Hewlett Packard Enterprise

HPE G2 Series Metered, Switched, and Metered & Switched Power Distribution Unit

User Guide

Abstract

This document is for the person who installs and maintains HPE PDU products. Hewlett Packard Enterprise assumes that this person is qualified in the installation of electrical equipment and trained in recognizing hazards in products with high energy levels.

Part Number: 30-33682715-010
Published: December 2024
Edition: 10

© Copyright 2018–2024 Hewlett Packard Enterprise Development LP

Notices

The information contained herein is subject to change without notice. The only warranties for Hewlett Packard Enterprise products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. Hewlett Packard Enterprise shall not be liable for technical or editorial errors or omissions contained herein.

Confidential computer software. Valid license from Hewlett Packard Enterprise required for possession, use, or copying. Consistent with FAR 12.211 and 12.212, Commercial Computer Software, Computer Software Documentation, and Technical Data for Commercial Items are licensed to the U.S. Government under vendor's standard commercial license.

Links to third-party websites take you outside the Hewlett Packard Enterprise website. Hewlett Packard Enterprise has no control over and is not responsible for information outside the Hewlett Packard Enterprise website.

Acknowledgments

Linux® is the registered trademark of Linus Torvalds in the U.S. and other countries.

Microsoft® and Windows® are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.



Contents

Before you begin 7
- Overview 7
- Important safety information 7

Introduction 9
- Classification overview 9
- Features 9
- Form factors 10
- Rack mounting options and maximum configurations 10
  - Metered PDUs—rack mounting options 10
  - Metered 0U (vertical) PDUs—maximum configuration 11
  - Metered 1U PDU (true 0U)—maximum configuration 12
  - Switched PDUs—rack mounting options 12
  - Switched 0U (Vertical) PDUs—maximum configuration 12
  - Switched 1U PDU (true 0U)—maximum configuration 13
  - Metered & Switched PDUs—rack mounting options 13
  - Metered & Switched 0U (Vertical) PDUs—maximum configuration 13
- Load segment and phase distinction 14
- Power cord retention 15
  - Integrated cord retention 15
  - Locking power cord 17
  - NEMA 5-20R outlet retention bracket 17

Installing the PDU 21
- Required tools 21
- Vertical PDU installation 21
  - Installing cord retention brackets 21
  - Installing the mounting hardware 24
  - Vertical (0U) PDU—single installation 24
  - Vertical (0U) PDU—two or more installations 27
  - High-density PDU installation 30
  - PDU shipping retention for rack transportation 32
  - Installing a vertical PDU in an HPE standard G1 or 10K series rack 36
- 1U PDU installation 38
  - Installing cord retention brackets (PDUs with NEMA 5-20R outlets) 38
  - Mounting options 39
  - Mounting hardware installation 40
- 2U PDU installation 45
  - Installing cord retention brackets (PDUs with NEMA 5-20R outlets) 45
  - Mounting options 46
  - Mounting hardware installation 46
- Grounding the PDU 48
  - Connecting the ground bonding cable 48

Connecting the PDU 50

Connecting the PDU to a power source 50
Network management module 50
Using the reset button 51
Connecting the PDU to a LAN 51
Connecting the PDU to a computer serial port 53
Setting up serial communication 53

Remote configuration 55
Dynamic Host Configuration Protocol (DHCP) 55
Web configuration 55
Supported web browsers 55
Logging in to the web interface 55
Access privileges 59
Web menu overview 70
Web menu options 71
Web interface overview 74

Simple Network Management Protocol (SNMP) 92
SNMP configuration 92
Setting up SNMP 92
Setting up the SNMP port 92
Configuring the SNMP V1/V2c user 92
Configuring SNMP v1/2c Manager 93
SNMP v3 Manager 93
Trap Receiver 94
Deleting SNMP and Trap Receiver IP addresses 94
Configuring users for encrypted SNMP V3 communications 94

Configuring local access 96
Connecting through a serial connection 96
Connecting the PDU to a computer 96
Supported commands 96
Logging in with the CLI 97
Logging in with HyperTerminal 97
Logging in with SSH through PuTTY 97
Controlling outlets using SSH 100
Recovering passwords with the CLI/SSH 100
Working with NTP through CLI/SSH 100
Serial cable pinout to create your own cable 101

Local display 102
OLED display 102
Menu mode 102
Power save mode 102
LED unit status 103
OLED menu structure 104
Main menu selections 104
Setup menu 105
Alarms menu 111
Power menu 112
Sensors menu 117

Daisy chain configuration 117

Connecting and configuring optional hardware 119

Hardware overview 119
Temperature sensor 121
Connecting a temperature sensor 122
Connecting a temperature and humidity sensor 122
Connecting a 3-temperature and 1-humidity sensor 122
Connecting a rope fluid leak sensor 123
Using the leak sensor detector 124
Connecting an Open door sensor 125
Connecting the sensor hub 132
Detecting environmental sensors 132
Configuring environmental sensors 133
Configuring door sensors 133

Spares 134

Ordering spares 134
Metered PDU spare parts list 134
Switched PDU spare parts list 135
Metered & Switched PDU spare parts list 135
Spare options 136
Hardware options 136

Support and other resources 137

Accessing Hewlett Packard Enterprise Support 137
HPE product registration 137
Accessing updates 137
Remote support 138
Warranty information 138
Regulatory information 138
Documentation feedback 139

Appendix 140

Appendix A: CLI commands 140
Help commands 140
System commands 140
Network commands 143
User commands 145
Device commands 146
Power commands 148
System configure commands 149
Network application configure commands 152
Appendix B: Firmware update procedure 154
Updating the PDU firmware using a USB connection 154
Updating the PDU firmware using a web interface 154
Updating the PDU firmware using a Serial CLI 154
Updating the PDU Firmware using FTP 155
Updating the PDU Firmware using Bootloader mode 156
Firmware recovery with bootloader mode 156
Upgrading configuration with bootloader mode 156

Appendix C: PDU alarms 157
Trap Codes assigned to Alarms List 160
Appendix D: Horizontal Network Management Module Replacement 163
Appendix E: Vertical Network Management Module Replacement 166
Appendix F: Systems Insight Manager Integration 169
Discovering the PDU 169
Systems Insight Manager Overview 170
Configuring HPE SIM to Receive Traps 170
Configuring the PDU to Send Traps to SIM 171
Appendix G: Redfish URLs support 171
Supported Redfish services 171
Sessions 172
Accounts 173
Managers 176
Power Equipment 180
Branches 182
Outlets 185
Mains 190
Metrics 192
Sensors 192
POST Method 203
DELETE Method 205

Before you begin

Overview

This document provides installation and configuration instructions for installing a HPE G2 Series Metered, Switched, and Metered & Switched Power Distribution Units into a data center rack. Read all instructions before operating the equipment and save this document for future reference.

Important safety information

See the complete regulatory compliance notices in *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products* on the **Hewlett Packard Enterprise website**. Follow the safety precautions specific to this device.

This PDU is intended only for Information Technology Equipment loads with linear/Power Factor Corrected input current. If nonlinear loads are connected, the nameplate current rating of the PDU must be reduced by a factor of 0.8.

⚠ **WARNING:** A risk of personal injury from electric shock and hazardous energy levels exists. The installation of options and routine maintenance and service of this product must be performed by individuals who are knowledgeable about the procedures, precautions, and hazards associated with AC power products.

SAVE THESE IMPORTANT SAFETY PRECAUTIONS

Follow these safety precautions when connecting multiple hardware components to power sources.

WARNING: To reduce the risk of fire, electric shock, and damage to the equipment:

- **HIGH LEAKAGE CURRENT.** To reduce the risk of electric shock due to high leakage currents, make sure that there is a reliable grounded (earthed) connection before connecting power distribution products to AC power. If many products will be connected to a single PDU, it might be necessary to conduct an evaluation of the installation to verify the total amount of leakage current. The total combined leakage current must not exceed 5% of the input current for the PDU and associated load.
- Connect only to a circuit that provides circuit overcurrent protection of the appropriate current rating.
- Connect the input power cord to a grounded (earthed) electrical outlet that is located near the equipment and is easily accessible.
- Make sure that all circuit breakers are in the off position before connecting input power.
- Make sure that the devices connected to the PDU are adjusted for, or otherwise capable of, operation from the same line voltage supplying the PDU. Failure to verify the voltage can lead to severe equipment damage.
- Do not overload the PDU. The total input current rating of all equipment connected to each output cannot exceed the total output rating marked on the PDU.
- Use only the hardware provided to install the PDU.
- To reduce the risk of fire or electric shock, install this PDU in a temperature and humidity-controlled, indoor environment, free of conductive contaminants. Do not operate near water or excessive humidity (90% maximum noncondensing).
- Ambient temperature must not exceed 0°C to 60°C (32°F to 140°F).
- The internal components can become hot during operation. Allow sufficient time for the PDU to cool before handling.
- Do not use a two-wire power cord in any product configuration.
- To isolate this equipment, disconnect the power cord.

DANGER: This PDU contains **LETHAL VOLTAGES**. **NO** repairs should be performed on this PDU, except for the replacement of the management card as explained in **Appendix C** and **Appendix D**. There are **NO USER-SERVICEABLE PARTS** inside the PDU. The installation of options, routine maintenance, and service of this PDU must be performed by individuals who are knowledgeable about the procedures, precautions, and hazards associated with AC power products.

THIS EQUIPMENT MUST BE CONNECTED TO AN ELECTRICAL SUPPLY.

Introduction

Classification overview

The HPE G2 Series Metered, Switched, and Metered & Switched Power Distribution Units are intelligent PDUs designed to distribute power to IT equipment installed in a rack. These PDUs are either single-phase (1Ph) or three-phase (3Ph) models with electrical metering and switching capabilities. Each PDU provides power distribution to IT loads through C13, C19, or NEMA 5-20R outlets. The quantity and location of outlets vary by model. The PDUs allow you to connect and manage these outlets from a single power connection. The PDUs are managed from a web interface or a Command Line Interface (CLI) and are viewed from a local display.

HPE PDUs are designed for use with HPE Standard, Advanced, and Enterprise racks, but are compatible with most third-party data center racks. The PDU models vary in form factor, with several mounting configurations available, including the following:

- HPE Metered PDU— Provides real-time local and remote power monitoring at each load segment, enabling users to obtain information about power usage and available circuit capacity.
- HPE Switched PDU—Offers the same features as Metered PDUs and also provides controlled on/off switching of individual outlets and groups of outlets, power sequencing delays to minimize inrush currents, and support for unauthorized equipment provisioning.
- HPE Metered & Switched PDU—Offers the same features as Switched PDUs and also provides individual outlet metering instead of load segment metering.

Features

The HPE G2 Series Metered, Switched, and Metered & Switched Power Distribution Units have the following features:

- Lower profile on Vertical PDUs—Increases the serviceability area in the back of the rack.
- Multiple mounting option on Vertical PDUs—Can be mounted with outlets facing toward center, front or back of the rack.
- Higher operating temperature—All G2 Series PDUs are rated for 60˚C (140˚F) operating temperature.
- Colored receptacles—Help to easily differentiate load segments and phases.
- Integrated cord retention on all C13 and C19 receptacles—Eliminates the need for cord retention brackets.
- Optional locking cords on all C13 and C19 receptacles—Eliminates the need for tie wraps on both ends of the power cord connection.
- 1U PDUs with multiple mounting options—Can be mounted horizontally in a U space or in the true 0U space between the RETMA rails.
- Hot Swappable Network Management Module—Allows power distribution during module replacement, eliminating downtime.
- 1 Gb Ethernet—Eliminates the need for older network switches.
- Daisy-chain configuration—Enables networking of up to four of the same PDUs on one IP address.
- Enhanced sensor support—Supports up to six physical sensors (with optional hub) and eight measurements per PDU, with a total of 32 measurements in a maximum daisy-chain configuration.
- Dual-color OLED display—Provides local access to view configuration settings and automatically enters sleep mode to conserve energy.



- Dual network access—Using a redundant power delivery configuration and separate network connections, provides facilities management and IT (or Tenant) power consumption information.
- High-density models—Provides 24 outlets in a half-height or 48 outlets in a full-height PDU, keeping out of the back of rack serviceability area.
- Security—Firmware has self-signed images and verified boot.

Form factors

Form factor	Description
0U (vertical)	Vertical PDUs have half-, mid-, and full-height versions and are installed vertically in the 0U space in the back of the rack. There are also half- and full-height high-density models that are installed vertically in the 0U space in the back of the rack. The high-density model is mounted on its side with the outlets facing the back of the rack.
1U	1U PDUs are installed in either a U position in the rack or in the true 0U space on the side of the rack between the RETMA rails.
2U	2U PDUs are installed in a U position in the rack.

Rack mounting options and maximum configurations

Metered PDUs—rack mounting options

HPE P/N	Form factor	0U (Vertical)	0U (between RETMA rails)	U position in rack
P9R45A	1U		*	*
P9R46A	0U—Half height	*		
P9R48A	0U—Mid-height	*		
P9R49A	2U			*
P9R50A	1U		*	*
P9R51A	1U		*	*
P9R52A	2U			*
P9R53A	0U—Full-height	*		
P9R54A	1U		*	*
P9R55A	2U			*
P9R56A	0U—Full-height	*		
P9R57A	0U—Full-height	*		
P9R58A	0U—Mid-height	*		
P9R59A	0U—Full-height	*		
P9R60A	0U—Full-height	*		

Table Continued

HPE P/N	Form factor	0U (Vertical)	0U (between RETMA rails)	U position in rack
P9R61A	0U—Full-height	*		
P9R77A	1U		*	*
P9R78A	1U		*	*
P9R79A	1U		*	*
P9R80A	1U		*	*
P9R81A	1U		*	*
P9R82A	0U—Half-height high density[1]	*		
P9R83A	0U—Full-height high density[1]	*		
P9R84A	0U—Half-height high density[1]	*		
P9R85A	0U—Full-height high density[1]	*		
P9R86A	0U—Full-height	*		
P9R87A	0U—Full-height	*		

[1] HPE high-density model mounts on its side with outlets facing the back of the rack.

Metered 0U (vertical) PDUs—maximum configuration

Mounting configuration for 0U (Vertical) PDUs in an HPE 1075 mm rack depth. These are the maximum number of PDUs per side of rack.

HPE P/N	Form factor	14U	22U	36U	42U	47U	48U
P9R46A	0U—Half-height		2	2	4	4	4
P9R48A	0U—Mid-height			2	2	2	2
P9R53A	0U—Full-height				2	2	2
P9R56A	0U—Full-height				2	2	2
P9R57A	0U—Full-height				2	2	2
P9R58A	0U—Mid-height			2	2	2	2
P9R59A	0U—Full-height			2	2	2	2
P9R60A	0U—Full-height				2	2	2
P9R61A	0U—Full-height				2	2	2
P9R82A	0U—Half-height high density[1]		1	1	2	2	2
P9R86A	0U—Full-height				2	2	2
P9R83A	0U—Full-height high density[1]				1	1	1
P9R84A	0U—Half-height high density[1]		1	1	2	2	2

Table Continued

HPE P/N	Form factor	14U	22U	36U	42U	47U	48U
P9R87A	0U—Full-height				2	2	2
P9R85A	0U—Full-height high density[1]				1	1	1

[1] HPE high-density model mounts on its side with outlets facing the back of the rack.

Metered 1U PDU (true 0U)—maximum configuration

Mounting configuration for a 1U PDU in an HPE 1075 mm rack depth between the RETMA rails. These are the maximum number of PDUs per side of rack.

HPE P/N	Form factor	14U	22U	36U	42U	47U	48U
P9R45A	1U	1	2	2	6	6	6
P9R50A	1U	1	2	2	6	6	6
P9R51A	1U	1	2	2	6	6	6
P9R54A	1U	1	2	2	6	6	6
P9R77A	1U	1	2	2	6	6	6
P9R78A	1U	1	2	2	6	6	6
P9R79A	1U	1	2	2	6	6	6
P9R80A	1U	1	2	2	6	6	6
P9R81A	1U	1	2	2	6	6	6

Switched PDUs—rack mounting options

HPE P/N	Form factor	0U (Vertical)	0U (between RETMA rails)	U position in rack
P9S07A	1U		*	*
P9S08A	0U—Half height	*		
P9S09A	0U—Mid-height	*		
P9S10A	2U			*
P9S11A	1U		*	*
P9S12A	0U—Half-height	*		
P9S13A	2U			*
P9S14A	0U—Full-height	*		
P9S16A	2U			*
P9S17A	0U—Full-height	*		

Switched 0U (Vertical) PDUs—maximum configuration

Mounting configuration for 0U (vertical) PDUs in an HPE 1075 mm rack depth. These are the maximum number of PDUs per side of rack.

HPE P/N	Form factor	14U	22U	36U	42U	47U	48U
P9S08A	0U—Half-height		2	2	4	4	4
P9S09A	0U—Mid-height			2	2	2	2
P9S12A	0U—Half-height		2	2	4	4	4
P9S14A	0U—Full-height				2	2	2
P9S17A	0U—Full-height				2	2	2

Switched 1U PDU (true 0U)—maximum configuration

Mounting configuration for a 1U PDU in an HPE 1075 mm rack depth between the RETMA rails. These are the maximum number of PDUs per side of rack.

HPE P/N	Form factor	14U	22U	36U	42U	47U	48U
P9S07A	1U	1	2	2	6	6	6
P9S11A	1U	1	2	2	6	6	6

Metered & Switched PDUs—rack mounting options

HPE P/N	Form factor	0U (Vertical)	0U (between RETMA rails)	U position in rack
P9S15A	0U—Full-height	*		
P9S18A	0U—Full-height	*		
P9S19A	0U—Full-height	*		
P9S20A	0U—Full-height	*		
P9S21A	0U—Full-height	*		
P9S22A	0U—Full-height	*		
P9S23A	0U—Full-height high-density [1]	*		
P9S24A	0U—Full-height	*		
P9S25A	0U—Full-height high-density [1]	*		

[1] HPE high-density model mounts on its side with outlets facing the back of the rack.

Metered & Switched 0U (Vertical) PDUs—maximum configuration

Mounting configuration for 0U (vertical) PDUs in an HPE 1075 mm rack depth. These are the maximum number of PDUs per side of rack.

HPE P/N	Form factor	14U	22U	36U	42U	47U	48U
P9S15A	0U—Full-height				2	2	2
P9S18A	0U—Full-height				2	2	2
P9S19A	0U—Full-height				2	2	2

Table Continued

HPE P/N	Form factor	14U	22U	36U	42U	47U	48U
P9S20A	0U—Full-height				2	2	2
P9S21A	0U—Full-height				2	2	2
P9S22A	0U—Full-height				2	2	2
P9S23A	0U—Full-height high-density [1]				1	1	1
P9S24A	0U—Full-height				2	2	2
P9S25A	0U—Full-height high-density [1]				1	1	1

[1] HPE high-density model mounts on its side with outlets facing the back of the rack.

Load segment and phase distinction

HPE G2 PDUs have colored receptacles to help distinguish between the different load segments and phases. All HPE 3Ph PDUs have different colored receptacles (white, light gray, and black) to distinguish the different phases. All HPE PDUs with breakers have different colored receptacles to distinguish the different load segments. The one exception to the colored receptacles is shown in the following illustrations. For 1Ph PDUs with no breakers, the receptacles are all black.

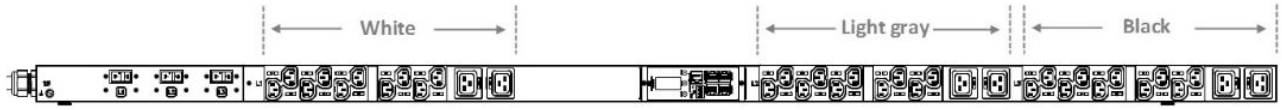


Figure 1: 1Ph PDU example

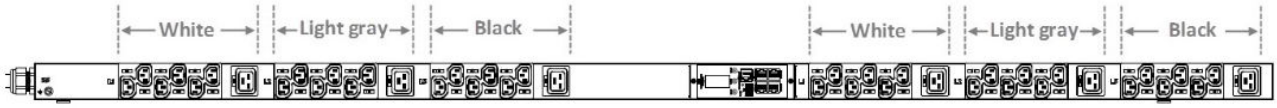


Figure 2: 3Ph PDU example

There is one exception to the different colored receptacles per load segment. The 3Ph half-height high-density model has two different load segments on each phase, as shown in the following illustration.

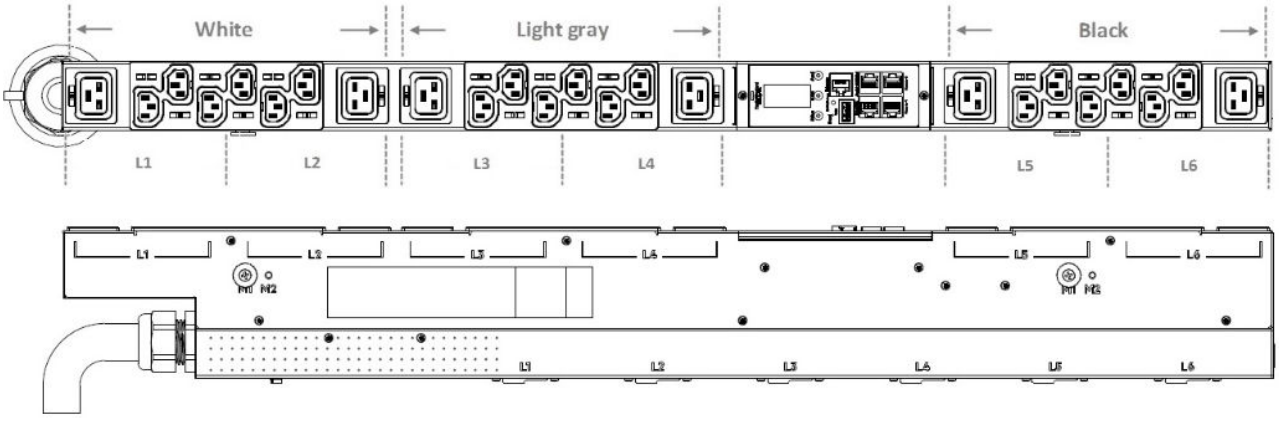


Figure 3: 3Ph half-height high-density PDU example (P9R82A and P9R84A)

Power cord retention

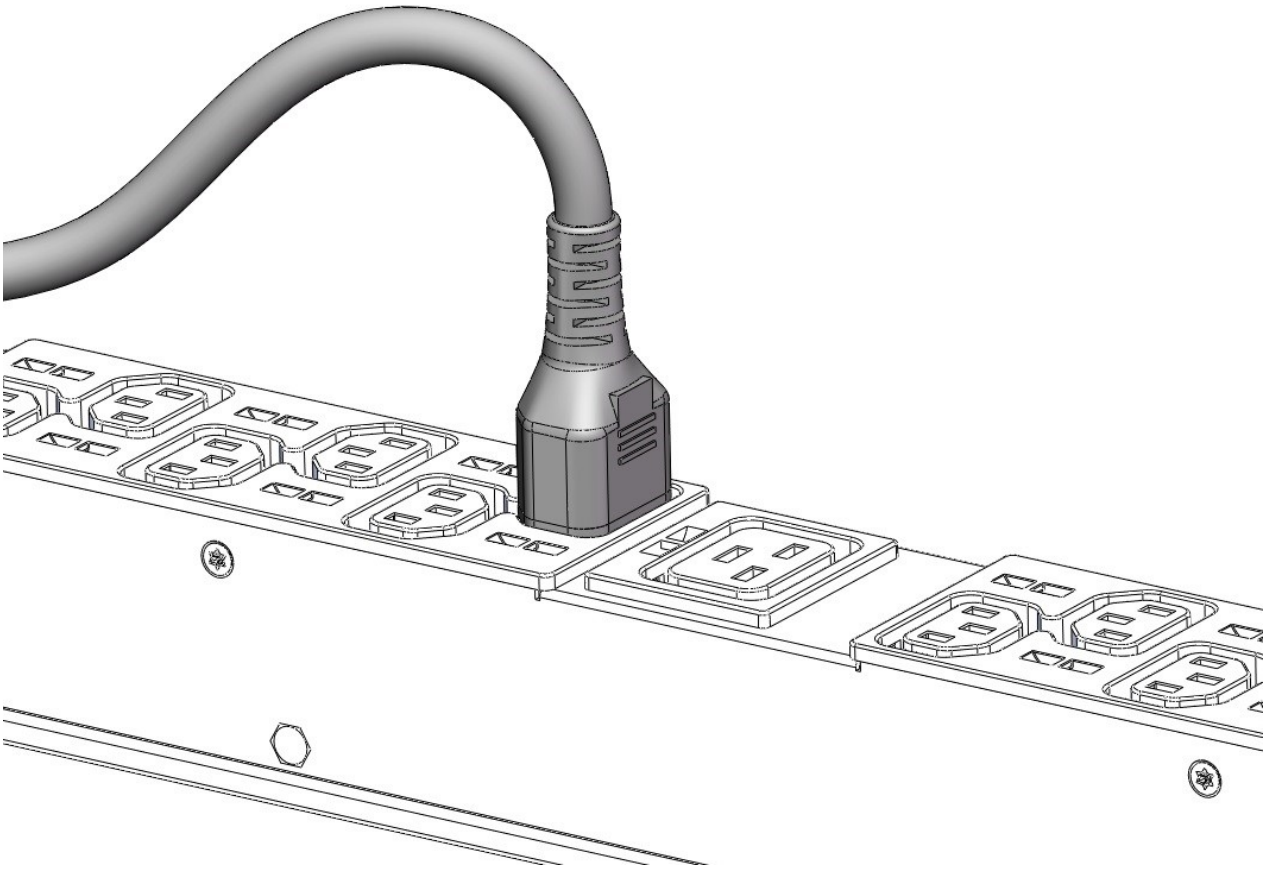
Integrated cord retention

About this task

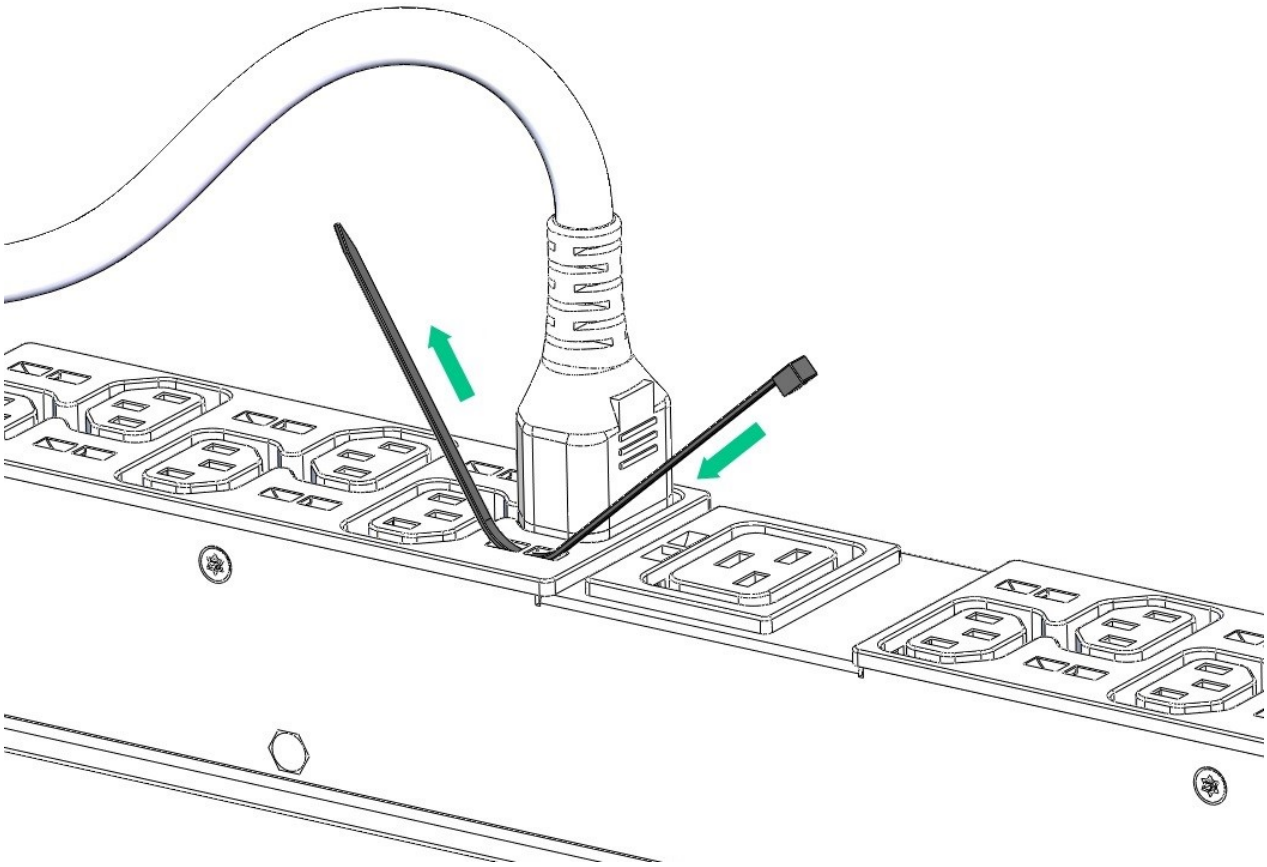
Each IEC C13 and C19 outlet on the PDU has an integrated cord retention feature that allows you to secure the cord to the outlet without needing a cord retention bracket.

Procedure

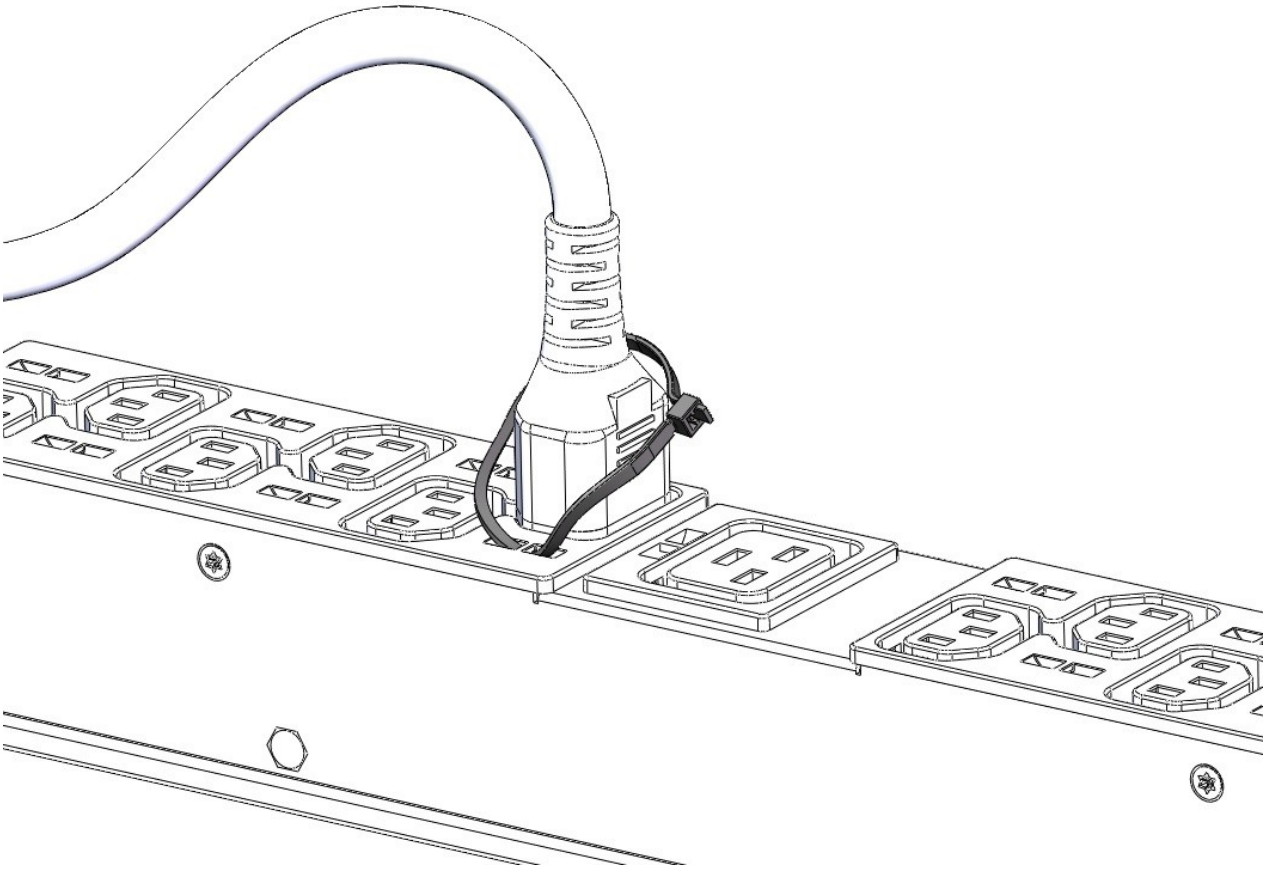
1. Plug in the power cord.



2. Using one of the tie wraps provided, slide the end of the tie wrap into the notch on the PDU next to the desired outlet, and then wrap it around the cord.

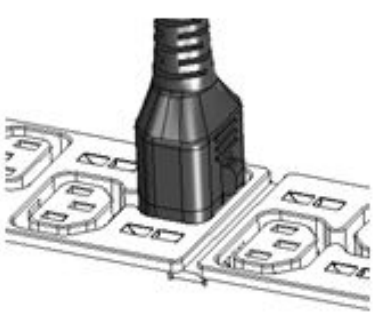


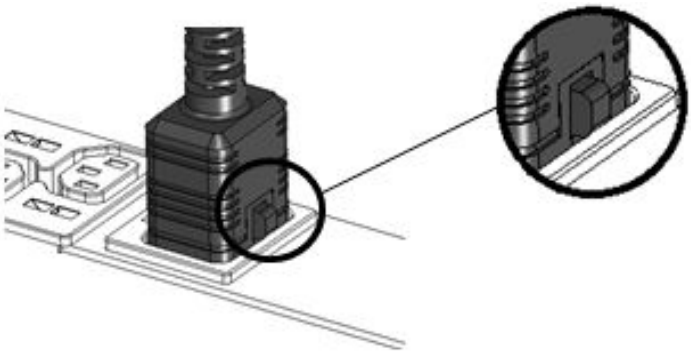
3. Secure the tie wrap.



Locking power cord

Optional locking power cords can be used on each IEC C13 and C19 outlet on the PDU. Several lengths are available to support any configuration. The following illustration shows the locking power cord engaged with the outlets.





