOCA0172EN](#) HeatTag Wireless Sensor for Early Detection of Overheating Cables – User Guide.

Modbus Register Tables

Overview

The following sections describe the Modbus registers of the PowerTag Link gateway and the Modbus registers of the wireless devices connected to it. These registers provide information that can be read, such as electrical measures and monitoring information.

The Modbus registers are presented in the tables as per the type of device as follows:

- PowerTag Link gateway Modbus registers (refer to PowerTag Link Gateway Modbus Registers, page 97)
- PowerTag System Modbus registers (refer to PowerTag System Modbus Registers, page 99)
 - PowerTag Energy sensors Modbus registers (refer to PowerTag Energy Sensors Modbus Registers, page 99)
 - PowerTag control modules Modbus registers (refer to PowerTag Control Modules Modbus Registers, page 107)
 - HeatTag sensor Modbus registers (refer to HeatTag Sensor Modbus Registers, page 113)
 - Load monitoring Modbus registers (refer to Load Monitoring Modbus Registers, page 115)
 - Wireless devices Modbus registers (refer to Wireless Devices Modbus Registers, page 117)
 - Modbus synthesis tables (refer to Modbus Synthesis Tables, page 124)

Modbus Table Format and Data Types

Table Formats

Register tables have the following columns:

| Address | Register | No. | RW | X | Unit | Type | Range | Default Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|----|---|------|------|-------|---------------|-----|---------------|--------------------|-------------|
|---------|----------|-----|----|---|------|------|-------|---------------|-----|---------------|--------------------|-------------|

| Designation | Description |
|-------------|--|
| Address | 16-bit register address in hexadecimal. The address is the data used in the Modbus frame. |
| Register | 16-bit register number in decimal. Register = Address + 1 |
| No | Number of 16-bit registers that need to be read/written to access the complete information |
| R/RW | Whether the register is read only (R/RW) or read-write (RW). |
| X | Scale factor: <ul style="list-style-type: none"> • A scale of 1 means that the value of the register is the right one with the unit indicated. • A scale of 10 means that the register contains the value multiplied by 10. The actual value is therefore the value of the register divided by 10. • A scale of 0.1 means that the register contains the value multiplied by 0.1. The actual value is therefore the value of the register multiplied by 10. |
| Unit | Information unit of measurement: <ul style="list-style-type: none"> • “–”: no unit corresponding to the value expressed. • “h”: hours • “D”: the unit depends on the connected device. |
| Type | Coding data type (see Data type table below). |

| Designation | Description |
|--------------------|--|
| Range | Range of permitted values for the variable, usually a subset of what the format allows. For BITMAP type data, the content of this domain is “–”. |
| Default Value | Default value for the variable |
| Svd | Value saved when the power supply to the PowerTag Link gateway is switched off: <ul style="list-style-type: none"> • “Y”: the value of the register is saved. • “N”: the value is lost. NOTE: On start-up or reset, the available values are retrieved. |
| Function code | Code of functions that can be used in the register. |
| Applicable Devices | Code indicating the types of devices for which the register is available. |
| Description | Information about the register and the restrictions that apply. |

Data Types

| Name | Description | Range |
|----------|-----------------------------------|--|
| INT16 | 16-bit signed integer (1 word) | -32768...+32767 |
| UINT16 | 16-bit unsigned integer (1 word) | 0...65535 |
| INT32 | 32-bit signed integer (2 words) | -2 147 483 648...+2 147 483 647 |
| UINT32 | 32-bit unsigned integer (2 words) | 0...4 294 967 295 |
| INT64 | 64-bit signed integer (4 words) | -9 223 372 036 854 775 808...9 223 372 036 854 775 807 |
| UINT64 | 64-bit unsigned integer (4 words) | 0 to 18 446 744 073 709 600 000 |
| Float32 | 32-bit value (2 words) | -3.4028E+38... +3.4028E+38 |
| ASCII | 8-bit alphanumeric character | Table of ASCII Characters |
| BITMAP | 16-bit field (1 word) | – |
| DATETIME | Refer to DATETIME, page 95 | – |

NOTE:

Float32 type data: Single precision float with sign bit, 8 bits exponent, 23 bits mantissa (positive and negative normalized real)

For ASCII type data, the order of transmission of characters in words (16-bit registers) is as follows:

- Character n as least significant
- Character n + 1 as most significant

All registers (16-bit or 2 bytes) are transmitted with Big Endian coding:

- The most significant byte is transmitted first.
- The least significant byte is transmitted second.

32-bit variables saved on two 16-bit words (e.g. consumption meters) are in Big Endian format:

- The most significant word is transmitted first, then the least significant.

64-bit variables saved on four 16-bit words (e.g. dates) are in Big Endian format:

- The most significant word is transmitted first, and so on.

DATETIME

DATETIME is a data type used to code date and time defined by the IEC 60870-5 standard.

| Register | Type | Bit | Range | Description |
|----------|--------|-------|---------------|---|
| 1 | INT16U | 0–6 | 0x00–0x7F | Year: 0x00 (00) to 0x7F (127) correspond to years 2000 to 2127 For example, 0x0D (13) corresponds to year 2013. |
| | | 7–15 | – | Reserved |
| 2 | INT16U | 0–4 | 0x01–0x1F | Day |
| | | 5–7 | – | Reserved |
| | | 8–11 | 0x00–0x0C | Month |
| | | 12–15 | – | Reserved |
| 3 | INT16U | 0–5 | 0x00–0x3B | Minutes |
| | | 6–7 | – | Reserved |
| | | 8–12 | 0x00–0x17 | Hours |
| | | 13–15 | – | Reserved |
| 4 | INT16U | 0–15 | 0x0000–0xEA5F | Milliseconds |

Direct Bit Addressing

Addressing is permitted for BITMAP type zones with functions 1, 2, 5, and 15.

The address of the first bit is constructed as follows: (register address x 16) + bit number.

This addressing mode is specific to Schneider Electric.

Example: For functions 1, 2, 5, and 15, bit 3 of register 0x0078 should be addressed; the bit address is therefore 0x0783.

NOTE: The register whose bit needs to be addressed should have an address $\leq 0x0FFF$.

Example of Modbus Frames

Request

| Definition | Number of Bytes | Value | Comment |
|-----------------|-----------------|--------|--|
| Server number | 1 byte | 0x05 | PowerTag Link Modbus Address |
| Function code | 1 byte | 0x03 | Reads n output or internal words |
| Address | 2 bytes | 0x36E2 | Address of a consumption meter whose address is 14050 in decimal notation. |
| Number of words | 2 bytes | 0x002C | Reads 44 16-bit registers. |
| CRC | 2 bytes | xxxx | Value of CRC16. |

Response

| Definition | Number of Bytes | Value | Comment |
|-----------------|-----------------|--------|----------------------------------|
| Server number | 1 byte | 0x05 | PowerTag Link Modbus Address |
| Function code | 1 byte | 0x03 | Reads n output or internal words |
| Number of Bytes | 2 bytes | 0x0058 | Number of bytes read |

| Definition | Number of Bytes | Value | Comment |
|---------------------|-----------------|-------|---------------------------|
| Value of words read | 88 bytes | — | Reads 44 16-bit registers |
| CRC | 2 bytes | xxxx | Value of CRC16. |

Modbus Register

The address of register number n is n-1. The tables detailed in the following parts of this document provides both register numbers (in decimal format) and corresponding addresses (in hexadecimal format). For example, the address of register number 3000 is 0x0BB7 (2999).

NOTE: To know the description of the registers of each associated device (how to use them), print the PDF report of Modbus registers using EcoStruxure Power Commission software (refer to *EcoStruxure Power Commission Online Help*). This report gives a dynamic knowledge of all the registers potentially to be integrated into the supervision systems including a description of each register.

PowerTag Link Gateway Modbus Registers

Identification

The Modbus server address of PowerTag Link gateway to read Identification Modbus registers is 255.

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Description |
|---------|----------|-----|----|---|------|-------|-------|---------------|-----|---------------|--|
| 0x0050 | 81 | 6 | R | – | – | ASCII | – | NA | Y | 03, 100–4 | Gateway Hardware version on 11 ASCII characters, valid for firmware version 001.008.007 and later. Example: 000.000.001 |
| 0x0064 | 101 | 6 | R | – | – | ASCII | – | NA | Y | 03, 100–4 | Serial number on 12 ASCII characters; 11 alphanumeric digits maximum [SN] or [S/N]: PP YY WW [D [nnnn]] <ul style="list-style-type: none">• PP: Plant• YY: Year in decimal notation [05...99]• WW: Week in decimal notation [1...53]• D: Day of the week in decimal notation [1...7]• nnnn: Sequence of numbers [0001...10.00-0-1] |
| 0x006A | 107 | 3 | R | – | – | ASCII | – | NA | Y | 03, 100–4 | Gateway hardware version on 6 ASCII characters valid up to firmware version 001.008.007. Example: V0.0.1 |
| 0x006D | 110 | 3 | R | – | – | ASCII | – | NA | Y | 03, 100–4 | Gateway firmware version on 6 ASCII characters, valid up to firmware version 001.008.007. Example: V1.4.5 |
| 0x0078 | 121 | 6 | R | – | – | ASCII | – | NA | N | 03, 100–4 | Gateway firmware version on 11 ASCII characters, valid for firmware version 001.008.007 and later. Example: 001.008.007 |

Status

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Description |
|---------|----------|-----|----|---|------|--------|-------|---------------|-----|----------------------|---|
| 0x0070 | 113 | 1 | R | – | – | BITMAP | – | 0x0000 | N | 01, 02, 03, 100–4 | <p>PowerTag Link gateway status and diagnostic register</p> <p>Bit 0 = 1: start-up phase</p> <p>Bit 1 = 1: operating phase</p> <p>Bit 2 = 1: downgraded mode</p> <p>Bit 3 = 1: Failure mode</p> <p>Bit 12: not used</p> <p>Bit 13: E2PROM error</p> <p>Bit 14: RAM error</p> <p>Bit 15: FLASH error</p> <p>NOTE: Bits 0 to 3 are exclusive: only one mode is used at any given time.</p> |

Date and Time

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Description |
|---------|----------|-----|----|---|------|-----------|-------|---------------|-----|------------------|--|
| 0x0073 | 116 | 4 | RW | – | – | DATE-TIME | (1) | NA | N | 03, 16, 100–4 | Indicates the year, month, day, hour, minute and millisecond on the PowerTag Link gateway. |

(1) Refer to DATETIME, page 95.

PowerTag System Modbus Registers

Description

The PowerTag Link gateway assigns a Modbus address to each of the wireless devices paired with it. The Modbus address of the wireless devices range from 1 to 247.

The Modbus address of a wireless device can be edited on the webpages with the parameters of the wireless device (refer to Wireless Device Configuration with Webpages, page 42).

The following sections lists the Modbus registers that applies to the wireless paired devices.

To read a value from a particular wireless device, the supervision system uses the Modbus address of the device.

PowerTag Energy Sensors Modbus Registers

Applicable Devices

The code in the Applicable Devices column indicates the types of PowerTag Energy sensors for which the register is available:

- A: the register is available for PowerTag Energy •63 (A9MEM152•, A9MEM154•, A9MEM156•, and A9MEM157•)
- M: the register is available for PowerTag Energy M250/M630 (LV43402•)
- R: the register is available for PowerTag Energy F160 (A9MEM1580) and Rope (A9MEM159•)

Current Metering Data

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|----|---|------|---------|-------|---------------|-----|---------------|--------------------|------------------------|
| 0x0BB7 | 3000 | 2 | R | – | A | Float32 | – | 0xFF-C00000 | N | 03, 100–4 | A/M/R | RMS current on phase A |
| 0x0BB9 | 3002 | 2 | R | – | A | Float32 | – | 0xFF-C00000 | N | 03, 100–4 | A/M/R | RMS current on phase B |
| 0x0BBB | 3004 | 2 | R | – | A | Float32 | – | 0xFF-C00000 | N | 03, 100–4 | A/M/R | RMS current on phase C |
| 0x0BBD | 3006 | 2 | R | – | A | Float32 | – | 0xFF-C00000 | N | 03, 100–4 | R | RMS current on Neutral |

Voltage Metering Data

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|----|---|------|---------|-------|---------------|-----|---------------|--------------------|--------------------------------|
| 0x0BCB | 3020 | 2 | R | – | V | Float32 | – | 0xFF-C00000 | N | 03, 100–4 | A/M/R | RMS phase-to-phase voltage A-B |
| 0x0BCD | 3022 | 2 | R | – | V | Float32 | – | 0xFF-C00000 | N | 03, 100–4 | A/M/R | RMS phase-to-phase voltage B-C |

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|----|---|------|---------|-------|---------------|-----|---------------|--------------------|----------------------------------|
| 0x0BCF | 3024 | 2 | R | - | V | Float32 | - | 0xFF-C00000 | N | 03, 100-4 | A/M/R | RMS phase-to-phase voltage C-A |
| 0x0BD1 | 3026 | 2 | - | - | - | - | - | - | - | - | - | Reserved |
| 0x0BD3 | 3028 | 2 | R | - | V | Float32 | - | 0xFF-C00000 | N | 03, 100-4 | A/M/R | RMS phase-to-neutral voltage A-N |
| 0x0BD5 | 3030 | 2 | R | - | V | Float32 | - | 0xFF-C00000 | N | 03, 100-4 | A/M/R | RMS phase-to-neutral voltage B-N |
| 0x0BD7 | 3032 | 2 | R | - | V | Float32 | - | 0xFF-C00000 | N | 03, 100-4 | A/M/R | RMS phase-to-neutral voltage C-N |

Power Metering Data

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|----|---|------|---------|-------|---------------|-----|---------------|--------------------|-----------------------------------|
| 0x0BED | 3054 | 2 | R | - | W | Float32 | - | 0xFF-C00000 | N | 03, 100-4 | A/M/R | Active power on phase A |
| 0x0BEF | 3056 | 2 | R | - | W | Float32 | - | 0xFF-C00000 | N | 03, 100-4 | A/M/R | Active power on phase B |
| 0x0BF1 | 3058 | 2 | R | - | W | Float32 | - | 0xFF-C00000 | N | 03, 100-4 | A/M/R | Active power on phase C |
| 0x0BF3 | 3060 | 2 | R | - | W | Float32 | - | 0xFF-C00000 | N | 03, 100-4 | A/M/R | total active power |
| 0x0BF5 | 3062 | 2 | R | - | VAR | Float32 | - | 0xFF-C00000 | N | 03, 100-4 | R | Reactive power on phase A |
| 0x0BF7 | 3064 | 2 | R | - | VAR | Float32 | - | 0xFF-C00000 | N | 03, 100-4 | R | Reactive power on phase B |
| 0x0BF9 | 3066 | 2 | R | - | VAR | Float32 | - | 0xFF-C00000 | N | 03, 100-4 | R | Reactive power on phase C |
| 0x0BFB | 3068 | 2 | R | - | Var | Float32 | - | 0xFF-C00000 | N | 03, 100-4 | M/R | Total reactive power |
| 0x0BFD | 3070 | 2 | R | - | VA | Float32 | - | 0xFF-C00000 | N | 03, 100-4 | R | Apparent power on phase A |
| 0x0BFF | 3072 | 2 | R | - | VA | Float32 | - | 0xFF-C00000 | N | 03, 100-4 | R | Apparent power on phase B |
| 0x0C01 | 3074 | 2 | R | - | VA | Float32 | - | 0xFF-C00000 | N | 03, 100-4 | R | Apparent power on phase C |
| 0x0C03 | 3076 | 2 | R | - | VA | Float32 | - | 0xFF-C00000 | N | 03, 100-4 | A/M/R | Total apparent power (arithmetic) |

Power Factor Metering Data

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|----|---|------|---------|-------|---------------|-----|---------------|--------------------|---|
| 0x0C05 | 3078 | 2 | R | – | – | Float32 | – | 0xFF-C00000 | N | 03, 100–4 | R | Power factor on phase A |
| 0x0C07 | 3080 | 2 | R | – | – | Float32 | – | 0xFF-C00000 | N | 03, 100–4 | R | Power factor on phase B |
| 0x0C09 | 3082 | 2 | R | – | – | Float32 | – | 0xFF-C00000 | N | 03, 100–4 | R | Power factor on phase C |
| 0x0C0B | 3084 | 2 | R | – | – | Float32 | – | 0xFF-C00000 | N | 03, 100–4 | A/M/R | Total power factor |
| 0x0C0D | 3086 | 1 | R | – | – | UINT16 | – | 0xFFFF | N | 03, 100–4 | R | Power factor sign convention 0 = IEC 1 = IEEE |

Frequency Metering Data

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|----|---|------|---------|-------|---------------|-----|---------------|--------------------|--------------|
| 0x0C25 | 3110 | 2 | R | – | Hz | Float32 | – | 0xFF-C0000-0 | N | 03, 100–4 | M/R | AC frequency |

Device Temperature Metering Data

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|----|---|------|---------|-------|---------------|-----|---------------|--------------------|-----------------------------|
| 0x0C3B | 3132 | 2 | R | – | °C | Float32 | – | 0xFF-C0000-0 | N | 03, 100–4 | M/R | Device internal temperature |

Energy Data – Legacy Zone

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|----|---|------|-------|-------|-----------------------|-----|---------------|--------------------|---|
| 0x0C83 | 3204 | 4 | R | - | Wh | INT64 | - | 0x800-00000-00000-000 | Y | 03 | A | Total active energy delivered + received (not resettable) |
| 0x0C87 | 3208 | 4 | R | – | Wh | INT64 | – | 0x800-00000-00000-000 | Y | 03 | M/R | Total active energy delivered count positively (not resettable) |
| 0x0C8B | 3212 | 4 | R | – | Wh | INT64 | – | 0x800-00000-00000-000 | Y | 03 | M/R | Total active energy received (not resettable) |
| 0x0C8F | 3216 | 4 | R | – | Wh | INT64 | – | 0x800- | Y | 03 | M | Active energy on |

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|----|---|------|-------|-------|-----------------------|-----|---------------|--------------------|--|
| | | | | | | | | 00000-00000-000 | | | | phase A delivered - received (not resettable) |
| 0x0C93 | 3220 | 4 | R | - | Wh | INT64 | - | 0x800-00000-00000-000 | Y | 03 | M | Active energy on phase B delivered - received (not resettable) |
| 0x0C97 | 3224 | 4 | R | - | Wh | INT64 | - | 0x800-00000-00000-000 | Y | 03 | M | Active energy on phase C delivered - received (not resettable) |
| 0x0C9A | 3227 | 28 | - | - | - | - | - | - | - | - | - | Reserved |
| 0x0CB7 | 3256 | 4 | R | - | Wh | INT64 | - | 0x800-00000-00000-000 | Y | 03 | A | Partial active energy delivered + received (resettable) |
| 0x0CBB | 3260 | 4 | RW | - | Wh | INT64 | - | 0x800-00000-00000-000 | Y | 03, 16 | M | Set partial active energy counter. The value returns to zero by PowerTag Link gateway. |
| 0x0CBF | 3264 | 4 | R | - | Wh | INT64 | - | 0x800-00000-00000-000 | Y | 03 | M/R | Partial active energy delivered (resettable) |
| 0x0CC3 | 3268 | 4 | RW | - | Wh | INT64 | - | 0x800-00000-00000-000 | N | 03, 16 | M/R | Set partial active energy delivered counter. The value returns to zero by PowerTag Link gateway. |
| 0x0CC7 | 3272 | 4 | R | - | Wh | INT64 | - | 0x800-00000-00000-000 | N | 03 | M/R | Partial active energy received (resettable) |
| 0x0CCB | 3276 | 4 | RW | - | Wh | INT64 | - | 0x800-00000-00000-000 | N | 03, 16 | M/R | Set partial active energy received counter. The value returns to zero by PowerTag Link gateway. |
| 0x0CCF | 3280 | 4 | R | - | VARh | INT64 | - | 0x800-00000-00000-000 | Y | 03 | M/R | Partial reactive energy delivered (resettable) |
| 0x0CD3 | 3284 | 4 | RW | - | VARh | INT64 | - | 0x800-00000-00000-000 | N | 03, 16 | M/R | Set partial reactive energy delivered counter. The value returns to zero by PowerTag Link gateway. |

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|----|---|------|-------|-------|-----------------------|-----|---------------|--------------------|---|
| 0x0CD7 | 3288 | 4 | R | – | VARh | INT64 | – | 0x800-00000-00000-000 | N | 03 | M/R | Partial reactive energy received (resettable) |
| 0x0CDB | 3292 | 4 | RW | – | VARh | INT64 | – | 0x800-00000-00000-000 | N | 03, 16 | M/R | Set partial reactive energy received counter. The value returns to zero by PowerTag Link gateway. |

Energy Data – New Zone

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|----|---|------|-------|-------|-----------------------|-----|---------------|--------------------|---|
| 0x1390 | 5009 | 4 | RW | – | Wh | INT64 | – | 0x800-00000-00000-000 | Y | 03, 16 | R | Active energy delivered (resettable) |
| 0x1394 | 5013 | 4 | R | – | Wh | INT64 | – | 0x800-00000-00000-000 | Y | 03 | R | Active energy delivered count positively (not resettable) |
| 0x1398 | 5017 | 4 | RW | – | Wh | INT64 | – | 0x800-00000-00000-000 | Y | 03, 16 | R | Active energy received (resettable) |
| 0x139C | 5021 | 4 | R | – | Wh | INT64 | – | 0x800-00000-00000-000 | Y | 03 | R | Active energy received count negatively (not resettable) |
| 0x13A0 | 5025 | 24 | – | – | – | – | – | – | – | – | – | Reserved |
| 0x13B8 | 5049 | 4 | RW | – | Wh | INT64 | – | 0x800-00000-00000-000 | Y | 03, 16 | R | Active energy on phase A delivered (resettable) |
| 0x13BC | 5053 | 4 | R | – | Wh | INT64 | – | 0x800-00000-00000-000 | Y | 03 | R | Active energy on phase A delivered (not resettable) |
| 0x13C0 | 5057 | 4 | RW | – | Wh | INT64 | – | 0x800-00000-00000-000 | Y | 03, 16 | R | Active energy on phase A received (resettable) |
| 0x13C4 | 5061 | 4 | R | – | Wh | INT64 | – | 0x800-00000-00000-000 | Y | 03 | R | Active energy on phase A received (not resettable) |
| 0x13C8 | 5065 | 12 | – | – | – | – | – | – | – | – | – | Reserved |
| 0x13D4 | 5077 | 4 | R | – | Wh | INT64 | – | 0x800- | Y | 03 | R | Active energy on phase A |

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|----|---|------|-------|-------|-----------------------|-----|---------------|--------------------|---|
| | | | | | | | | 00000-00000-000 | | | | delivered + received (not resettable) |
| 0x13D8 | 5081 | 8 | - | - | - | - | - | - | - | - | - | Reserved |
| 0x13E0 | 5089 | 4 | RW | - | Wh | INT64 | - | 0x800-00000-00000-000 | Y | 03, 16 | R | Active energy on phase B delivered (resettable) |
| 0x13E4 | 5093 | 4 | R | - | Wh | INT64 | - | 0x800-00000-00000-000 | Y | 03 | R | Active energy on phase B delivered (not resettable) |
| 0x13E8 | 5097 | 4 | RW | - | Wh | INT64 | - | 0x800-00000-00000-000 | Y | 03, 16 | R | Active energy on phase B received (resettable) |
| 0x13EC | 5101 | 4 | R | - | Wh | INT64 | - | 0x800-00000-00000-000 | Y | 03 | R | Active energy on phase B received (not resettable) |
| 0x13F0 | 5105 | 24 | - | - | - | - | - | - | - | - | - | Reserved |
| 0x1408 | 5129 | 4 | RW | - | Wh | INT64 | - | 0x800-00000-00000-000 | Y | 03, 16 | R | Active energy on phase C delivered (resettable) |
| 0x140C | 5133 | 4 | R | - | Wh | INT64 | - | 0x800-00000-00000-000 | Y | 03 | R | Active energy on phase C delivered (not resettable) |
| 0x1410 | 5137 | 4 | RW | - | Wh | INT64 | - | 0x800-00000-00000-000 | Y | 03, 16 | R | Active energy on phase C received (resettable) |
| 0x1414 | 5141 | 4 | R | - | Wh | INT64 | - | 0x800-00000-00000-000 | Y | 03 | R | Active energy on phase C received (not resettable) |
| 0x1418 | 5145 | 32 | - | - | - | - | - | - | - | - | - | Reserved |
| 0x1438 | 5177 | 4 | RW | - | VARh | INT64 | - | 0x800-00000-00000-000 | Y | 03, 16 | R | Reactive energy delivered (resettable) |
| 0x143C | 5181 | 4 | R | - | VARh | INT64 | - | 0x800-00000-00000-000 | Y | 03 | R | Reactive energy delivered count positively (not resettable) |
| 0x1440 | 5185 | 8 | - | - | - | - | - | - | - | - | - | Reserved |
| 0x1488 | 5193 | 4 | RW | - | VARh | INT64 | - | 0x800-00000-00000-000 | Y | 03, 16 | R | Reactive energy received (resettable) |
| 0x144C | 5197 | 4 | R | - | VARh | INT64 | - | 0x800- | Y | 03 | R | Reactive energy received |

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|----|---|------|-------|-------|-----------------------|-----|---------------|--------------------|---|
| | | | | | | | | 00000-00000-000 | | | | count negatively (not resettable) |
| 0x1450 | 5201 | 32 | - | - | - | - | - | - | - | - | - | Reserved |
| 0x1470 | 5233 | 4 | RW | - | VARh | INT64 | - | 0x800-00000-00000-000 | Y | 03, 16 | R | Reactive energy on phase A delivered (resettable) |
| 0x1474 | 5237 | 4 | R | - | VARh | INT64 | - | 0x800-00000-00000-000 | Y | 03 | R | Reactive energy on phase A delivered (not resettable) |
| 0x1478 | 5241 | 4 | RW | - | VARh | INT64 | - | 0x800-00000-00000-000 | Y | 03, 16 | R | Reactive energy on phase A received (resettable) |
| 0x147C | 5245 | 4 | R | - | VARh | INT64 | - | 0x800-00000-00000-000 | Y | 03 | R | Reactive energy on phase A received (not resettable) |
| 0x1480 | 5249 | 24 | - | - | - | - | - | - | - | - | - | Reserved |
| 0x1498 | 5273 | 4 | RW | - | VARh | INT64 | - | 0x800-00000-00000-000 | Y | 03, 16 | R | Reactive energy on phase B delivered (resettable) |
| 0x149C | 5277 | 4 | R | - | VARh | INT64 | - | 0x800-00000-00000-000 | Y | 03 | R | Reactive energy on phase B delivered (not resettable) |
| 0x14A0 | 5281 | 4 | RW | - | VARh | INT64 | - | 0x800-00000-00000-000 | Y | 03, 16 | R | Reactive energy on phase B received (resettable) |
| 0x14A4 | 5285 | 4 | R | - | VARh | INT64 | - | 0x800-00000-00000-000 | Y | 03 | R | Reactive energy on phase B received (not resettable) |
| 0x14A8 | 5289 | 24 | - | - | - | - | - | - | - | - | - | Reserved |
| 0x14C0 | 5313 | 4 | RW | - | VARh | INT64 | - | 0x800-00000-00000-000 | Y | 03, 16 | R | Reactive energy on phase C delivered (resettable) |
| 0x14C4 | 5317 | 4 | R | - | VARh | INT64 | - | 0x800-00000-00000-000 | Y | 03 | R | Reactive energy on phase C delivered (not resettable) |
| 0x14C8 | 5321 | 4 | RW | - | VARh | INT64 | - | 0x800-00000-00000-000 | Y | 03, 16 | R | Reactive energy on phase C received (resettable) |
| 0x14CC | 5325 | 4 | R | - | VARh | INT64 | - | 0x800- | Y | 03 | R | Reactive energy on phase C |

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|----|---|------|-------|-------|-----------------------|-----|---------------|--------------------|---|
| | | | | | | | | 00000-00000-000 | | | | received (not resettable) |
| 0x14D0 | 5329 | 36 | - | - | - | - | - | - | - | - | - | Reserved |
| 0x14F4 | 5365 | 4 | RW | - | VAh | INT64 | - | 0x800-00000-00000-000 | Y | 03, 16 | R | Apparent energy delivered + received (resettable) |
| 0x14F8 | 5369 | 4 | R | - | VAh | INT64 | - | 0x800-00000-00000-000 | Y | 03 | R | Apparent energy delivered + received (not resettable) |
| 0x14FC | 5373 | 16 | - | - | - | - | - | - | - | - | - | Reserved |
| 0x150C | 5389 | 4 | RW | - | VAh | INT64 | - | 0x800-00000-00000-000 | Y | 03, 16 | R | Apparent energy on phase A (resettable) |
| 0x1510 | 5393 | 4 | R | - | VAh | INT64 | - | 0x800-00000-00000-000 | Y | 03 | R | Apparent energy on phase A (not resettable) |
| 0x1514 | 5397 | 32 | - | - | - | - | - | - | - | - | - | Reserved |
| 0x1534 | 5429 | 4 | RW | - | VAh | INT64 | - | 0x800-00000-00000-000 | Y | 03, 16 | R | Apparent energy on phase B (resettable) |
| 0x1538 | 5433 | 4 | R | - | VAh | INT64 | - | 0x800-00000-00000-000 | Y | 03 | R | Apparent energy on phase B (not resettable) |
| 0x153C | 5437 | 32 | - | - | - | - | - | - | - | - | - | Reserved |
| 0x155C | 5469 | 4 | RW | - | VAh | INT64 | - | 0x800-00000-00000-000 | Y | 03, 16 | R | Apparent energy on phase C (resettable) |
| 0x1560 | 5473 | 4 | R | - | VAh | INT64 | - | 0x800-00000-00000-000 | Y | 03 | R | Apparent energy on phase C (not resettable) |

Power Demand Data

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|----|---|------|-----------|-------|---------------------|-----|---------------|--------------------|--|
| 0x0EB5 | 3766 | 2 | R | - | W | Float32 | - | 0xFF-C0000-0 | N | 03, 100-4 | A/R | Demand total active power |
| 0x0EB7 | 3768 | 2 | - | - | - | - | - | - | - | - | - | Reserved |
| 0x0EB9 | 3770 | 2 | R | - | W | Float32 | - | 0xFF-C0000-0 | Y | 03, 100-4 | A/R | Maximum Demand total active power |
| 0x0EBA | 3771 | 1 | - | - | - | - | - | - | - | - | - | Reserved |
| 0x0EBB | 3772 | 4 | R | - | NA | DATE-TIME | - | 0xFFFFFFF-FFFFF-FFF | Y | 03, 100-4 | A/R | Maximum Demand total active power time stamp |

PowerTag Control Modules Modbus Registers

Digital Input 1 Registers

The following table provides the registers that are available for PowerTag control IO and PowerTag control 2DI modules.

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Description |
|---------|----------|-----|----|----|------|--------|-------|---------------|-----|---------------|---|
| 0x84D0 | 34001 | 10 | R | NA | NA | ASCII | NA | 0x00 | Y | 03, 100-4 | Digital input 1 name |
| 0x84DA | 34011 | 13 | - | - | - | - | - | - | - | - | Reserved |
| 0x84E7 | 34024 | 3 | R | NA | NA | ASCII | NA | 0x00 | Y | 03, 100-4 | Digital input 1 circuit identifier |
| 0x84EA | 34027 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | Y | 03, 100-4 | Digital input 1 product usage ⁽¹⁾ |
| 0x84EB | 34028 | 1 | - | - | - | - | - | - | - | - | Reserved |
| 0x84EC | 34029 | 1 | R | NA | NA | UINT16 | NA | 0x8000 | Y | 03, 100-4 | Digital input 1 assignment reference ⁽²⁾ When digital output 1 feedback loop is configured to 'Enabled', the register is forced to 'Feedback loop' (16), (see register 37036, refer to Digital Output 1 Registers, page 111). |
| 0x84ED | 34030 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | Y | 03, 100-4 | Digital input 1 contact type • 0 = Normally open • 1 = Normally close |
| 0x84EE | 34031 | 10 | - | - | - | - | - | - | - | - | Reserved |
| 0x84F8 | 34041 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | Y | 03, 100-4 | Digital input 1 electrical status Indicates the electrical status of the input regardless of the assignment reference • 0 = Low level • 1 = High level |
| 0x84F9 | 34042 | 5 | - | - | - | - | - | - | - | - | Reserved |
| 0x84FE | 34047 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | Y | 03, 100-4 | Digital input 1 breaker position Indicates the breaker position – Only available if input 1 assignment reference is 'Breaker position' (case = 2) • 0 = Open • 1 = Close |
| 0x84FF | 34048 | 9 | - | - | - | - | - | - | - | - | Reserved |
| 0x8508 | 34057 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | Y | 03, 100-4 | Digital input 1 trip indicator Indicates the trip status – Only available if input 1 assignment reference is one of the trip causes (case = 3 to 8) • 0 = Tripped • 1 = Not tripped |
| 0x8509 | 34058 | 7 | - | - | - | - | - | - | - | - | Reserved |

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Description |
|---------|----------|-----|----|----|------|--------|-------|---------------|-----|---------------|---|
| 0x8510 | 34065 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | Y | 03, 100-4 | Digital input 1 status Indicates the status of the digital input 1 – Only available if input 1 assignment reference is not 'Breaker position' or none of the trip causes (Cases 1, 9, 15, 16) • 0 = On • 1 = Off |

(1) For the register 34027, the various Digital input 1 product usage are:

- 1 = Main/Incomer
- 2 = Sub/Head of group
- 3 = Heating
- 4 = Cooling
- 5 = HVAC
- 6 = Ventilation
- 7 = Lighting
- 8 = Office Equipment
- 9 = Cooking
- 10 = Food refrigeration
- 11 = Elevators
- 12 = Computers
- 13 = Renewable Energy Production
- 14 = Genset
- 15 = Compressed air
- 16 = Vapor
- 17 = Machine
- 18 = Process
- 19 = Water
- 20 = Other sockets
- 21 = Other

(2) For the register 34029, the various Digital input 1 assignment reference are:

- 0 = None
- 1 = Standard input
- 2 = Breaker position
- 3 = Trip indicator (SD)
- 4 = Chained trip indicator
- 5 = Electrical trip signal contact
- 6 = Thermal trip signal contact
- 7 = Earth leakage trip signal contact (SDV)
- 8 = Ground fault trip signal contact
- 9 = Surge failure contact
- 15 = Switchboard board door contact
- 16 = Feedback loop

NOTE: For the registers 34041, 34047, 34057, and 34065, the value of the configuration is normally open. If the register 34030 is normally close, then switch the description of the registers 34041, 34047, 34057, and 34065. So, basically for these registers, 0 becomes 1 and 1 becomes 0, when they are normally close.