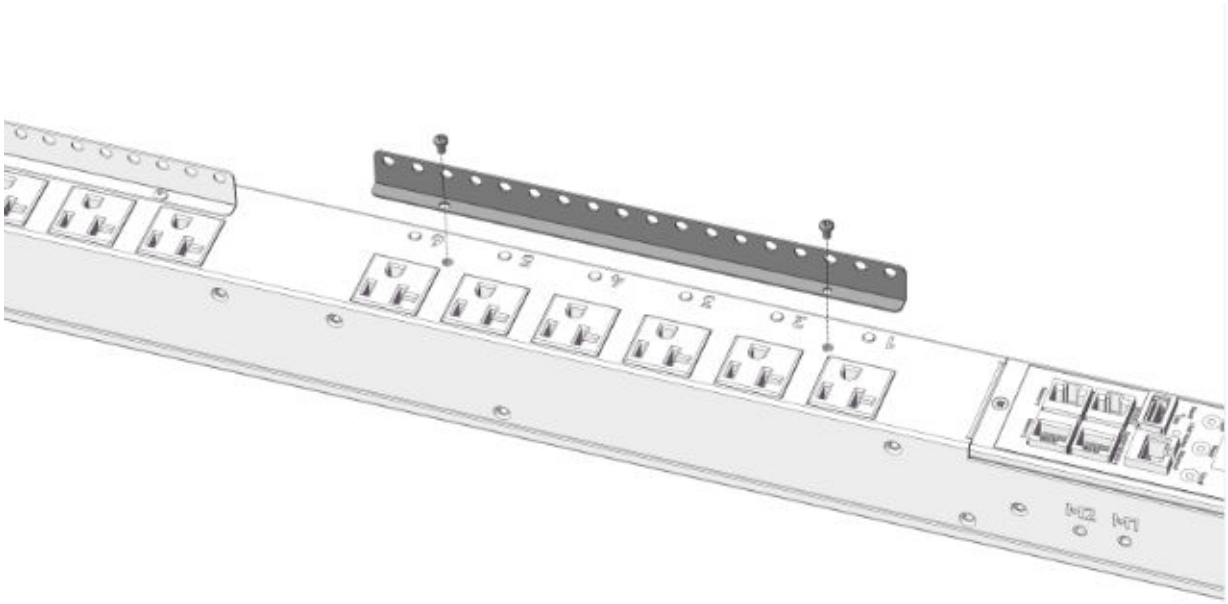
NEMA 5-20R outlet retention bracket

About this task

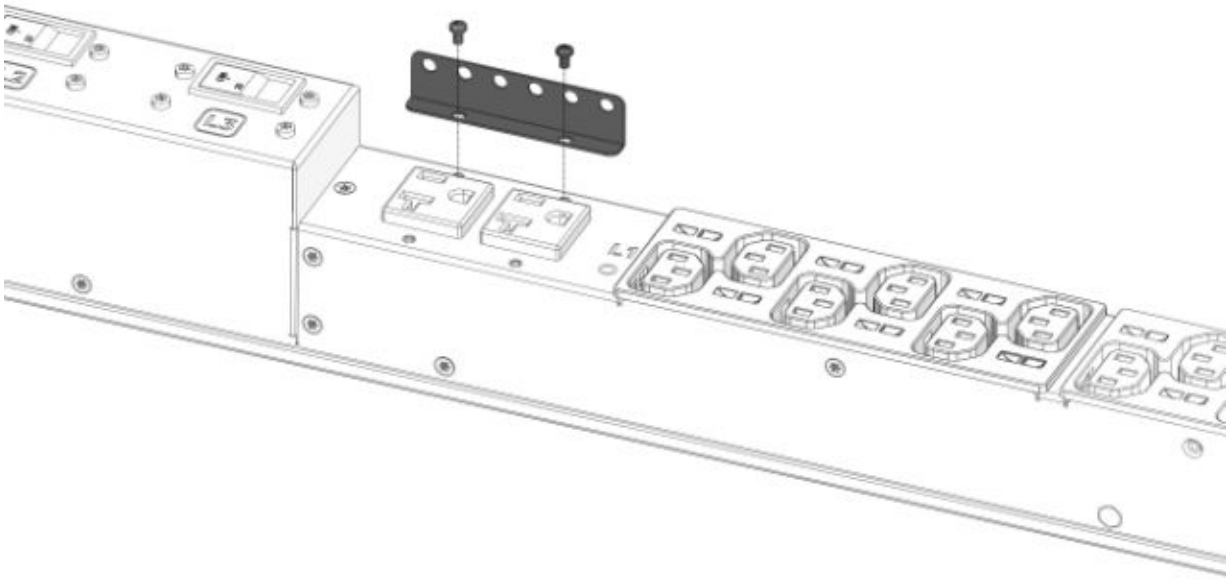
PDUs with 5-20R outlets require installation of a separate retention bracket to secure the equipment power cord at the outlet. For instructions on how to install the retention bracket for each form factor, see **Installing the PDU**.

Procedure

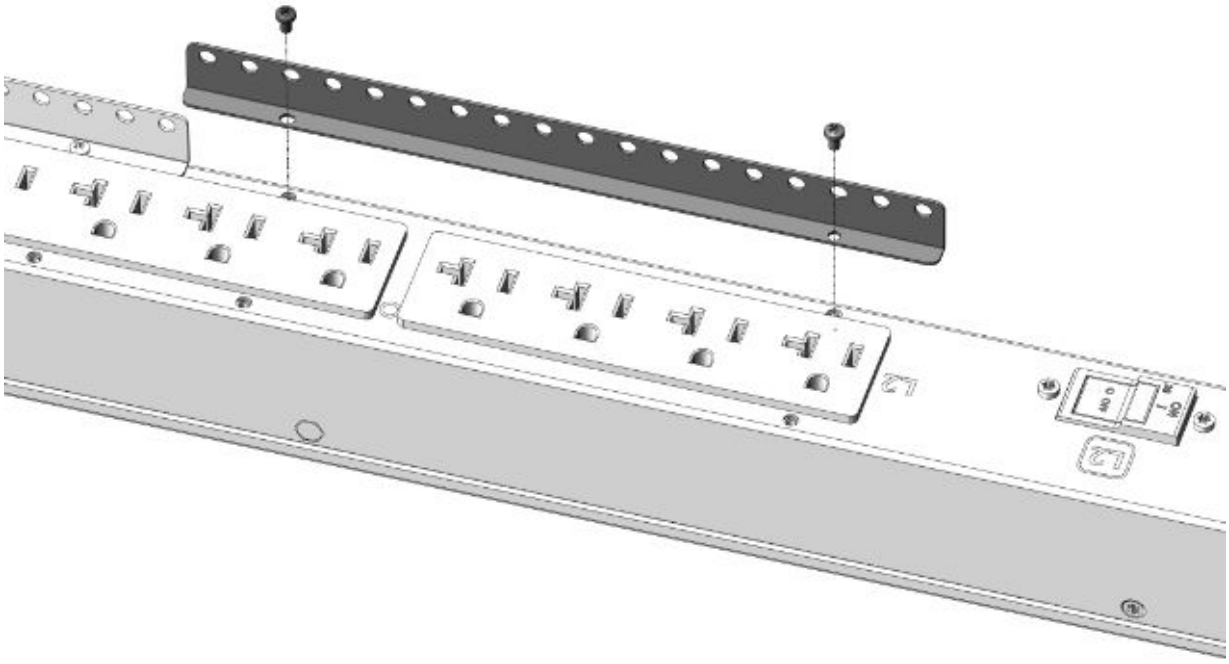
1. Using the screws provided, attach the bracket to one of the locations shown in the following illustrations, a - d.



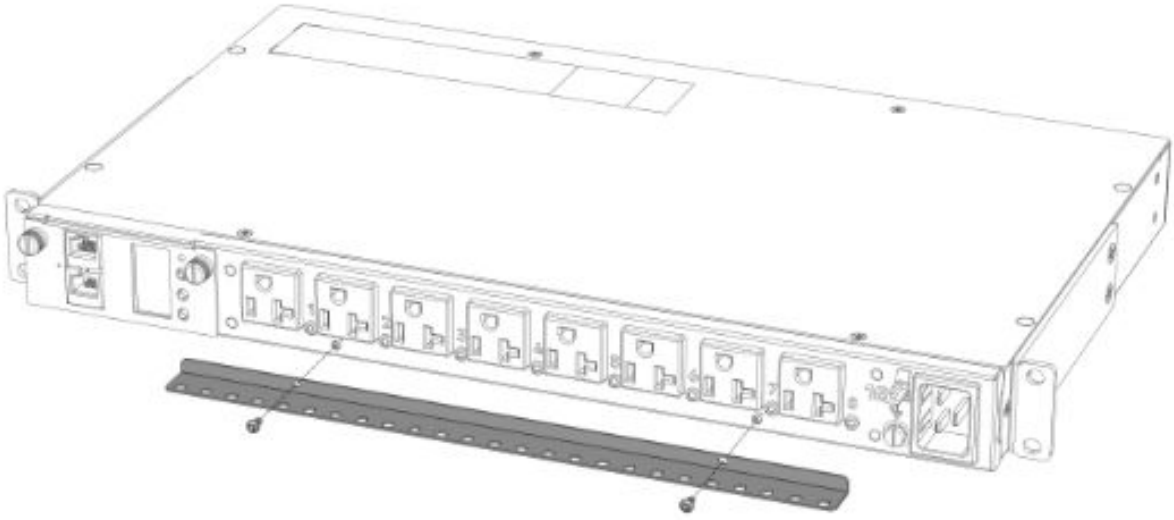
a.



b.

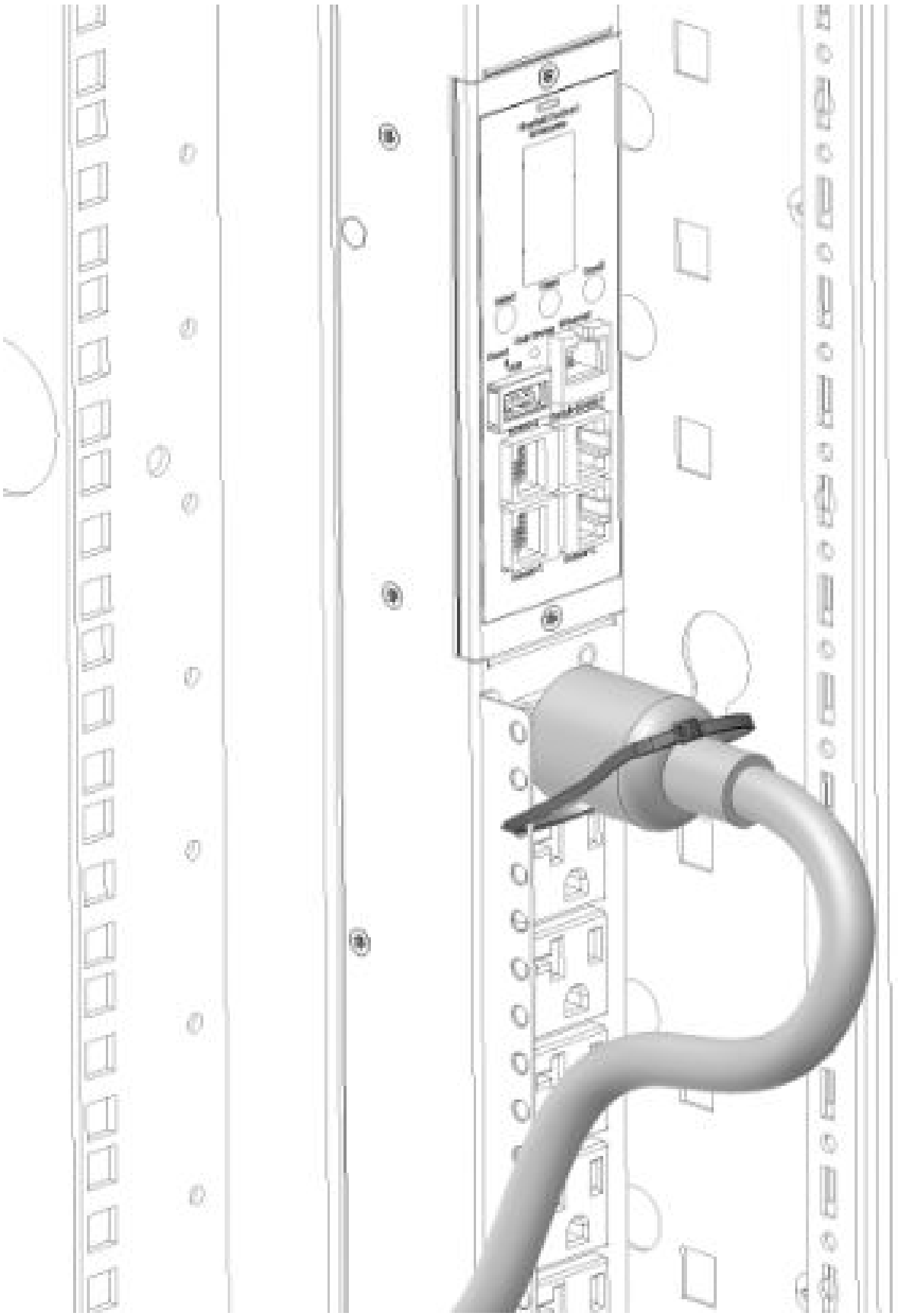


c.



d.

2. Install the PDU into the rack.
3. Feed the tie wrap through the hole in the retention bracket and around the input cord.



Installing the PDU

Required tools

- Phillips screwdriver
- Torx screwdriver

Vertical PDU installation

HPE Vertical PDUs include the following form factor models:

- Half-height
- Mid-height
- Full-height

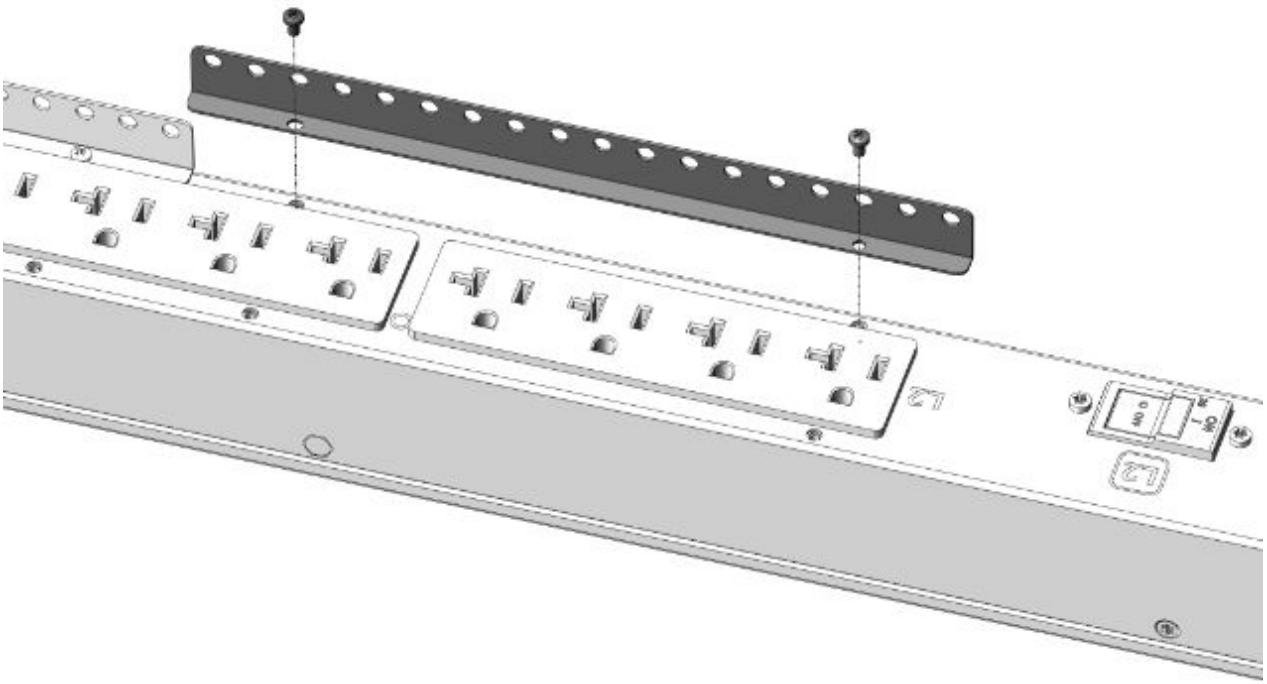
Installing cord retention brackets

About this task

The following instructions are for PDUs with NEMA 5-20R outlets, which require the installation of a separate retention bracket to secure the input power cord at the outlet.

Procedure

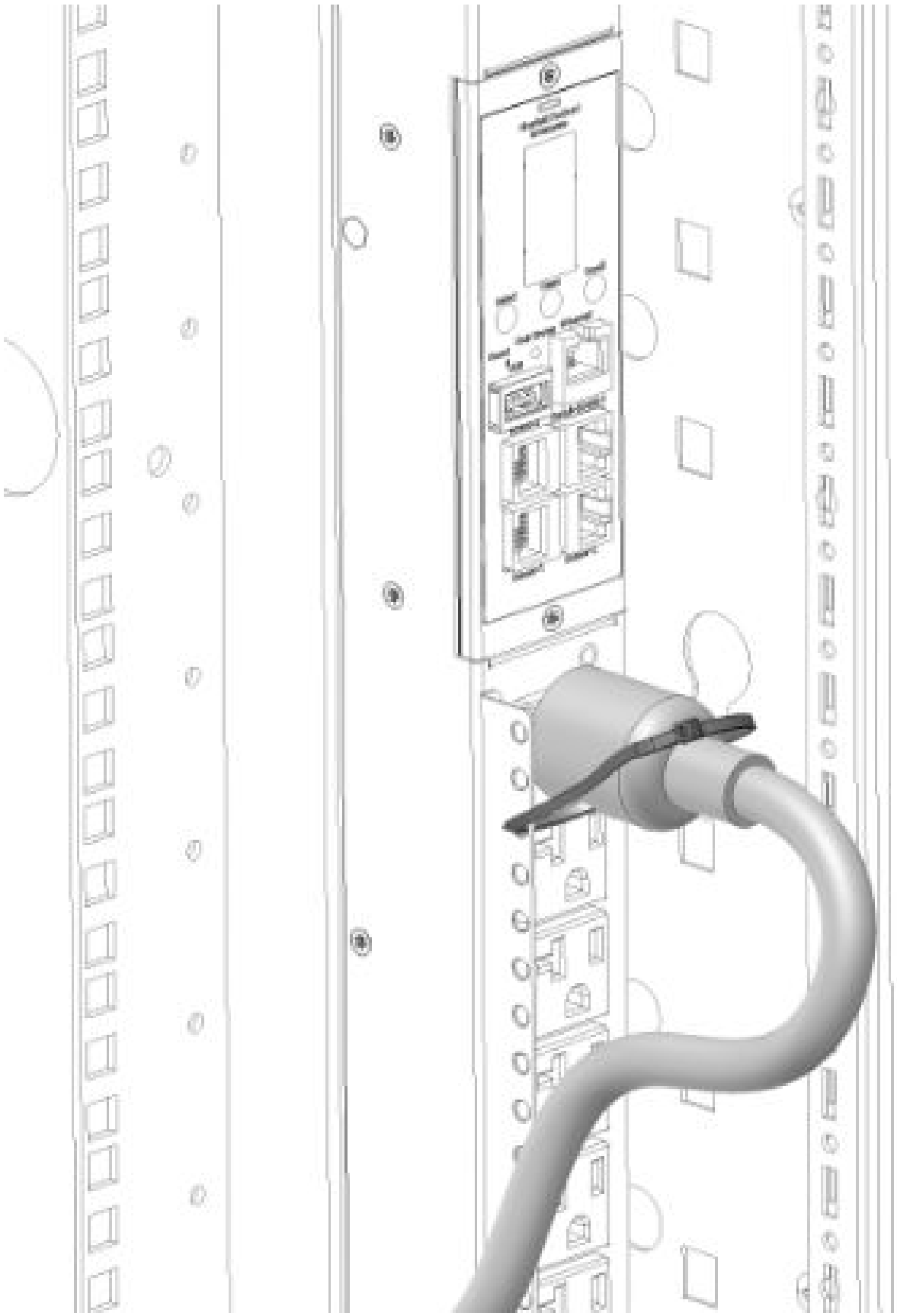
1. Attach the bracket to the unit using the screws provided.



2. Install the PDU into the rack.

For more instructions, see **Installing mounting hardware**.

3. Insert the power cord.
4. Feed the tie wrap through the hole in the retention bracket and around the input cord.



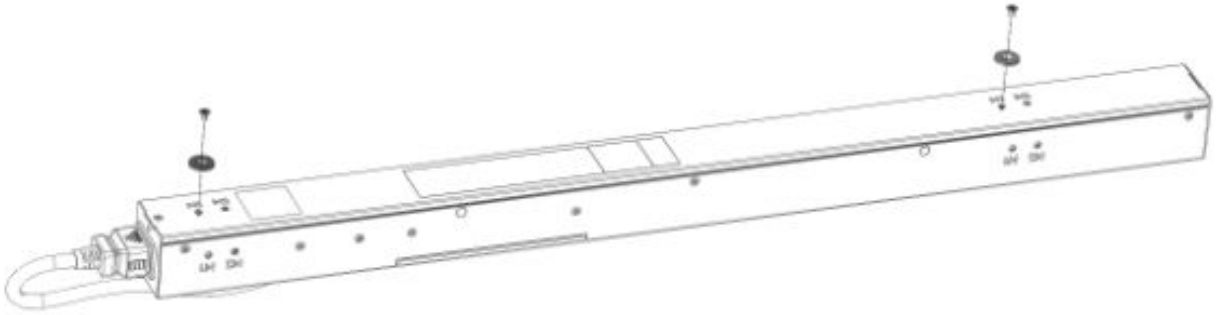
Installing the mounting hardware

To assist with mounting in non-HPE racks, each vertical PDU has two mounting hole locations (M1 and M2) on the sides and back of the PDU for installing the buttons. When installing the mounting buttons, use either the M1 or M2 mounting holes as a set.

Installing the mounting button–outlets facing the center of the rack

Procedure

1. Align and install the mounting buttons in the screw holes on the face opposite of the receptacles.

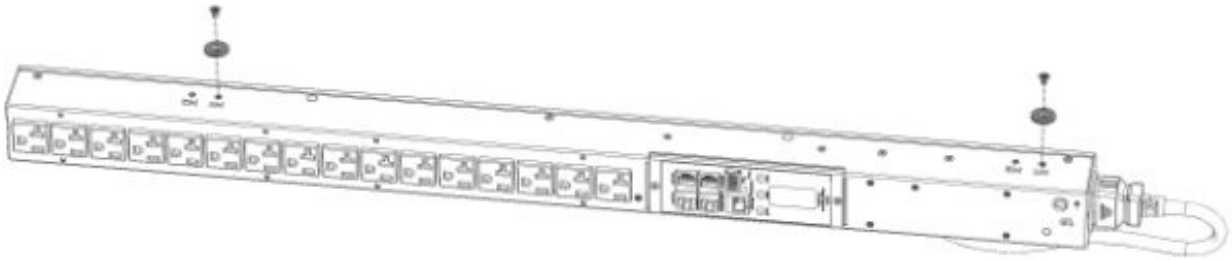


2. Install the PDU by inserting the mounting buttons in the keyhole slots on the PDU mounting bracket in the rack.

Installing the mounting button–outlets facing the back or front of the rack

Procedure

1. Align and install the mounting buttons in the screw holes on the side of the PDU.

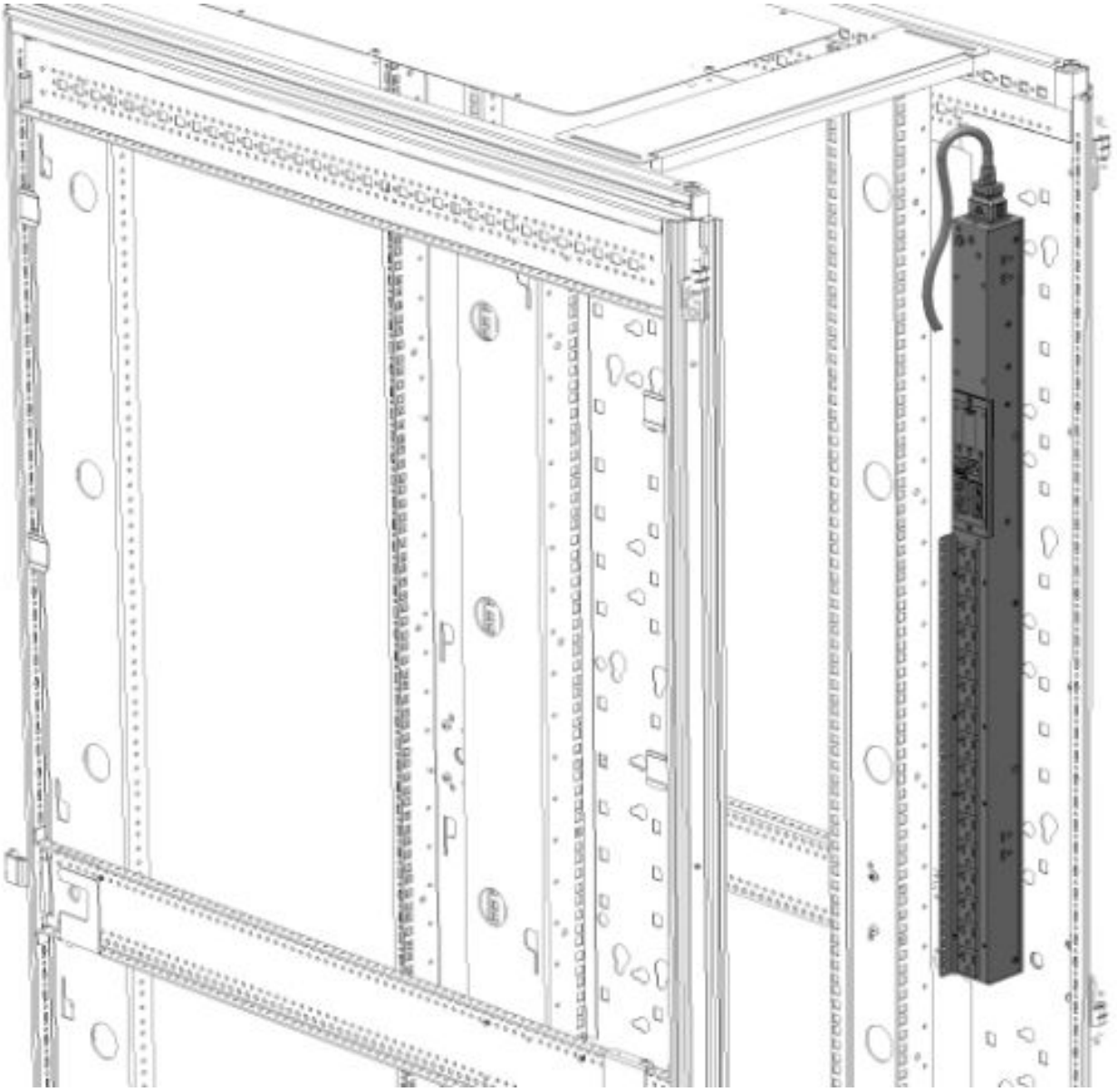


2. Install the PDU by inserting the mounting buttons in the keyhole slots on the PDU mounting bracket in the rack.

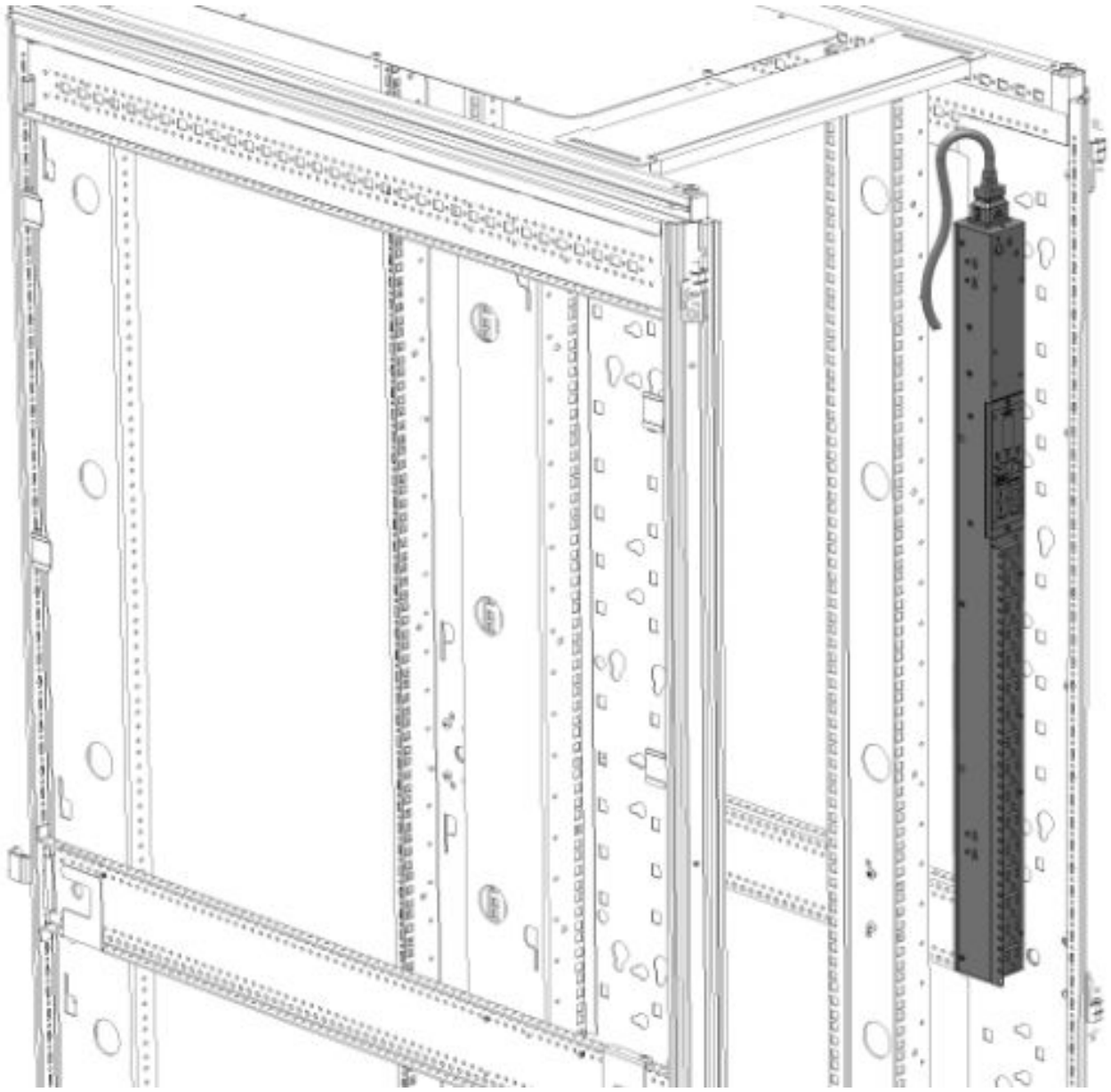
Vertical (0U) PDU—single installation

A single Vertical PDU can be installed with the outlets facing one of the following ways:

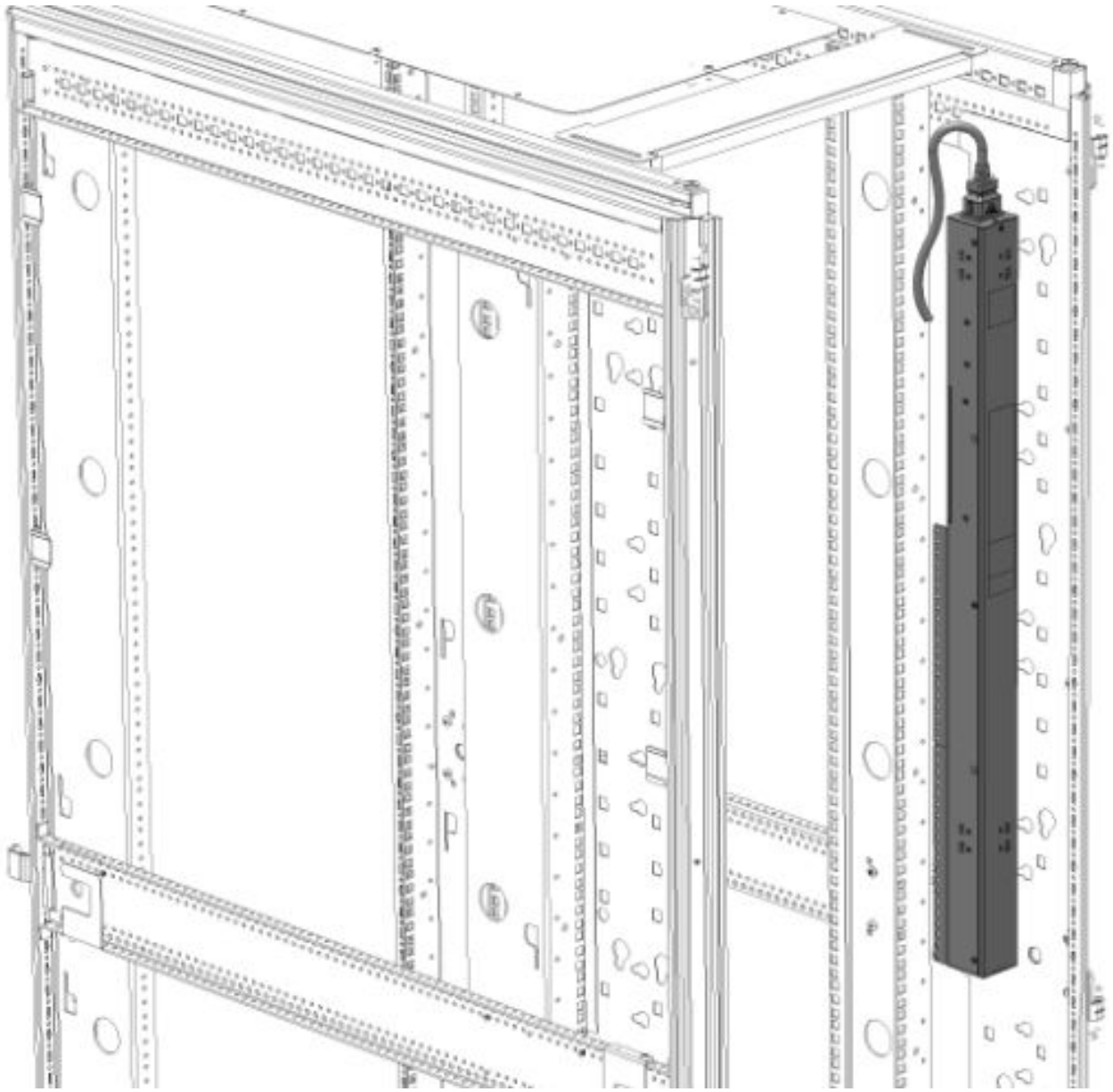
- Outlets facing the center of the rack



- Outlets facing the back of the rack



- Outlets facing the front of the rack

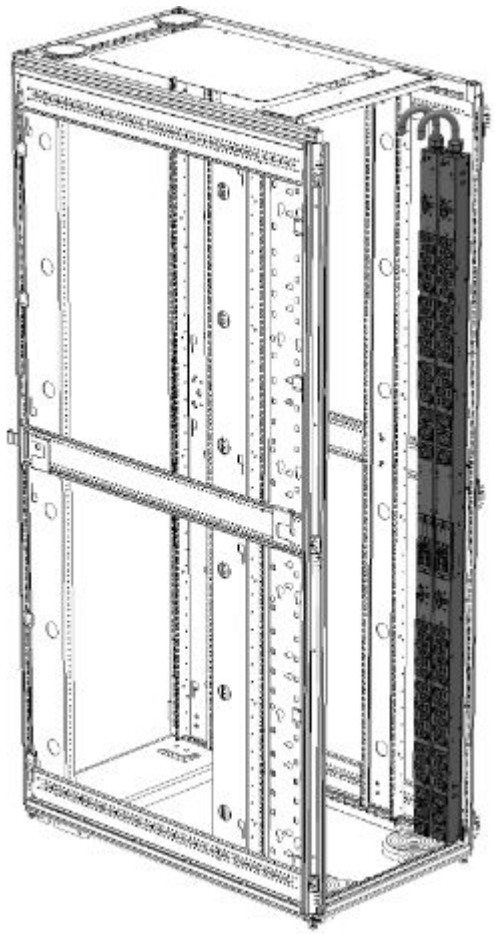


NOTE: These installation methods apply to all vertical models except for the high-density models. High-density units must be installed on its side with the outlets facing the back of the rack. For more information, see **High-density PDU installation**.