Digital Input 2 Registers

The following table provides the registers that are available for PowerTag control 2DI module only.

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Description |
|---------|----------|-----|----|----|------|--------|-------|---------------|-----|---------------|--|
| 0x8534 | 34101 | 10 | R | NA | NA | ASCII | NA | 0x00 | Y | 03, 100-4 | Digital input 2 name |
| 0x853E | 34111 | 13 | - | - | - | - | - | - | - | - | Reserved |
| 0x854B | 34124 | 3 | R | NA | NA | ASCII | NA | 0x00 | Y | 03, 100-4 | Digital input 2 circuit identifier |
| 0x854E | 34127 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | Y | 03, 100-4 | Digital input 2 product usage ⁽¹⁾ |
| 0x854F | 34128 | 1 | - | - | - | - | - | - | - | - | Reserved |
| 0x8550 | 34129 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | Y | 03, 100-4 | Digital input 2 assignment reference ⁽²⁾ |
| 0x8551 | 34130 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | Y | 03, 100-4 | Digital input 2 contact type <ul style="list-style-type: none"> • 0 = Normally open • 1 = Normally close |
| 0x8552 | 34131 | 10 | - | - | - | - | - | - | - | - | Reserved |
| 0x855C | 34141 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | Y | 03, 100-4 | Digital input 2 electrical status <ul style="list-style-type: none"> Indicates the electrical status of the input regardless of the assignment reference <ul style="list-style-type: none"> • 0 = Low level • 1 = High level |
| 0x855D | 34142 | 5 | - | - | - | - | - | - | - | - | Reserved |
| 0x8562 | 34147 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | Y | 03, 100-4 | Digital input 2 breaker position <ul style="list-style-type: none"> Indicates the breaker position – Only available if input 2 assignment reference is in 'Breaker position' (case = 2) <ul style="list-style-type: none"> • 0 = Open • 1 = Close |
| 0x8563 | 34148 | 9 | - | - | - | - | - | - | - | - | Reserved |
| 0x856C | 34157 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | Y | 03, 100-4 | Digital input 2 trip indicator <ul style="list-style-type: none"> Indicates the trip status – Only available if input 2 assignment reference is one of the trip cause (case = 3 to 8) <ul style="list-style-type: none"> • 0 = Tripped • 1 = Not tripped |
| 0x857D | 34158 | 7 | - | - | - | - | - | - | - | - | Reserved |

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Description |
|---------|----------|-----|----|----|------|--------|-------|---------------|-----|---------------|--|
| 0x8574 | 34165 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | Y | 03, 100-4 | Digital input 2 status Indicates the status of the digital input 2 – Only available if input 2 assignment reference is not 'Breaker position' or none of the trip causes (Cases 1, 9, 15, 16) <ul style="list-style-type: none">• 0 = On• 1 = Off |

(1) For the register 34127, the various Digital input 2 product usage are:

- 1 = Main/Incomer
- 2 = Sub/Head of group
- 3 = Heating
- 4 = Cooling
- 5 = HVAC
- 6 = Ventilation
- 7 = Lighting
- 8 = Office Equipment
- 9 = Cooking
- 10 = Food refrigeration
- 11 = Elevators
- 12 = Computers
- 13 = Renewable Energy Production
- 14 = Genset
- 15 = Compressed air
- 16 = Vapor
- 17 = Machine
- 18 = Process
- 19 = Water
- 20 = Other sockets
- 21 = Other

(2) For the register 34129, the various Digital input 2 assignment reference are:

- 0 = None
- 1 = Standard input
- 2 = Breaker position
- 3 = Trip indicator (SD)
- 4 = Chained trip indicator
- 5 = Electrical trip signal contact
- 6 = Thermal trip signal contact
- 7 = Earth leakage trip signal contact (SDV)
- 8 = Ground fault trip signal contact
- 9 = Surge failure contact
- 15 = Switchboard door contact
- 16 = Feedback loop

Digital Output 1 Registers

The following table provides the registers that are available for PowerTag control IO module only.

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Description |
|---------|----------|-----|----|----|------|--------|-------|---------------|-----|----------------------|---|
| 0x9088 | 37001 | 10 | R | NA | NA | ASCII | NA | 0x00 | Y | 03, 100-4 | Digital output 1 name |
| 0x9092 | 37011 | 13 | - | - | - | - | - | - | - | - | Reserved |
| 0x909F | 37024 | 3 | R | NA | NA | ASCII | NA | 0x00 | Y | 03, 100-4 | Digital output 1 circuit identifier |
| 0x90A2 | 37027 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | Y | 03, 100-4 | Digital output 1 product usage ⁽¹⁾ |
| 0x90A3 | 37028 | 1 | - | - | - | - | - | - | - | - | Reserved |
| 0x90A4 | 37029 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | Y | 03, 100-4 | Digital output 1 behavior <ul style="list-style-type: none"> • 0 = Normal • 1 = Latched |
| 0x90A5 | 37030 | 2 | - | - | - | - | - | - | - | - | Reserved |
| 0x90A7 | 37032 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | Y | 03, 100-4 | Digital output 1 contact type <ul style="list-style-type: none"> • 0 = Normally open • 1 = Normally close |
| 0x90A8 | 37033 | 1 | - | - | - | - | - | - | - | - | Reserved |
| 0x90A9 | 37034 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | Y | 03, 100-4 | Digital output 1 local control enable <ul style="list-style-type: none"> • 0 = Disable • 1 = Enabled |
| 0x90AA | 37035 | 1 | - | - | - | - | - | - | - | - | Reserved |
| 0x90AB | 37036 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | Y | 03, 100-4 | Digital output 1 feedback loop enable. <p>When output is configured to 'Latched' behavior, register is forced to 'enabled' (see register 37029). When the register is enabled, feedback data are available in Input 1 registers (starting from register 34001). <ul style="list-style-type: none"> • 0 = Disable • 1 = Enabled </p> |
| 0x90AC | 37037 | 14 | - | - | - | - | - | - | - | - | Reserved |
| 0x90BA | 37051 | 1 | RW | NA | NA | UINT16 | NA | 0xFFFF | N | 03, 06, 16, 100-4 | Digital output 1 command <p>NOTE: Off and On commands (value 1 and 2) are possible only if the control device is a PowerTag control IO module with configuration type set to 'contactor' <ul style="list-style-type: none"> • 0 = No command • 1 = Off command • 2 = On command • 3 = Toggle command </p> |

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Description |
|---------|----------|-----|----|----|------|--------|-------|---------------|-----|---------------|--|
| 0x90BB | 37052 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | N | 03, 100-4 | Digital output 1 status Only significant if output is configured to 'Normal' behavior. (see register 37029). Otherwise, the output is set to invalid value. <ul style="list-style-type: none">• 0 = Off• 1 = On |

(1) For the register 37027, the various Digital output 1 product usage are:

- 1 = Main/Incomer
- 2 = Sub/Head of group
- 3 = Heating
- 4 = Cooling
- 5 = HVAC
- 6 = Ventilation
- 7 = Lighting
- 8 = Office Equipment
- 9 = Cooking
- 10 = Food refrigeration
- 11 = Elevators
- 12 = Computers
- 13 = Renewable Energy Production
- 14 = Genset
- 15 = Compressed air
- 16 = Vapor
- 17 = Machine
- 18 = Process
- 19 = Water
- 20 = Other sockets
- 21 = Other

HeatTag Sensor Modbus Registers

The following table provides the registers that are available for HeatTag sensor.

| Address | Register | No. | RW | XR | Unit | Type | Range | Invalid Value | Svd | Function Code | Description |
|---------|----------|-----|----|----|------|---------|-------|---------------|-----|---------------|--|
| 0x0C3B | 3132 | 2 | RW | NA | °C | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | Internal temperature |
| 0x0CE1 | 3298 | 2 | RW | NA | NA | UINT32 | NA | 0x0000-0000 | N | 03, 100-4 | Validity of the alarm bitmap (register 3300) <ul style="list-style-type: none"> • 0 = Invalid • 1 = Valid |
| 0x0CE3 | 3300 | 2 | RW | NA | NA | UINT32 | NA | 0x0000-0000 | N | 03, 100-4 | Alarms bitmap <ul style="list-style-type: none"> 0 = Alarm OFF 1 = Alarm ON Bit 8 = HeatAlarm status Bit 9 = Preventive maintenance on the device (fan error from HeatTag sensor) Bit 10 = Device replacement (internal error from HeatTag sensor that implies to replacement) |
| 0x0CF9 | 3322 | 1 | RW | NA | NA | UINT16 | 0–190 | 0x0000 | N | 03, 100-4 | HeatTag alarm type <ul style="list-style-type: none"> • 0 = No alarm • 1–15 = Low level alarm • 16–93 = Medium level alarm • 94–190 (except 99) = High level alarm • 99 = Test alarm (For more information on Test modes, refer to DOCA0172EN HeatTag Wireless Sensor for Early Detection of Overheating Cables – User Guide) |
| 0x0CFA | 3323 | 1 | RW | NA | NA | UINT16 | 0–3 | 0x0000 | N | 03, 100-4 | HeatTag alarm level <ul style="list-style-type: none"> • 0 = No alarm • 1 = Low level alarm • 2 = Medium level alarm • 3 = High level alarm |
| 0x0FA0 | 4001 | 2 | RW | NA | °C | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | Temperature value |
| 0x0FA2 | 4003 | 2 | RW | NA | °C | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | Maximum value that the wireless device can read (maximum measurable temperature) |
| 0x0FA4 | 4005 | 2 | RW | NA | °C | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | Minimum value that the wireless device can read (minimum measurable temperature) |
| 0x0FA6 | 4007 | 2 | RW | NA | NA | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | Relative humidity value Example: 50% represented as 0.50 |
| 0x0FA8 | 4009 | 2 | RW | NA | NA | Float32 | NA | 0xFF-C00000 | N | 03, | Maximum value that the wireless device can read |

| Address | Register | No. | RW | XR | Unit | Type | Range | Invalid Value | Svd | Function Code | Description |
|---------|----------|-----|----|----|------|---------|-------|---------------|-----|---------------|--|
| | | | | | | | | | | 100-4 | (maximum measurable humidity) |
| 0x0FAA | 4011 | 2 | RW | NA | NA | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | Minimum value that the wireless device can read (minimum measurable humidity) |
| 0x0FAC | 4013 | 2 | RW | NA | NA | Float32 | 0-10 | 0xFF-C00000 | N | 03, 100-4 | Air quality index <ul style="list-style-type: none"> • 0 = Good without triggered alarm • 1-9 = Intermediate without triggered alarm • 10 = Bad with triggered alarm (register 3322 and 3323) |
| 0x79C7 | 31176 | 1 | RW | NA | NA | UINT16 | 0-2 | 0xFFFF | N | 03, 100-4 | Operation mode <ul style="list-style-type: none"> • 0 = Test mode (0-30 minutes after HeatTag sensor is powered on) • 1 = Auto-learning mode (30 minutes-8 hours after HeatTag sensor is powered on) • 2 = Normal operation mode (>8 hours after HeatTag sensor is powered on) |

Load Monitoring Modbus Registers

Description

The Modbus registers of the wireless device allows you to monitor the following status in any supervision system:

- **Alarm with two types:**
 - The voltage loss of the load.
 - If an overload has occurred at the voltage loss event.
- **Load Operating Time:** The duration of how long the load worked effectively (above a certain power, this avoiding idle/standby times to be counted), to optimize the maintenance times.

Applicable Devices

The code in the Applicable Devices column indicates the types of wireless device for which the register is available:

- A: the register is available for PowerTag Energy •63 (A9MEM152•, A9MEM154•, A9MEM156•, and A9MEM157•)
- M: the register is available for PowerTag Energy M250/M630 (LV43402•)
- R: the register is available for PowerTag Energy F160 (A9MEM1580) and Rope (A9MEM159•)

Alarm

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|----|---|------|--------|-------|---------------|-----|---------------|--------------------|--|
| 0x0CE1 | 3298 | 1 | R | – | – | BITMAP | – | 0xFFFF | N | 03, 100–4 | A/M/R | Validity of the alarm bitmap (register 3300) <ul style="list-style-type: none"> • 0 = Invalid. • 1 = Valid. |
| 0x0CE2 | 3299 | 1 | – | – | – | – | – | – | – | – | – | Reserved |
| 0x0CE3 | 3300 | 1 | R | – | – | BITMAP | – | 0xFFFF | N | 03, 100–4 | A/M/R | Alarms bitmap <ul style="list-style-type: none"> 0 = Alarm OFF. 1 = Alarm ON. Bit 0 = Voltage loss Bit 1 = Current overload at voltage loss Bit 2 = Reserved Bit 3 = Overload 45% Bit 4 = Load current loss Bit 5 = Overvoltage 120% |

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|----|----|------|---------|-------|---------------|-----|---------------|--------------------|---|
| | | | | | | | | | | | | Bit 6 = Undervoltage 80% Bit 7 = Battery low |
| 0x0CE4 | 3301 | 1 | — | — | — | — | — | — | — | — | — | Reserved |
| 0x0CE5 | 3302 | 2 | R | NA | A | Float32 | NA | 0xFF-C00000 | N | 03, 100–4 | A/M/R | RMS current on phase A at voltage loss (last RMS current measured when voltage loss occurred) |
| 0x0CE7 | 3304 | 2 | R | NA | A | Float32 | NA | 0xFF-C00000 | N | 03, 100–4 | A/M/R | RMS current on phase B at voltage loss (last RMS current measured when voltage loss occurred) |
| 0x0CE9 | 3306 | 2 | R | NA | A | Float32 | NA | 0xFF-C00000 | N | 03, 100–4 | A/M/R | RMS current on phase C at voltage loss (last RMS current measured when voltage loss occurred) |

Load Operating Time

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|----|---|------|-----------|-------|---------------|-----|---------------|--------------------|---|
| 0x0CEB | 3308 | 2 | RW | — | s | UINT32 | — | 0xFFFF-FFFF | Y | 03, 100–4 | A/M/R | Load operating time counter. |
| 0x0CED | 3310 | 2 | RW | — | W | Float32 | — | 0xFF-C00000 | Y | 03, 100–4 | A/M/R | Active power threshold for Load operating time counter. Counter starts above the threshold value. |
| 0x0CEF | 3312 | 4 | RW | — | — | DATE-TIME | — | 0x0000-0000 | Y | 03, 100–4 | A/M/R | Date and time stamp of last Set or reset of Load operating time counter. |

Wireless Devices Modbus Registers

Applicable Devices

The code in the Applicable Devices column indicates the types of wireless device for which the register is available:

- A: the register is available for PowerTag Energy •63 (A9MEM152•, A9MEM154•, A9MEM156•, and A9MEM157•)
- M: the register is available for PowerTag Energy M250/M630 (LV43402•)
- R: the register is available for PowerTag Energy F160 (A9MEM1580) and Rope (A9MEM159•)
- IO: the register is available for PowerTag control IO module (A9XMC1D3)
- 2DI: the register is available for PowerTag control 2DI module (A9XMC2D3)
- D: the register is available for PowerTag Link display (A9XMWRD)
- H: the register is available for HeatTag sensor (SMT10020)