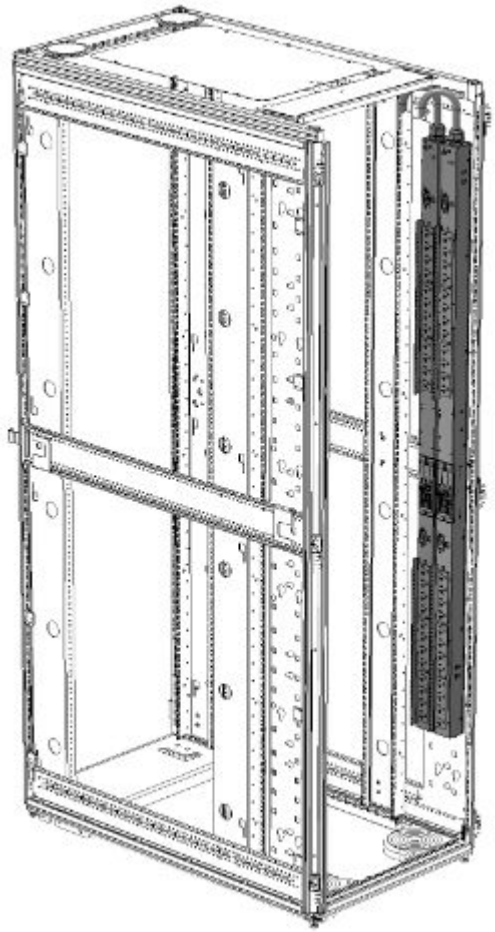
Vertical (0U) PDU—two or more installations

In order for two full-height (in a 42U/47U/48U rack), two mid-height (in a 36U/42U/47U/48U rack), or four half-height (in a 42U/47U/48U rack) vertical units to be mounted on one side of the rack, all units must be installed with the outlets facing towards the center of the rack. The following illustrations show how to install the units.

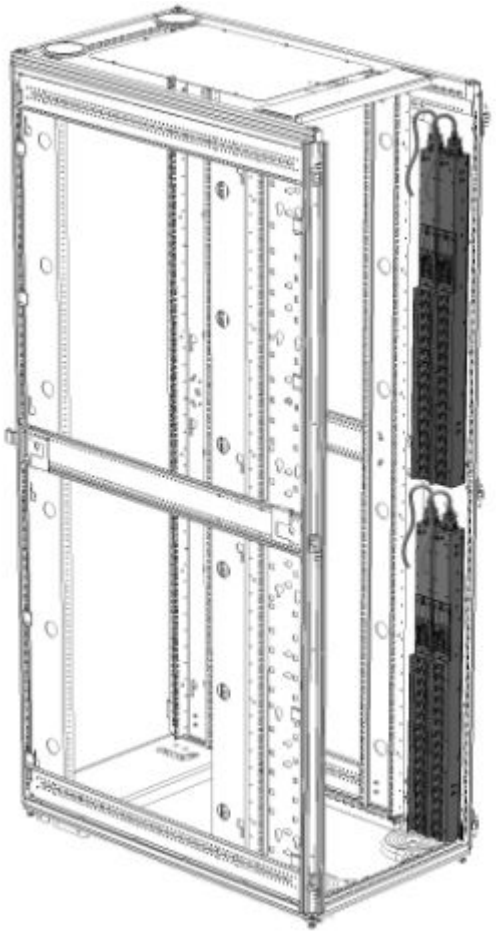
- Two full-height PDUs with outlets facing towards the center of the rack.



- Two mid-height PDUs with outlets facing towards the center of the rack.



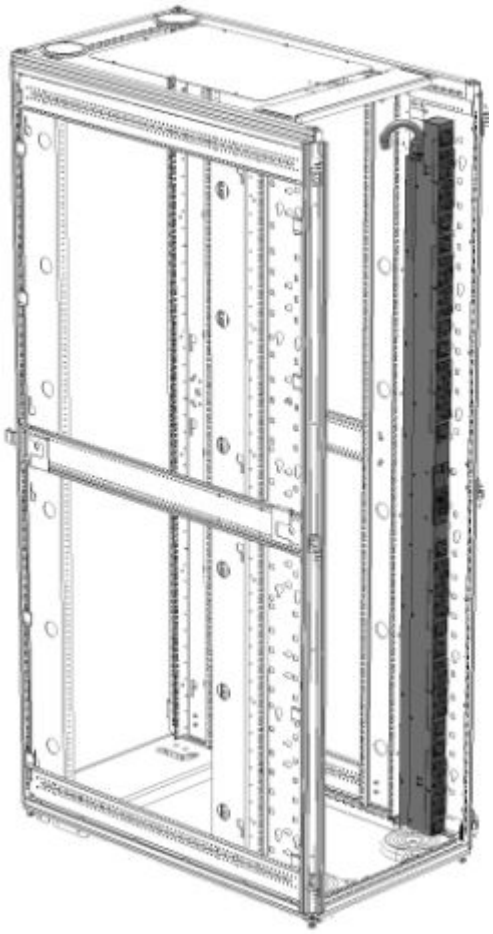
- Four half-height PDUs with outlets facing towards the center of the rack.



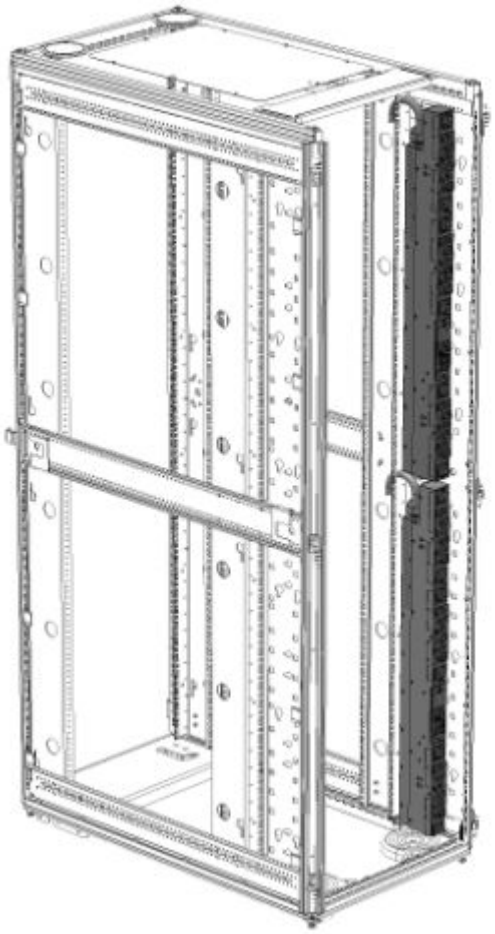
High-density PDU installation

High-density PDUs have a unique form factor and are available in the following models:

- Full-height



- Half-height



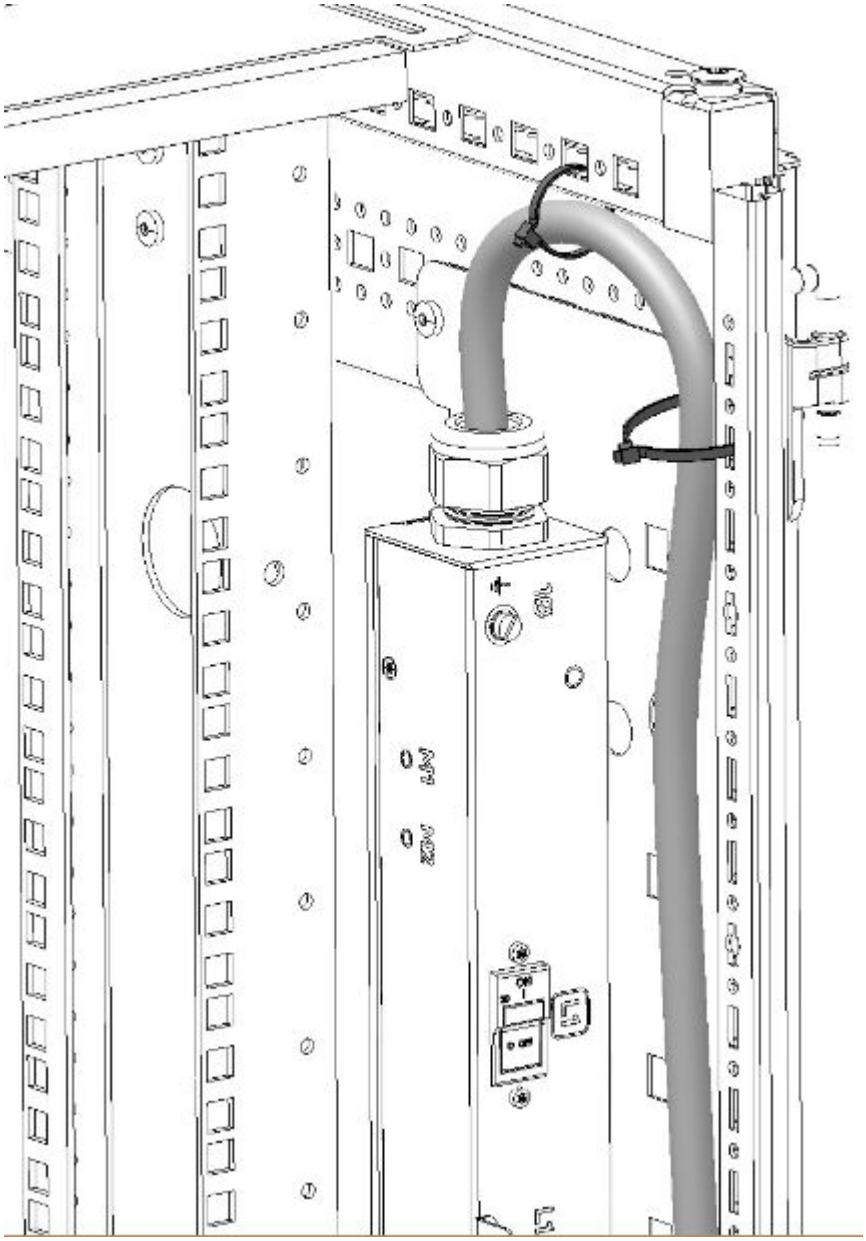
High-density PDUs must be installed on its side with the outlets facing the back of the rack.

NOTE: Only one full-height PDU can be installed on each side of the rack, and only two half-height PDUs can be installed on each side of the rack.

PDU shipping retention for rack transportation

For vertical PDUs with attached input power cord (mid-height and full-height models)

For rack transportation, mid-height and full-height vertical units with an attached input power cord must be secured using a tie wrap around the input cord and the rack frame.



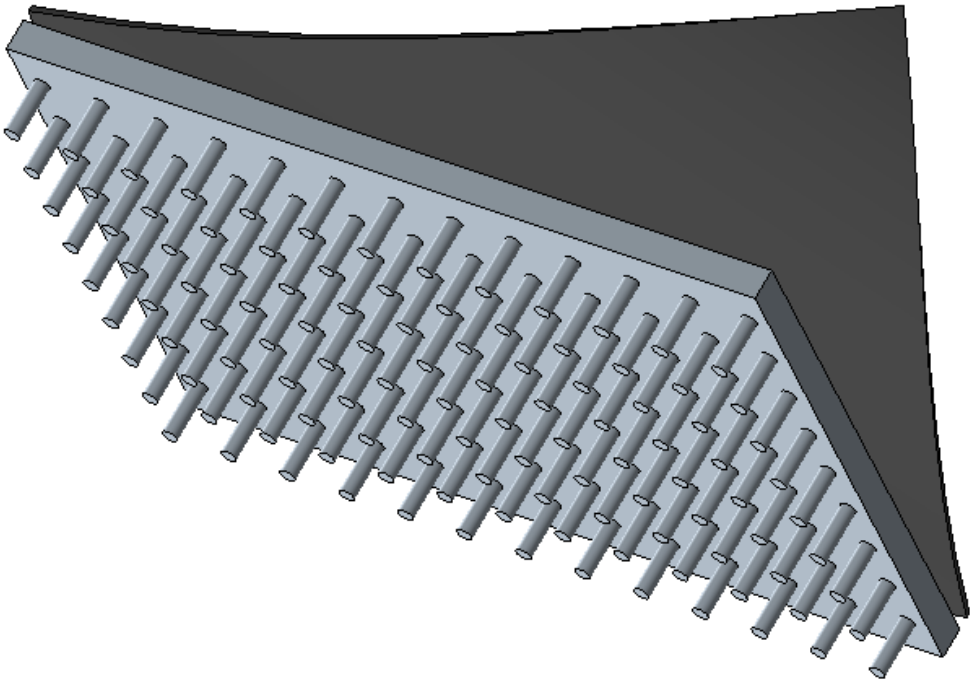
For Vertical PDUs with detached input power cord and for all half-height models

About this task

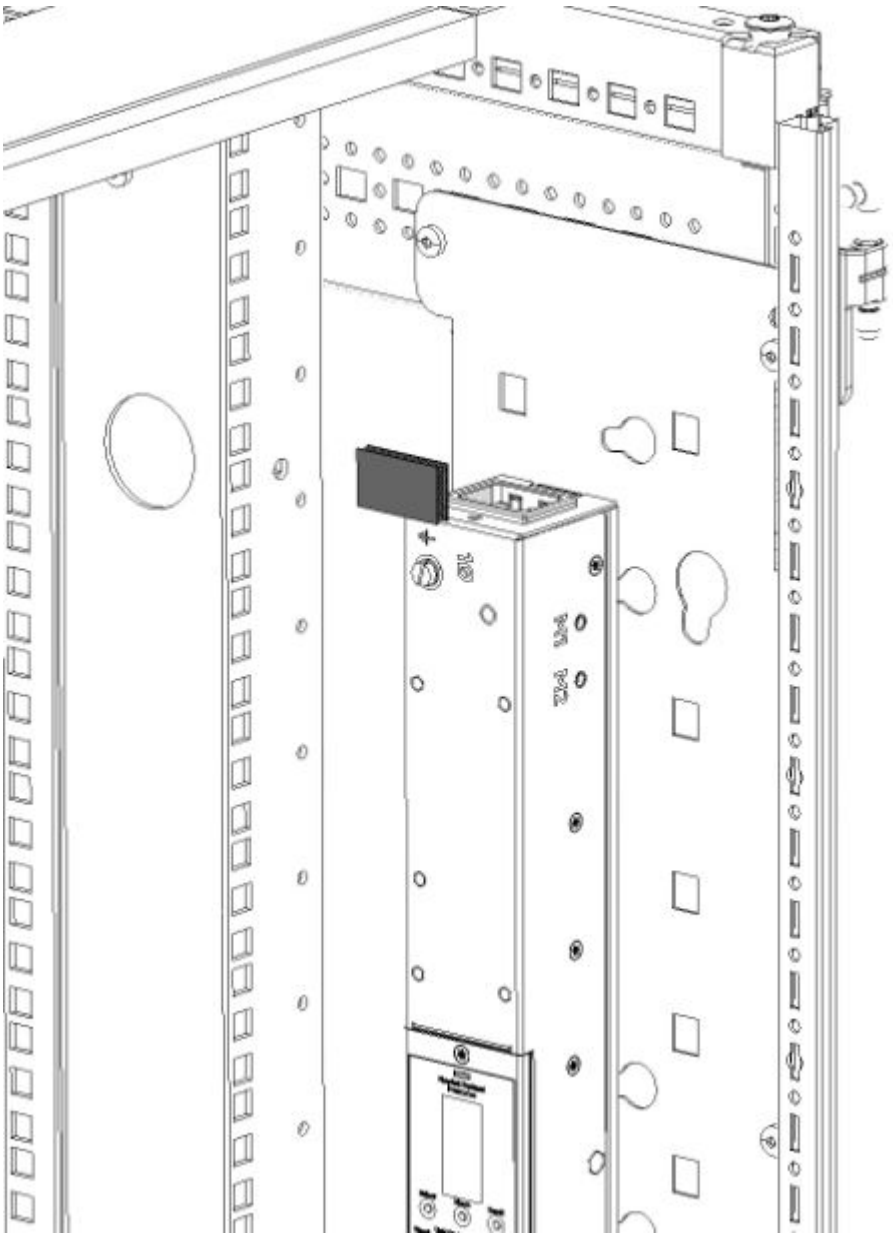
For rack transportation, Vertical units with a detached input power cord and all half-height units must be secured using the shipping retention locking tape.

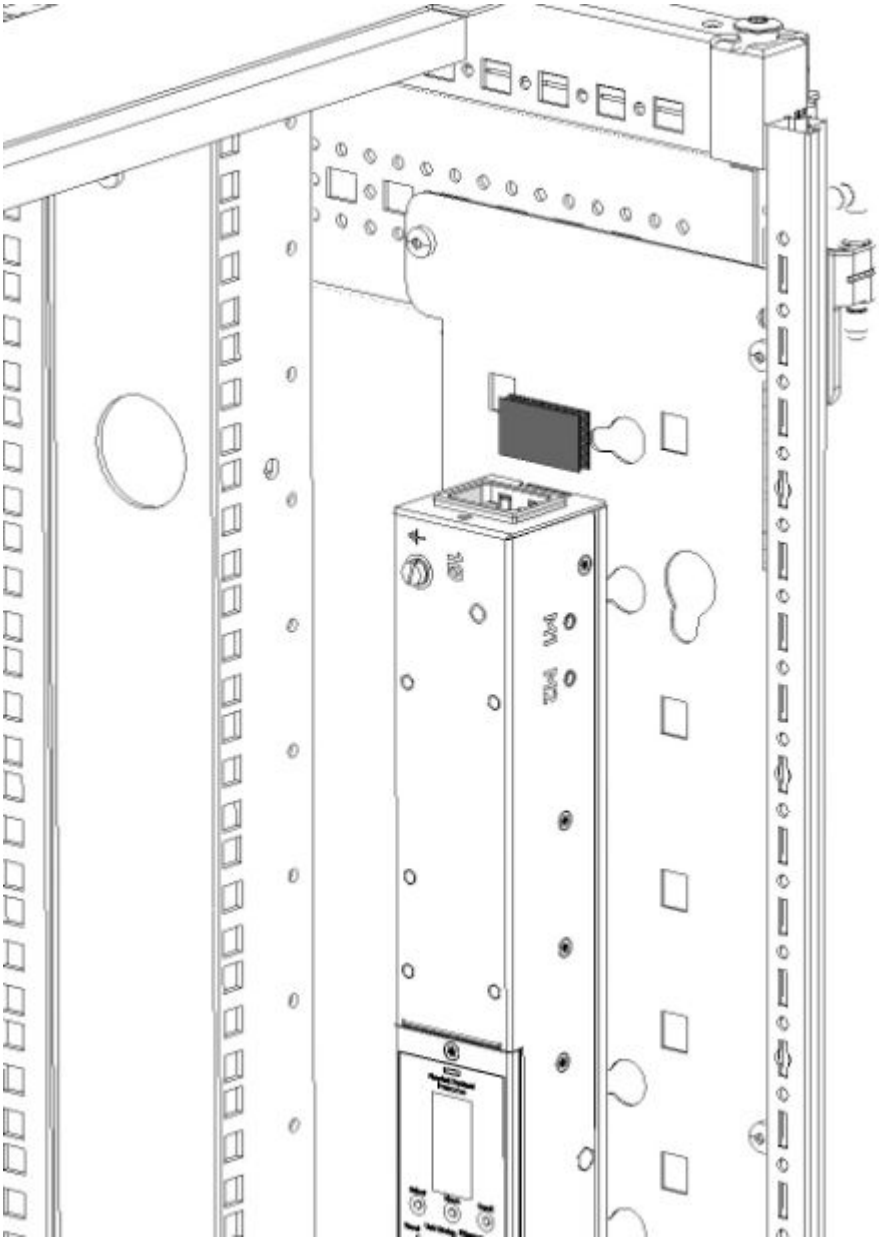
Procedure

1. Remove the adhesive backing from only one side of the shipping retention locking tape.



2. Place the locking tape directly above the unit on the rack PDU mounting bracket.





NOTE: If the PDU must be removed from the rack, remove the top piece of the locking tape and lift the unit out of the rack.

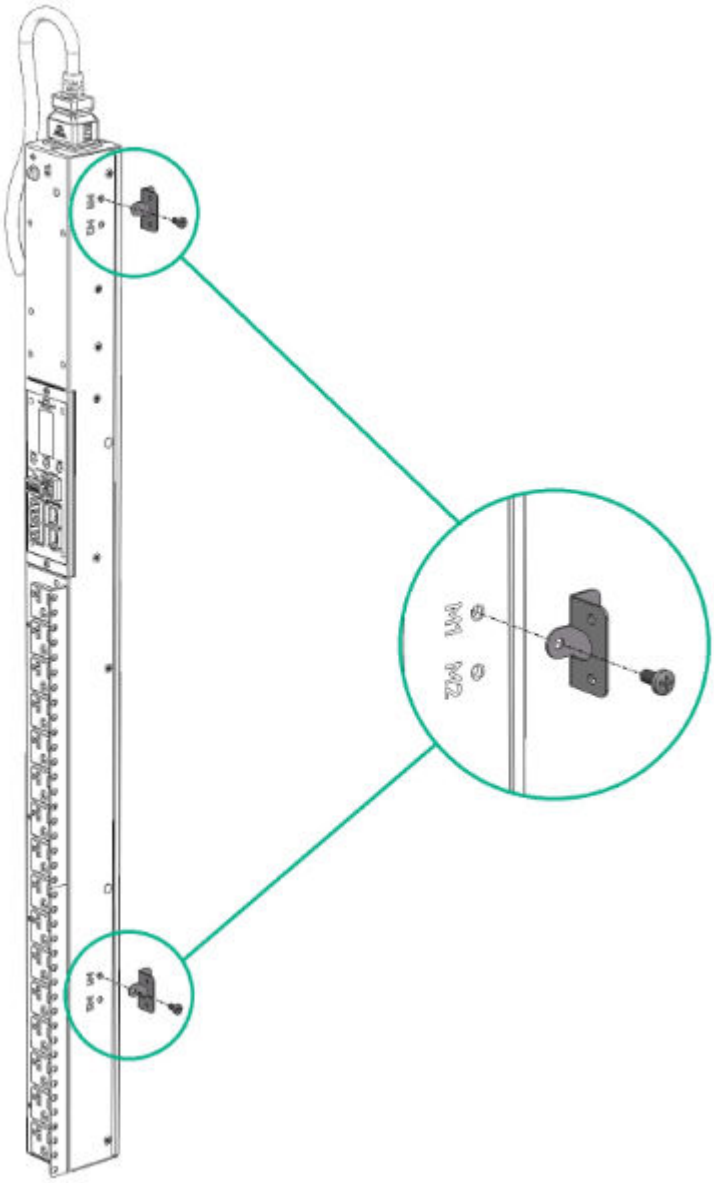
Installing a vertical PDU in an HPE standard G1 or 10K series rack

About this task

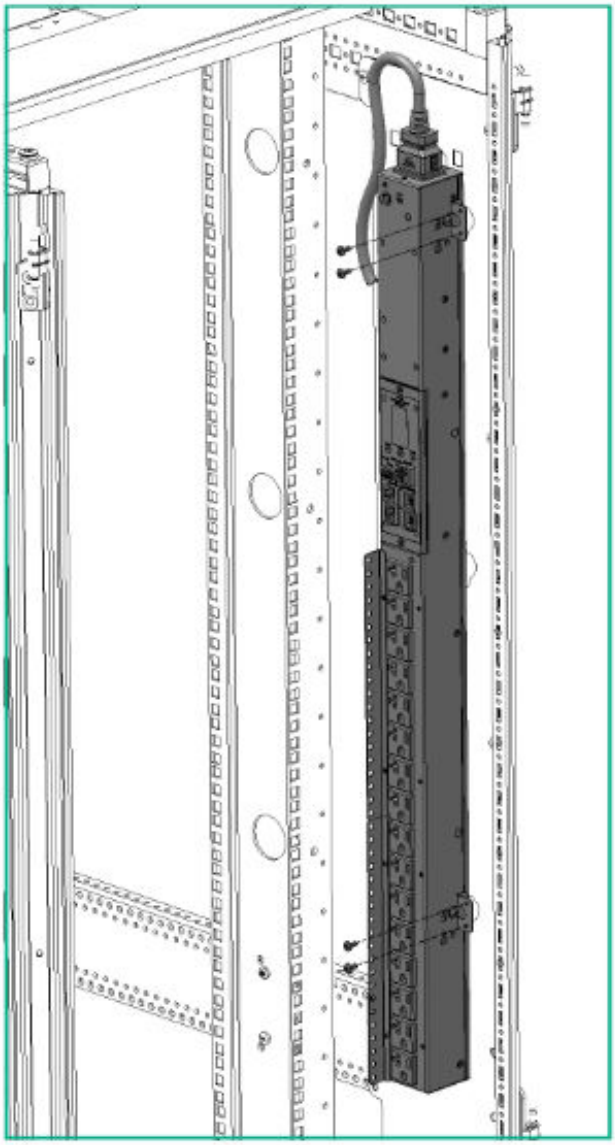
Installing a PDU in an older HPE 10K series rack requires option kit H6L32A, which is purchased separately.

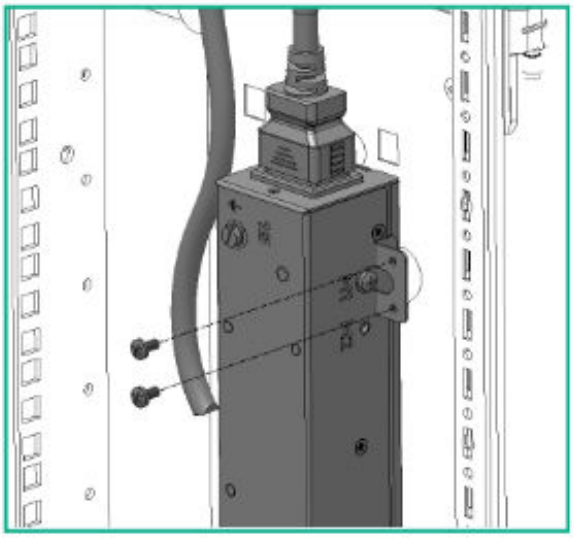
Procedure

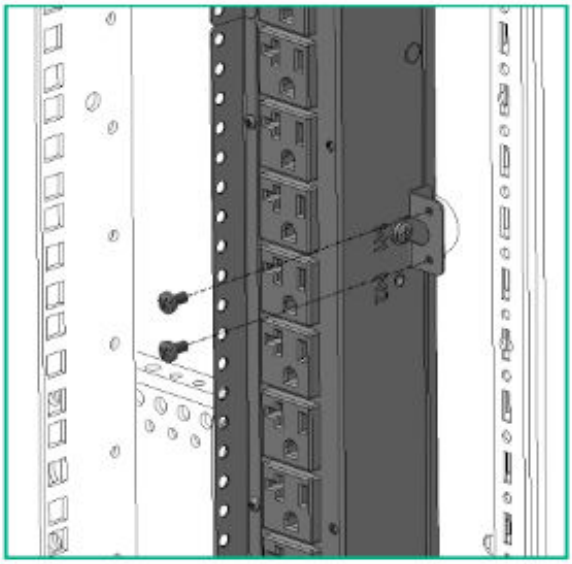
1. Install the brackets on the PDU.



2. Install the PDU in the rack frame.







1U PDU installation

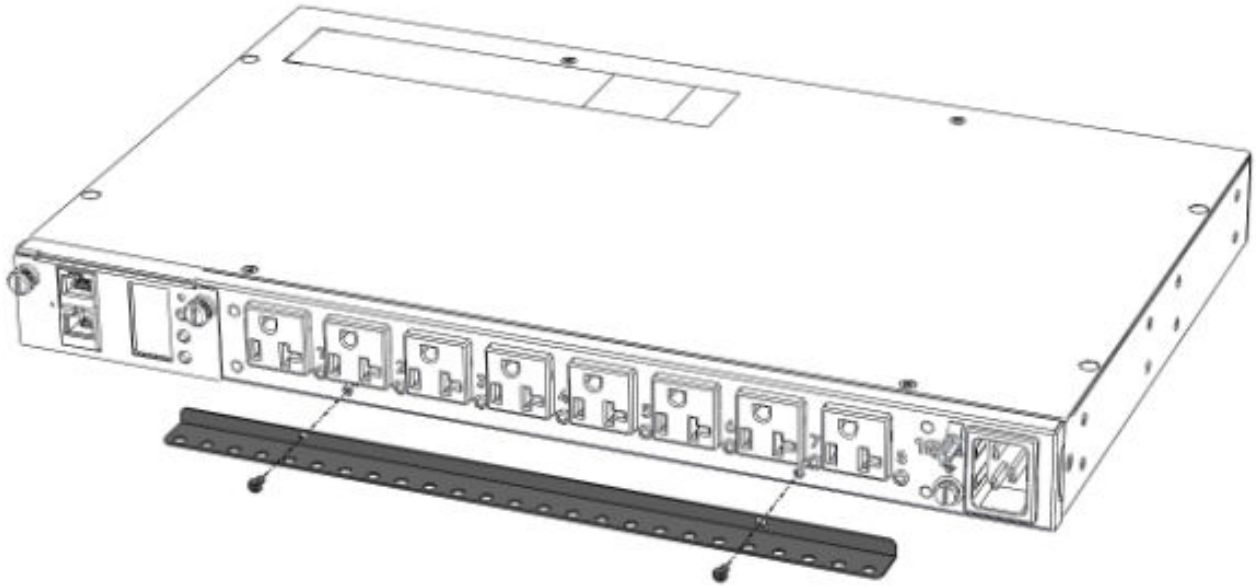
Installing cord retention brackets (PDUs with NEMA 5-20R outlets)

About this task

PDUs with 5-20R outlets require installation of a retention bracket to secure the input power cord at the outlet.

Procedure

1. Attach the retention bracket to the unit using the screws provided.



2. Install the PDU into the rack.

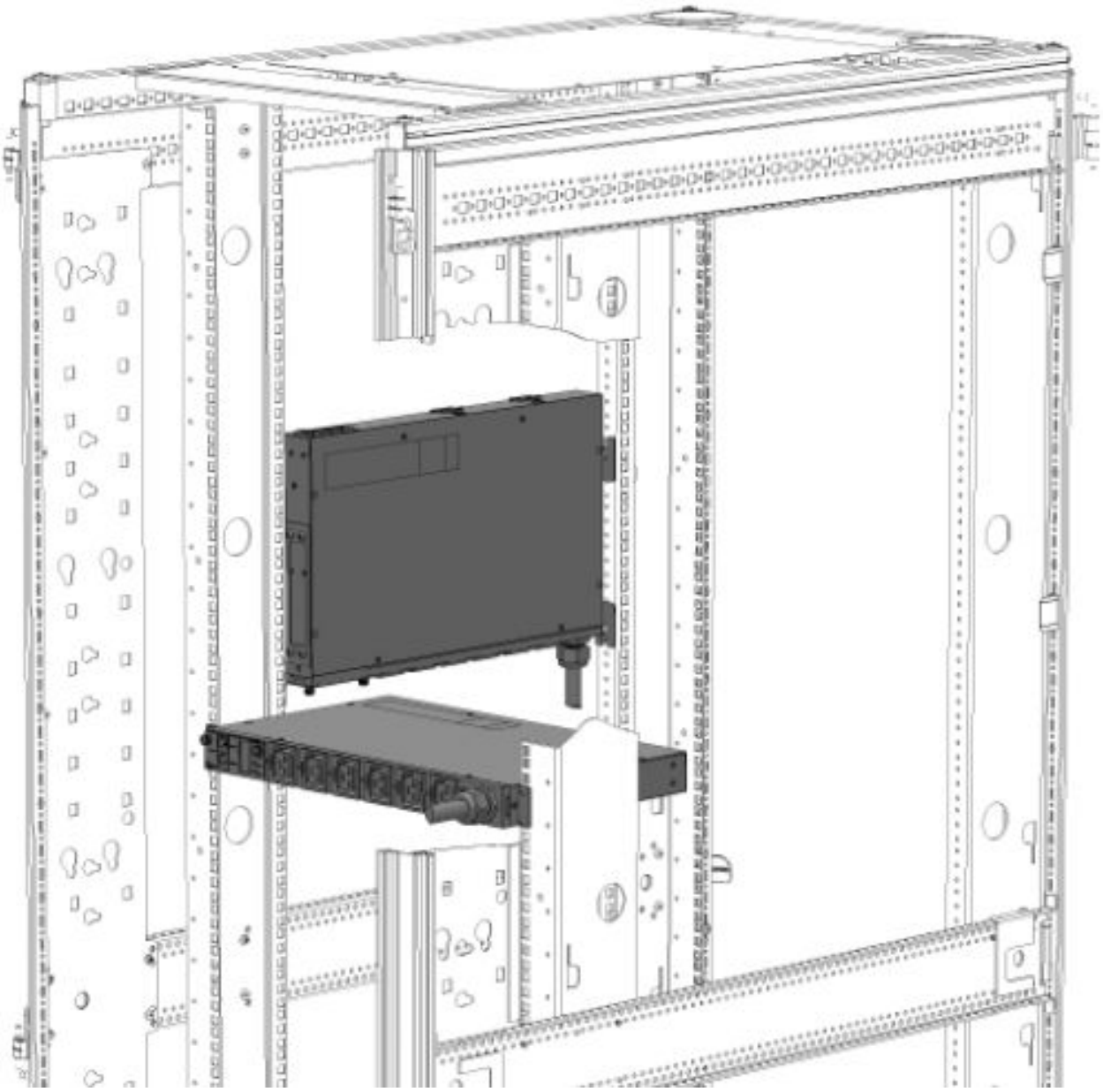
   For more information, see **Mounting hardware installation**.

3. Insert the power cord.

4. Feed the tie wrap through the hole in the retention bracket and around the input cord.

Mounting options

The 1U PDU can be installed in any 1U location of the rack, or in the true 0U space between the RETMA rails, with the outlets facing down.

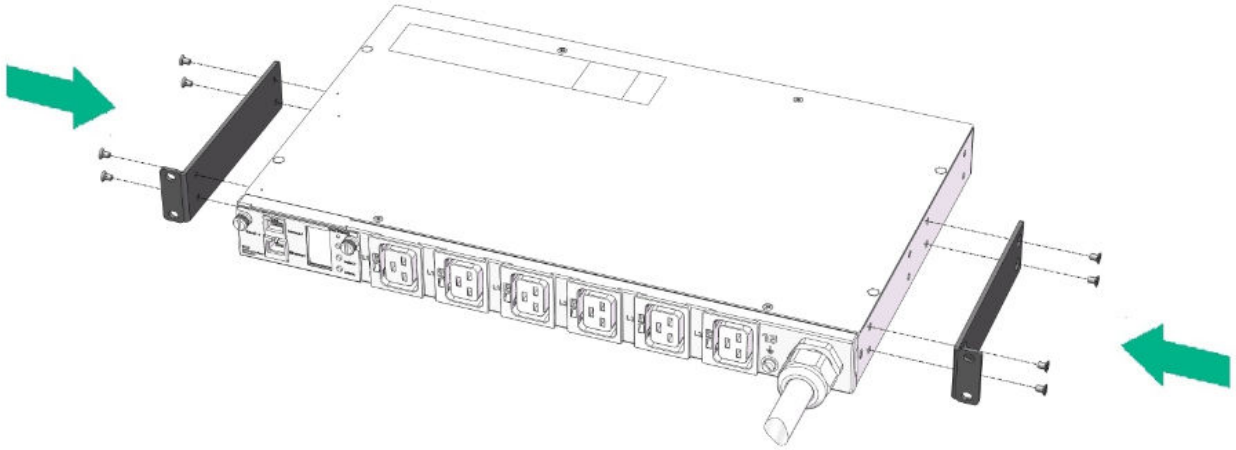


Mounting hardware installation

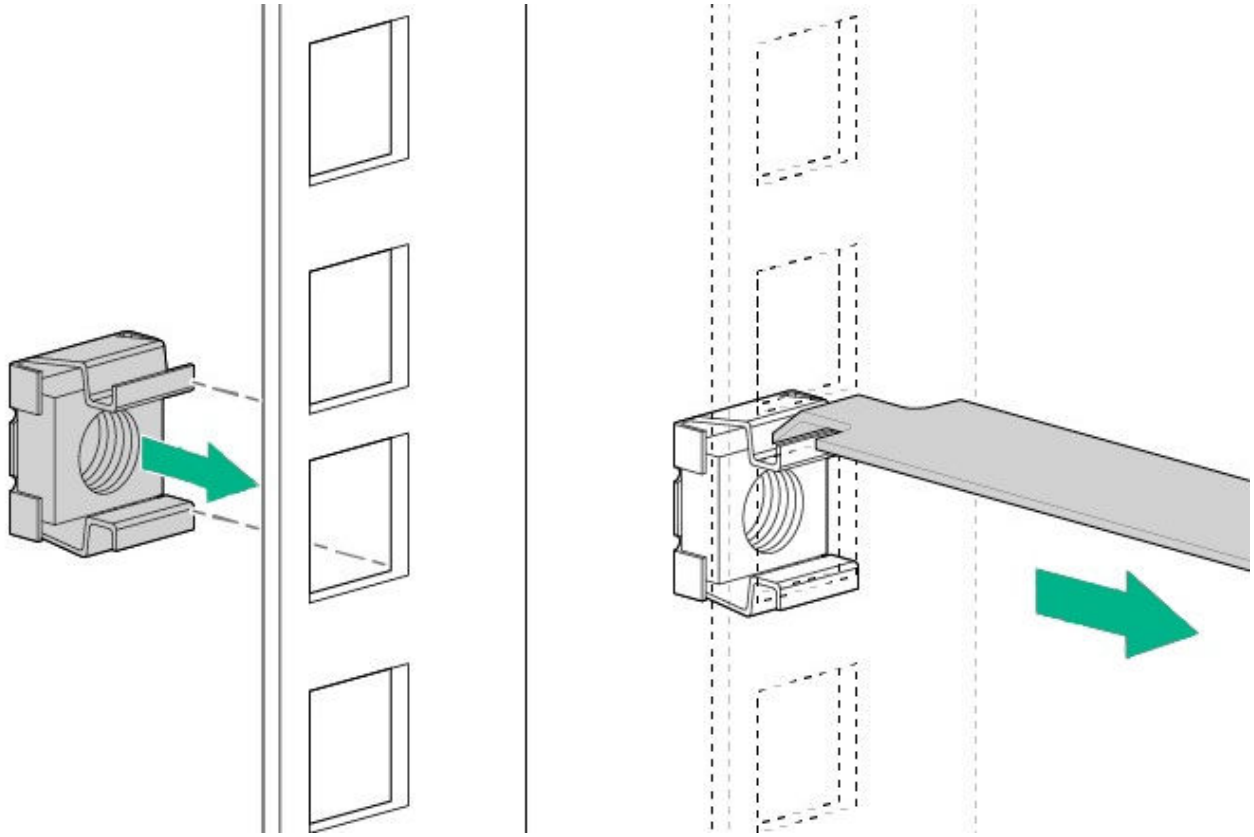
Mounting the 1U PDU in a U position of the rack

Procedure

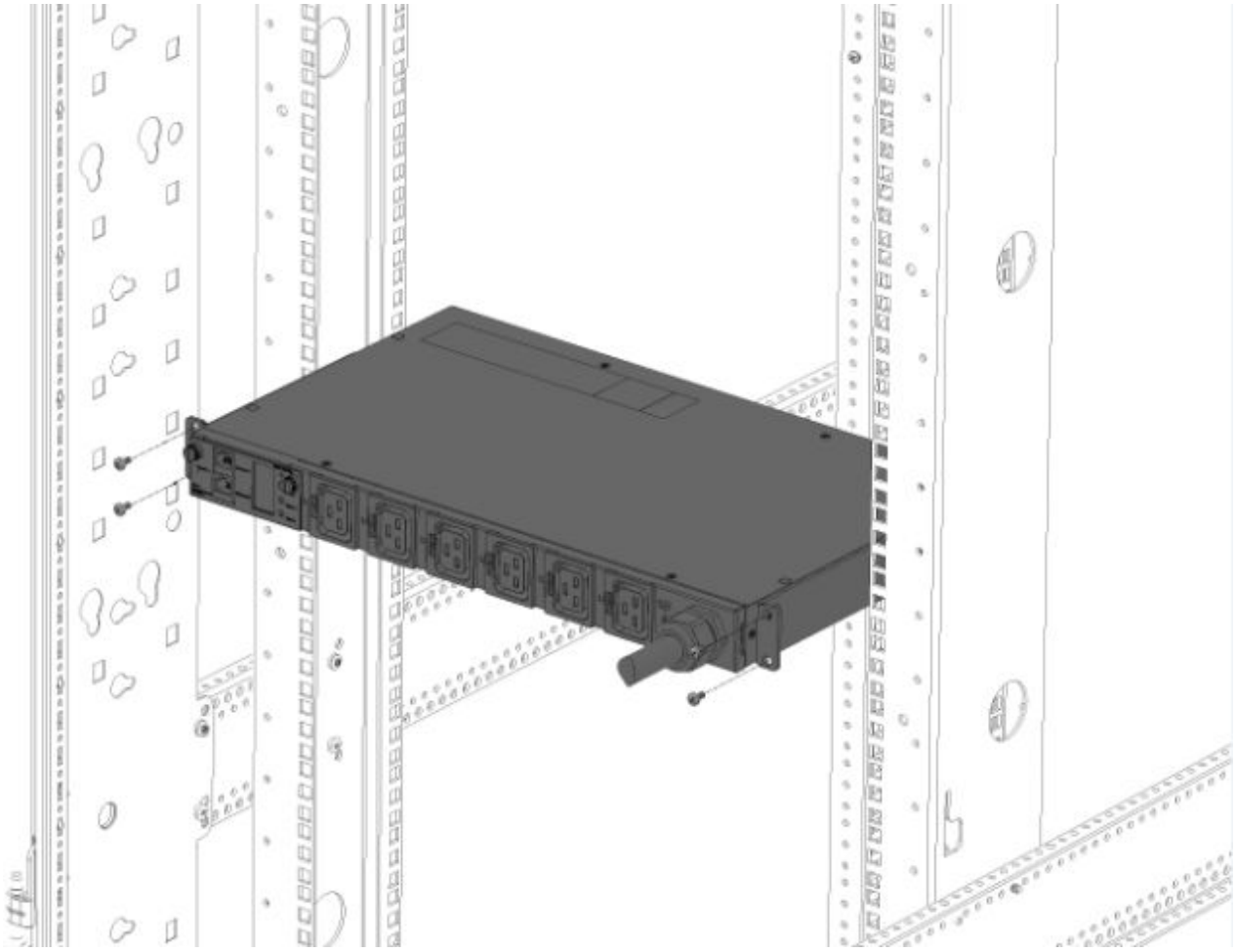
1. Attach the mounting brackets to the unit using the screws provided.



2. Install the cage nuts in the desired U location.



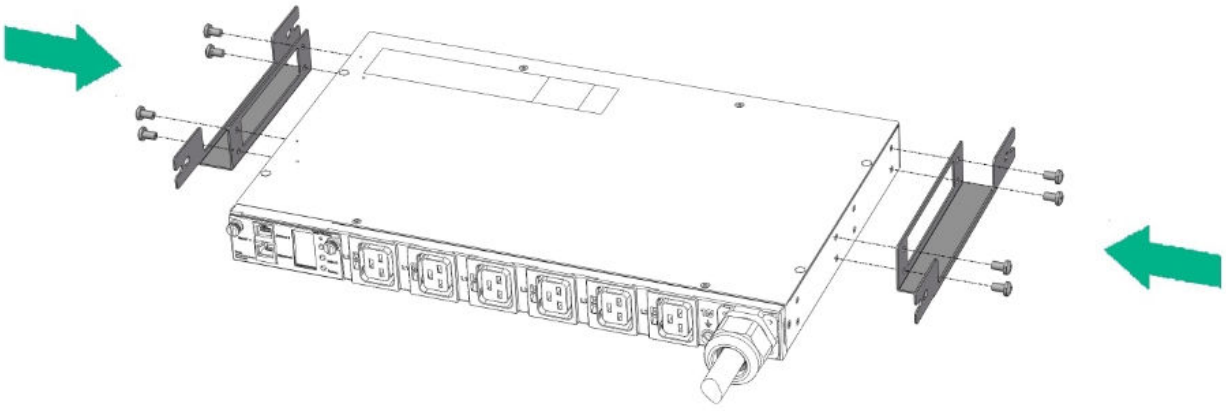
3. Screw the mounting bracket ears into the RETMA rail surface at the U location where the cage nuts were installed.



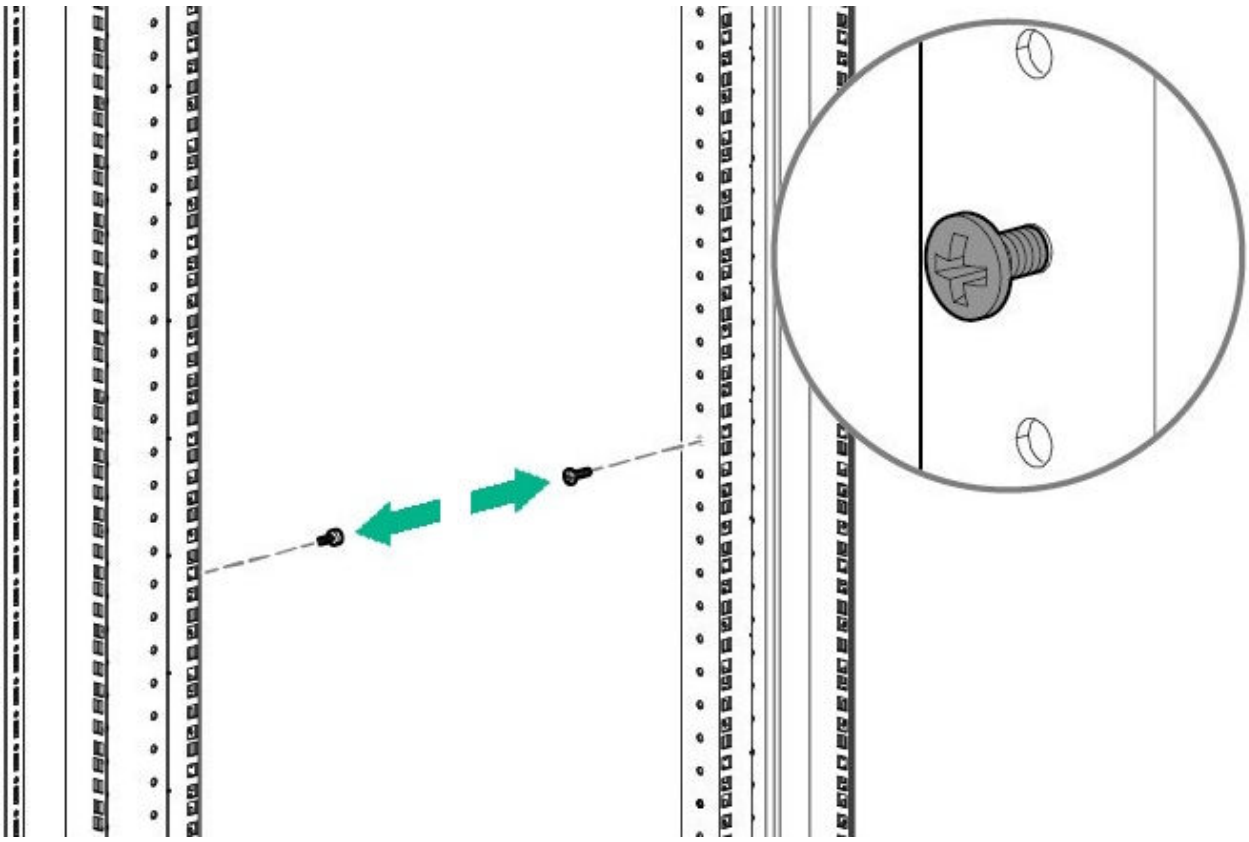
Mounting the 1U PDU in a U position between the RETMA rails

Procedure

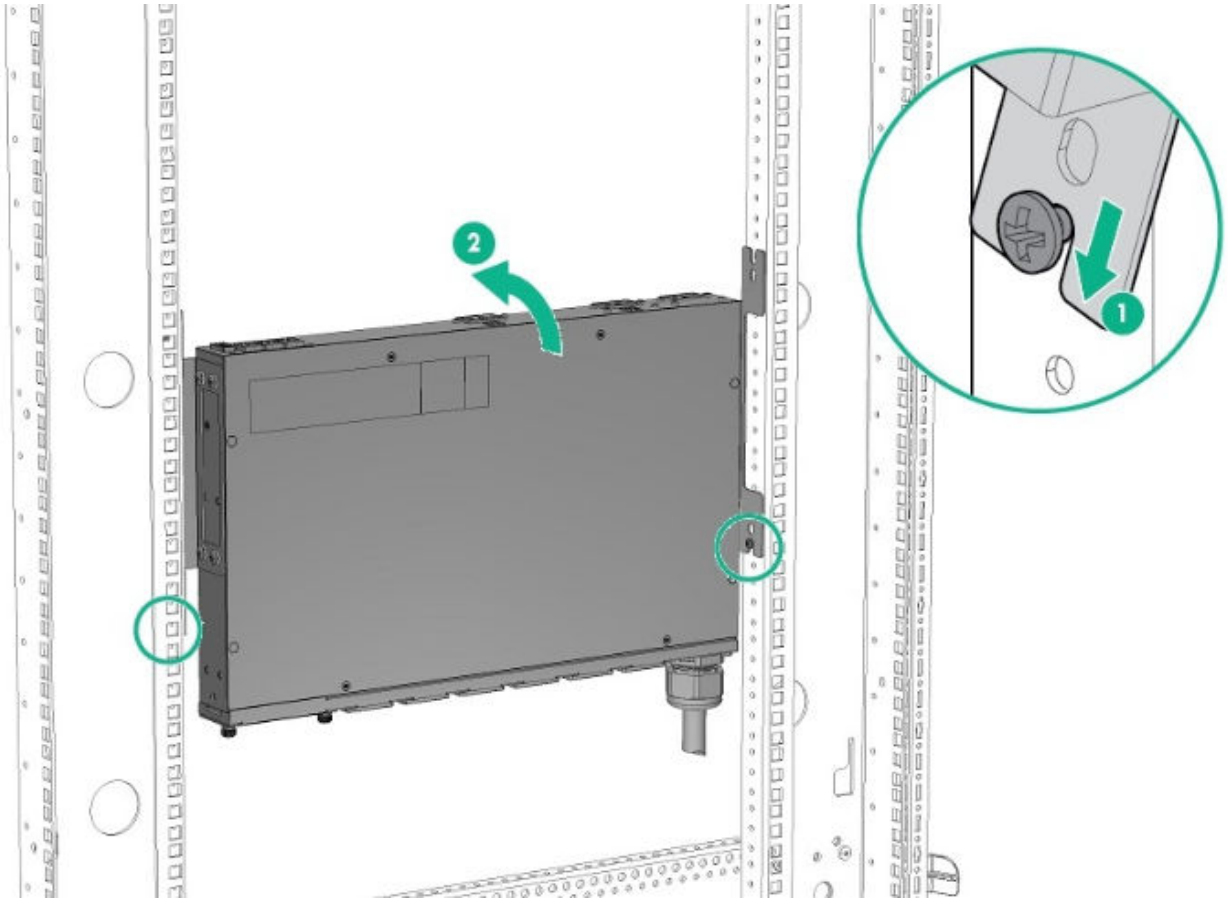
1. Attach the 0U mounting brackets to the unit using the screws provided.



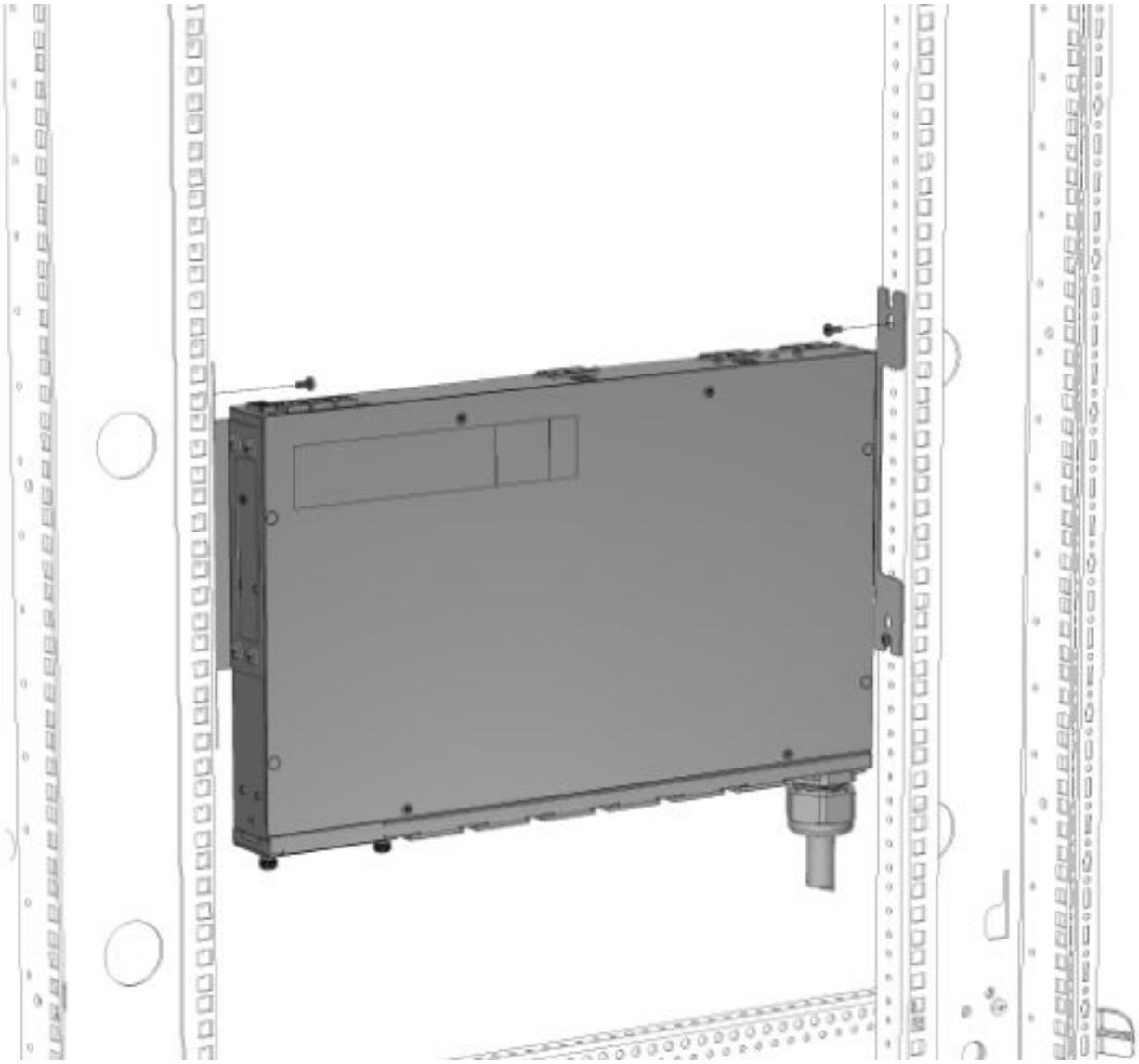
2. Insert the mounting screws in the desired 0U location on the RETMA rails.



3. Rest the cutout on the end of the bracket on the screw and pivot the PDU until the holes line up with the hole in the bracket.



4. Insert and tighten the screws provided through the bracket into the holes in the RETMA rails of the rack.



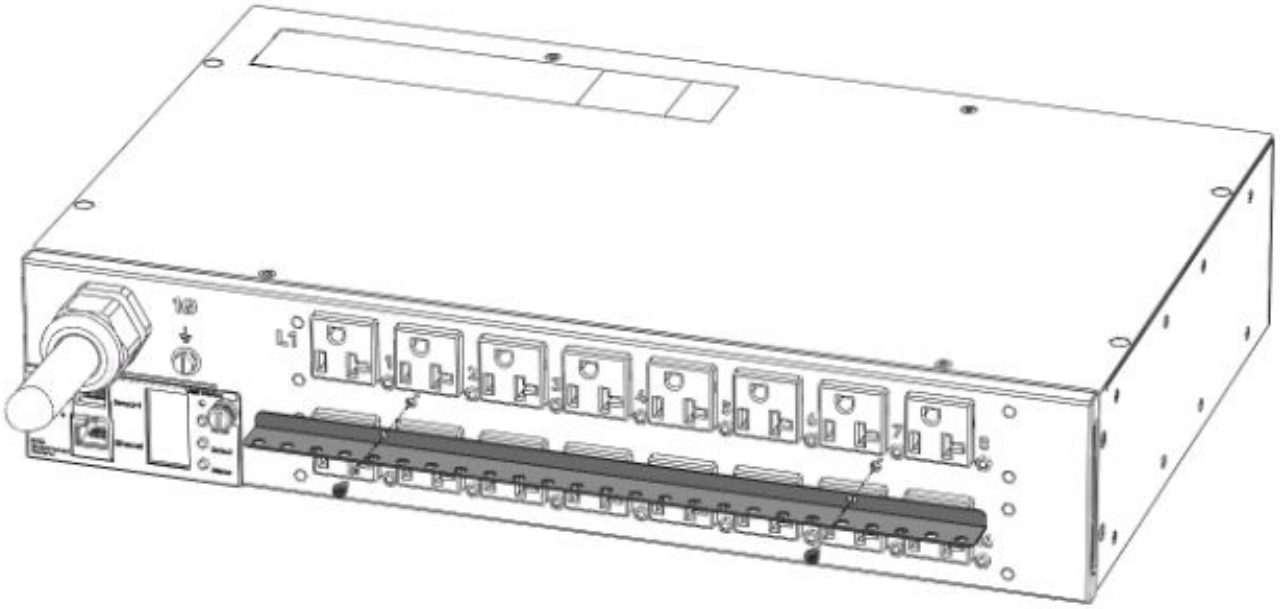
2U PDU installation

Installing cord retention brackets (PDUs with NEMA 5-20R outlets)

Procedure

Install the power cord retention bracket for 2U PDUs with 5-20R outlets.

NOTE: No cord retention bracket is required for 2U PDUs with IEC C13 and C19 outlets.



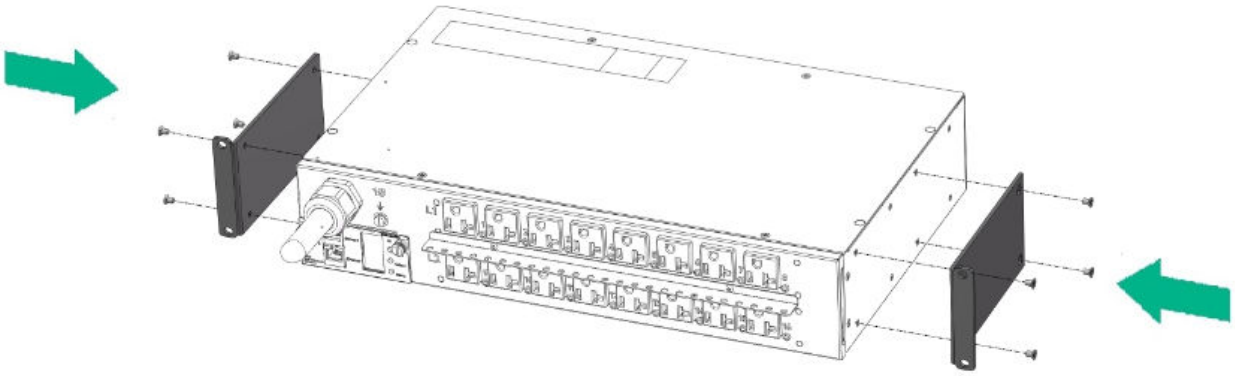
Mounting options

This unit can be installed in any U location of the rack.

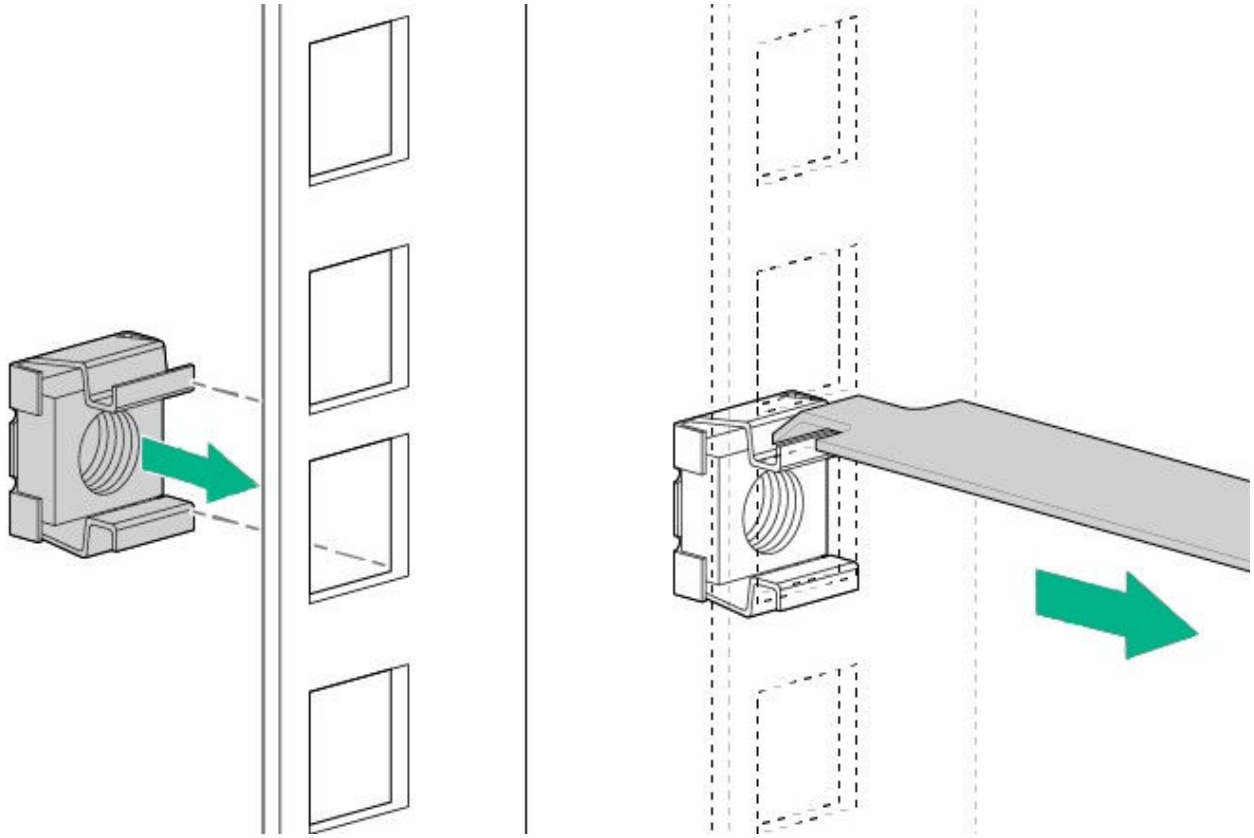
Mounting hardware installation

Procedure

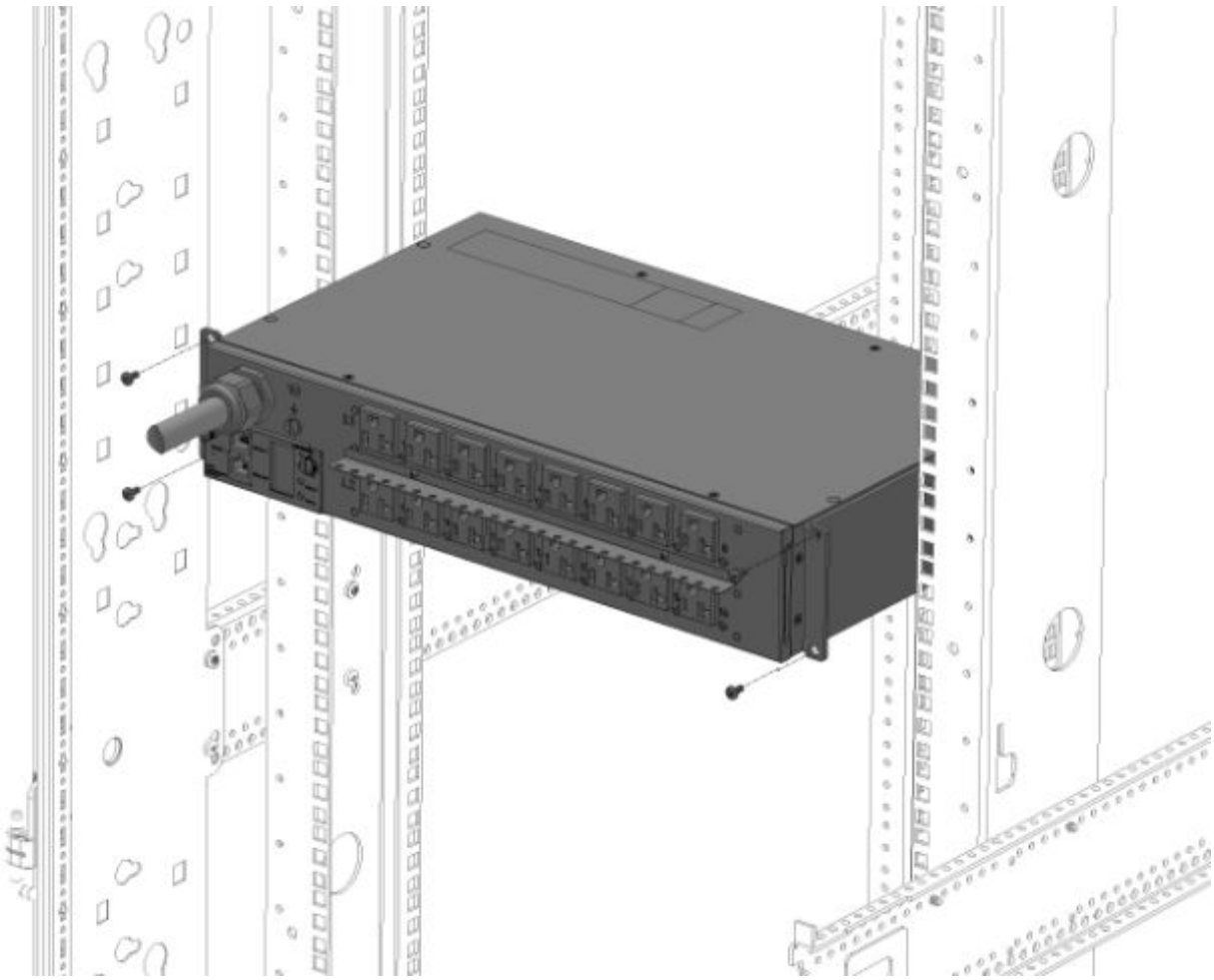
1. Attach the mounting brackets to the unit. Each bracket requires four screws on each side.