Configuration Registers

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|----|---|------|--------|-------|---------------|-----|-------------------------|--------------------|---|
| 0x7918 | 31001 | 10 | R | – | – | ASCII | – | 0x0000 | Y | 03, 06, 16, 100–4 | A/M/R D/H | User application name of the wireless device. The user can enter maximum 20 characters. |
| 0x7922 | 31011 | 3 | R | – | – | ASCII | – | 0x0000 | Y | 03, 06, 16, 100–4 | A/M/R/H | Circuit identifier of the wireless device. The user can enter maximum five characters. |
| 0x7925 | 31014 | 1 | R | – | – | UINT16 | – | 0xFFFF | Y | 03, 06, 16, 100–4 | A/M/R | Indicates the usage of the wireless device ⁽¹⁾ . |
| 0x7926 | 31015 | 1 | R | – | – | UINT16 | – | 0xFFFF | Y | 03, 06, 16, 100–4 | A/M/R | Phase sequence ⁽²⁾ . |
| 0x7927 | 31016 | 1 | R | – | – | UINT16 | – | 0xFFFF | Y | 03, 06, 16, 100–4 | A/M/R | Mounting position 0 = Not configured 1 = Top 2 = Bottom 3 = Not applicable |
| 0x7928 | 31017 | 1 | RW | – | – | UINT16 | – | 0xFFFF | Y | 03, 06, 16, 100–4 | A/M/R D | Circuit diagnostics 0 = Not configured 1 = Top 2 = Bottom |

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|----|----|------|---------|-------|---------------|-----|-------------------------|--------------------|---|
| 0x7929 | 31018 | 1 | RW | – | A | UINT16 | – | 0xFFFF | Y | 03, 06, 16, 100–4 | A/M/R | Rated current of the protective device to the wireless device |
| 0x792A | 31019 | 1 | R | – | – | UINT16 | – | 0xFFFF | Y | 03 | M/R | Electrical network system type 0 = Unknown system type 3 = 3PH3W 11= 3PH4W |
| 0x792B | 31020 | 2 | R | – | V | Float32 | – | 0xFF-C00000 | Y | 03 | A/M/R | Rated voltage ⁽³⁾ |
| 0x792D | 31022 | 1 | – | – | – | – | – | – | – | – | – | Reserved |
| 0x792E | 31023 | 1 | RW | NA | NA | UINT16 | – | 0xFFFF | N | – | A/R | Reset All Peak Demands |

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|----|----|------|--------|-------|---------------|-----|---------------|--------------------|--|
| 0x792F | 31024 | 1 | R | NA | NA | UINT16 | – | 0xFFFF | N | – | A/M/R | Power supply type 0 = Not configured 1 = Top 2 = Bottom (default value) |

(1) For the register 31014, the usage of wireless devices are:

- 1 = Main/Incomer
- 2 = Sub/Head of group
- 3 = Heating
- 4 = Cooling
- 5 = HVAC
- 6 = Ventilation
- 7 = Lighting
- 8 = Office Equipment
- 9 = Cooking
- 10 = Food refrigeration
- 11 = Elevators
- 12 = Computers
- 13 = Renewable Energy Productio
- 14 = Genset
- 15 = Compressed air
- 16 = Vapor
- 17 = Machine
- 18 = Process
- 19 = Water
- 20 = Other Sockets
- 21 = Other

(2) For register 31015, the various phase sequences available are:

- 1 = Phase A
- 2 = Phase B
- 3 = Phase C
- 4 = Phase sequence ABC
- 5 = Phase sequence ACB
- 6 = Phase sequence BCA
- 7 = Phase sequence BAC
- 8 = Phase sequence CAB
- 9 = Phase sequence CBA

(3) The register 31020 has two types of rated voltage:

- LN rated voltage for single phase wiring systems
- LL rated voltage for 3 phases wiring systems

Device Identification

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|----|----|------|--------|-------|----------------------|-----|---------------|------------------------|--|
| 0x7930 | 31025 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | Y | 03, 100-4 | A/M/R IO/2DI D/H | Wireless device code type (see table, page 121) |
| 0x7931 | 31026 | 1 | NA | NA | NA | UINT16 | - | 0xFFFF | Y | 03, 100-4 | A/M/R IO/2DI D/H | Virtual Modbus server address |
| 0x7932 | 31027 | 4 | NA | NA | NA | UINT64 | - | 0x8000-000000-000000 | Y | 03, 100-4 | A/M/R IO/2DI D/H | Wireless device Radio Frequency Identifier (RF-Id) |
| 0x7936 | 31031 | 1 | - | - | - | - | - | - | - | - | - | Reserved |
| 0x7937 | 31032 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | Y | 03, 100-4 | A/M/R IO/2DI D/H | Wireless device identifier (see table, page 121) |
| 0x7938 | 31033 | 12 | - | - | - | - | - | - | - | - | - | Reserved |
| 0x7944 | 31045 | 16 | R | NA | NA | ASCII | NA | 0x00 | N | 03, 100-4 | A/M/R IO/2DI D/H | Vendor name |
| 0x7954 | 31061 | 16 | R | NA | NA | ASCII | NA | 0x00 | N | 03, 100-4 | A/M/R IO/2DI D/H | Wireless device commercial reference (see table, page 121) |
| 0x7964 | 31077 | 6 | R | NA | NA | ASCII | NA | 0x00 | N | 03, 100-4 | A/M/R IO/2DI D/H | Firmware revision |
| 0x796A | 31083 | 6 | R | NA | NA | ASCII | NA | 0x00 | N | 03, 100-4 | A/M/R IO/2DI D/H | Hardware revision |
| 0x7970 | 31089 | 10 | R | NA | NA | ASCII | NA | 0x00 | N | 03, 100-4 | A/M/R IO/2DI D/H | Serial number |
| 0x797A | 31099 | 8 | R | NA | NA | ASCII | NA | 0x00 | N | 03, 100-4 | A/M/R IO/2DI D/H | Product range |
| 0x7982 | 31107 | 8 | R | NA | NA | ASCII | NA | 0x00 | N | 03, 100-4 | A/M/R IO/2DI D/H | Product model |
| 0x798A | 31115 | 8 | R | NA | NA | ASCII | NA | 0x00 | N | 03, 100-4 | A/M/R IO/2DI D/H | Product family |

Wireless Device Type Code

| Code | Identifier | Device type | Commercial reference |
|------|------------|-----------------------------|----------------------|
| 41 | 17200 | PowerTag M63 1P | A9MEM1520 |
| 42 | 17201 | PowerTag M63 1P+N Top | A9MEM1521 |
| 43 | 17202 | PowerTag M63 1P+N Bottom | A9MEM1522 |
| 44 | 17203 | PowerTag M63 3P | A9MEM1540 |
| 45 | 17204 | PowerTag M63 3P+N Top | A9MEM1541 |
| 46 | 17205 | PowerTag M63 3P+N Bottom | A9MEM1542 |
| 81 | 17206 | PowerTag F63 1P+N | A9MEM1560 |
| 82 | 17207 | PowerTag P63 1P+N Top | A9MEM1561 |
| 83 | 17208 | PowerTag P63 1P+N Bottom | A9MEM1562 |
| 84 | 84 17209 | PowerTag P63 1P+N Bottom | A9MEM1563 |
| 85 | 17210 | PowerTag F63 3P+N | A9MEM1570 |
| 86 | 17211 | PowerTag P63 3P+N Top | A9MEM1571 |
| 87 | 17212 | PowerTag P63 3P+N Bottom | A9MEM1572 |
| 92 | 17800 | PowerTag M250 3P | LV434020 |
| 93 | 17801 | PowerTag M250 4P | LV434021 |
| 94 | 17802 | PowerTag M630 3P | LV434022 |
| 95 | 17803 | PowerTag M630 4P | LV434023 |
| 96 | 17213 | PowerTag M63 3P 230 V | A9MEM1543 |
| 97 | 17900 | PowerTag C 2DI 230 V | A9XMC2D3 |
| 98 | 17901 | PowerTag C IO 230 V | A9XMC1D3 |
| 101 | 17215 | PowerTag F63 1P+N 110 V | A9MEM1564 |
| 102 | 17214 | PowerTag F63 3P | A9MEM1573 |
| 103 | 17216 | PowerTag F63 3P+N 110/230 V | A9MEM1574 |
| 104 | 17969 | PowerTag R200 | A9MEM1590 |
| 105 | 17970 | PowerTag R600 | A9MEM1591 |
| 106 | 17971 | PowerTag R1000 | A9MEM1592 |
| 107 | 17972 | PowerTag R2000 | A9MEM1593 |
| 121 | 17980 | PowerTag F160 | A9MEM1580 |
| 170 | 9150 | PowerTag Link display | A9XMWRD |
| 171 | 17350 | HeatTag sensor | SMT10020 |

Diagnostic Data Registers

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|----|----|------|---------|-------|---------------|-----|---------------|------------------------|--|
| 0x79A8 | 31145 | 1 | R | – | – | BITMAP | – | 0xFFFF | N | 03, 100–4 | A/M/R IO/2DI D/H | Validity of the RF communication between PowerTag system and PowerTag Link gateway status. • 0 = Invalid. • 1 = Valid. |
| 0x79A9 | 31146 | 1 | R | – | – | BITMAP | – | 0xFFFF | N | 03, 100–4 | A/M/R IO/2DI D/H | Communication status between PowerTag Link gateway and wireless devices. • 0 = Communication loss. • 1 = Communication OK. |
| 0x79AA | 31147 | 2 | R | NA | NA | Float32 | NA | 0xFF-C00000 | N | – | A/M/R IO/2DI D/H | Packet Error Rate (PER) of the device, received by PowerTag Link gateway |
| 0x79AC | 31149 | 2 | R | NA | dBm | Float32 | NA | 0xFF-C00000 | N | – | A/M/R IO/2DI D/H | RSSI of the device, received by PowerTag Link gateway |
| 0x79AE | 31151 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | N | – | A/M/R IO/2DI D/H | Link Quality Indicator (LQI) of the device, received by PowerTag Link gateway |
| 0x79AF | 31152 | 2 | R | NA | NA | Float32 | NA | 0xFF-C00000 | N | – | A/M/R IO/2DI D/H | PER of gateway, calculated inside the PowerTag Link gateway |
| 0x79B1 | 31154 | 2 | R | NA | dBm | Float32 | NA | 0xFF-C00000 | N | – | A/M/R IO/2DI D/H | Radio Signal Strength Indicator (RSSI) of gateway, calculated inside the PowerTag Link gateway |

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|----|----|------|---------|-------|---------------|-----|---------------|------------------------|--|
| 0x79B3 | 31156 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | N | - | A/M/R IO/2DI D/H | LQI of gateway, calculated insider the PowerTag Link gateway |
| 0x79B4 | 31157 | 2 | R | NA | NA | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | A/M/R IO/2DI D/H | PER – Maximum value between device and gateway |
| 0x79B6 | 31159 | 2 | R | NA | NA | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | A/M/R IO/2DI D/H | RSSI – Minimal value between device and gateway |
| 0x79B8 | 31161 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | N | 03, 100-4 | A/M/R IO/2DI D/H | LQI – Minimal value between device and gateway |

Modbus Synthesis Tables

Description

The Modbus synthesis table provides a synthesis of information from all the wireless devices at a time. By default, the synthesis table is based on Modbus address 247.

NOTE: The synthesis table address is the first one available in decreasing order from 247.

Applicable Devices

The code in the Applicable Devices column indicates the types of wireless devices for which the register is available:

- A: the register is available for PowerTag Energy •63 (A9MEM152•, A9MEM154•, A9MEM156•, and A9MEM157•)
- M: the register is available for PowerTag Energy M250/M630 (LV43402•)
- R: the register is available for PowerTag Energy F160 (A9MEM1580) and Rope (A9MEM159•)
- IO: the register is available for PowerTag control IO module (A9XMC1D3)
- 2DI: the register is available for PowerTag control 2DI module (A9XMC2D3)
- D: the register is available for PowerTag Link display (A9XMWRD)
- H: the register is available for HeatTag sensor (SMT10020)

Synthesis Table Identification

Identification and Status Register

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|----|----|------|--------|-------|---------------|-----|---------------|--------------------|--|
| 0x0001 | 2 | 1 | R | NA | NA | UINT16 | NA | 9120 | Y | 03, 100–4 | — | Product ID of the synthesis table |
| 0x0002 | 3 | 16 | R | NA | NA | ASCII | NA | 0x00 | Y | 03, 100–4 | — | Manufacturer name: Schneider Electric |
| 0x0012 | 19 | 16 | R | NA | NA | ASCII | NA | 0x00 | Y | 03, 100–4 | — | Commercial reference of the gateway |
| 0x0022 | 35 | 8 | R | NA | NA | ASCII | NA | 0x00 | Y | 03, 100–4 | — | Product range of the gateway |
| 0x002A | 43 | 8 | R | NA | NA | ASCII | NA | 0x00 | Y | 03, 100–4 | — | Product model |
| 0x0032 | 51 | 10 | R | NA | NA | ASCII | NA | 0x00 | Y | 03, 100–4 | — | Asset name |
| 0x003C | 61 | 17 | R | NA | NA | ASCII | NA | 0x00 | Y | 03, 100–4 | — | Vendor URL string default value: https://www.se.com |
| 0x004D | 78 | 1 | — | — | — | — | — | — | — | — | — | Reserved |

Gateway Data

| Address | Register | No | RW | X | Unit | Type | Range | Invalid value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|----|----|----|------|--------|-------|---------------|-----|---------------|--------------------|---|
| 0x004E | 79 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | Y | 03, 100–4 | — | Gateway product identifier |
| 0x004F | 80 | 16 | R | NA | NA | ASCII | NA | 0x00 | Y | 03, 100–4 | — | Gateway product code / commercial reference |
| 0x005F | 96 | 6 | R | NA | NA | ASCII | NA | 0x00 | Y | 03, 100–4 | — | Gateway firmware version |
| 0x0065 | 102 | 10 | R | NA | NA | ASCII | NA | 0x00 | Y | 03, 100–4 | — | Gateway serial number |
| 0x006F | 112 | 8 | R | NA | NA | ASCII | NA | 0x00 | Y | 03, 100–4 | — | Gateway product model |

Wireless Devices Identification

Wireless Configured Devices – 100 Devices

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|-----|-----|------|--------|-------|---------------|-----|---------------|------------------------|--|
| 0x012C | 301 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | Y | 03, 100–4 | A/M/R IO/2DI D/H | Virtual Modbus server address of 1 st wireless node (1–245) |
| 0x012D | 302 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | Y | 03, 100–4 | A/M/R IO/2DI D/H | Virtual Modbus server address of 2 nd wireless node (1–245) |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x018F | 400 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | Y | 03, 100–4 | A/M/R IO/2DI D/H | Virtual Modbus server address of 100 th wireless node (1–245) |
| 0x0190 | 401 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | Y | 03, 100–4 | A/M/R IO/2DI D/H | Product ID of 1 st device |
| 0x0191 | 402 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | Y | 03, 100–4 | A/M/R IO/2DI D/H | Product ID of 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x01F3 | 500 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | Y | 03, 100–4 | A/M/R IO/2DI D/H | Product ID of 100 th device |

Wireless Device Metadata

| Address | Register | No | RW | X | Unit | Type | Range | Invalid value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|-----|-----|------|--------|-------|---------------|-----|---------------|------------------------|---|
| 0x01F4 | 501 | 2 | R | NA | NA | UINT32 | NA | 0xFFFF-FFFF | Y | 03, 100-4 | A/M/R IO/2DI D/H | Configuration counter. Incremented each time a configuration data is modified on at least one of the virtual devices |
| 0x01F6 | 503 | 10 | R | NA | NA | ASCII | NA | 0x00 | Y | 03, 100-4 | A/M/R IO/2DI D/H | Asset name (maximum 20 characters) given by the user to the 1 st device. The name should be written from MSB to LSB. |
| 0x0200 | 513 | 10 | R | NA | NA | ASCII | NA | 0x00 | Y | 03, 100-4 | A/M/R IO/2DI D/H | Asset name (maximum 20 characters) given by the user to the 2 nd device. The name should be written from MSB to LSB. |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x05D4 | 1493 | 10 | R | NA | NA | ASCII | NA | 0x00 | Y | 03, 100-4 | A/M/R IO/2DI D/H | Asset name (maximum 20 characters) given by the user to the 100 th device. The name should be written from MSB to LSB. |

Characteristics

Circuit Breaker Rating

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|-----|-----|------|--------|-------|---------------|-----|---------------|--------------------|--|
| 0x1388 | 5001 | 1 | R | NA | A | UINT16 | NA | 0xFFFF | Y | 03, 100-4 | 2DI | Circuit breaker rating of the 1 st device |
| 0x1389 | 5002 | 1 | R | NA | A | UINT16 | NA | 0xFFFF | Y | 03, 100-4 | 2DI | Circuit breaker rating of the 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x13EB | 5100 | 1 | R | NA | A | UINT16 | NA | 0xFFFF | Y | 03, 100-4 | 2DI | Circuit breaker rating of the 100 th device |