2. Install the cage nuts at the desired U locations.



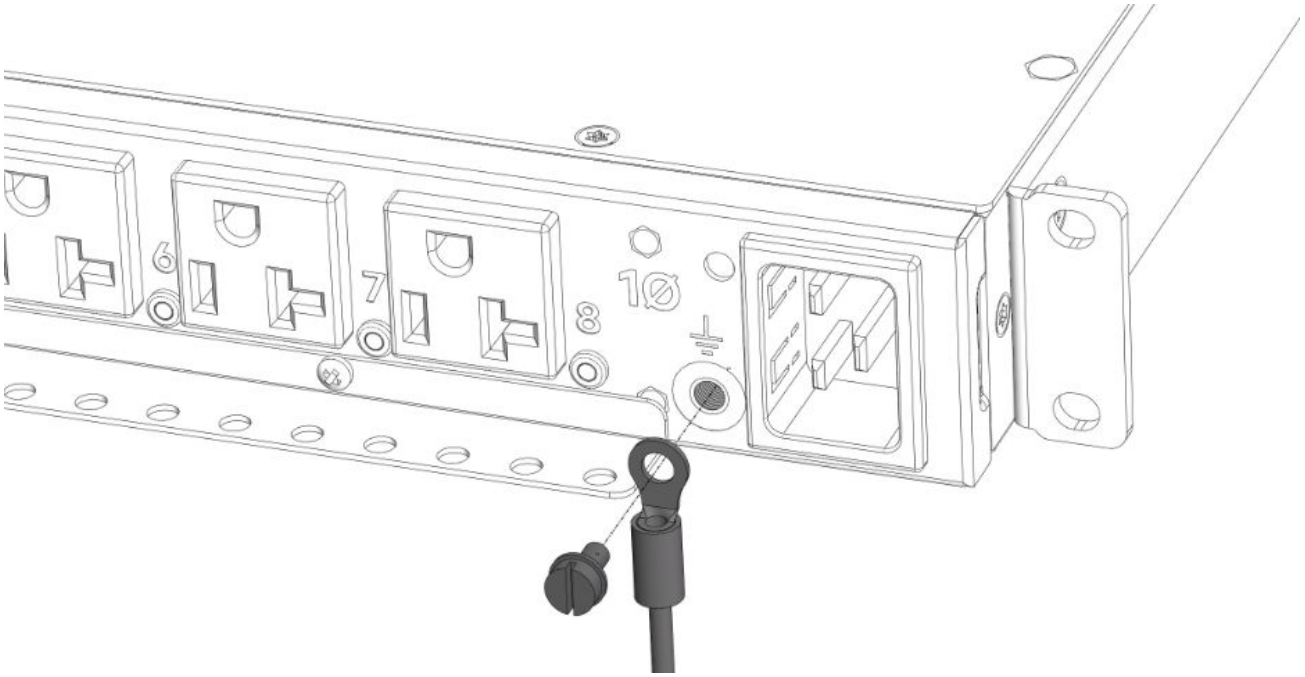
3. Install the PDU.



Grounding the PDU

Connecting the ground bonding cable

The PDU chassis has an external ground bonding point. The ground bonding screw is provided as an attachment point for conductors. Use a ground bonding cable if the rack contains any conductors for functional grounding or bonding of ungrounded metal parts. This bonding point can also be used to bond the PDU to a known earthed reference terminal in the building. Per international regulatory requirements, the primary Safety Earth Bond connection is contained in the PDU as a part of the branch circuit cabling and plug. The ground bonding point is on the surface with the receptacles on all PDUs, except for the high density models where the ground bonding point is on the surface with the circuit breakers.


6
7
8
10

Connecting the PDU

Connecting the PDU to a power source

About this task

Always follow local and national codes when installing the PDU. The PDU must be connected to a dedicated circuit protected by a branch circuit breaker matching the PDU input plug type.

NOTE: Make sure that the PDU power cord is long enough to reach the PDU power source.

Procedure

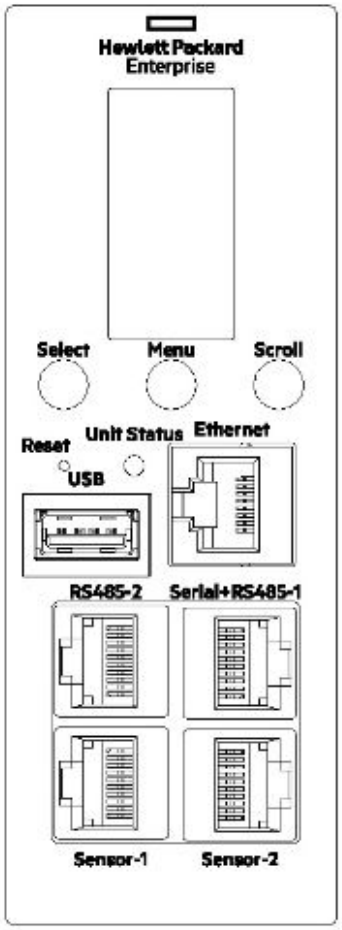
1. Turn the feed circuit breaker Off.
2. Make sure that all circuit breakers on the PDU are set to On.
3. Connect the PDU to an appropriately rated branch circuit.

   NOTE: See the label on the PDU for the input ratings.
4. Turn the feed circuit breaker On.

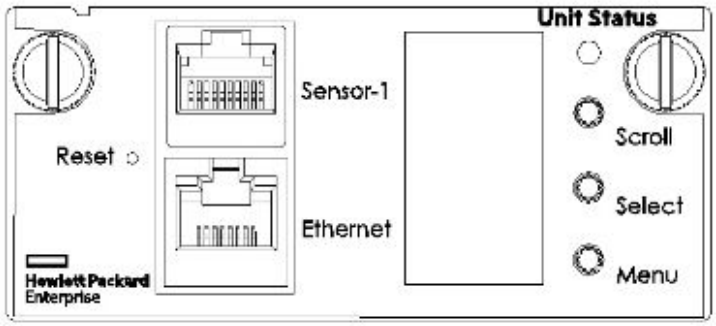
   The OLED screen displays a status bar when the PDU operating system is loading. When complete, the Main Menu displays on the OLED screen. On Switched PDUs and Switched and Metered PDUs, a light indicates each outlet as it is powered up.

Network management module

The HPE G2 Series Metered, Switched, and Metered & Switched Power Distribution Units have an integral and hot swappable Network Management Module. The Network Management Module contains the OLED interface, control buttons, USB, Ethernet, Serial and Sensor ports, and a recessed Reset Button.



Vertical Model Front Panel



Horizontal Model Front Panel

Using the reset button

Press and hold the Reset button for 8 seconds to recover from a Network Management Module communication failure.

NOTE: Pressing the Reset button only reboots the Network Management Module. It does not change the Energy (KWh) value and it does not affect the output voltage.

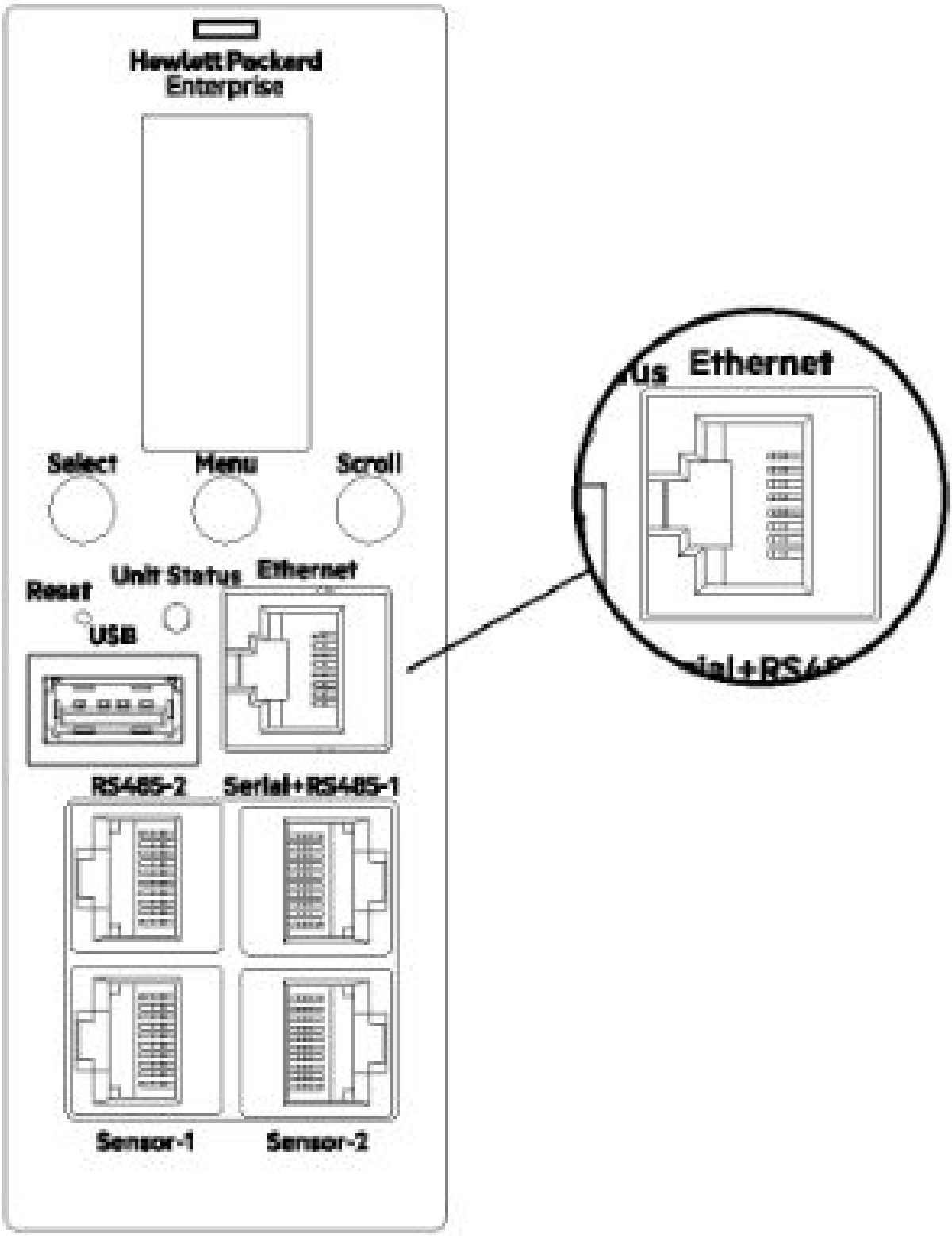
Connecting the PDU to a LAN

About this task

Connecting the PDU to a LAN provides communication through an Internet or intranet connection. You can monitor the PDU from any computer connected to the same network. The PDU is configured to use Dynamic Host Configuration Protocol (DHCP) by default. If an IP address has been assigned successfully, it is displayed on the OLED screen.

Procedure

1. Locate the Ethernet cable.
2. Connect one end of the cable to the Ethernet port on the PDU, and then connect the other end of the cable to the Ethernet port on the router (or other LAN device).


Hewlett Packard
Enterprise
Select
Menu
Scroll
Reset
Unit Status
Ethernet
USB
RS485-2
Serial+RS485-1
Sensor-1
Sensor-2
Ethernet

Connecting the PDU to a computer serial port

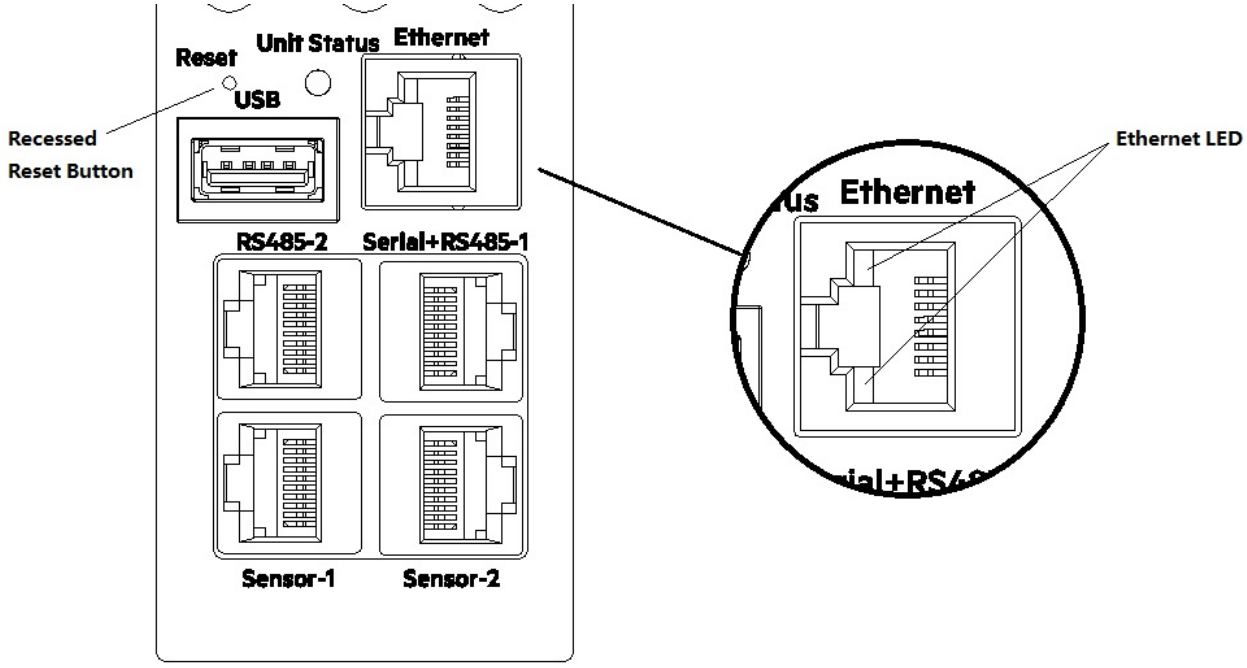
About this task

If you cannot connect to a network, change the network setting using the serial interface.

Procedure

1. Connect the PDU to a computer serial port, and then set the baud rate for a terminal program.
2. Use a CLI command to enable DHCP or set a static IP address.
3. Verify access to the web interface.

   The Ethernet LED on the PDU front panel indicates the communication status by color and display activity. The recessed Reset button restarts the PDU.



Setting up serial communication

About this task

You can configure network settings using a serial connection between the PDU and a laptop computer. You can use the optional RJ45-DB9 cable or you can make your own cable by creating a unique pinout. For more information, see **Serial cable pinout to create your own cable**.

Procedure

1. Verify that the computer has a serial port.

   If your computer does not have a DB9 serial connector, but has a USB connector, obtain a USB-to-DB9 adapter to convert the computer USB port to a DB9 serial port.
2. Using the optional RJ45-DB9 cable, connect the RJ-45 end to the port labeled Serial+RS485-1 on the front panel of the PDU and then connect the DB9 end of the cable to the serial port on the computer.
3. Open the terminal emulation program (HyperTerminal or PuTTY) on the computer and select the serial port connection (such as COM1).

4. Set the communications port.

   - Bits per second: 115200
   - Data bits: 8
   - Parity: None
   - Stop bits: 1
   - Flow control: None

5. Use the default initial login credentials.

   The user name and password are case sensitive.

   - User name: **admin**
   - Password: **12345678** (or your new password)

   The HPE> prompt appears after you have log in.

6. To configure the network settings, at the CLI prompt, enter the appropriate net command and press **Enter**.

   All commands are case sensitive. Enter **?** to for a list of available commands.

   a. To enable the IPv4 DHCP by default:

      - Enter the following command:

        net tcpip dhcp

      - Enter **Y** to confirm and the Network Management Module will reboot.

   b. To set a static IPv4 configuration:

      - Enter the following command:

        net tcpip static *ip-address netmask gateway*

        For example, **net tcpip static 192.168.1.100 255.255.255.0 192.168.1.1**

      - Enter **Y** to confirm and the Network Management Module will reboot.

Remote configuration

Dynamic Host Configuration Protocol (DHCP)

About this task

The PDU is DHCP compatible. If the network does not use a DHCP server, see **Connecting through a serial connection**. When connected to the network, the PDU automatically obtains an IP address through DHCP. If necessary, log in to the web interface to configure the PDU and assign a static IP address.

Procedure

1. Connect a standard Ethernet patch cable to the Ethernet port on the PDU.
2. Connect the other end of the Ethernet cable to the LAN.
3. To confirm connectivity to the network, make sure the Ethernet port on the PDU shows a solid green light on the left and a flashing yellow light on the right.
4. Use the menu buttons to look up the IP address of the device on the OLED display by selecting **Setup** > **Network** > **IPv4** or **IPv6** as applicable.
5. In a standard web browser, enter the PDU IP address and configure the PDU described in **Web configuration**.

Web configuration

Supported web browsers

- Mozilla Firefox for Windows
- Mozilla Firefox for Linux
- Mozilla Firefox for HPE-UX
- Windows Internet Explorer
- Google Chrome

Logging in to the web interface

Procedure

1. Open a supported web browser, and then enter the IP address of the PDU.

- If a user name and password were configured during the Network Configuration Setup, enter the user name and password in the appropriate fields. Press **Login** or **Enter**.
- If a user name and password were not configured during the Network Configuration Setup, use the default user name, **admin**, and password, **12345678**. For security purposes, change the password upon login.

Changing the password

Procedure

1. At initial login, change the password.
   a. The **Change Password** window opens.
   b. Enter the current password, and then enter the new password twice to confirm.

      Passwords must be between 8 and 32 characters.
   c. To complete the password change, click **Change Password**.
2. After the initial login, change the password.
   a. Select **User Administration** > **Change Password**.

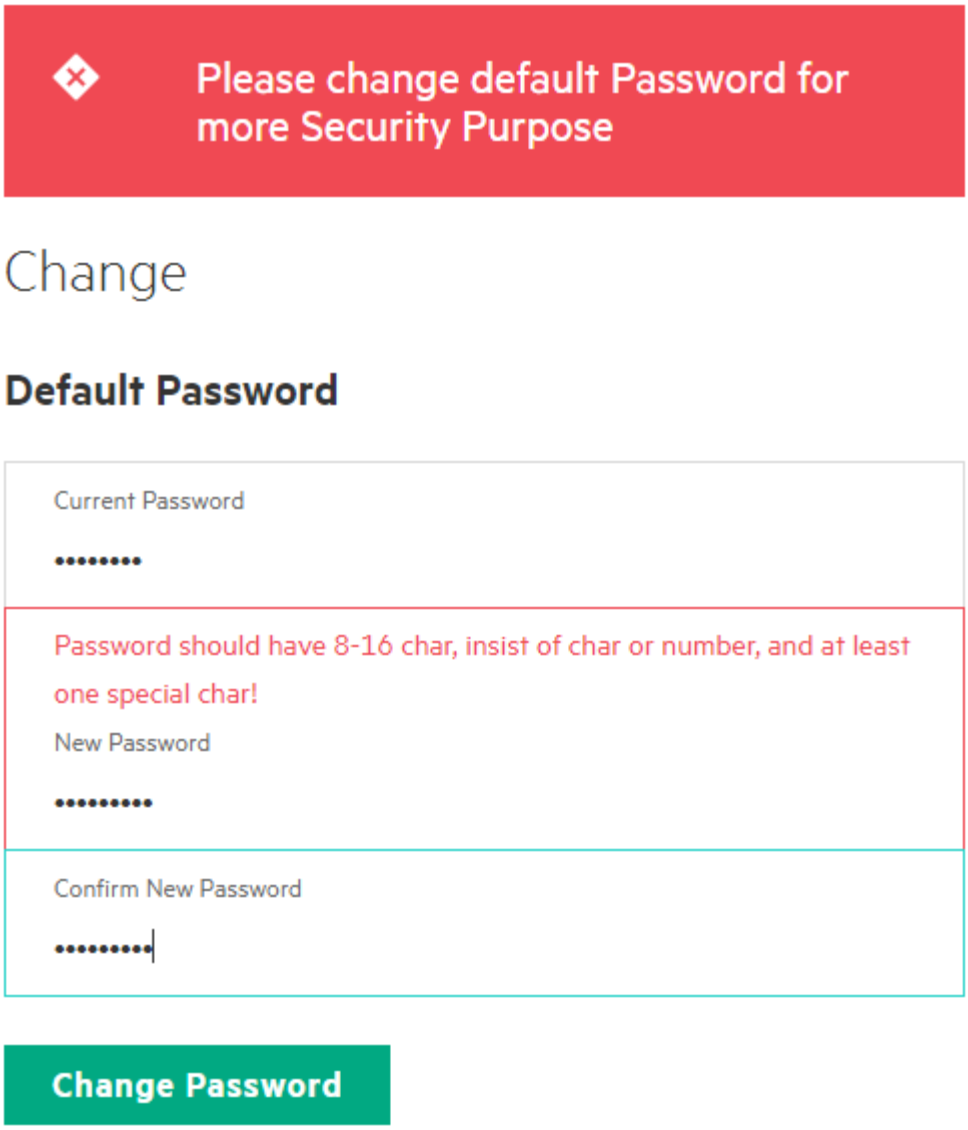
      The **Change User Password** window opens.
   b. Enter the old password, and then enter new password twice to confirm.

      Passwords must be between 8 and 32 characters.
   c. To complete the password change, click **Change Password**.

Changing the password on a default PDU

Procedure

1. On a default PDU, the web will ask for Password change during Login. The range of the password length is 8-16 characters.



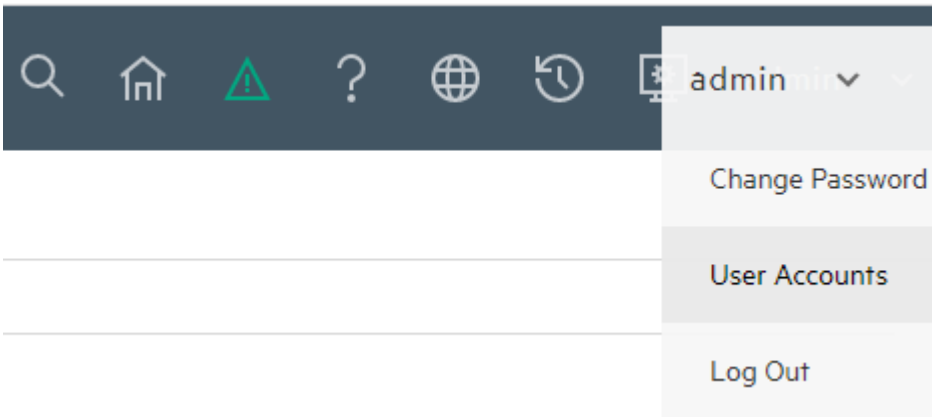
2. Enter a new password of length between 8-16 characters.

NOTE: The new password cannot be same as the default password.

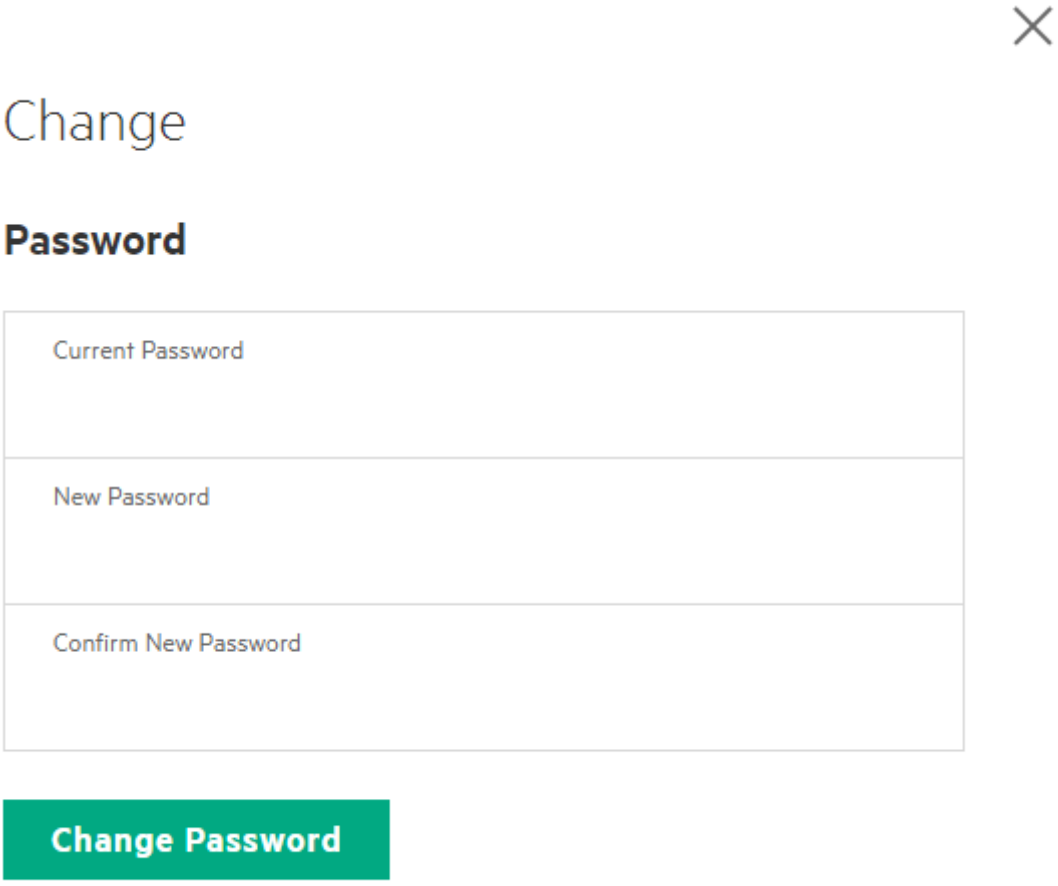
Setting a password of up to 32 characters

Procedure

1. After logging in with the new password, click on admin and select Change Password from the drop-down menu.



2. Enter the current password and set a new password of length between 8-32



characters.

NOTE: The special characters supported are !@#$%^&*()_-.

Recovering passwords with the web interface

About this task

This procedure is for an administrative to recover a password through the web interface.

Procedure

1. Log in to the web interface with the administrative username and password.
2. Click the  icon, and then select **System Management**.
3. From the System Management page, navigate to **Settings**, and then select **Default Settings**.

The PDU resets to the original default settings, allowing the administer to create passwords.

Logging out

About this task

To prevent unauthorized changes to the system, users must log out after each session.

Procedure

1. Click the user-name icon in the top right corner of the screen.
2. Select **Log Out** from the drop-down menu.

Access privileges

There are two levels of access privileges:

- Full
- Read-only

The PDU includes a standard Full profile and a standard Read-only profile. The Full profile is typically the system administrator and includes the Administrative Role with full operating permissions. The default Read-only profile includes the default User Role permissions.

All users must be added by the Full user. Users are defined by their unique login credentials and user role. The level of access privilege determines what the user can see and which actions the user can perform. The level of access privilege also determines which menu items the user can access and which fields are displayed on setting and configuration dialog boxes. Before setting up users, determine the Roles that will be required. Each user must be assigned a Role, which defines the permissions granted to the user.

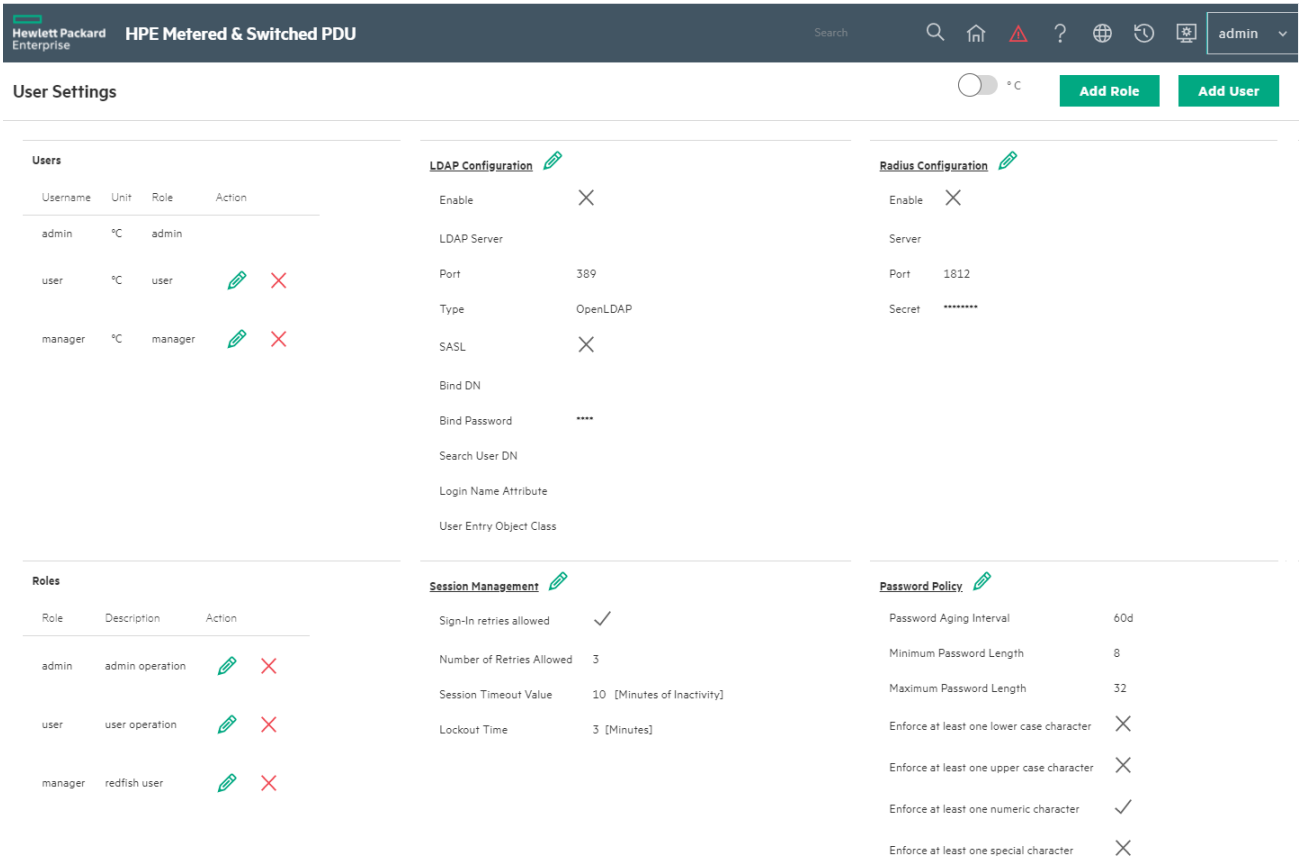
Role	Default permissions
Full	Full permissions that cannot be modified or deleted.
Read-only	Limited permissions that can be modified or deleted. By default, these permissions include the following: • Change Input Phase Setting • Change Circuit Breaker Setting • Change Outlet Setting • Change Own Password • Change Event Settings
Customized	Permissions for user customized roles can be set as needed.

User Accounts

The **User Settings** page lets you add a new user/role, configure LDAP and RADIUS, set session management, change the temperature units, and set the password policy.

IMPORTANT: LDAP and RADIUS cannot be configured at the same time.

To access **User Settings**, select **Admin** > **User Accounts**.



Adding a user

Procedure

1. On the **User Settings** page, click **Add User** in the top right corner.
2. Add a user name, set the password, select the desired role, and click **Save**.

The changes are displayed in the **Users** list.

Adding a user role

Procedure

1. On the User Settings page, click **Add Role** in the top right corner.
2. Enter a new role name and description, and set the administrator privileges, if required.
3. Click **Save**.

The new role is displayed in the **Roles** list.

Modifying users and roles

Procedure

1. Select **User Administration** > **Users**.
2. Click the **Edit** button next to the user/role you want to modify.

   NOTE: All roles can be edited except for the default Administrator.
3. Update the user profile or role.
4. Click **Save**.

Deleting a user profile

Procedure

1. Select **User Administration** > **Users**.
2. Find the user name or role you want to delete.
3. Click the red **X** next to the user or role to delete.

   NOTE: You cannot delete the default Administrator user.
4. Click **Delete**.

Configuring LDAP

About this task

IMPORTANT: LDAP and RADIUS cannot be configured at the same time.

LDAP configuration can be set to access the **Active Directory**.

Procedure

1. On the **User Settings** screen, click the edit icon next to LDAP configuration.
2. Configure LDAP to access the **Active Directory** (AD) by choosing one of the following:
   - **Open LDAP**
   - **Microsoft Active Directory**
3. Enter the following information:
   - Server address (only accepts single IPv4 address)
   - Port number (typically port 389)
   - Type
   - Bind DN
   - Bind Password
   - Search user DN
   - Login name attribute
   - User entry object class
   - Test name
   - Password
4. In the **Bind DN** field, enter the name of the account to be used to access the AD.

   For example: **`CN=myuser,CN=Users,DC=EMEA,DC=mydomain,DC=com`**
5. In the **Search User DN** field, enter **`DC=subdomain,DC=mydomain,DC=com.`**
6. In the **Login Name Attribute** field, enter **`sAMAccountName`** (typically).
7. In the **User Entry Object Class** field, enter **`person`**.
8. Add a role to match a LDAP group name and select the desired privilege.

   NOTE: The role must be added before testing the configuration.
9. Test the configuration.

   After successful testing, enable and save the LDAP configuration.

   NOTE: LDAP can work with LDAP alone or SASL enabled.

Configuring LDAP Server

Prerequisites

A **PDUAdmin** role with admin privilege is required for LDAP to work.