Power Factor Sign

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|-----|-----|------|--------|-------|---------------|-----|---------------|--------------------|--|
| 0x13EC | 5101 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | Y | 03, 100–4 | R | Power factor sign convention of the 1 st device |
| 0x13ED | 5102 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | Y | 03, 100–4 | R | Power factor sign convention of the 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x144F | 5200 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | Y | 03, 100–4 | R | Power factor sign convention of the 100 th device |

Electrical Metering

Demand Data

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|-----|-----|------|------------------------|-------|-----------------------|-----|---------------|--------------------|--|
| 0x1770 | 6001 | 2 | R | NA | W | Float32 | NA | 0xFF-C00000 | N | 03, 100–4 | A/R | Demand total active power of the 1 st device |
| 0x1772 | 6003 | 2 | R | NA | W | Float32 | NA | 0xFF-C00000 | N | 03, 100–4 | A/R | Demand total active power of the 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x1836 | 6199 | 2 | R | NA | W | Float32 | NA | 0xFF-C00000 | N | 03, 100–4 | A/R | Demand total active power of the 100 th device |
| 0x1838 | 6201 | 2 | R | NA | W | Float32 | NA | 0xFF-C00000 | Y | 03, 100–4 | A/R | Maximum Demand total active power of the 1 st device |
| 0x183A | 6203 | 2 | R | NA | W | Float32 | NA | 0xFF-C00000 | Y | 03, 100–4 | A/R | Maximum Demand total active power of the 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x18FE | 6399 | 2 | R | NA | W | Float32 | NA | 0xFF-C00000 | Y | 03, 100–4 | A/R | Maximum Demand total active power of the 100 th device |
| 0x1900 | 6401 | 4 | R | NA | NA | D/T IEC 870-5-4 (T081) | NA | 0x000-00000-00000-000 | Y | 03, 100–4 | A/R | Maximum Demand total active power Time stamp of the 1 st device |
| 0x1902 | 6405 | 4 | R | NA | NA | D/T IEC 870-5-4 (T081) | NA | 0x000-00000-00000-000 | Y | 03, 100–4 | A/R | Maximum Demand total active power Time stamp of the 2 nd device |

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|-----|-----|------|------------------------|-------|-----------------------|-----|---------------|--------------------|--|
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x1A8C | 6797 | 4 | R | NA | NA | D/T IEC 870-5-4 (T081) | NA | 0x000-00000-00000-000 | Y | 03, 100-4 | A/R | Maximum Demand total active power Time stamp of the 100 th device |

Current Metering Data

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|-----|-----|------|---------|-------|---------------|-----|---------------|--------------------|---|
| 0x1A90 | 6801 | 2 | R | NA | A | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | A/M/R | RMS current on phase A of the 1 st device |
| 0x1A92 | 6803 | 2 | R | NA | A | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | A/M/R | RMS current on phase A of the 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x1B56 | 6999 | 2 | R | NA | A | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | A/M/R | RMS current on phase A of the 100 th device |
| 0x1B58 | 7001 | 2 | R | NA | A | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | A/M/R | RMS current on phase B of the 1 st device |
| 0x1B5A | 7003 | 2 | R | NA | A | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | A/M/R | RMS current on phase B of the 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x1C1E | 7199 | 2 | R | NA | A | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | A/M/R | RMS current on phase B of the 100 th device |
| 0x1C20 | 7201 | 2 | R | NA | A | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | A/M/R | RMS current on phase C of the 1 st device |
| 0x1C22 | 7203 | 2 | R | NA | A | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | A/M/R | RMS current on phase C of the 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x1CE6 | 7399 | 2 | R | NA | A | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | A/M/R | RMS current on phase C of the 100 th device |
| 0x1CE8 | 7401 | 2 | R | NA | A | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | R | RMS current on Neutral of the 1 st device (calculated) |
| 0x1CEA | 7403 | 2 | R | NA | A | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | R | RMS current on Neutral of the 2 nd device (calculated) |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x1DAE | 7599 | 2 | R | NA | A | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | R | RMS current on Neutral of the 100 th device (calculated) |
| 0x1DB0 | 7601 | 2 | R | NA | A | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | A/M/R | RMS average current of the 1 st device |

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|-----|-----|------|---------|-------|---------------|-----|---------------|--------------------|---|
| 0x1DB2 | 7603 | 2 | R | NA | A | Float32 | NA | 0xFF-C00000 | N | 03, 100–4 | A/M/R | RMS average current of the 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x1E76 | 7799 | 2 | R | NA | A | Float32 | NA | 0xFF-C00000 | N | 03, 100–4 | A/M/R | RMS average current of the 100 th device |

Voltage Metering Data

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|-----|-----|------|---------|-------|---------------|-----|---------------|--------------------|--|
| 0x1E78 | 7801 | 2 | R | NA | V | Float32 | NA | 0xFF-C00000 | N | 03, 100–4 | A/M/R | RMS phase-to-phase voltage A-B of the 1 st device |
| 0x1E7A | 7803 | 2 | R | NA | V | Float32 | NA | 0xFF-C00000 | N | 03, 100–4 | A/M/R | RMS phase-to-phase voltage A-B of the 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x1F3E | 7999 | 2 | R | NA | V | Float32 | NA | 0xFF-C00000 | N | 03, 100–4 | A/M/R | RMS phase-to-phase voltage A-B of the 100 th device |
| 0x1F40 | 8001 | 2 | R | NA | V | Float32 | NA | 0xFF-C00000 | N | 03, 100–4 | A/M/R | RMS phase-to-phase voltage B-C of the 1 st device |
| 0x1F42 | 8003 | 2 | R | NA | V | Float32 | NA | 0xFF-C00000 | N | 03, 100–4 | A/M/R | RMS phase-to-phase voltage B-C of the 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x2006 | 8199 | 2 | R | NA | V | Float32 | NA | 0xFF-C00000 | N | 03, 100–4 | A/M/R | RMS phase-to-phase voltage B-C of the 100 th device |
| 0x2008 | 8201 | 2 | R | NA | V | Float32 | NA | 0xFF-C00000 | N | 03, 100–4 | A/M/R | RMS phase-to-phase voltage C-A of the 1 st device |
| 0x200A | 8203 | 2 | R | NA | V | Float32 | NA | 0xFF-C00000 | N | 03, 100–4 | A/M/R | RMS phase-to-phase voltage C-A of the 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x20CE | 8399 | 2 | R | NA | V | Float32 | NA | 0xFF-C00000 | N | 03, 100–4 | A/M/R | RMS phase-to-phase voltage C-A of the 100 th device |
| 0x20D0 | 8401 | 2 | R | NA | V | Float32 | NA | 0xFF-C00000 | N | 03, 100–4 | A/M/R | Average phase-to-phase voltage of the 1 st device |
| 0x20D2 | 8403 | 2 | R | NA | V | Float32 | NA | 0xFF-C00000 | N | 03, 100–4 | A/M/R | Average phase-to-phase voltage of the 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|-----|-----|------|---------|-------|---------------|-----|---------------|--------------------|--|
| 0x2196 | 8599 | 2 | R | NA | V | Float32 | NA | 0xFF-C00000 | N | 03, 100–4 | A/M/R | Average phase-to-phase voltage of the 100 th device |
| 0x2198 | 8601 | 2 | R | NA | V | Float32 | NA | 0xFF-C00000 | N | 03, 100–4 | A/M/R | RMS phase-to-neutral voltage A-N of the 1 st device |
| 0x219A | 8603 | 2 | R | NA | V | Float32 | NA | 0xFF-C00000 | N | 03, 100–4 | A/M/R | RMS phase-to-neutral voltage A-N of the 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x225E | 8799 | 2 | R | NA | V | Float32 | NA | 0xFF-C00000 | N | 03, 100–4 | A/M/R | RMS phase-to-neutral voltage A-N of the 100 th device |
| 0x2260 | 8801 | 2 | R | NA | V | Float32 | NA | 0xFF-C00000 | N | 03, 100–4 | A/M/R | RMS phase-to-neutral voltage B-N of the 1 st device |
| 0x2262 | 8803 | 2 | R | NA | V | Float32 | NA | 0xFF-C00000 | N | 03, 100–4 | A/M/R | RMS phase-to-neutral voltage B-N of the 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x2326 | 8999 | 2 | R | NA | V | Float32 | NA | 0xFF-C00000 | N | 03, 100–4 | A/M/R | RMS phase-to-neutral voltage B-N of the 100 th device |
| 0x2328 | 9001 | 2 | R | NA | V | Float32 | NA | 0xFF-C00000 | N | 03, 100–4 | A/M/R | RMS phase-to-neutral voltage C-N of the 1 st device |
| 0x232A | 9003 | 2 | R | NA | V | Float32 | NA | 0xFF-C00000 | N | 03, 100–4 | A/M/R | RMS phase-to-neutral voltage C-N of the 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x23EE | 9199 | 2 | R | NA | V | Float32 | NA | 0xFF-C00000 | N | 03, 100–4 | A/M/R | RMS phase-to-neutral voltage C-N of the 100 th device |
| 0x23F0 | 9201 | 2 | R | NA | V | Float32 | NA | 0xFF-C00000 | N | 03, 100–4 | A/M/R | Average phase-to-neutral voltage of the 1 st device |
| 0x23F2 | 9203 | 2 | R | NA | V | Float32 | NA | 0xFF-C00000 | N | 03, 100–4 | A/M/R | Average phase-to-neutral voltage of the 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x24B6 | 9399 | 2 | R | NA | V | Float32 | NA | 0xFF-C00000 | N | 03, 100–4 | A/M/R | Average phase-to-neutral voltage of the 100 th device |

Power Metering Data

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|-----|-----|------|---------|-------|---------------|-----|---------------|--------------------|---|
| 0x24B8 | 9401 | 2 | R | NA | W | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | A/M/R | Active power on phase A of the 1 st device |
| 0x24BA | 9403 | 2 | R | NA | W | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | A/M/R | Active power on phase A of the 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x257E | 9599 | 2 | R | NA | W | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | A/M/R | Active power on phase A of the 100 th device |
| 0x2580 | 9601 | 2 | R | NA | W | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | A/M/R | Active power on phase B of the 1 st device |
| 0x2582 | 9603 | 2 | R | NA | W | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | A/M/R | Active power on phase B of the 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x2646 | 9799 | 2 | R | NA | W | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | A/M/R | Active power on phase B of the 100 th device |
| 0x2648 | 9801 | 2 | R | NA | W | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | A/M/R | Active power on phase C of the 1 st device |
| 0x264A | 9803 | 2 | R | NA | W | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | A/M/R | Active power on phase C of the 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x270E | 9999 | 2 | R | NA | W | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | A/M/R | Active power on phase C of the 100 th device |
| 0x2710 | 10001 | 2 | R | NA | W | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | A/M/R | Total active power of the 1 st device |
| 0x2712 | 10003 | 2 | R | NA | W | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | A/M/R | Total active power of the 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x27D6 | 10199 | 2 | R | NA | W | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | A/M/R | Total active power of the 100 th device |
| 0x27D8 | 10201 | 2 | R | NA | W | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | M/R | Total reactive power of the 1 st device |
| 0x27DA | 10203 | 2 | R | NA | W | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | M/R | Total reactive power of the 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x289E | 10399 | 2 | R | NA | W | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | M/R | Total reactive power of the 100 th device |
| 0x28A0 | 10401 | 2 | R | NA | W | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | R | Total apparent power of the 1 st device |
| 0x28A2 | 10403 | 2 | R | NA | W | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | R | Total apparent power of the 2 nd device |

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|-----|-----|------|---------|-------|---------------|-----|---------------|--------------------|--|
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x2966 | 10599 | 2 | R | NA | W | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | R | Total apparent power of the 100 th device |

Power Factor Metering Data

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|-----|-----|------|---------|-------|---------------|-----|---------------|--------------------|--|
| 0x2968 | 10601 | 2 | R | NA | NA | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | A/M/R | Total power factor of the 1 st device |
| 0x296A | 10603 | 2 | R | NA | NA | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | A/M/R | Total power factor of the 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x2A2E | 10799 | 2 | R | NA | NA | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | A/M/R | Total power factor of the 100 th device |

Energy Metering Data

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|-----|-----|------|-------|-------|---------------|-----|---------------|--------------------|---|
| 0x2A30 | 10801 | 2 | R | NA | kWh | INT32 | NA | 0x800-00000 | Y | 03, 100-4 | A | Total active energy delivered + received (not resettable) of the 1 st device |
| 0x2A32 | 10803 | 2 | R | NA | kWh | INT32 | NA | 0x800-00000 | Y | 03, 100-4 | A | Total active energy delivered + received (not resettable) of the 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x2AF6 | 10999 | 2 | R | NA | kWh | INT32 | NA | 0x800-00000 | Y | 03, 100-4 | A | Total active energy delivered + received (not resettable) of the 100 th device |
| 0x2AF8 | 11001 | 2 | R | NA | kWh | INT32 | NA | 0x800-00000 | Y | 03, 100-4 | A | Partial active energy delivered + received of the 1 st device |
| 0x2AFA | 11003 | 2 | R | NA | kWh | INT32 | NA | 0x800-00000 | Y | 03, 100-4 | A | Partial active energy delivered + received of the 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x2BBE | 11199 | 2 | R | NA | kWh | INT32 | NA | 0x800-00000 | Y | 03, 100-4 | A | Partial active energy delivered + received of the 100 th device |

| Address | Register | No. | RW | X | Unit | Type | Range | Invalid Value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|-----|-----|------|-------|-------|---------------|-----|---------------|--------------------|--|
| 0x2BC0 | 11201 | 2 | R | NA | kWh | INT32 | NA | 0x800-00000 | Y | 03, 100-4 | M/R | Total active energy delivered (not resettable) of the 1 st device |
| 0x2BC2 | 11203 | 2 | R | NA | kWh | INT32 | NA | 0x800-00000 | Y | 03, 100-4 | M/R | Total active energy delivered (not resettable) of the 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x2C86 | 11399 | 2 | R | NA | kWh | INT32 | NA | 0x800-00000 | Y | 03, 100-4 | M/R | Total active energy delivered (not resettable) of the 100 th device |
| 0x2C88 | 11401 | 2 | R | NA | kWh | INT32 | NA | 0x800-00000 | Y | 03, 100-4 | M/R | Total active energy received (not resettable) of the 1 st device |
| 0x2C8A | 11403 | 2 | R | NA | kWh | INT32 | NA | 0x800-00000 | Y | 03, 100-4 | M/R | Total active energy received (not resettable) of the 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x2D4E | 11599 | 2 | R | NA | kWh | INT32 | NA | 0x800-00000 | Y | 03, 100-4 | M/R | Total active energy received (not resettable) of the 100 th device |

Environment Data

Ambient

| Address | Register | No | RW | X | Unit | Type | Range | Invalid value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|-----|-----|------|---------|-------|---------------|-----|---------------|--------------------|---|
| 0x7530 | 30001 | 2 | R | NA | °C | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | H | Temperature of the 1 st device |
| 0x7532 | 30003 | 2 | R | NA | °C | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | H | Temperature of the 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x75F6 | 30199 | 2 | R | NA | °C | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | H | Temperature of the 100 th device |
| 0x75F8 | 30201 | 2 | R | NA | NA | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | H | Relative humidity of the 1 st device |
| 0x75FA | 30203 | 2 | R | NA | NA | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | H | Relative humidity of the 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x76BE | 30399 | 2 | R | NA | NA | Float32 | NA | 0xFF-C00000 | N | 03, 100-4 | H | Relative humidity of the 100 th device |

| Address | Register | No | RW | X | Unit | Type | Range | Invalid value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|-----|-----|------|---------|-------|---------------|-----|---------------|--------------------|---|
| 0x76C0 | 30401 | 2 | R | NA | NA | Float32 | NA | 0xFF-C00000 | N | 03, 100–4 | H | Air quality: Pre-alarm of the 1 st device |
| 0x76C2 | 30403 | 2 | R | NA | NA | Float32 | NA | 0xFF-C00000 | N | 03, 100–4 | H | Air quality: Pre-alarm of the 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x7786 | 30599 | 2 | R | NA | NA | Float32 | NA | 0xFF-C00000 | N | 03, 100–4 | H | Air quality: Pre-alarm of the 100 th device |