About this task

To setup LDAP to access the **Active Directory** and provide authentication when logging into the PDU via the Web Interface:

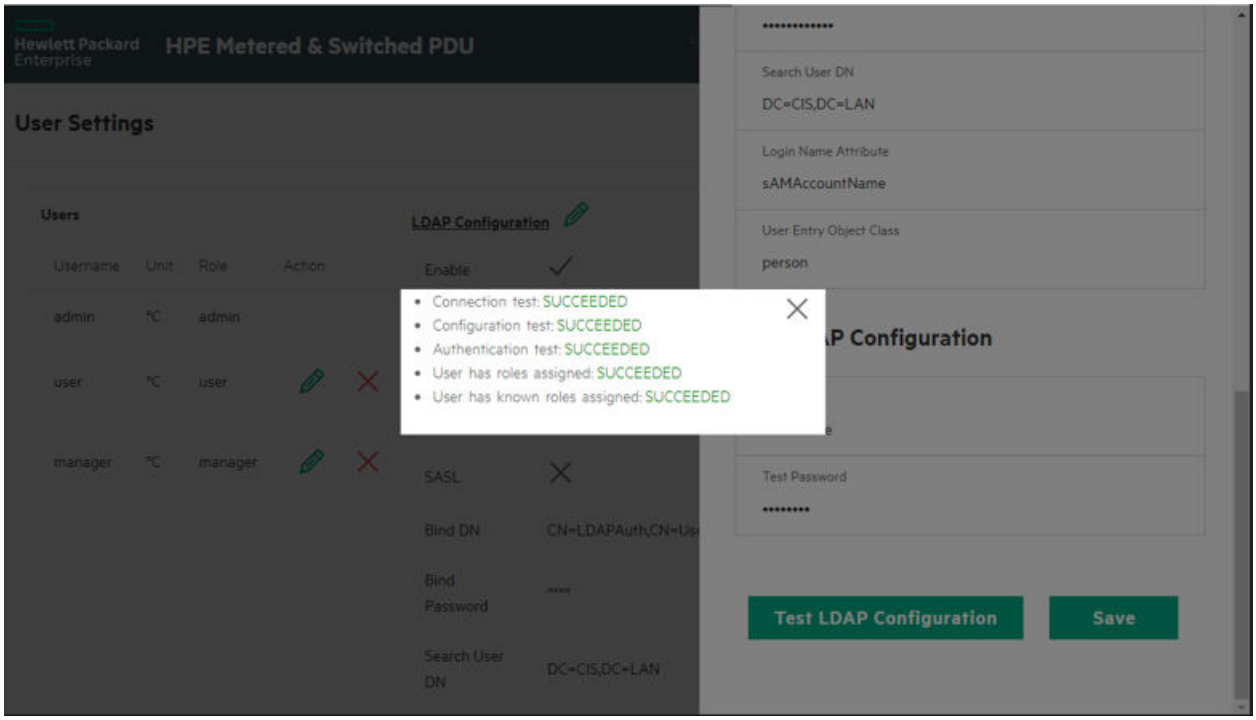
Procedure

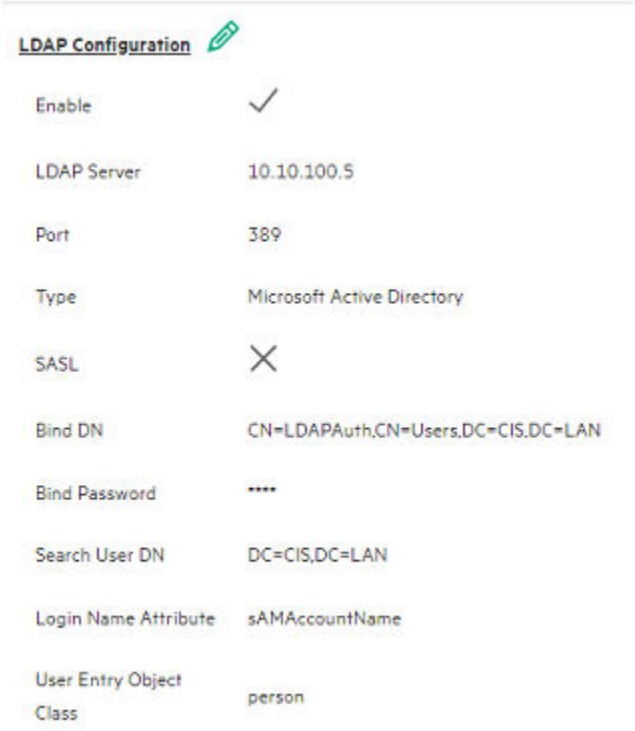
1. Go to **Device User Setting > LDAP Configuration**.
2. Select the **LDAP Enable** check-box.
3. From the Type (Type of LDAP Server) drop down menu, select **Open LDAP**.
4. Type Port number.

   NOTE: For Microsoft, this is typically port 389.
5. Type Password in the Bind Password and Confirm Password fields.
6. In the Base DN field, type in the account.
7. Type Password in the Bind Password and Confirm Password fields.
8. Search User DN.

9. Type SAMAccountName (typically) in the Login Name Attribute field.

10. Type Person Name in the User Entry Object Class field. With these LDAP settings configured, the Bind is complete.





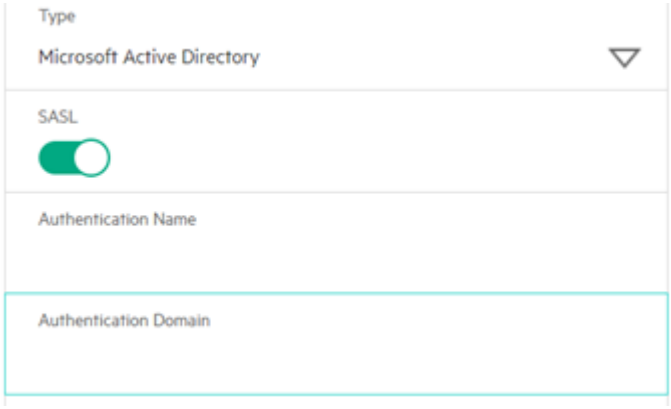
Configuring LDAP with SASL

Prerequisites

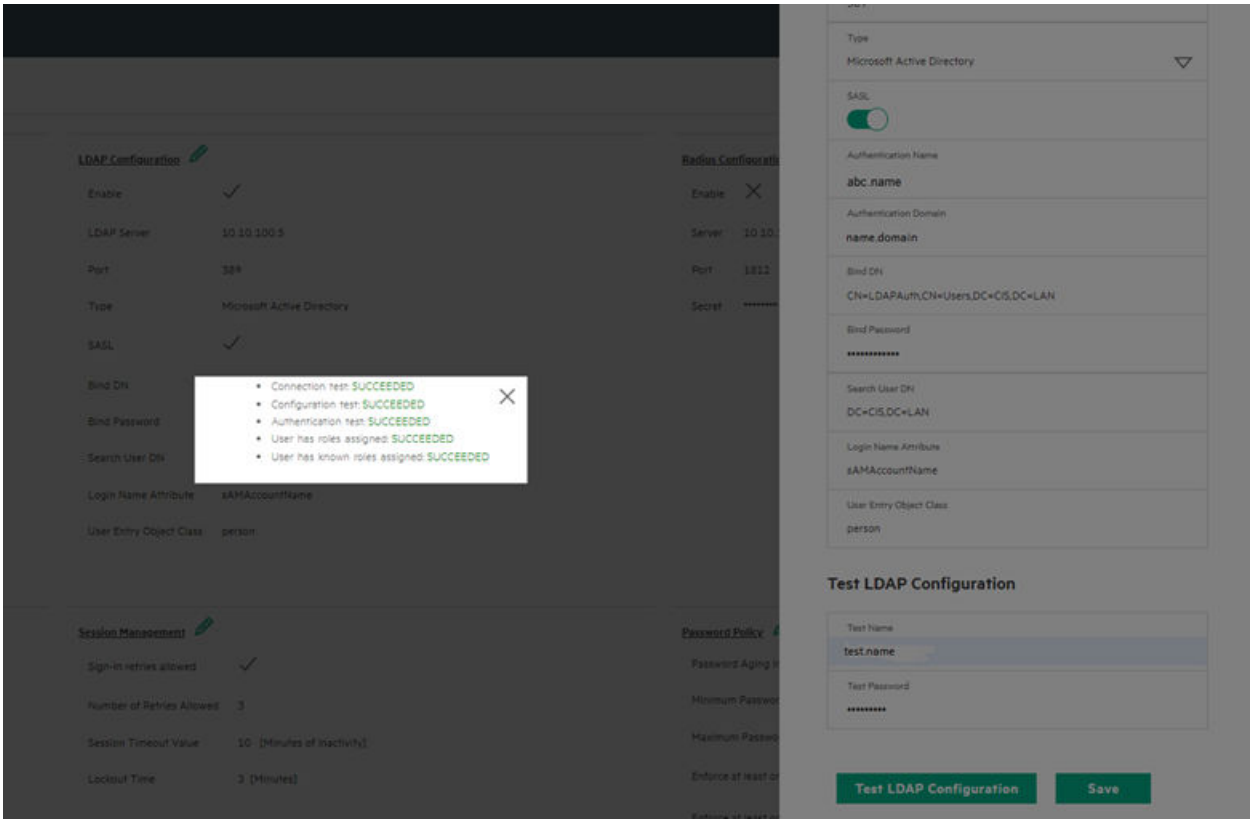
To configure SASL with LDAP, LDAP configuration must be added and enabled.

Procedure

1. Enable the SASL option and enter the Authentication name and Authentication Domain of the LDAP server.



2. Test LDAP Configuration and then Save. The test should be successful, and the dialog message appears.



3. The LDAP user (Test Name) can log in to the PDU web with admin privilege.

Configuring RADIUS

About this task

IMPORTANT: LDAP and RADIUS cannot be configured at the same time.

Procedure

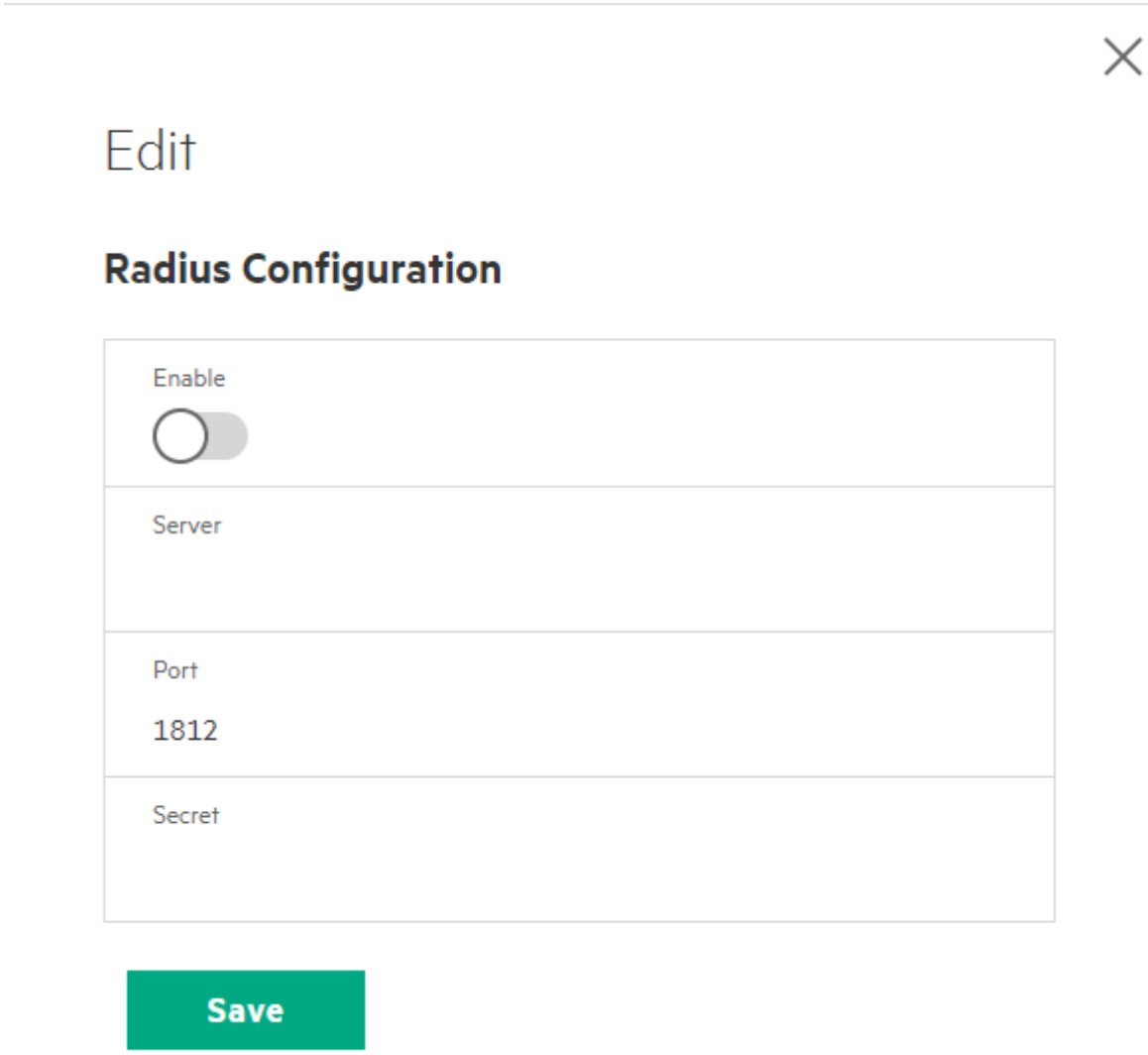
1. Navigate to the User Accounts screen in the web UI.
2. Enter the RADIUS Server details for RADIUS Configuration, and then enable RADIUS configuration.
   - Server—**<Radius Server IP>**
   - Secret—**<Secret Passphrase>**
3. **Add a user role** named **radius** with the admin privileges.
4. Logout of the web UI.
5. Verify that the RADIUS Server is enabled in the Network.
6. Log in to the web UI with username and password you configured for the RADIUS server.

   You can now log in to the PDU and access the webpage.

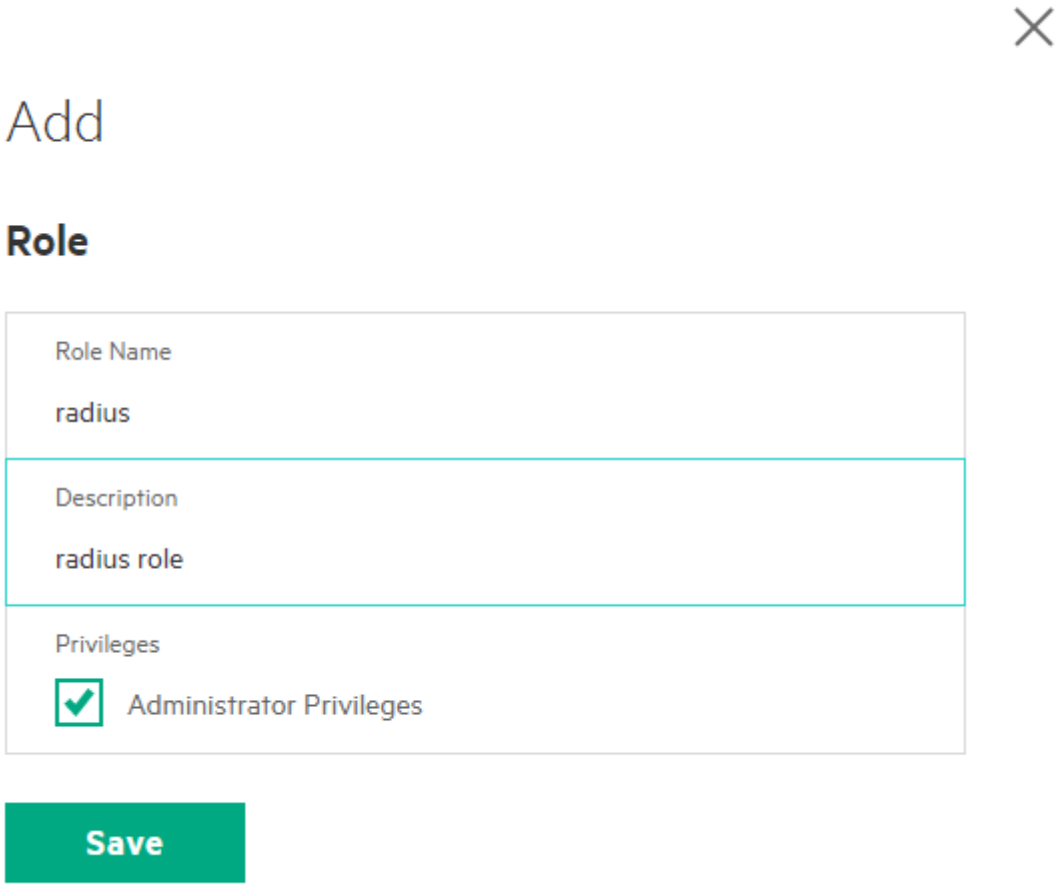
Configuring RADIUS Server

Procedure

1. Go to User Settings in the admin menu.
2. Go to Radius Configuration and click the edit pencil.
3. Select the Edit button.
   - Type Server IP address, Port number, and Secret in the corresponding field.
   - Click save button to complete the Radius authentication.



NOTE: A “Radius” role configured in Roles is required for Radius to work in Admin mode.



Creating a certificate and private key

Prerequisites

The PDU needs the following environments to create a certificate and private key.

- Operating system—Linux
- Apps—OpenSSL

About this task

Create sha1/sha256 and 1024bits/2048bits certificate and private key for the PDU..

Procedure

1. Open Terminal on your Linux operating system.
2. Enter `mkdir cer`.
3. Enter `cd cer`.
4. Enter `openssl req -x509 -$1 - newkey rsa :$ 2 - keyout cert.key -out cert.crt -days $3 -nodes`.

NOTE: You can generate different types of certificates and private keys based on different $1, $2 and $3. To generate the different certificate and private keys, replace $1, $2 and $3 with the following options:

- $1—`sha1 or sha256`
- $2—`1024 or 2048`
- $3—valid period of certificate

For example, `openssl req -x509 -sha256 - newkey rsa:2048 - keyout cert.key -out cert.crt -days 1024 -nodes`. In this case, we are trying to generate sha256/2048bits certificate and private key that can be valid for 1,024 days.

5. To enter the following information, follow the instructions.
   - Country name
   - State
   - Locality name
   - Organization name
   - Organizational unit name
   - Common name
   - Email address
6. Navigate to the **cer** folder and obtain the cert.crt and cert.key.
7. Login to the PDU with the **GUI>Network Setting>Web/ RESTapi Access Configuration**.
8. Make sure that the access is set to **web access>Https and web port> 443, RESTapi Access>enable**.
9. Click the **Set Certificate Key** icon, and then choose SSL Certificate Key Length (1024/2048) bits.
10. Upload the cert.crt and cert.key.
11. Wait for the rebooting to complete.
12. Log in to the IP address of the PDU through https.

    You will see that the secure connection is established by the customized Certificate or you can check the connection on the SSH terminal by entering `net cert`, which will print the certificate information.
13. To cancel the customized certificate, enter `net cert def` in the SSH terminal.
14. The PDU will restart automatically.

Session management

About this task

Use the **Session Management** section of the **User Settings** page to set the number of session retries allowed, enable or disable the session retries, and set the session timeout value and lockout time.

Procedure

1. Select **User Administration** > **Users**.
2. Edit the **Session Management** values, and then click **Save**.

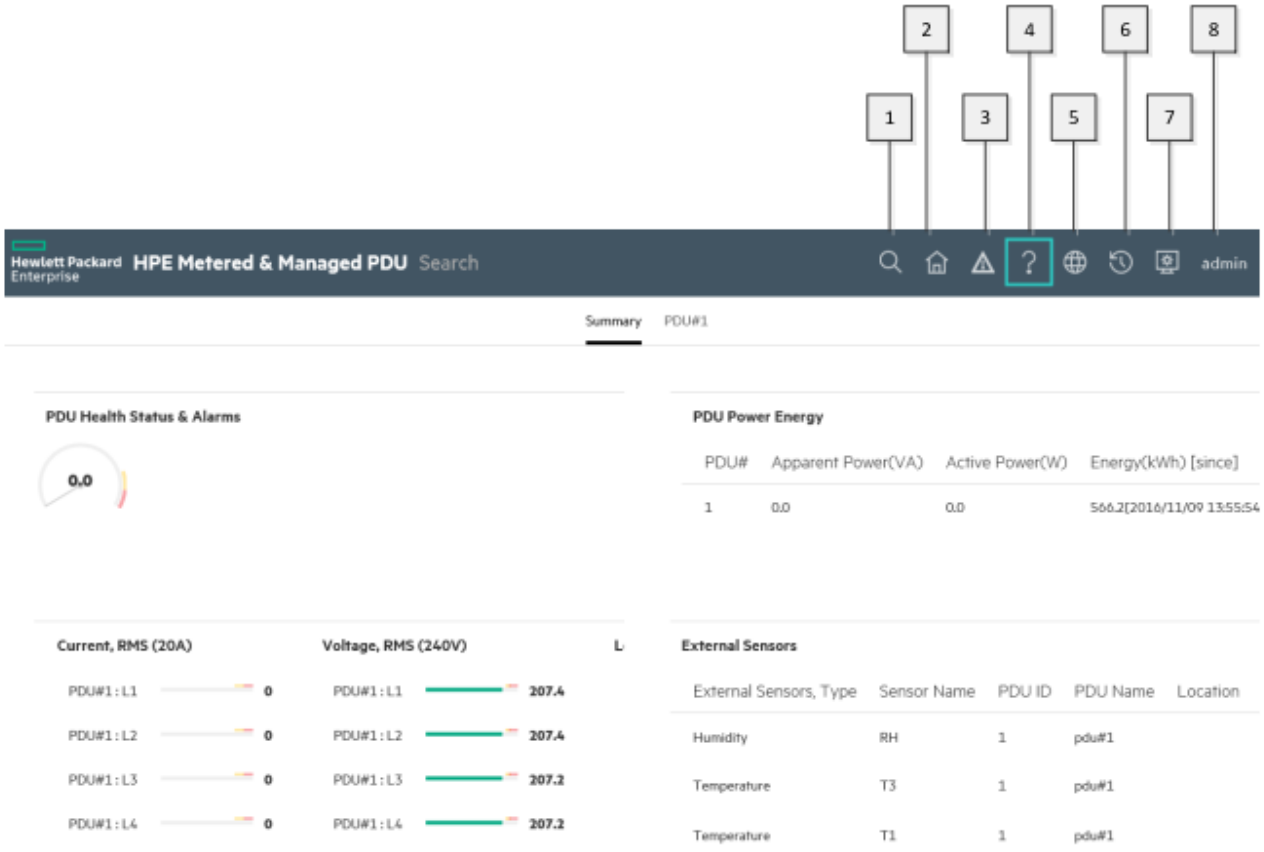
Password policy

Use the **Password Policy** setting to change the following:

- Password aging interval
- Minimum and maximum password length
- Characters required in the password (lowercase, uppercase, numeric, or special characters)

To edit the Password Policy, select **Administration** > **User accounts**.

Web menu overview



Number	Icon	Description
1		The search icon allows you to enter keywords and search for related results.
2		The home icon provides an overview of the PDU with access to Dashboard, Alarms, Identification, and Control & Manage.
3		The Alarm icon provides details of the active critical alarms and active warning alarms.
4		This icon provides information about the PDU can be found using this icon. You can also click user guide and license to for assistance.
5		This icon allows you to select one of the following languages: English, Chinese, French, Italian, German, Spanish, and Japanese.
6		This icon provides the logs of the PDU, which you can be view and download.
7		This icon allows you to set up Network Settings, System Management, SNMP Manager, Email Setup, Event Notifications, Trap Receiver, and Thresholds.
8		This icon shows who is logged in (user or admin). You can change passwords and manage user accounts from this page.

Web menu options

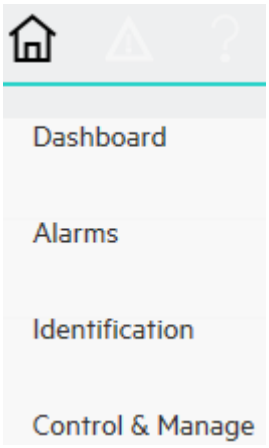
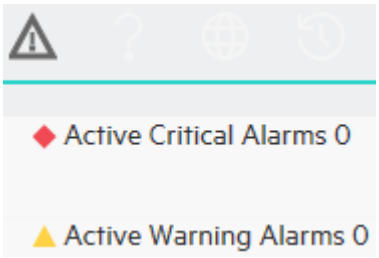
Menu	Illustration
Overview	
Alarms	

Table Continued

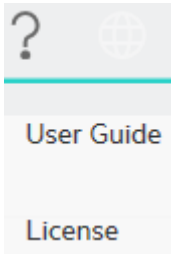
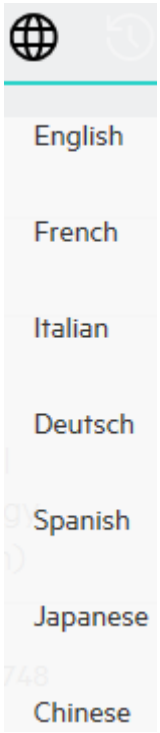
Menu	Illustration
Help	
Language	

Table Continued

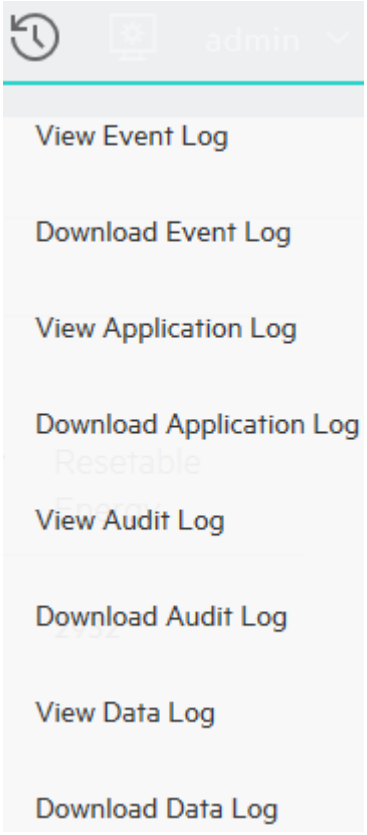
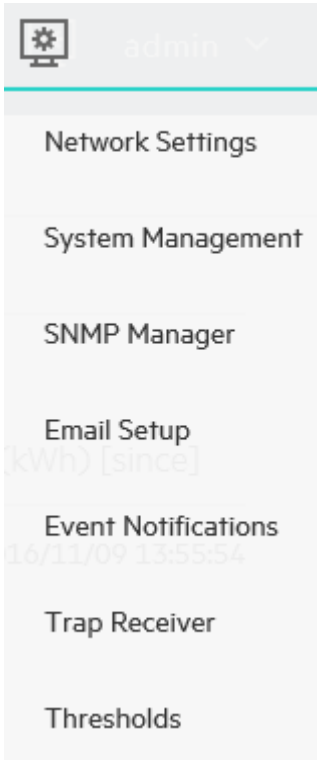
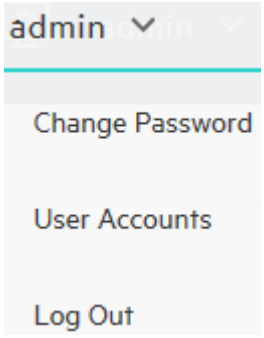
Menu	Illustration
Logs	

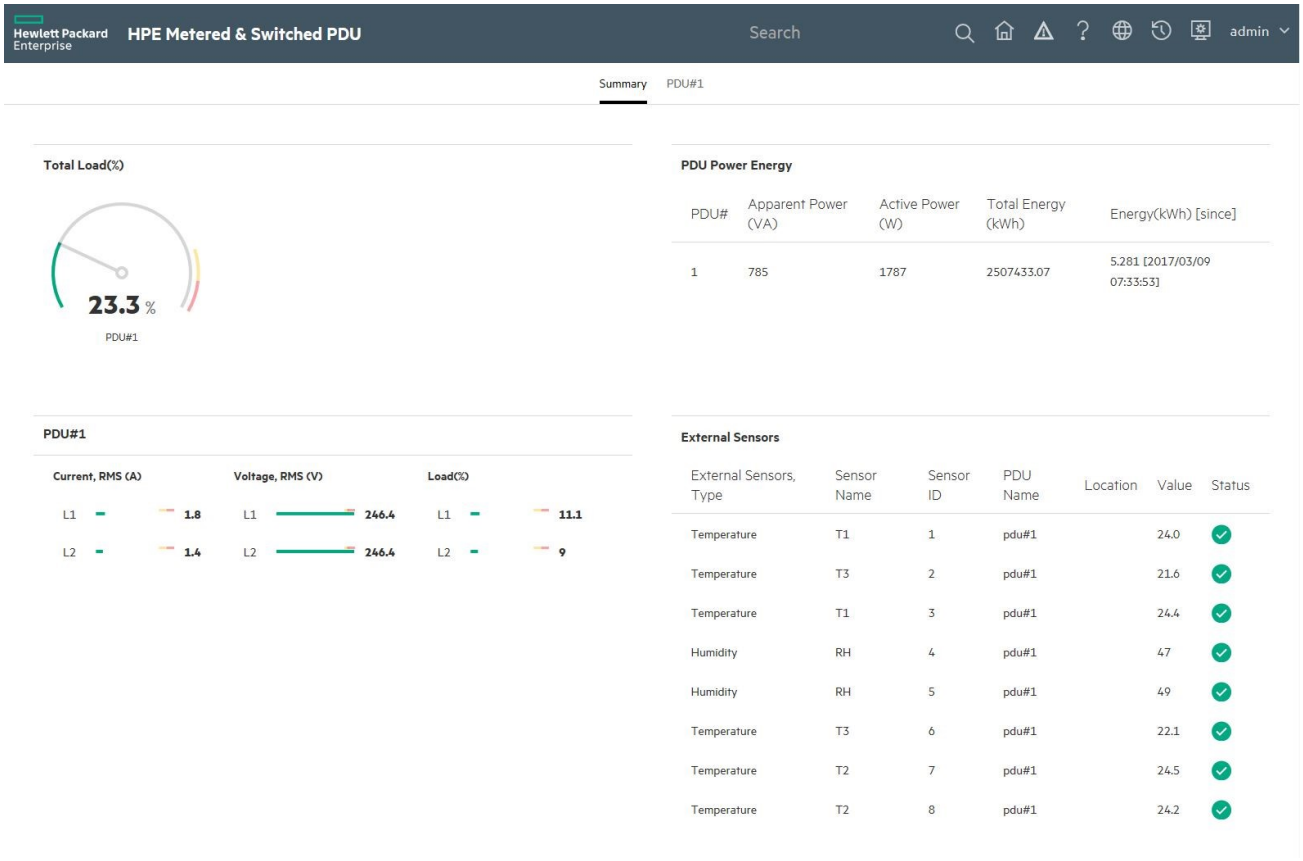
Table Continued

Menu	Illustration
Settings	
Admin	

Web interface overview

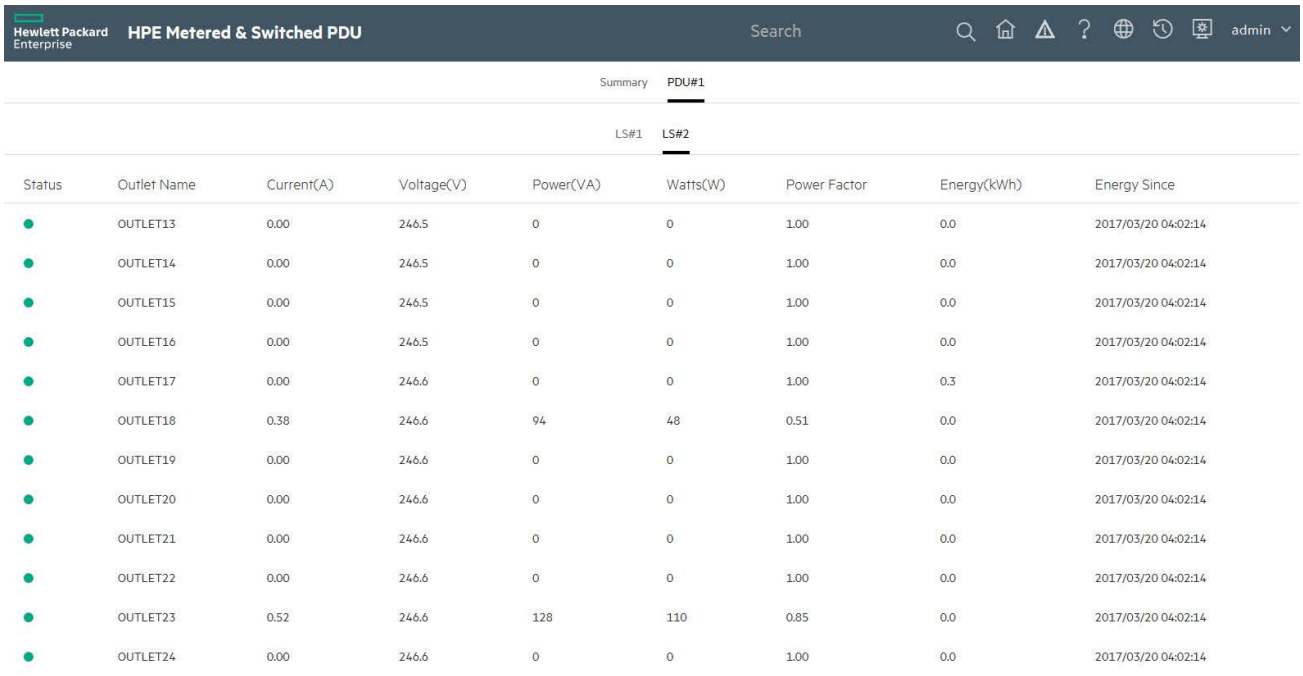
Summary page

The dashboard summary page appears when you log in to the PDU web UI. This page displays the PDU total load percent (in a doughnut chart), PDU power energy, external sensor information, current, and voltage and load percent of each load segment.



PDU page

The dashboard PDU page displays the status of load segments and outlets, current, voltage, and power values, depending on the type of PDU (Metered, Switched, or Metered & Switched).



Control & Manage page

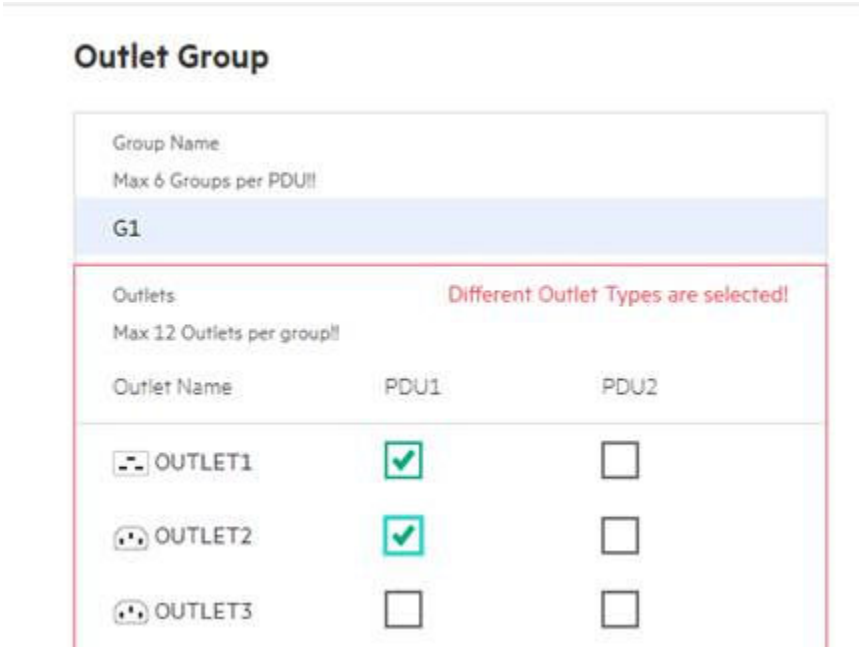
Outlet grouping

The Outlet Groups tab is under the PDU# tab on the Control and Manage page. Outlet Groups lists the outlet groups created, the power control options, and the "Add new outlet group" option. There are two types of outlet groups:

- Master PDU
- Slave PDU

Slave and Master PDU outlets can be grouped perform Power Control options on the Outlet Groups.

If you try to group outlets of different types, a "Different Outlet types are selected" caution message displays.



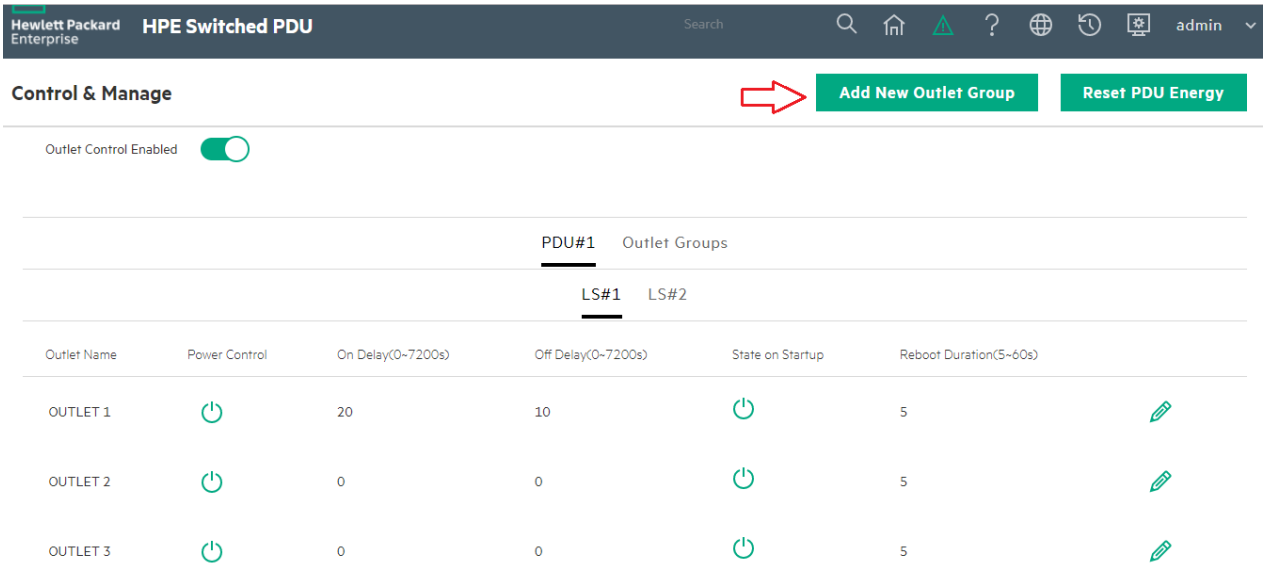
Outlet grouping observes the following restrictions.

- Each group can have a minimum of 1 outlet and maximum of 12 outlets grouped.
- A maximum of six outlet groups can be added to each PDU.
- Traps/events are received for the individual outlets that are grouped when Power control actions are performed on that outlet group.

Creating an outlet group

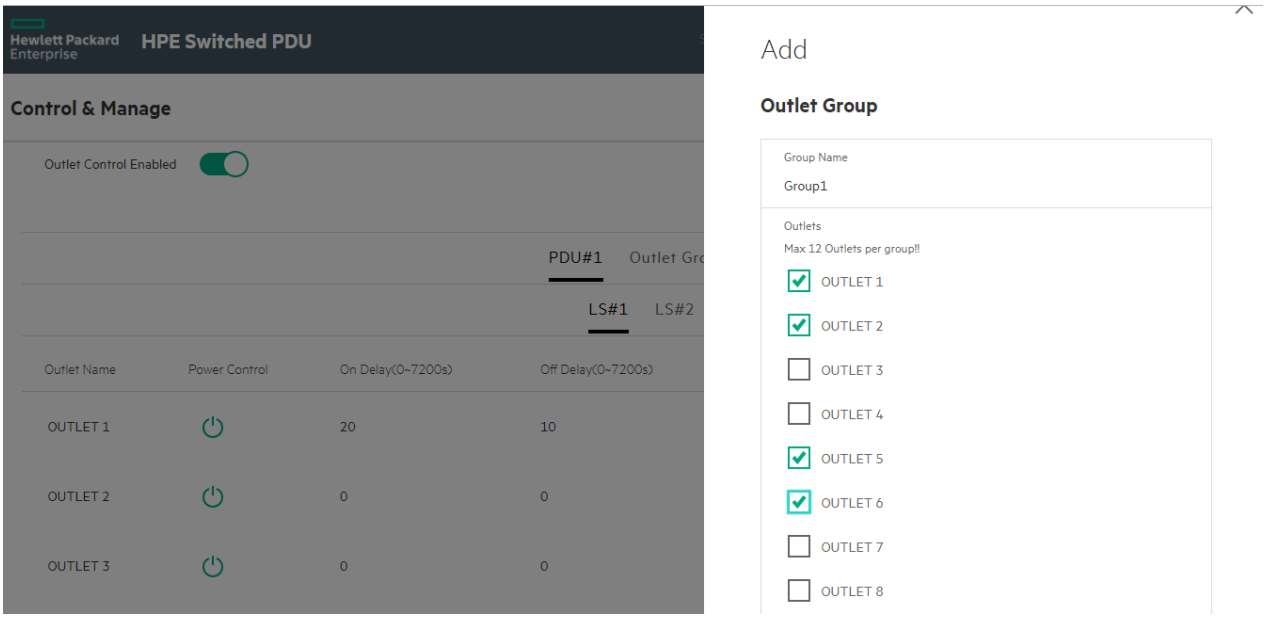
Procedure

1. Open a supported web browser, enter the IP address of the PDU, and then enter the credentials of the PDU.
2. Navigate to **Home** > **Control and Manage**.
3. Click **Outlet Control Enabled** to enable outlet control.
4. Click **Add New Outlet Group**.



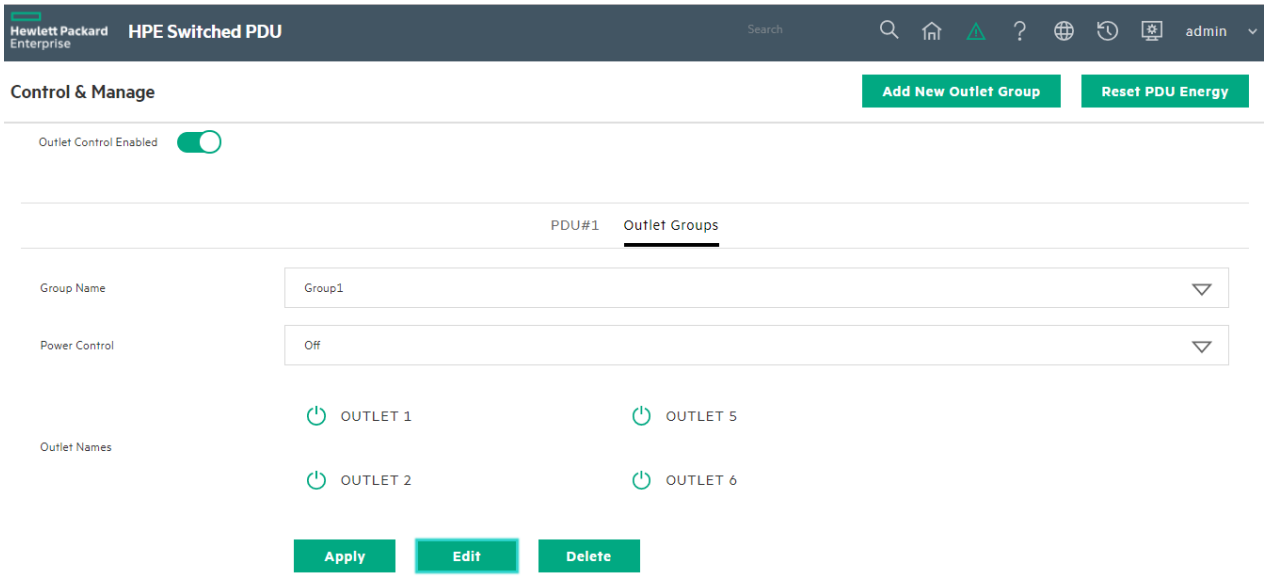
5. Add a group name and select the outlets you want to group.

   You can group a minimum of one outlet and a maximum of twelve outlets.



6. Click **Save**.

   The new outlet group appears in the Outlet Groups tab.



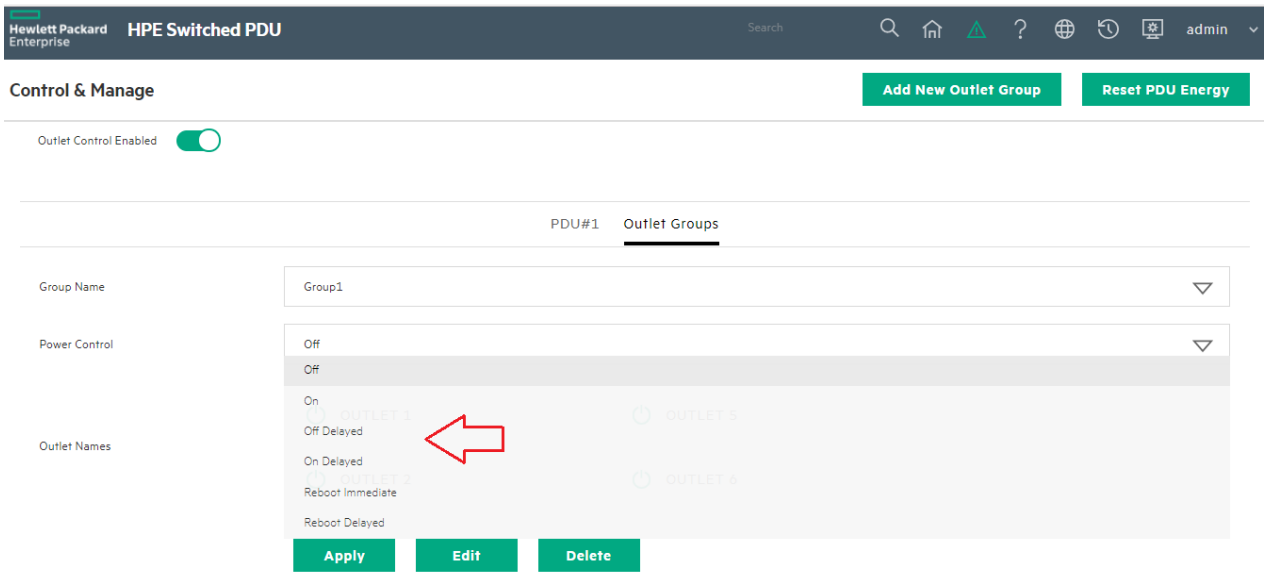
Controlling an outlet group

About this task

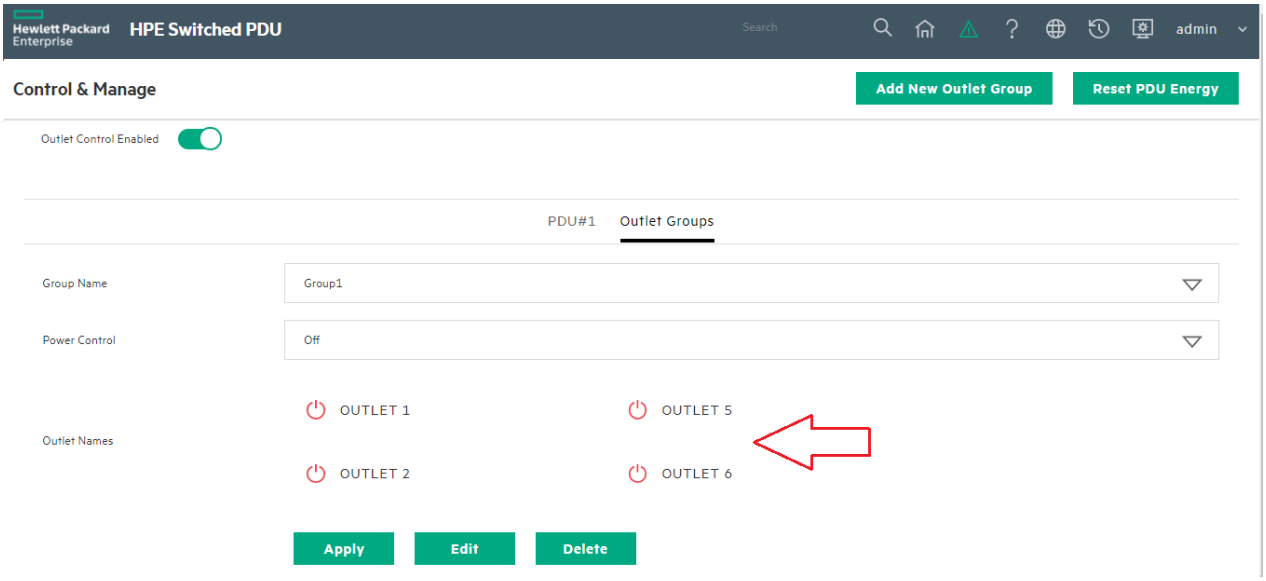
You can apply power controls to an outlet group.

Procedure

1. Select the group name and the power control option from the **Group Name** and **Power Control** drop-down menu.
2. Click **Apply**.



The group outlets are switched on or off accordingly.



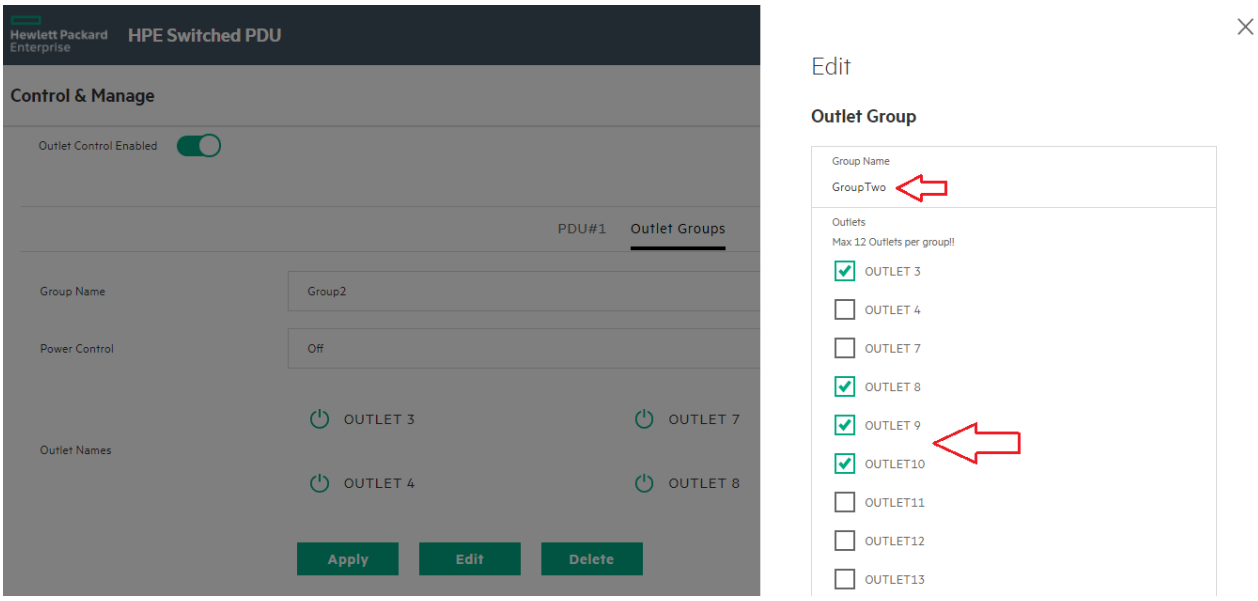
Editing an outlet group

About this task

You can edit an outlet group name or add or remove outlets from an existing outlet group.

Procedure

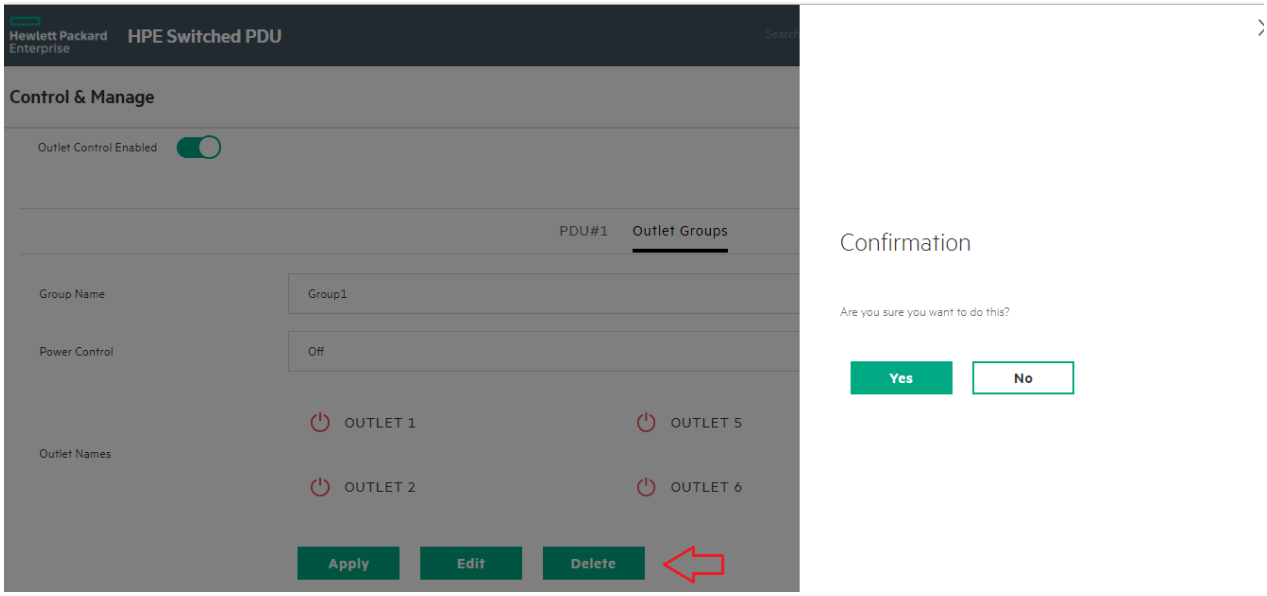
1. Select the outlet group you want to edit.
2. Click **Edit**.
3. Edit the outlet group name, delete an existing outlet, or select a new outlet.
4. Click **Save**.



Deleting an outlet group

Procedure

1. Select the outlet group you want to delete.
2. Click **Delete**.
3. Click **Yes** to confirm that you want to delete the outlet group.



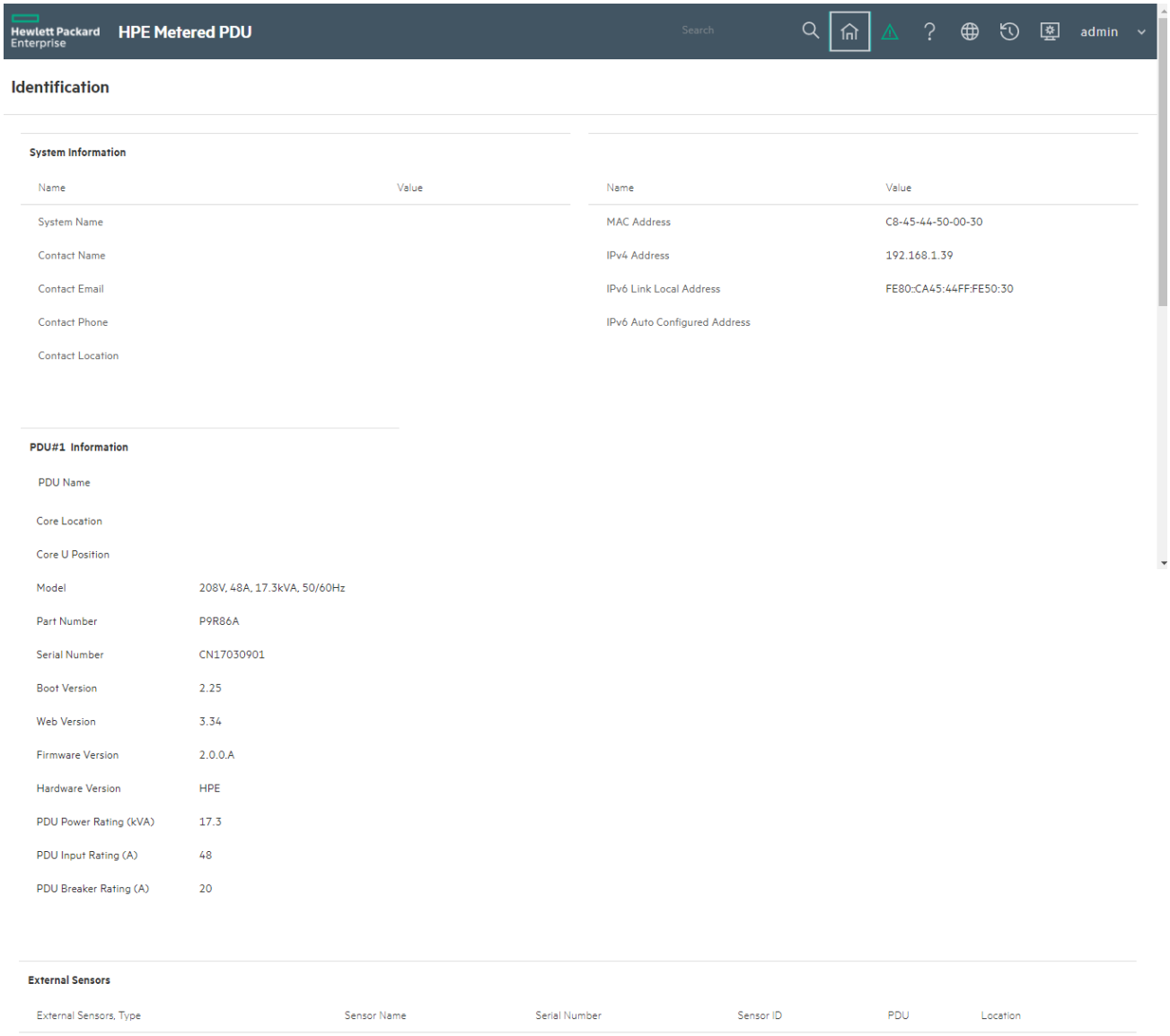
Outlet grouping in a daisy chain setup

Outlet groups are created by grouping outlets from different PDUs in a daisy chain setup. A maximum of 16 groups can be created. Each group can have a minimum of one outlet and a maximum of 12 outlets.

NOTE: The web interface page loading speed will be slow when creating the Outlet Groups and performing Outlet Control actions. Wait for some time or refresh the page during this time to completely load it.

Identification page

The Identification page displays system information such as the system name, contact name, email, phone, and location. It also displays the IP address details and PDU information such as the PDU name, model, part number, serial number, boot version, web, and firmware and hardware versions. This page also displays the external sensor information for the PDU.

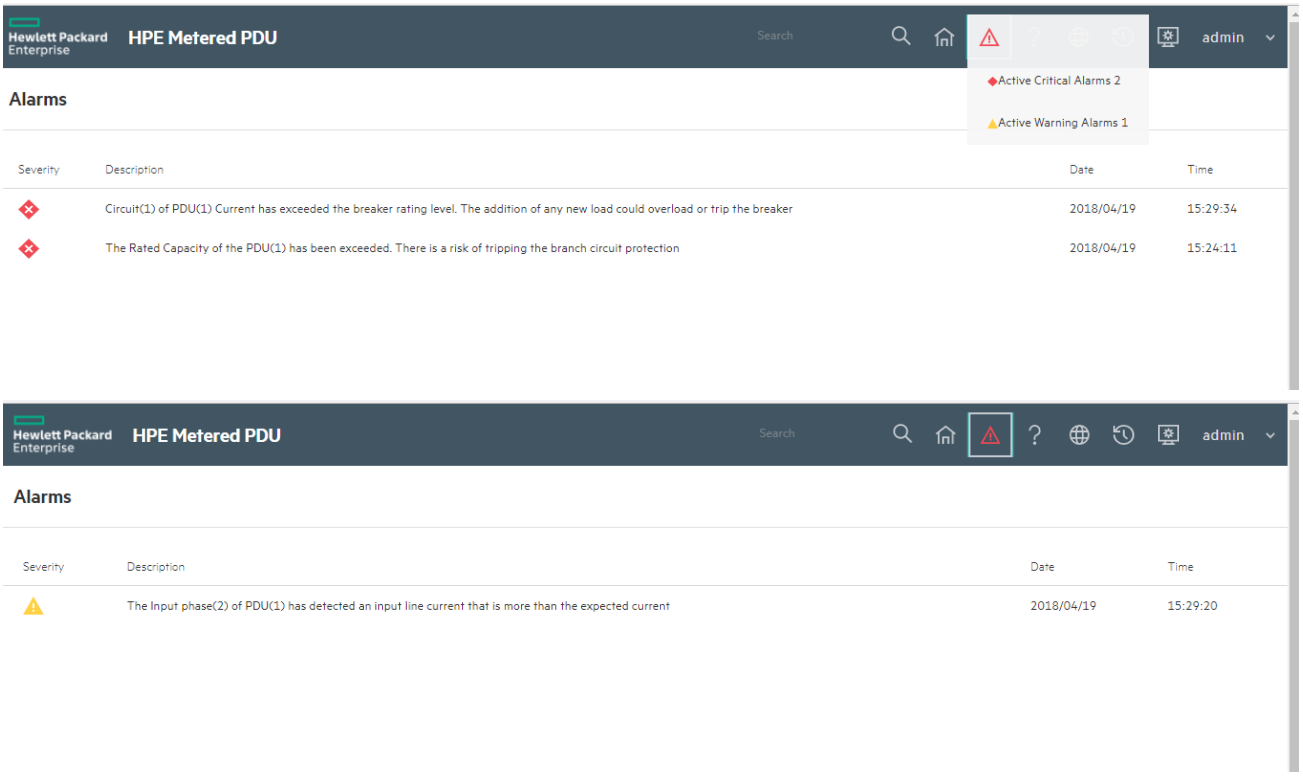


Alarms page

The Alarms page displays the generated alarms. Alarms are categorized by severity level:

- Active critical alarms
- Active warning alarms

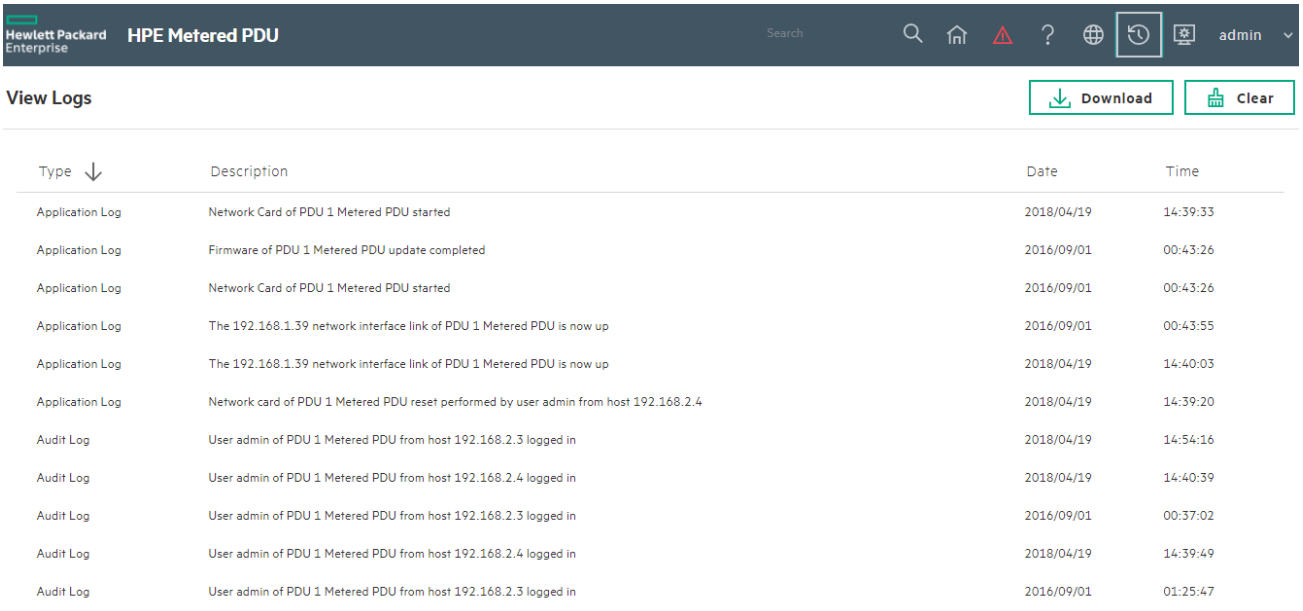
The alarms icon displays the count of critical alarms and warning alarms. The count is reduced as the alarms are cleared. The Alarms page displays the active alarms, the severity, date, and time generated when any threshold value exceeds or is less than the expected value.



View Logs page

The event log lists the events, applications, and audit logs with the time stamp of when the event log was generated. All user activities are logged and displayed on the View Logs page. You can download an event log as an Excel sheet or clear an event log by using the **Download** or **Clear** button in the top right corner of the page.

The data log contains entries with the time of each record. The data log configuration lets you set the time interval and enable or disable the logs. To clear the data logs, click **Clear**.



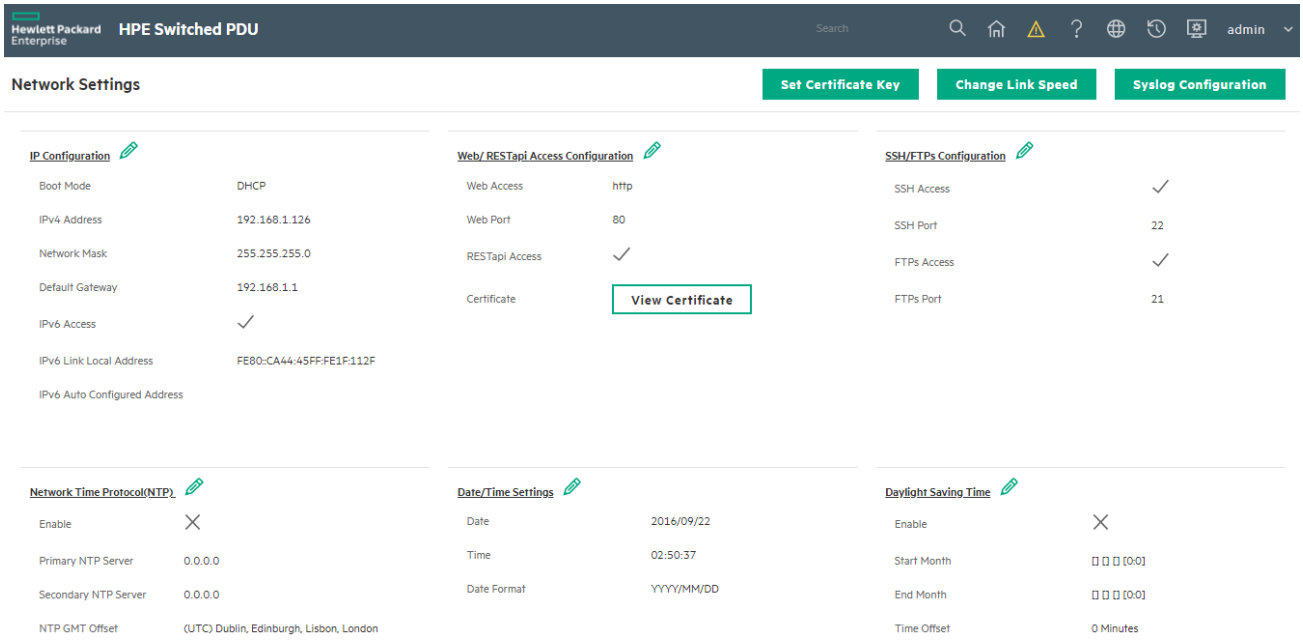
Network Settings page

The Network Settings page allows you to edit the IP Configuration, Web/REST API access configuration, SSH/FTP Configuration, Network Time Protocol, Date/Time Settings, and daylight-savings time.

To access the Network Settings page, select **Settings** > **Network Settings**.

You can also perform the following tasks on this page:

- Set Certificate Key—Set the SSL certificate key length (1024/2048 bits).
- Change Link Speed— Set the Ethernet link speed (Auto Negotiation, 10/100 Mbps, or 1GMbps).
- Syslog Configuration—Configure the system log. Add the Syslog server address, server port, and then enable the access to the Syslog.



IP configuration

About this task

On the Network Settings page, select the desired options in the IP Configuration section.

Procedure

1. If using IPv4, select one of the following Boot Mode options:
   - To manually enter an IP address, select **Static**, and then enter the following information:

- IPv4 address
- Network Mask
- Gateway

- To autoconfigure the PDU IP address, select **DHCP**.

Configuring RESTapi access

Procedure

1. Enter the PDU IP address in Google Chrome and login to the PDU using the credentials.
2. Navigate to the Network Settings page and enable RESTapi Access Configuration.
3. Click **Save**, and then confirm and apply changes.

   The PDU reboots.
4. Open **POSTMAN** app.
5. Add the basic authentication header that is required for all the query requests.

   - For **GET** request, enter the URL request, basic authentication header with username and password, and then query the request.
   - For **POST** request, include the json object type with the basic authentication header.

     a. Query the URL `http://{pdu_ip} /redfish/v1/SessionService/Sessions` , along with the two headers (basic auth and json object type) and the following body:

     ```
     {
     "username":"admin",
     "password":"123456789"
     }
     ```

     b. Use the X-Auth Token from the response body along with the other two headers and basic authentication for any POST request.
   - For **DELETE** request, enter the URL for session or users you want to delete, along with the basic authentication and send information.

Network Time Protocol and date/time settings

About this task

You can set the internal on the PDU either manually or by linking to a Network Time Protocol (NTP) server.

Procedure

1. Set the internal clock in one of the following ways:

   - Manually

- Use the calendar icon to select the date or enter the date in YYYY-MM-DD format.
- Enter the time in HH:MM:SS format, and then select the time format (for example 24-hour).

- Link to a Network Time Protocol (NTP) server
  - Enter the valid primary and secondary NTP server addresses.
  - Select the desired GMT offset time from the drop-down list.

Working with NTP on the web interface

About this task

NTP is used to synchronize the PDU time over the Internet. Either one or two valid NTP servers can be configured for the PDU.

Procedure

1. Log into the PDU web interface.
2. Navigate to **Network Settings>Edit the NTP access**.
3. Choose to configure either one or two valid NTP servers.
   To configure one NTP server, complete the following steps.

   a. Enter the valid IP address in the Primary NTP Server field. Leave the Secondary NTP Server as 0.0.0.0 and set the GMT offset.

   b. Click **Test**.