Alarm

Summary Registers: Alarm Data

| Address | Register | No | RW | X | Unit | Type | Range | Invalid value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|----|----|----|------|--------|-------|-----------------|-----|---------------|--------------------|--|
| 0x88B8 | 35001 | 2 | R | NA | NA | UINT32 | NA | 0xFFFF-FFFF | Y | 03, 100–4 | — | Global alarm and event change counter. Incremented when a new alarm or an event occurs on one of the devices. |
| 0x88BA | 35003 | 2 | R | NA | NA | UINT32 | NA | 0x000- 00000 | N | 03, 100–4 | A/M/R/H | Validity of the alarm array of the 1 st device (register 35004) <ul style="list-style-type: none">• 0 = Invalid• 1 = Valid |
| 0x88BC | 35005 | 2 | R | NA | NA | UINT32 | NA | 0x000- 00000 | N | 03, 100–4 | A/M/R/H | Alarm array bitmap of the 1 st device 0 = Alarm OFF 1 = Alarm ON Bit 0 = PowerTag energy – Voltage loss Bit 1 = PowerTag energy – Overcurrent at voltage loss Bit 2 = Reserved Bit 3 = PowerTag energy – Overload 45% Bit 4 = PowerTag energy – Loadcurrent loss |

| Address | Register | No | RW | X | Unit | Type | Range | Invalid value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|----|----|----|------|--------|-------|---------------|-----|---------------|--------------------|--|
| | | | | | | | | | | | | Bit 5 = PowerTag energy – Overvoltage 120% Bit 6 = PowerTag energy – Undervoltage 80% Bit 8 = HeatTag – HeatTag alarm Bit 10 = HeatTag – Preventive maintenance on device Bit 11 = HeatTag – Device replacement |
| 0x88BE | 35007 | 2 | R | NA | NA | UINT32 | NA | 0x000-00000 | N | 03, 100–4 | A/M/R/H | Validity of the alarm array of the 2 nd device (register 35008) • 0 = Invalid • 1 = Valid |
| 0x88C0 | 35009 | 2 | R | NA | NA | UINT32 | NA | 0x000-00000 | N | 03, 100–4 | A/M/R/H | Alarm array bitmap of the 2 nd device 0 = Alarm OFF 1 = Alarm ON Bit 0 = PowerTag energy – Voltage loss Bit 1 = PowerTag energy – Overcurrent at voltage loss Bit 2 = Reserved Bit 3 = PowerTag energy – Overload 45% Bit 4 = PowerTag energy – Loadcurrent loss Bit 5 = PowerTag energy – Overvoltage 120% Bit 6 = PowerTag energy – Undervoltage 80% |

| Address | Register | No | RW | X | Unit | Type | Range | Invalid value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|-----|-----|------|--------|-------|---------------|-----|---------------|--------------------|--|
| | | | | | | | | | | | | Bit 8 = HeatTag – HeatTag alarm Bit 10 = HeatTag – Preventive maintenance on device Bit 11 = HeatTag – Device replacement |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x8A46 | 35399 | 2 | R | NA | NA | UINT32 | NA | 0x000-00000 | N | 03, 100–4 | A/M/R/H | Validity of the alarm array of the 100 th device (register 35400) • 0 = Invalid • 1 = Valid |
| 0x8A48 | 35401 | 2 | R | NA | NA | UINT32 | NA | 0x000-00000 | N | 03, 100–4 | A/M/R/H | Alarm array bitmap of the 100 th device 0 = Alarm OFF 1 = Alarm ON Bit 0 = PowerTag energy – Voltage loss Bit 1 = PowerTag energy – Overcurrent at voltage loss Bit 2 = Reserved Bit 3 = PowerTag energy – Overload 45% Bit 4 = PowerTag energy – Loadcurrent loss Bit 5 = PowerTag energy – Overtoltage 120% Bit 6 = PowerTag energy – Undervoltage 80% Bit 8 = HeatTag – HeatAlarm Bit 10 = HeatTag – Preventive |

| Address | Register | No | RW | X | Unit | Type | Range | Invalid value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|-----|-----|------|--------|-------|---------------|-----|---------------|--------------------|---|
| | | | | | | | | | | | | maintenance on device Bit 11 = HeatTag – Device replacement |
| 0x8B12 | 35603 | 1 | R | NA | NA | UINT16 | NA | 0x0000 | N | 03, 100–4 | H | HeatTag alarm type of the 1 st device – Value between 1 and 190 |
| 0x8B13 | 35604 | 1 | R | NA | NA | UINT16 | NA | 0x0000 | N | 03, 100–4 | H | HeatTag alarm type of the 2 nd device – Value between 1 and 190 |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x8B75 | 35702 | 1 | R | NA | NA | UINT16 | NA | 0x0000 | N | 03, 100–4 | H | HeatTag alarm type of the 100 th device – Value between 1 and 190 |
| 0x8B76 | 35703 | 1 | R | NA | NA | UINT16 | NA | 0x0000 | N | 03, 100–4 | H | HeatTag alarm level of the 1 st device <ul style="list-style-type: none">• 0 = Good• 1 = Low• 2 = Medium• 3 = Bad |
| 0x8B77 | 35704 | 1 | R | NA | NA | UINT16 | NA | 0x0000 | N | 03, 100–4 | H | HeatTag alarm level of the 2 nd device <ul style="list-style-type: none">• 0 = Good• 1 = Low• 2 = Medium• 3 = Bad |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0x8BD9 | 35802 | 1 | R | NA | NA | UINT16 | NA | 0x0000 | N | 03, 100–4 | H | HeatTag alarm level of the 100 th device <ul style="list-style-type: none">• 0 = Good• 1 = Low• 2 = Medium• 3 = Bad |

Communication Diagnostic

Wireless Discovered Devices – 100 Devices

| Address | Register | No | RW | X | Unit | Type | Range | Invalid value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|-----|-----|------|--------|-------|---------------|-----|---------------|------------------------|--|
| 0x9C40 | 40001 | 1 | R | NA | NA | BITMAP | NA | 0x0000 | N | 03, 100–4 | A/M/R IO/2DI D/H | Validity of the alarm communication status of the 1 st device (register 40002) <ul style="list-style-type: none"> • 0 = Invalid • 1 = Valid |
| 0x9C41 | 40002 | 1 | R | NA | NA | BITMAP | NA | 0x0000 | N | 03, 100–4 | A/M/R IO/2DI D/H | Communication status between the PowerTag Link gateway and the 1 st device <ul style="list-style-type: none"> • 0 = Communication loss • 1 = Communication OK |
| 0x9C42 | 40003 | 1 | R | NA | NA | BITMAP | NA | 0x0000 | N | 03, 100–4 | A/M/R IO/2DI D/H | Validity of the alarm communication status of the 2 nd device (register 40004) <ul style="list-style-type: none"> • 0 = Invalid • 1 = Valid |
| 0x9C43 | 40004 | 1 | R | NA | NA | BITMAP | NA | 0x0000 | N | 03, 100–4 | A/M/R IO/2DI D/H | Communication status between the PowerTag Link gateway and the 2 nd device <ul style="list-style-type: none"> • 0 = Communication loss • 1 = Communication OK |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |

| Address | Register | No | RW | X | Unit | Type | Range | Invalid value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|----|----|----|------|--------|-------|---------------|-----|---------------|------------------------|--|
| 0x9D06 | 40199 | 1 | R | NA | NA | BITMAP | NA | 0x0000 | N | 03, 100–4 | A/M/R IO/2DI D/H | Validity of the alarm communication status of the 100 th device (register 40200) <ul style="list-style-type: none"> • 0 = Invalid • 1 = Valid |
| 0x9D07 | 40200 | 1 | R | NA | NA | BITMAP | NA | 0x0000 | N | 03, 100–4 | A/M/R IO/2DI D/H | Communication status between the PowerTag Link gateway and the 100 th device <ul style="list-style-type: none"> • 0 = Communication loss • 1 = Communication OK |

Input and Output Data

Input Data

| Address | Register | No | RW | X | Unit | Type | Range | Invalid value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|-----|-----|------|--------|-------|---------------|-----|---------------|--------------------|--|
| 0xAFC8 | 45001 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | N | 03, 100–4 | 2DI | Digital input 1 breaker position of the 1 st device |
| 0xAFC9 | 45002 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | N | 03, 100–4 | 2DI | Digital input 1 breaker position of the 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0xB02B | 45100 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | N | 03, 100–4 | 2DI | Digital input 1 breaker position of the 100 th device |
| 0xB02C | 45101 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | N | 03, 100–4 | 2DI | Digital input 1 trip indicator of the 1 st device |
| 0xB02D | 45102 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | N | 03, 100–4 | 2DI | Digital input 1 trip indicator of the 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0xB08F | 45200 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | N | 03, 100–4 | 2DI | Digital input 1 trip indicator of the 100 th device |
| 0xB090 | 45201 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | N | 03, 100–4 | 2DI | Digital input 1 status of the 1 st device |
| 0xB091 | 45202 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | N | 03, 100–4 | 2DI | Digital input 1 status of the 2 nd device |

| Address | Register | No | RW | X | Unit | Type | Range | Invalid value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|-----|-----|------|--------|-------|---------------|-----|---------------|--------------------|--|
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0xB0F3 | 45300 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | N | 03, 100–4 | 2DI | Digital input 1 status of the 100 th device |
| 0xB0F4 | 45301 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | N | 03, 100–4 | 2DI | Digital input 2 breaker position of the 1 st device |
| 0xB0F5 | 45302 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | N | 03, 100–4 | 2DI | Digital input 2 breaker position of the 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0xB157 | 45400 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | N | 03, 100–4 | 2DI | Digital input 2 breaker position of the 100 th device |
| 0xB158 | 45401 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | N | 03, 100–4 | 2DI | Digital input 2 trip indicator of the 1 st device |
| 0xB159 | 45402 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | N | 03, 100–4 | 2DI | Digital input 2 trip indicator of the 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0xB1BB | 45500 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | N | 03, 100–4 | 2DI | Digital input 2 trip indicator of the 100 th device |
| 0xB1BC | 45501 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | N | 03, 100–4 | 2DI | Digital input 2 status of the 1 st device |
| 0xB1BD | 45502 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | N | 03, 100–4 | 2DI | Digital input 2 status of the 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0xB21F | 45600 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | N | 03, 100–4 | 2DI | Digital input 2 status of the 100 th device |

Output Data

| Address | Register | No | RW | X | Unit | Type | Range | Invalid value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|-----|-----|------|--------|-------|---------------|-----|---------------|--------------------|--|
| 0xB220 | 45601 | 1 | RW | NA | NA | UINT16 | NA | 0xFFFF | N | 03, 100–4 | IO | Digital output 1 control of the 1 st device |
| 0xB221 | 45602 | 1 | RW | NA | NA | UINT16 | NA | 0xFFFF | N | 03, 100–4 | IO | Digital output 1 control of the 2 nd device |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0xB283 | 45700 | 1 | RW | NA | NA | UINT16 | NA | 0xFFFF | N | 03, 100–4 | IO | Digital output 1 control of the 100 th device |
| 0xB284 | 45701 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | N | 03, 100–4 | IO | Digital output 1 status of the 1 st device |
| 0xB285 | 45702 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | N | 03, 100–4 | IO | Digital output 1 status of the 2 nd device |

| Address | Register | No | RW | X | Unit | Type | Range | Invalid value | Svd | Function Code | Applicable Devices | Description |
|---------|----------|-----|-----|-----|------|--------|-------|---------------|-----|---------------|--------------------|---|
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 0xB2E7 | 45800 | 1 | R | NA | NA | UINT16 | NA | 0xFFFF | N | 03, 100–4 | IO | Digital output 1 status of the 100 th device |

Diagnostics and Troubleshooting

Monitoring and Diagnostics Webpages

General Diagnostics

Date/Time

| Step | Action |
|------|--|
| 1 | Launch the PowerTag Link webpage in the web browser. |
| 2 | Login with user name and password. |
| 3 | Click Diagnostics > General > Date/Time . |

The screenshot shows the Acti9 PowerTag Link web interface. At the top, there's a navigation bar with a gear icon, the text "Acti9 PowerTag Link", and user status ("Admin" and "Logout"). Below the navigation bar, there's a horizontal menu with tabs: MONITORING, DIAGNOSTICS, MAINTENANCE, and SETTINGS. Under the "GENERAL" section of the menu, the "DATE/TIME" tab is selected. The main content area has two sections: "DATE/TIME" and "LAST DATE/TIME SYNCHRONIZATION". The "DATE/TIME" section shows the current date (2020-08-09), time (14:43:58), and uptime (42 minutes 49 seconds). The "LAST DATE/TIME SYNCHRONIZATION" section shows the last synchronization time (0 second ago), source (Manual (admin)), date (2020-08-09), and time (14:42:45).

The **Date/Time** page displays the following information:

| Parameters | Description |
|---|---|
| Date/Time | |
| Date | Displays the current date in the format YYYY-MM-DD. |
| Time | Displays the current in the local time zone in the format hh:mm:ss. |
| Uptime | Displays the elapsed time since the last restart of the device. |
| Last Date/Time Synchronization | |
| Last Synchronization | Displays when the last synchronization happened. |
| Last Synchronization Time Source | Displays the time source of the last synchronization. |
| Last Synchronized Date | Displays the last synchronized date in the format YYYY-MM-DD. |
| Last Synchronized Time | Displays the last synchronized time in the format hh:mm:ss. |

Communication Diagnostics

Ethernet

| Step | Action |
|------|---|
| 1 | Launch the PowerTag Link webpage in the web browser. |
| 2 | Login with user name and password. |
| 3 | Click Diagnostics > Communication > Ethernet . |

The **Ethernet** page displays the global and port statistics of the Ethernet network.

The screenshot shows the Ethernet diagnostics interface. On the left, there's a sidebar with tabs for MONITORING, DIAGNOSTICS, MAINTENANCE, and SETTINGS, with 'GENERAL' and 'COMMUNICATION' sub-tabs under DIAGNOSTICS. The main area has two sections: 'ETHERNET GLOBAL STATISTICS' and 'ETHERNET PORT STATISTICS'. Under 'ETHERNET GLOBAL STATISTICS', it shows: Frames Received OK: 25668, Frames Transmitted OK: 19390, Reception Errors: 0. Under 'ETHERNET PORT STATISTICS', it shows: Link Speed: 100Mbps, Duplex Mode: Full Duplex. There is a 'Reset' button at the bottom right of each section.

| | Function Name | Description |
|-----------------------------------|-----------------------|---|
| Ethernet Global Statistics | Frames Received OK | Displays the number of frames received from all the Ethernet ports. |
| | Frames Transmitted OK | Displays the number of frames transmitted from all the Ethernet ports. |
| | Reception Errors | Displays the number of errors during reception of the frames. |
| Ethernet Port Statistics | Link speed | Displays link speed on Ethernet port. |
| | Duplex mode | Displays the communication mode of the Ethernet port. It can be half duplex or full duplex. |

Click **Reset** to clear the Ethernet frame counters.

IP Network Services

| Step | Action |
|------|--|
| 1 | Launch the PowerTag Link webpage in the web browser. |
| 2 | Login with user name and password. |
| 3 | Click Diagnostics > Communication > IP Network Services . |

The screenshot shows the IP Network Services diagnostics interface. On the left, there's a sidebar with tabs for MONITORING, DIAGNOSTICS, MAINTENANCE, and SETTINGS, with 'GENERAL' and 'COMMUNICATION' sub-tabs under DIAGNOSTICS. The main area has two sections: 'MODBUS TCP PORT' and 'MODBUS TCP PORT CONNECTIONS'. Under 'MODBUS TCP PORT', it shows: Port Status: Operational, Opened TCP Connections: 1, Received Messages: 9687, Transmitted Messages: 9687. Under 'MODBUS TCP PORT CONNECTIONS', it shows a table with columns: Index, Remote IP, Remote Port, Local Port, Transmitted Messages, Received Messages, and Sent Errors. There is a 'Reset' button at the bottom right of each section.

| | Function Name | Description |
|------------------------|------------------------|--|
| Modbus TCP Port | Port status | Displays the current status of the Modbus/TCP port. |
| | Opened TCP connections | Displays the number of established Modbus/TCP connections. |
| | Received messages | Displays the counter of received Modbus/TCP messages. |

| | Function Name | Description |
|-----------------------------|----------------------|--|
| | Transmitted messages | Displays the counter of transmitted Modbus/TCP messages. |
| Modbus TCP Port Connections | | Displays the statistics of open Modbus/TCP connections. |

Click **Reset** to clear the Modbus/TCP counter.

Wireless Network Quality Indicators

| Step | Action |
|------|--|
| 1 | Launch the PowerTag Link webpage in the web browser. |
| 2 | Login with user name and password. |
| 3 | Click Diagnostics > Communication > Wireless Network Quality Indicators . |

The **Wireless Network Quality Indicators** page displays wireless network quality information such as Link Quality Indicator (LQI), Received Signal Strength Indicator (RSSI), and Packet Error Rate (PER).

| Modbus Address | RF Id | Asset Name | Usage | Product Type | Product Reference | LQI | (Radio Quality) | RSSI | PER |
|----------------|-------|----------------------------|------------------------|--------------|-------------------|-------|-----------------|--------|-----|
| 0xFFFFFE02A500 | | Input1/Q8 to Q11 SD status | Input/Office Equipment | Control | A9XMC2D3 | 145 | Green | -41dBm | 0% |
| 66BD7FFFEBB1D6 | | Input2 SD NSX Q7 | Input2/Main/Incomer | | | | | | |
| 80BD7FFFEBB1A5 | | Buster Heating | Heating | Control | A9XMC1D3 | 143 | Green | -41dBm | 0% |
| 80BD7FFFEBB1A5 | | HeatTag Simulation | Heating | Control | A9XMC1D3 | 145 | Green | -41dBm | 0% |
| 0xFFFFFE0B2371 | | Panel Display | Process | Display | A9XMW0D | 148 | Green | -41dBm | 0% |
| 0xFFFFFE043924 | | HeatTag | Ambient | A9N18543 | 102 | Green | -55dBm | 0% | |
| E2079431 | | HVAC meeting room | HVAC | Energy | A9MEM1522 | 109 | Green | -52dBm | 10% |
| E2079424 | | kitchen | Cooking | Energy | A9MEM1522 | 152 | Green | -30dBm | 24% |
| E207943E | | Lighting workshop | Lighting | Energy | A9MEM1522 | 149 | Green | -40dBm | 10% |
| E2079441 | | datacenter room | Computers | Energy | A9MEM1522 | 154 | Green | -40dBm | 17% |
| E2079427 | | Server | Computers | Energy | A9MEM1522 | 107 | Green | -53dBm | 30% |
| E20792AD | | Boiler | Heating | Energy | A9MEM1521 | 131 | Green | -46dBm | 23% |
| E20228FA | | Socket1 | Other Sockets | Energy | A9MEM1550 | 122 | Green | -50dBm | 27% |
| E20228E9 | | HVAC rooftop | HVAC | Energy | A9MEM1550 | 113 | Green | -50dBm | 31% |

| Parameter | Description |
|----------------|--|
| Modbus Address | Displays the Modbus address of the wireless device. |
| Asset Name | Displays the user-defined asset name of the wireless device. |
| Usage | Displays the user-defined usage of the wireless device. |
| Product | Displays the type of wireless sensor. |
| LQI | <p>Displays the measurement of the strength and / or quality of the received frames.</p> <p>The following values of LQI indicates the quality of the received frames:</p> <ul style="list-style-type: none"> The value from 0...29 indicates that the RF communication is bad. In this case, check whether the rules of installation are followed. You can also change the location of the PowerTag Link gateway inside the panel to be near to the wireless device. The values from 29...59 indicates that the RF communication is average. In this case, look at the RSSI value whether to accept the level of quality or not. If the RSSI is above limit, consider the value of LQI as acceptable. The value greater than 59 indicates that the RF communication is OK. <p>NOTE: It is recommended to use this indicator as the main indicator of acceptance.</p> |
| Radio Quality | Displays the quality of the frames. When the LQI value is greater than 59, it indicates with green light and when LQI value is lesser than 29, it indicates with red light. When the LQI value is between 30 and 59, it indicates with orange light. |
| RSSI | Displays the power level of the wireless signal between the PowerTag Link gateway and the wireless device. <ul style="list-style-type: none"> Good: 0...-65 dbm Average: -65...-75 dbm Bad (with risk of outage): < -75 dbm |
| PER | Displays the ratio of the packet that does not reach a destination over the total expected number of packets and is expressed in percentage. For PowerTag Link gateway, the ratio is calculated over a fixed window of five minutes. |

Email Service

| Step | Action |
|------|--|
| 1 | Launch the PowerTag Link webpage in the web browser. |
| 2 | Login with user name and password. |
| 3 | Click Diagnostics > Communication > Email Service . |

The **Email Service** page displays the information such as number of emails sent and emails not sent. This page also displays the error count, if any, for connection errors, authentication errors, internal errors, and sending errors as shown in the following figure:

| Parameter | Description |
|--------------------------------|--|
| Email Sent successfully | Displays the total number of successfully sent emails. |
| Emails Not Sent | Displays the total number of emails not delivered to the recipients. |
| Connection Errors | Displays the total number of connection errors if a connection is lost during an email delivery. |
| Authentication Errors | Displays the total number of authentication errors. |
| Internal Errors | Displays the total number of internal errors during the email service. |
| Sending Errors | Displays the total number of sending errors. |

Click **Reset** to clear the Email counter.

Troubleshooting

Common Problems

Description

The following table describes the abnormal behavior and diagnostics, and provides some corrective actions:

| Problem | Diagnostics | Action |
|---|--|--|
| Webpage is displayed only with texts without graphics. | The text and graphics in the webpage is loaded based on the traffic and disruptions on the IT network. | Refresh the web browser. |
| IP setting changes are not effected. | IP settings not applied | Reboot the device if the changes do not take effect within two minutes. |
| Firmware upgrade is not succeeded. | PowerTag Link gateway is disconnected from the network | <p>Follow the below steps to recover the PowerTag Link gateway:</p> <ol style="list-style-type: none"> 1. Disconnect the PowerTag Link gateway from the network. 2. Power cycle the PowerTag Link gateway. 3. Connect your PC directly to the PowerTag Link gateway. 4. Use Automatic Discovery from the EcoStruxure Power Commission software to connect to the PowerTag Link gateway. Refer to <i>EcoStruxure Power Commission Online Help</i>. 5. Launch the firmware upgrade. |
| PowerTag Link gateway has lost the communication with wireless devices. | Pollution on the radio frequency channel | Change the radio frequency channel that communicates between wireless devices and PowerTag Link gateway in the Settings > Communication > Wireless Network Configuration page. |
| A wireless device is not detected/discovered by PowerTag Link gateway. | PowerTag Link gateway does not recognize this type of wireless devices. | Upgrade the firmware of PowerTag Link gateway with EcoStruxure Power Commission software. Refer to <i>EcoStruxure Power Commission Online Help</i> . |
| Gateway not functioning. | Lost data, problem of data display on webpage or on Modbus registers, lost connection with the wireless devices. | <p>Pre-requisite:</p> <p>You should have a backup file saved on your PC by using the backup function available in the Maintenance menu of the webpage. The file will be automatically saved under the name backup.dat.</p>  <p>Refer to Inoperative Gateway Replacement, page 65.</p> <p>NOTE: The time required for the PowerTag Link gateway to restart the wireless communication with all wireless devices can be up to 10 minutes.</p> |

| Problem | Diagnostics | Action |
|-----------------------------|---------------------------------|--|
| Unable to pair the devices. | Pairing is not working. | <ul style="list-style-type: none">• If there is a Reset button on the device, press this button and perform the pairing process.• If there is no Reset button, then perform a power OFF/ON cycle and then perform the pairing process. <p>NOTE: The device will be in the pairing process for 10 minutes only.</p> |
| Firmware update | Firmware update is not working. | <p>Close all the HTTPS sessions (Webpage and EcoStruxure Power Commissioning session) and restart the PowerTag Link gateway or wait for the current session to expire.</p> <p>NOTE: Closing the window is not enough to close the HTTPS sessions.</p> |

NOTE: If you have communication issues (Wireless LED not OK or communication loss), refer to Wireless Communication Devices, page 22.

Appendices

Appendix A: Details of Modbus Functions

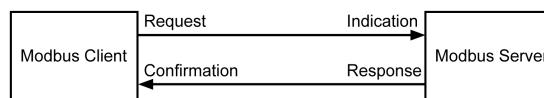
Modbus TCP/IP Functions

General Description

The Modbus messaging service provides a client/server communication between devices connected on an Ethernet TCP/IP network.

The client/server model is based on four type of messages:

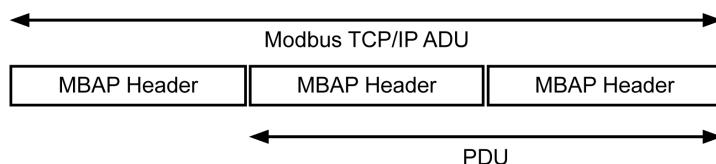
- Modbus Request, the message sent on the network by the client to initiate a transaction.
- Modbus Indication, the request message received on the server side.
- Modbus Response, the response message sent by the server.
- Modbus Confirmation, the response message received on the client side.



The Modbus messaging services (client/server model) are used for real time information exchange between:

- Two device applications.
- Device application and other device.
- HMI/SCADA applications and devices.
- A PC and a device program providing on line services.

A dedicated header is used on TCP/IP to identify the Modbus Application Data Unit. It is called the MBAP header (Modbus Application Protocol header).



The MBAP header contains the following fields:

| Fields | Length | Description | Client | Server |
|------------------------|---------|--|-------------------------------------|--|
| Transaction Identifier | 2 bytes | Identification of a Modbus Request/Response transaction | Initialized by the client | Recopied by the server from the received request |
| Protocol Identifier | 2 bytes | 0 = Modbus protocol | Initialized by the client | Recopied by the server from the received request |
| Length | 2 bytes | Number of following bytes | Initialized by the client (Request) | Initialized by the server (Response) |
| Unit Identifier | 1 byte | Identification of a remote server connected on a serial line or on other buses | Initialized by the client | Recopied by the server from the received request |

Table of Modbus Functions

The following table describes in detail the functions supported by the wireless devices of the PowerTag Link gateway:

| Function Code | Function Name |
|---------------|---|
| 01 | Read n output or internal bits |
| 02 | Read n input bits |
| 03 | Read n output or internal bits |
| 05 | Write 1 bit |
| 06 | Write 1 word |
| 08 | Modbus diagnostic data (refer to Function 8: Modbus Diagnostics, page 152) |
| 15 | Write n bits |
| 16 | Write n words |
| 43-14 | Read identification (refer to Function 43-14: Read Device Identification (Basic), page 154) |
| 43-15 | Read the date and time (refer to Function 43-15: Read Date and Time, page 156) |
| 43-16 | Write the date and time (refer to Function 43-16: Write Date and Time, page 157) |
| 100-4 | Read non-adjacent words where $n \leq 100$ (refer to Function 100-4: Read Non-Adjacent Registers, page 158) |

Modbus TCP/IP Exception Codes

Exception Responses

Exception responses issued by the client or a server can be the result of data processing errors. One of the following events can occur after a request from the client:

- If the server receives the request from the client without a communication error and manages the request correctly, it sends back a normal response.
- If the server does not receive the request from the client due to a communication error, it does not send back a response. The client program ends by applying a time delay condition to the request.
- If the server receives the request from the client but detects a communication error, it does not send back a response. The client program ends by applying a time delay condition to the request.
- If the server receives the request from the client without a communication error but cannot manage it (for example, the request consists of reading a register that does not exist), the server sends back an exception response to inform the client of the nature of the error.

Exception Frame

The server sends an exception frame to the client to indicate an exception response. An exception response consists of four fields:

| Field | Definition | Size |
|-------|-------------------------|---------|
| 1 | Server number | 1 byte |
| 2 | Exception function code | 1 byte |
| 3 | Exception code | n bytes |
| 4 | Check | 2 bytes |

Managing Modbus Exceptions

The exception response frame consists of two fields that distinguish it from a normal response frame:

- The exception response's exception function code is the same as the original request function code plus 128 (0x80).
- The exception code depends on the communication error detected by the server.

The following table describes the exception codes managed by the wireless devices of the PowerTag Link gateway:

| Exception Code | Name | Description |
|----------------|-----------------------|---|
| 01 | Illegal function | The function code received in the request is not a permitted action for the server. It is possible that the server is in an unsuitable state to process a specific request. |
| 02 | Illegal data address | The data address received by the server is not a permitted address for the server. |
| 03 | Illegal data value | The value of the request data field is not a permitted value for the server. |
| 04 | Server device failure | The server is unable to perform a required action due to an unrecoverable error. |
| 06 | Server device busy | The server is busy processing another command. The client should send the request once the server is free. |

NOTE: For more information, a detailed description of the Modbus protocol is available on www.modbus.org.

Access to Variables

A Modbus variable can have the following attributes:

- Read-only
- Read/write
- Write-only

NOTE: An attempt to write to a read-only variable generates an exception response.

Function 8: Modbus Diagnostics

Structure of Modbus Messages Concerning PowerTag Link Gateway Diagnostic Counter Management

Request

| Definition | Number of Bytes | Value |
|----------------------|-----------------|--|
| Server number | 1 byte | 0xFF |
| Function code | 2 bytes | 08 (0x08) |
| Sub-function code | 2 bytes | 22 (0x0016) |
| Operation code | 2 bytes | 1 ((0x0001) see below list for operation code) |
| Diagnostic control | 2 bytes | 0x0100 (see below list for diagnostic control) |
| Starting entry index | 1 byte | 0x00 (0 to 255) |

The operation code field is used to select the diagnostic and the statistic data to be read from the device.

| Most Significant Byte | | | | | | | | Least Significant Byte | | | | | | | |
|-----------------------|----|----|----|------------------|----|---|---|------------------------|---|---|---|---|---|---|---|
| 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Reserved | | | | Protocol Version | | | | Operation Code | | | | | | | |

Bit assignments are included in the table below:

| Bit | Field | Description |
|---------|-----------------------|--|
| 15...12 | Reserved | Must be zero |
| 11...8 | Protocol Version (PV) | Indicates version of the protocol of the client (requestor) Values are: 0x00 (initial version) |
| 7..0 | Operation Code | Indicates function to be performed by the command Values are: <ul style="list-style-type: none">• 0x01 = Read diagnostic data• 0x02 = Clear diagnostic data• 0x03 = Clear all diagnostic data• 0x04 = List ports |

The diagnostic control field provides the data selection information for this protocol as well as specifies the logical port from which, the data is to be retrieved (if applicable). The diagnostic control field is defined as shown in the following table:

| Most Significant Byte | | | | | | | | Least Significant Byte | | | | | | | |
|-----------------------|----|----|----|----|----|---|---|------------------------|---|---|---|---|---|---|---|
| 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Data Selection Code | | | | | | | | Port Select | | | | | | | |

Bit assignments are included in the following table:

| Bit | Field | Description |
|--------|--------------------------|--|
| 15...8 | Data Selection Code (DS) | Indicates the diagnostic data to retrieve or to clear from the logical port. See the table below for valid values. |
| 7...0 | Port Select (PS) | <p>Indicates the logical port number to retrieve the selected data from</p> <ul style="list-style-type: none"> • 0x00 = the internal port of a device that supports an embedded switch or any single port not accessible externally • 0x01 to 0xFE = logical number of the desired port • 0xFF = the port the current request came in <p>This value should be 0xFF if the requested data is not port specific. See the Port Select Needed column in the table below for which Data Selection Code requires a valid port select value.</p> |

Data selection code

| Data Selection Code | Diagnostic Data Retrieved | Port Select Needed | Type |
|---------------------|--------------------------------------|--------------------|----------|
| 0x00 | Reserved | | Public |
| 0x01 | Basic network diagnostics | | Public |
| 0x02 | Ethernet port diagnostics | Yes | Public |
| 0x03 | Modbus TCP port 502 diagnostics | | Public |
| 0x04 | Modbus TCP port 502 connection table | | Public |
| 0x05 to 0x7E | Reserved for other public codes | | Public |
| 0x7F | Data structure offsets | | Public |
| 0x80 to 0xFF | Reserved | | Reserved |

Response

| Definition | Number of Bytes | Value |
|----------------------|-----------------|--|
| Server number | 1 byte | 0xFF |
| Function code | 2 bytes | 08 (0x08) |
| Sub-function code | 2 bytes | 22 (0x0016) |
| Operation code | 2 bytes | 1 ((0x0001) see the above list for operation code) |
| Diagnostic control | 2 bytes | 0x0100 (see the above list for diagnostic control) |
| Starting entry index | 1 byte | 0x00 (0 to 255) |

Resetting Counters

The counters are reset to 0:

- When they reach the maximum value 65535.
- When they are reset by a Modbus command (function code 8, sub-function code 10).
- When the power is cut off, or
- When the communication parameters are modified.

Function 43-14: Read Device Identification (Basic)

Structure of Modbus Read Device Identification Messages

The ID consists of ASCII characters called objects.

Request for basic information

| Definition | Number of Bytes | Value |
|-------------------|-----------------|-------|
| Server number | 1 byte | 0xFF |
| Function code | 1 byte | 0x2B |
| Sub-function code | 1 byte | 0x0E |
| Product ID | 1 byte | 0x01 |
| Object identifier | 1 byte | 0x00 |

Response with basic information

| Definition | Number of Bytes | Value |
|-----------------------------|-----------------|--------------------|
| Server number | 1 byte | 0xFF |
| Function code | 1 byte | 0x2B |
| Sub-function code | 1 byte | 0x0E |
| Product ID | 1 byte | 0x01 |
| Conformity level | 1 byte | 0x01 |
| Reserved | 1 byte | 0x00 |
| Reserved | 1 byte | 0x00 |
| Number of objects | 1 byte | 0x03 |
| Object 0: manufacturer name | Object number | 0x00 |
| | Object length | 0x12 |
| | Object content | Schneider Electric |
| Object 1: product code | Object number | 0x01 |
| | Object length | 0x08 |
| | Object content | A9XMWD20/A9XMWD100 |
| Object 2: version number | Object number | 0x02 |
| | Object length | 0x06 (minimum) |
| | Object content | Vx.y.z |

Request for complete information

| Definition | Number of Bytes | Value |
|-------------------|-----------------|-------|
| Server number | 1 byte | 0xFF |
| Function code | 1 byte | 0x2B |
| Sub-function code | 1 byte | 0x0E |
| Product ID | 1 byte | 0x02 |
| Object identifier | 1 byte | 0x00 |

Response with complete information

| Definition | | Number of Bytes | Value |
|-----------------------------|----------------|------------------------|--------------------|
| Server number | | 1 byte | 0xFF |
| Function code | | 1 byte | 0x2B |
| Sub-function code | | 1 byte | 0x0E |
| Product ID | | 1 byte | 0x02 |
| Conformity level | | 1 byte | 0x02 |
| Reserved | | 1 byte | 0x00 |
| Reserved | | 1 byte | 0x00 |
| Number of objects | | 1 byte | 0x05 |
| Object 0: manufacturer name | Object number | 1 byte | 0x00 |
| | Object length | 1 byte | 0x12 |
| | Object content | 18 bytes | Schneider Electric |
| Object 1: product code | Object number | 1 byte | 0x01 |
| | Object length | 1 byte | 0x08 |
| | Object content | 8 bytes | A9XMWD20/A9XMWD100 |
| Object 2: version number | Object number | 1 byte | 0x02 |
| | Object length | 1 byte | 0x06 (minimum) |
| | Object content | 6 bytes minimum | Vx.y.z |

NOTE: The above table describes how to read the ID of a PowerTag Link gateway.

Function 43-15: Read Date and Time

Structure of Modbus Read Date and Time Messages

Request

| Definition | Number of Bytes | Value | Example |
|-------------------|-----------------|-------|----------|
| Server number | 1 byte | 0x2F | 47 |
| Function code | 1 byte | 0x2B | 43 |
| Sub-function code | 1 byte | 0x0F | 15 |
| Reserved | 1 byte | 0x00 | Reserved |

Response

| Definition | Number of Bytes | Value | Example | | |
|------------------------------|-------------------|------------------|----------|--------|-------------------------|
| Server number | 1 byte | 0x2F | 47 | | |
| Function code | 1 byte | 0x2B | 43 | | |
| Sub-function code | 1 byte | 0x0F | 15 | | |
| Reserved | 1 byte | 0x00 | Reserved | | |
| Date and time ⁽¹⁾ | byte 1 | Not used | 1 byte | 0x00 | Not used |
| | byte 2 | Year | 1 byte | 0x0A | Year 2010 |
| | byte 3 | Month | 1 byte | 0x0B | Month of November |
| | byte 4 | Day of the month | 1 byte | 0x02 | Second day of the month |
| | byte 5 | Hour | 1 byte | 0x0E | 14 hours |
| | byte 6 | Minute | 1 byte | 0x20 | 32 minutes |
| | byte 7 and byte 8 | Millisecond | 2 bytes | 0x0DAC | 3.5 seconds |

(1) Refer to DATETIME, page 95.

Function 43-16: Write Date and Time

Structure of Modbus Write Date and Time Messages

Request

| Definition | | | Number of Bytes | Value | Example |
|---------------------------------|-------------------|------------------|-----------------|--------|-------------------------|
| Server number | | | 1 byte | 0x2F | 47 |
| Function code | | | 1 byte | 0x2B | 43 |
| Sub-function code | | | 1 byte | 0x10 | 16 |
| Reserved | | | 1 byte | 0x00 | Reserved |
| Date and time ⁽¹⁾ | byte 1 | not used | 1 byte | 0x00 | Not used |
| | byte 2 | Year | 1 byte | 0x0A | Year 2010 |
| | byte 3 | Month | 1 byte | 0x0B | Month of November |
| | byte 4 | Day of the month | 1 byte | 0x02 | Second day of the month |
| | byte 5 | Hour | 1 byte | 0x0E | 14 hours |
| | byte 6 | Minute | 1 byte | 0x20 | 32 minutes |
| | byte 7 and byte 8 | Millisecond | 2 bytes | 0x0DAC | 3.5 seconds |
| (1) Refer to DATETIME, page 95. | | | | | |

Response

| Definition | | | Number of Bytes | Value | Example |
|---------------------------------|-------------------|------------------|-----------------|--------|-------------------------|
| Server number | | | 1 byte | 0x2F | 47 |
| Function code | | | 1 byte | 0x2B | 43 |
| Sub-function code | | | 1 byte | 0x10 | 15 |
| Reserved | | | 1 byte | 0x00 | Reserved |
| Date and time ⁽¹⁾ | byte 1 | Not used | 1 byte | 0x00 | Not used |
| | byte 2 | Year | 1 byte | 0x0A | Year 2010 |
| | byte 3 | Month | 1 byte | 0x0B | Month of November |
| | byte 4 | Day of the month | 1 byte | 0x02 | Second day of the month |
| | byte 5 | Hour | 1 byte | 0x0E | 14 hours |
| | byte 6 | Minute | 1 byte | 0x20 | 32 minutes |
| | byte 7 and byte 8 | Millisecond | 2 bytes | 0x0DAE | 3.502 seconds |
| (1) Refer to DATETIME, page 95. | | | | | |

Function 100-4: Read Non-Adjacent Registers

Structure of Modbus Read n Non-Adjacent Registers Messages Where n ≤ 100

The example below is the case of reading of 2 non-adjacent registers.

Request

| Definition | Number of Bytes | Value |
|--|-----------------|-------|
| Modbus server number | 1 byte | 0x2F |
| Function code | 1 byte | 0x64 |
| Length of data in bytes | 1 byte | 0x06 |
| Sub-function code | 1 byte | 0x04 |
| Transmission number ⁽¹⁾ | 1 byte | 0xXX |
| Address of the first word to be read (MSB) | 1 byte | 0x00 |
| Address of the first word to be read (LSB) | 1 byte | 0x65 |
| Address of the second word to be read (MSB) | 1 byte | 0x00 |
| Address of the second word to be read (LSB) | 1 byte | 0x67 |
| (1) The client gives the transmission number in the request. | | |

NOTE: The above table describes how to read addresses 101 = 0x65 and 103 = 0x67 of a Modbus server. The Modbus server number is 47 = 0x2F.

Response

| Definition | Number of Bytes | Value |
|--|-----------------|-------|
| Modbus server number | 1 byte | 0x2F |
| Function code | 1 byte | 0x64 |
| Length of data in bytes | 1 byte | 0x06 |
| Sub-function code | 1 byte | 0x04 |
| Transmission number ⁽¹⁾ | 1 byte | 0xXX |
| First word read (MSB) | 1 byte | 0x12 |
| First word read (LSB) | 1 byte | 0x0A |
| Second word read (MSB) | 1 byte | 0x74 |
| Second word read (LSB) | 1 byte | 0x0C |
| (1) The server sends back the same number in the response. | | |

NOTE: The above table describes how to read addresses 101 = 0x65 and 103 = 0x67 of a Modbus server. The Modbus server number is 47 = 0x2F.

Appendix B: Data Availability

PowerTag Data Availability

Presentation

The data transmitted by the PowerTag Energy sensors to the PowerTag Link gateway depends on the type of PowerTag Energy sensors. The following tables indicate which data are available in the PowerTag Link gateway according to the type of PowerTag Energy sensors.

Device Commercial References

The device commercial references used for each type of PowerTag Energy sensors are:

- A1: A9MEM1520, A9MEM1521, A9MEM1522, A9MEM1541, A9MEM1542
- A2: A9MEM1540, A9MEM1543
- P1: A9MEM1561, A9MEM1562, A9MEM1563, A9MEM1571, A9MEM1572
- F1: A9MEM1560, A9MEM1570
- F2: A9MEM1573
- F3: A9MEM1564, A9MEM1574
- FL: A9MEM1580
- M0: LV434020
- M1: LV434021
- M2: LV434022
- M3: LV434023
- R1: A9MEM1590, A9MEM1591, A9MEM1592, A9MEM1593

Power

| Data | PowerTag M63 | | PowerTag P63 | PowerTag F63 | | | PowerTag F160 | PowerTag M250 | | PowerTag M630 | | PowerTag Rope |
|--------------------------|--------------|-------------------|--------------|--------------|-------------------|----|------------------|------------------|----|------------------|----|------------------|
| | A1 | A2 | P1 | F1 | F2 | F3 | FL | M0 | M1 | M2 | M3 | R1 |
| Total active power | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Per phase active power | ✓ | NA ⁽¹⁾ | ✓ | ✓ | NA ⁽¹⁾ | ✓ | ✓ ⁽²⁾ | ✓ ⁽²⁾ | ✓ | ✓ ⁽²⁾ | ✓ | ✓ ⁽²⁾ |
| Total reactive power | — | — | — | — | — | — | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Per phase reactive power | — | — | — | — | — | — | ✓ ⁽²⁾ | — | — | — | — | ✓ ⁽²⁾ |
| Total apparent power | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Per phase apparent power | — | — | — | — | — | — | ✓ ⁽²⁾ | — | — | — | — | ✓ ⁽²⁾ |
| Total factor power | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Per phase factor power | — | — | — | — | — | — | ✓ ⁽²⁾ | — | — | — | — | ✓ ⁽²⁾ |
| Actual demand power | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | — | — | — | — | ✓ |

| Data | PowerTag M63 | | PowerTag P63 | PowerTag F63 | | | PowerTag F160 | PowerTag M250 | | PowerTag M630 | | PowerTag Rope |
|--|--------------|----|--------------|--------------|----|----|---------------|---------------|----|---------------|----|---------------|
| | A1 | A2 | P1 | F1 | F2 | F3 | FL | M0 | M1 | M2 | M3 | R1 |
| Peak demand power | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | — | — | — | — | ✓ |
| (1) Not applicable because there is no neutral voltage on the PowerTag Energy sensors. | | | | | | | | | | | | |
| (2) The values are significant only if the neutral voltage picking is connected. | | | | | | | | | | | | |

Energy

| Data | PowerTag M63 | | PowerTag P63 | PowerTag F63 | | | PowerTag F160 | PowerTag M250 | | PowerTag M630 | | PowerTag Rope |
|---|--------------|----|--------------|--------------|----|----|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | A1 | A2 | P1 | F1 | F2 | F3 | FL | M0 | M1 | M2 | M3 | R1 |
| Total resettable active energy delivered | — | — | — | — | — | — | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Total non resettable active energy delivered | — | — | — | — | — | — | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Per phase resettable active energy delivered | — | — | — | — | — | — | ✓ ⁽²⁾ | — | — | — | — | ✓ ⁽²⁾ |
| Per phase non resettable active energy delivered | — | — | — | — | — | — | ✓ ⁽²⁾ | — | — | — | — | ✓ ⁽²⁾ |
| Total resettable active energy received | — | — | — | — | — | — | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Total non resettable active energy received | — | — | — | — | — | — | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Per phase resettable active energy received | — | — | — | — | — | — | ✓ ⁽²⁾ | — | — | — | — | ✓ ⁽²⁾ |
| Per phase non resettable active energy received | — | — | — | — | — | — | ✓ ⁽²⁾ | — | — | — | — | ✓ ⁽²⁾ |
| Total resettable active energy delivered and received | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | NA ⁽¹⁾ |
| Total non resettable active energy delivered and received | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | NA ⁽¹⁾ |
| Per phase resettable active energy delivered and received | — | — | — | — | — | — | NA ⁽¹⁾ | — | — | — | — | NA ⁽¹⁾ |
| Per phase non resettable active energy delivered and received | — | — | — | — | — | — | NA ⁽¹⁾ | ✓ ⁽²⁾ | ✓ | ✓ ⁽²⁾ | ✓ | NA ⁽¹⁾ |
| Total resettable reactive energy delivered | — | — | — | — | — | — | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Total non resettable reactive energy delivered | — | — | — | — | — | — | ✓ ⁽²⁾ | — | — | — | — | ✓ ⁽²⁾ |
| Per phase resettable | — | — | — | — | — | — | ✓ ⁽²⁾ | — | — | — | — | ✓ ⁽²⁾ |

| Data | PowerTag M63 | | PowerTag P63 | PowerTag F63 | | | PowerTag F160 | PowerTag M250 | | PowerTag M630 | | PowerTag Rope |
|---|--------------|----|--------------|--------------|----|----|------------------|---------------|----|---------------|----|------------------|
| | A1 | A2 | P1 | F1 | F2 | F3 | FL | M0 | M1 | M2 | M3 | R1 |
| reactive energy delivered | | | | | | | | | | | | |
| Per phase non resettable reactive energy delivered | - | - | - | - | - | - | ✓ | - | - | - | - | ✓ |
| Total resettable reactive energy received | - | - | - | - | - | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Total non resettable reactive energy received | - | - | - | - | - | - | ✓ ⁽²⁾ | - | - | - | - | ✓ ⁽²⁾ |
| Per phase resettable reactive energy received | - | - | - | - | - | - | ✓ ⁽²⁾ | - | - | - | - | ✓ ⁽²⁾ |
| Per phase non resettable reactive energy received | - | - | - | - | - | - | ✓ ⁽²⁾ | - | - | - | - | ✓ ⁽²⁾ |
| Total resettable apparent energy delivered and received | - | - | - | - | - | - | ✓ | - | - | - | - | ✓ |
| Total non resettable apparent energy delivered and received | - | - | - | - | - | - | ✓ | - | - | - | - | ✓ |
| Per phase resettable apparent energy delivered and received | - | - | - | - | - | - | ✓ ⁽²⁾ | - | - | - | - | ✓ ⁽²⁾ |
| Per phase non resettable apparent energy delivered and received | - | - | - | - | - | - | ✓ ⁽²⁾ | - | - | - | - | ✓ ⁽²⁾ |

(1) Not applicable because energy is individually cumulated in received and delivered counters.

(2) The values are significant only if the neutral voltage picking is connected.

Alarms

| Data | PowerTag M63 | | PowerTag P63 | PowerTag F63 | | | PowerTag F160 | PowerTag M250 | | PowerTag M630 | | PowerTag Rope |
|-----------------------------|--------------|----|--------------|--------------|----|----|---------------|---------------|----|---------------|----|---------------|
| | A1 | A2 | P1 | F1 | F2 | F3 | FL | M0 | M1 | M2 | M3 | R1 |
| Voltage loss | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Overcurrent at voltage loss | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Load current 45% | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Load current loss | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Over voltage 120% | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

| Data | PowerTag M63 | | PowerTag P63 | PowerTag F63 | | | PowerTag F160 | PowerTag M250 | | PowerTag M630 | | PowerTag Rope |
|--|--------------|----|--------------|--------------|----|----|---------------|---------------|----|---------------|----|---------------|
| | A1 | A2 | P1 | F1 | F2 | F3 | FL | M0 | M1 | M2 | M3 | R1 |
| Undervoltage 80% | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| RMS current on phase A, B, C at voltage loss | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

Other Measurements

| Data | PowerTag M63 | | PowerTag P63 | PowerTag F63 | | | PowerTag F160 | PowerTag M250 | | PowerTag M630 | | PowerTag Rope |
|------------------------------|--------------|-------------------|--------------|--------------|-------------------|----|------------------|------------------|----|------------------|----|------------------|
| | A1 | A2 | P1 | F1 | F2 | F3 | FL | M0 | M1 | M2 | M3 | R1 |
| Phase current (measured) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Neutral current (calculated) | — | — | — | — | — | — | ✓ | — | — | — | — | ✓ |
| Phase-to-phase voltage | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Phase-to-neutral voltage | ✓ | NA ⁽¹⁾ | ✓ | ✓ | NA ⁽¹⁾ | ✓ | ✓ ⁽²⁾ | ✓ ⁽²⁾ | ✓ | ✓ ⁽²⁾ | ✓ | ✓ ⁽²⁾ |
| Frequency | — | — | — | — | — | — | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Quadrant | 1 | 1 | 1 | 1 | 1 | 1 | 4 | 4 | 4 | 4 | 4 | 4 |
| Internal temperature | — | — | — | — | — | — | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Load operating time counter | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

(1) Not applicable because there is no neutral voltage on the PowerTag Energy sensors.

(2) The values are significant only if the neutral voltage picking is connected.

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