      The First Time Server IP address lists SUCCEEDED, and the Second Time Server IP Address lists FAILED.

   c. Click **OK**.

   d. Click **Save**.

      The PDU will then reboot.

   To configure two NTP servers, complete the following steps.

   a. Enter two valid IP addresses in the Primary and Secondary NTP Server fields and set the GMT offset.

   b. Click **Test**.

      The First and Second Time Server IP addresses list SUCCEEDED.

   c. Click **OK**.

   d. Click **Save**.

      The PDU will then reboot.

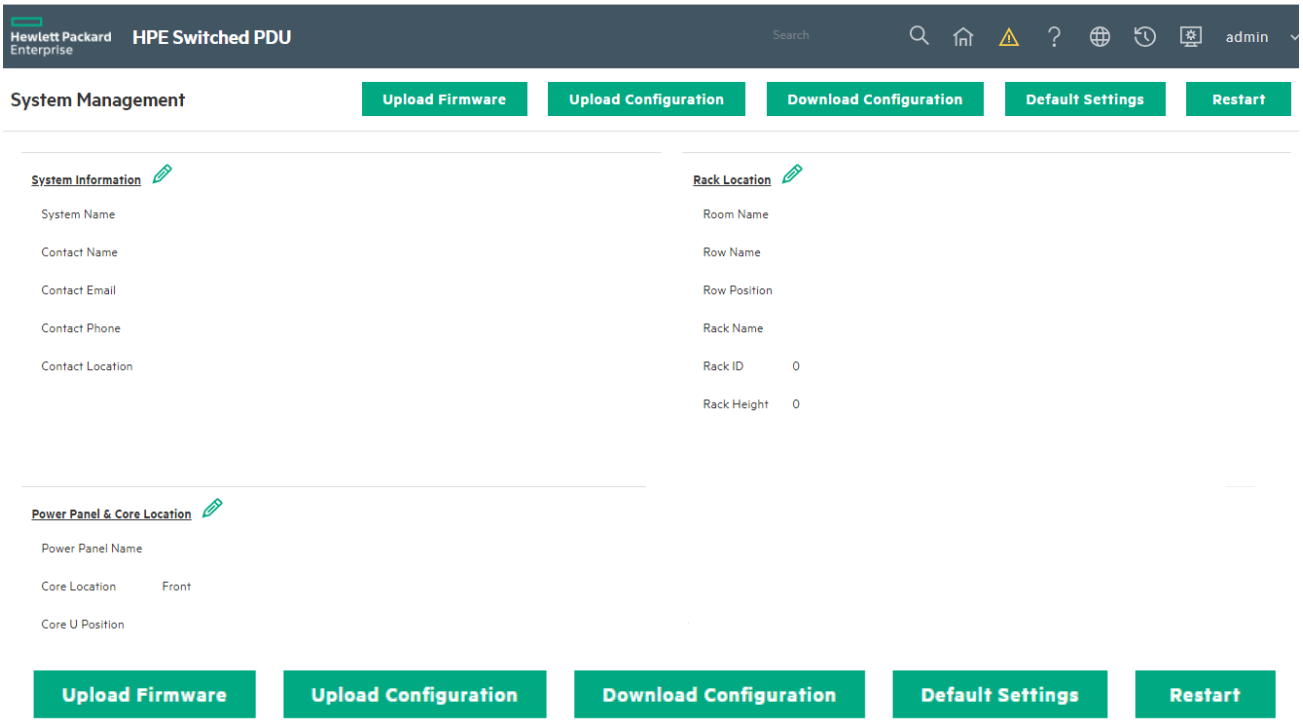
Daylight savings time

Procedure

1. Enable daylight savings time for the PDU time by setting a 1 hour or 30 minute offset.
2. Enter the start month (Start Month::Week::Day::Time) and end month (End Month::Week::Day::Time), and then select the time offset.

System Management page

The System Management page allows you to set the system, rack, power panel, and core location information.



Action	Description
Upload Firmware	Uploads the firmware file. Select the `HPE.FW` file and click **Upload**.
Upload Configuration	Uploads the configuration file. Create a configuration file and upload the file to the PDU with the same SKU. The configuration file must be named `conf.ini`.
Download Configuration	Downloads the configuration file of the PDU with the same settings.
Default Settings	Sets the PDU to its default settings.
Restart	Reboots the PDU.

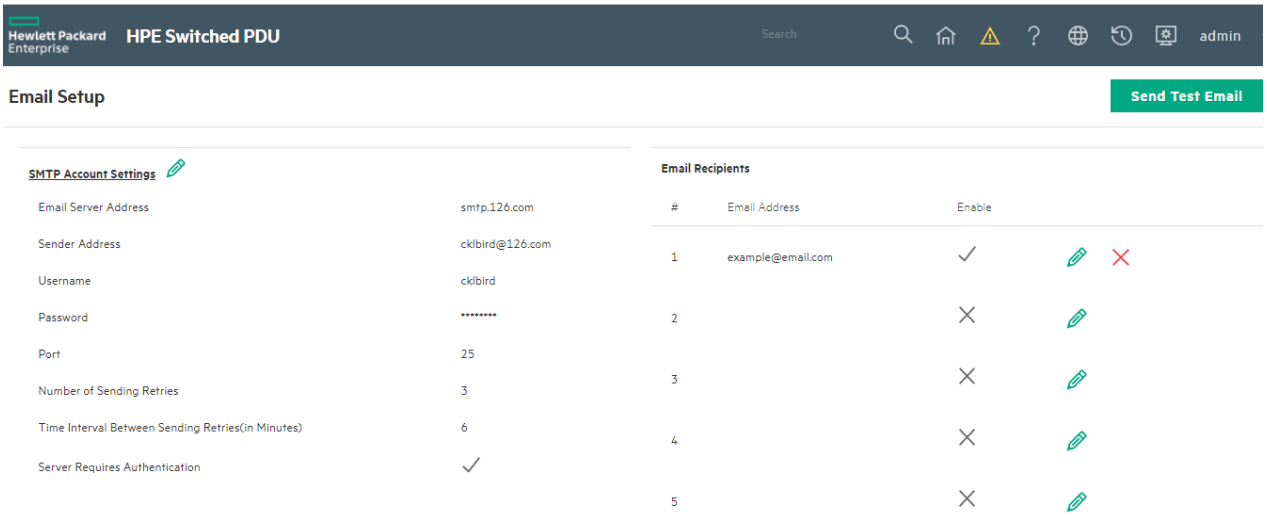
Email Setup page

Procedure

1. Navigate to **Settings** > **Email Setup**.
2. Edit the SMTP account settings
3. Add the email server address, sender address, and port number, and then set the number of retries allowed.
4. Enable authentication and set the user name and password, if required.

   When server authentication is disabled, user name and password might be empty.
5. Navigate to Email Recipients, add the email address, and then enable the email address.
6. Click **Send Test Email** and enter the email address.

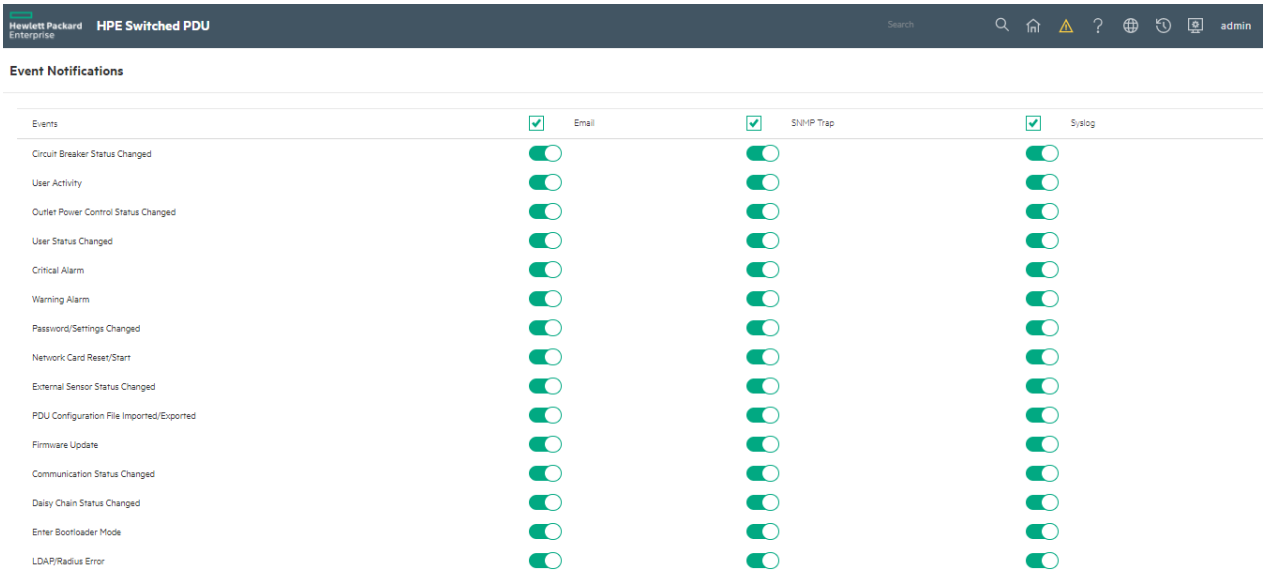
   An SMTP Configuration test mail will be sent to your email address.



Event Notifications page

Procedure

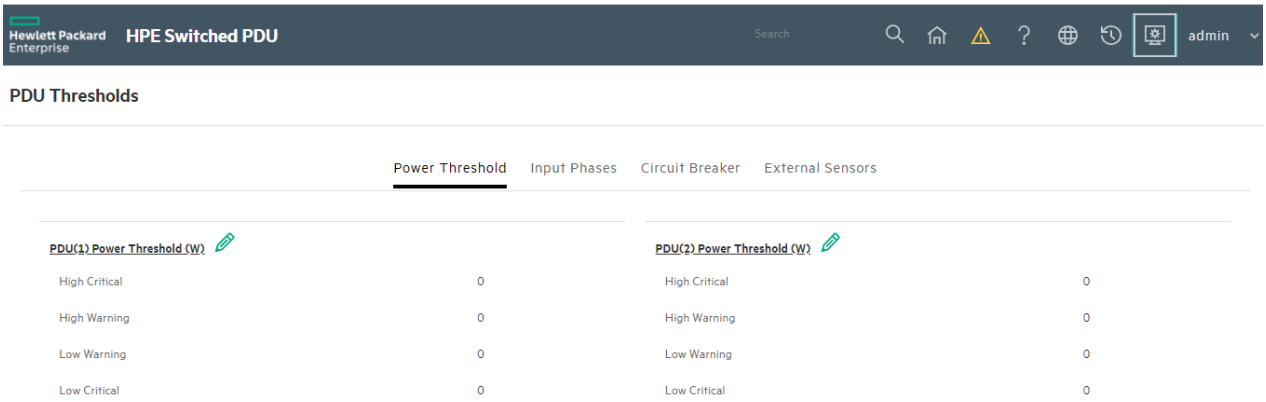
1. Navigate to **Settings** > **Event Notifications**.
2. Enable or disable the event notifications you want to receive for emails, SNMP traps, and the Syslog.



PDU Thresholds page

Procedure

1. Navigate to **Settings > Thresholds**.
2. Set the threshold values for PDU power, phase current, phase voltage, circuit breaker current, outlet power, and external sensors.



PDU power thresholds

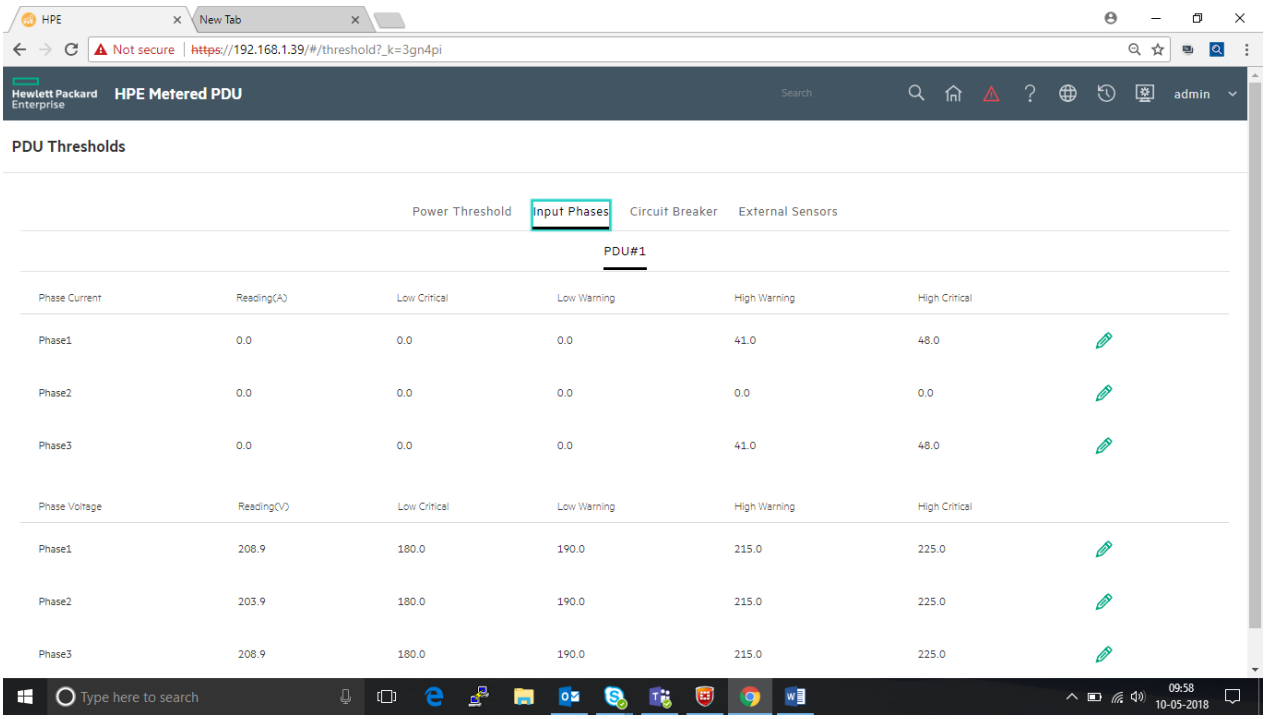
Procedure

1. On the PDU Thresholds page, click the **PDU Power Threshold** edit pencil.
2. Set the threshold values for **High Critical**, **High Warning**, **Low Warning**, or **Low Critical**.
3. Select the **Enable** check-box to enable those thresholds to trigger alarms.
4. Set the **Reset Threshold** value and **Alarm State Change Delay** value.
5. Click **Save**.

Power Input phases

Procedure

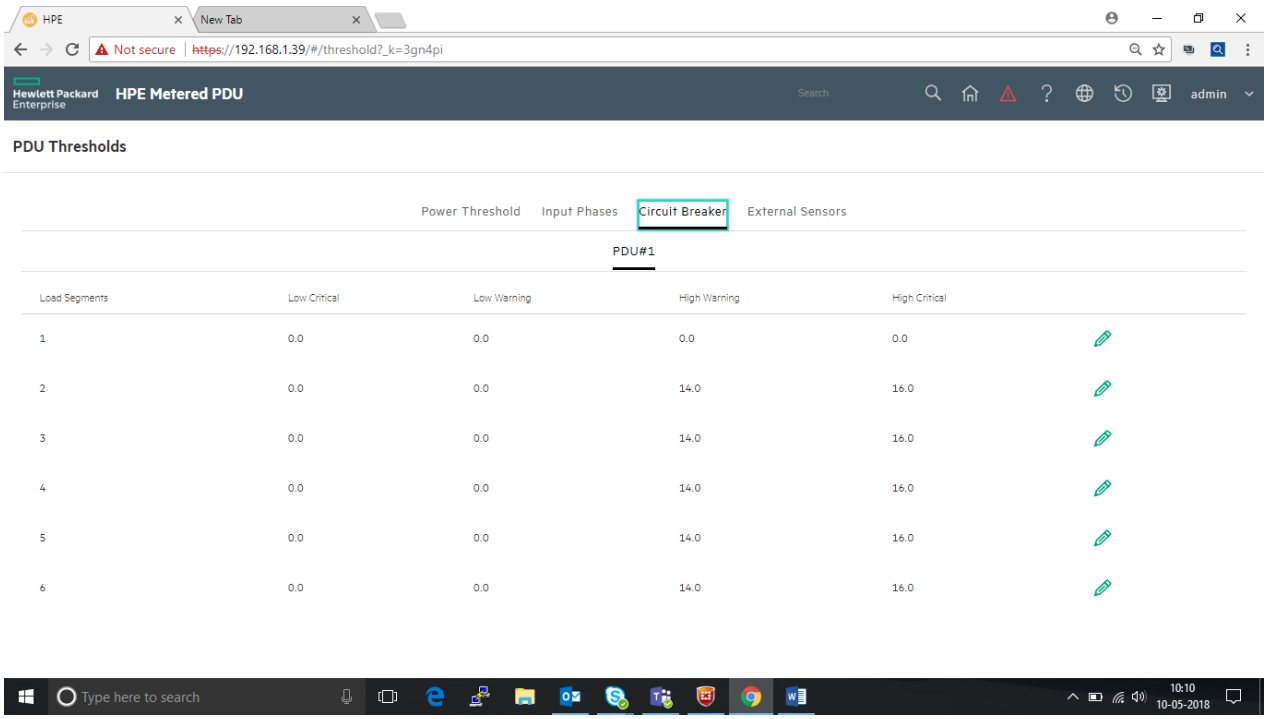
1. In the **Input Phases** tab of PDU Thresholds page, click the Edit pencil icon for the PDU input current and voltage phases.
2. Set the current and voltage phase threshold values for High Critical, High Warning, Low Warning, and Low Critical for each phase.
3. Enable the threshold values to receive the alarms.
4. Set the Reset threshold and alarm state change delay value.
5. Click **Save**.



Circuit breaker

Procedure

1. In the PDU Thresholds **Circuit Breaker** tab, click the Edit pencil icon to set the circuit breaker threshold for each Load Segment.
2. Set the threshold values for High Critical, High Warning, Low Warning, or Low Critical.
3. Enable the threshold values to trigger the alarms.
4. Set the Reset threshold and alarm state change delay value.
5. Click **Save**.



Control Management

About this task

When thresholds are enabled for alarms, the PDU generates the alarms in order of priority:

1. Power alarms
2. Circuit breaker
3. Input phase
4. External sensor
5. Outlet alarms

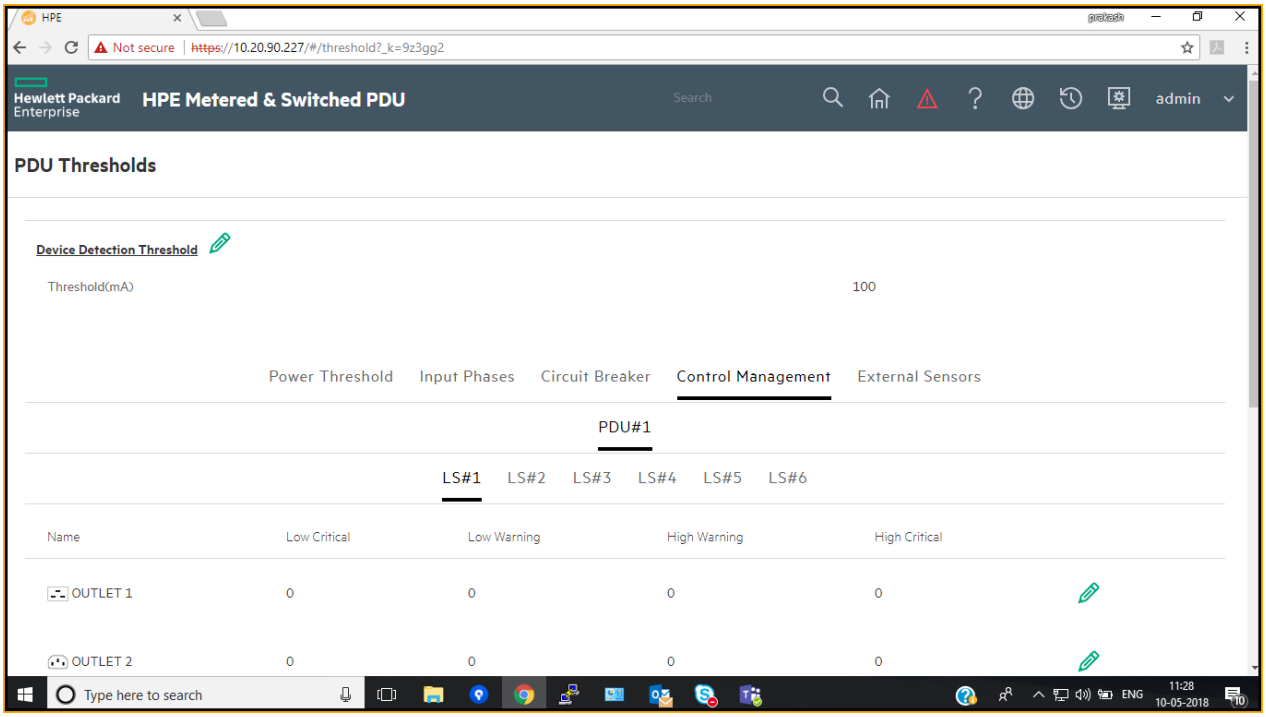
The alarms are checked at 20-minute intervals.

You can set individual thresholds for High Critical, High Warning, Low Warning, and Low Critical. To enable two or more thresholds, set the condition for the threshold values. For example:

Low Critical less than **Low Warning** less than **High Warning** less than **High Critical**

Procedure

1. To set outlet active power threshold values, click the Edit pencil icon.
2. Set the threshold values for High Critical, High Warning, Low Warning, or Low Critical.
3. Enable the threshold values to receive the alarms.
4. Set the Reset Threshold and Alarm State Change Delay value.
5. Click **Save**.


HPE
Not secure
https://10.20.90.227/#/threshold?_k=9z3gg2
Hewlett Packard Enterprise
HPE Metered & Switched PDU
Search
admin
PDU Thresholds
Device Detection Threshold
Threshold(mA)
100
Power Threshold
Input Phases
Circuit Breaker
Control Management
External Sensors
PDU#1
LS#1
LS#2
LS#3
LS#4
LS#5
LS#6
Name
Low Critical
Low Warning
High Warning
High Critical
OUTLET 1
0
0
0
0
OUTLET 2
0
0
0
0
Type here to search
ENG
11:28
10-05-2018

Simple Network Management Protocol (SNMP)

SNMP configuration

IMPORTANT: For SNMP OID (Delta PDU) Pdu3InputPhaseCurrent 1.1, the value is calculated as Phase Current * sqrt 3 for both Master and Slave. The GUI threshold page displays as "PDU 1-displays Phase 1 current."

Setting up SNMP

Procedure

1. Access the web interface and log in.
2. Under SNMP Managers, select **SNMP General**.

   The **SNMP General** page is displayed, which includes SNMP Access and Version.

Setting up the SNMP port

Procedure

1. Navigate to **Settings** > **SNMP Manager**.
2. Select **SNMP General**.

   The **SNMP General** page is displayed.
3. Edit the SNMP Access and Version.
4. Select **SNMP Port**, and then set the SNMP port number.

Configuring the SNMP V1/V2c user

Procedure

1. Access the web interface and log in.
2. Under SNMP Managers, select **SNMP V1/V2c**.

   The SNMP V1/V2c page is displayed.
3. Verify that SNMP V1/V2c is selected in the SNMP Version field.
4. On the SNMP V1/V2c panel, in the Community column, select the SNMP V1/V2c user to configure.
5. Choose one of the following access rights for the SNMP V1/V2c user:

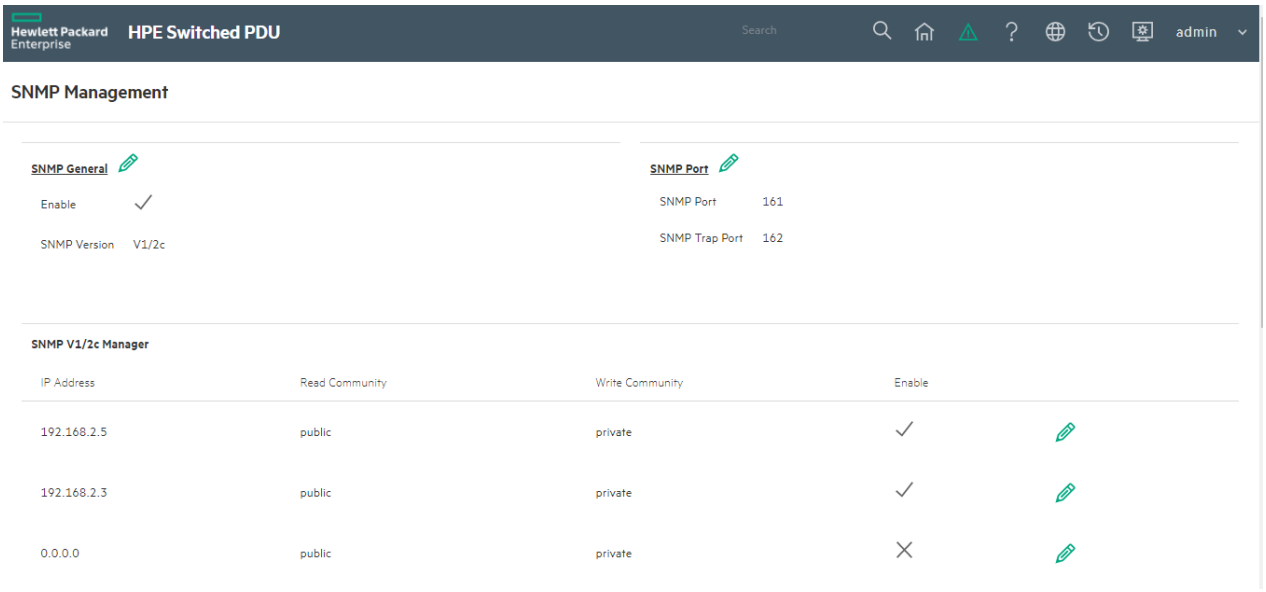
   - Read Community—SNMP V1/V2c user can edit "public" settings.
   - Write Community—SNMP V1/V2c user can edit "private" settings.

6. Click **Enable**.
7. Click **Update**.

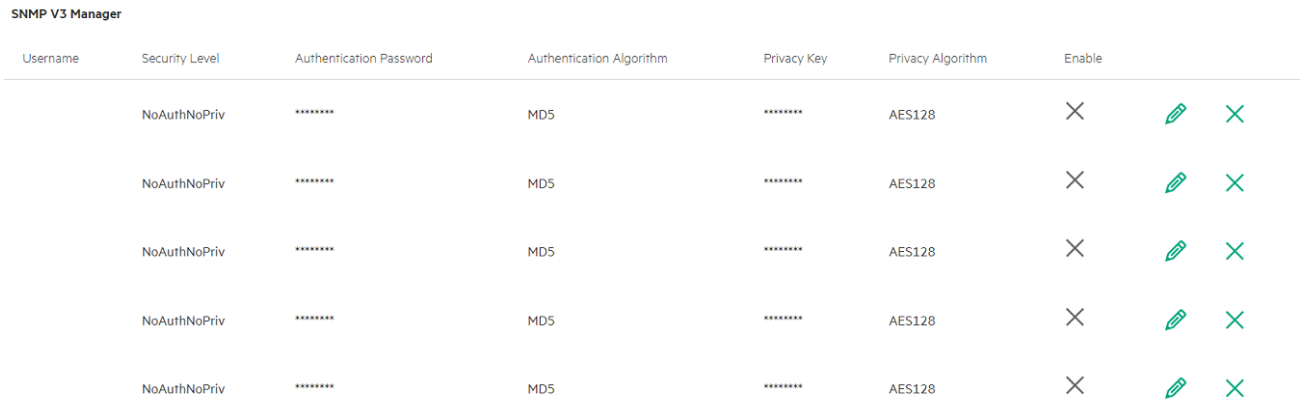
Configuring SNMP v1/2c Manager

Procedure

1. On the SNMP Management page, click the edit pencil icon of the IP address to be configured.
2. Choose the access rights for the Read community and the Write community.
3. Click **Enable**.
4. Click **Save**.



SNMP v3 Manager

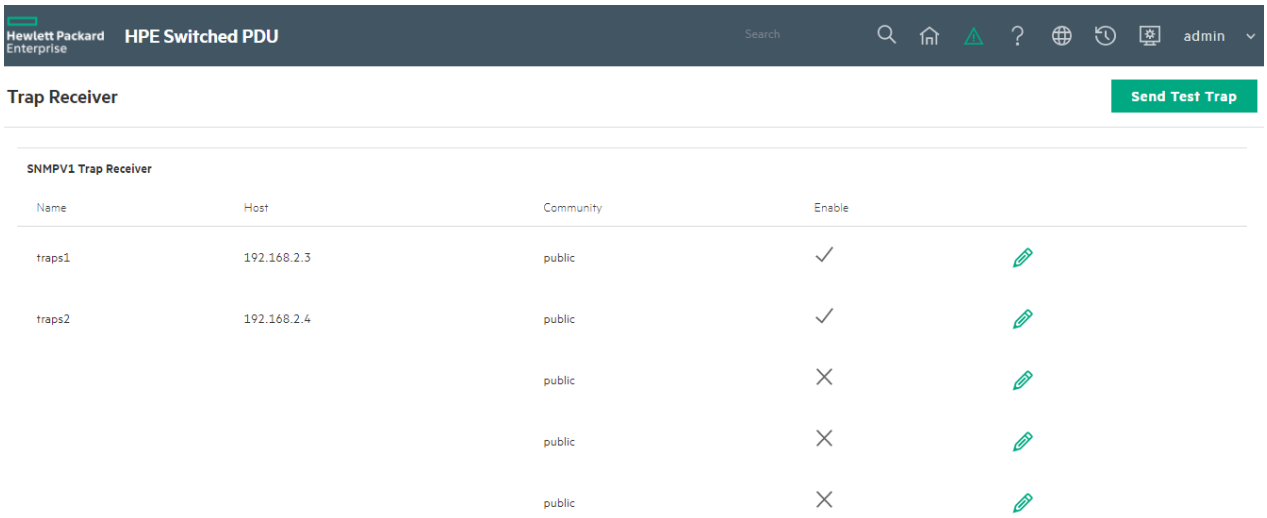


Trap Receiver

Setting up an SNMP trap receiver

Procedure

1. Navigate to **Settings** > **SNMP Manager**.
2. Select **SNMP Port**, and then set the trap port number.
3. Navigate to **Settings** > **Trap Receiver**.
4. Edit the SNMPV1 Trap Receiver by setting the name, host IP address, and community string.
5. Click **Enable**.
6. Click **Save**.



Deleting SNMP and Trap Receiver IP addresses

About this task

The web interface allows the user to delete the SNMP and Trap Host IP addresses when they are no longer in use.

Procedure

1. To delete any Host IP address on the SNMP or Trap Receivers page, click the green**X** button next to the Edit icon.
2. After the Host IP is deleted, the IP address displays the default value of 0.0.0.0.

Configuring users for encrypted SNMP V3 communications

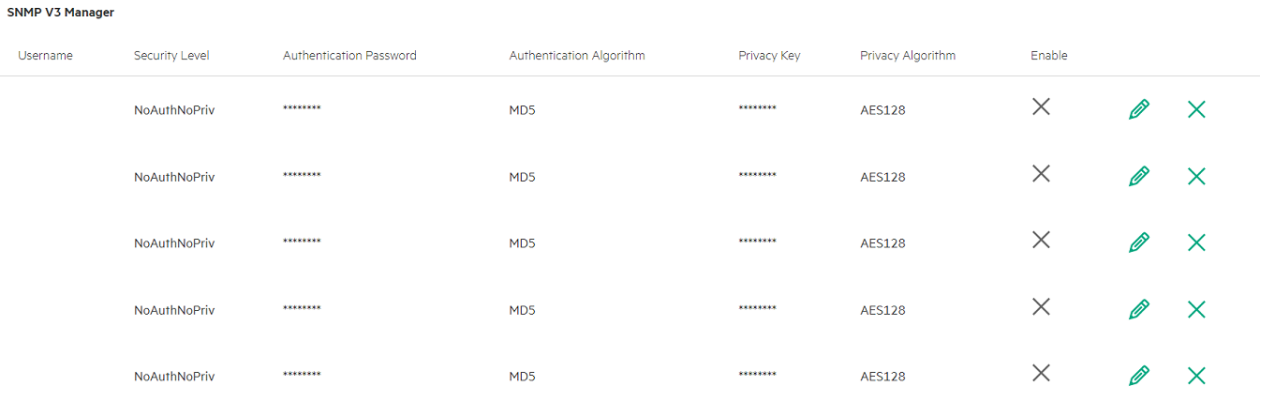
Procedure

1. Navigate to **SNMP Managers** > **SNMP V3**.

   The SNMP V3 page is displayed.
2. Enter the Username.

3. Choose a security level from the drop-down menu:
   - NoAuthNoPriv—No authentication and no privacy, default option.
   - AuthNoPriv—Authentication and no privacy.
   - AuthPriv—Authentication and privacy.
4. Select an Authentication Algorithm:
   - Select **MD5—** This is a digest algorithm that provides assurance that transferred data is in tact.
   - Select **SHA**—This is a cryptographic algorithm designed to keep data secure.
5. Set the authentication password and privacy key.
6. Select a Privacy Algorithm:
   - **AES128**
   - **AES192**

     AES256
7. Click **Enable**.
8. Click **Save**.



Configuring local access

Connecting through a serial connection

You can access the following PDU information through a serial connection by running CLI commands.

- System configuration
- Network Configuration
- User Operation
- Device Settings
- Power Measurements
- Switch Outlets On/Off.

A serial connection also requires a terminal emulation program, such as HyperTerminal, or the use of an SSH client, such as PuTTY.

Communicating through the serial port requires a specialized optional RJ45-DB9 cable, or you can create your own cable. For more information on making your own cable, see **Serial cable pinout to create your own cable**.

Connecting the PDU to a computer

Procedure

1. Using the optional RJ45-DB9 cable, connect the RJ45 end to the port labeled Serial+RS485-1 on the front panel of the PDU.
2. Connect the DB9 end of the cable to the serial connector on the computer.

Supported commands

The PDU CLI command set for managing and monitoring the PDU includes the following commands:

`?`

PDU help query

`sys`

PDU system configure and setting

`net`

PDU net application configure and setting

`usr`

PDU user operation

`dev`

PDU device setting

`pwr`

PDU power setting

Command variables are represented in command input syntax surrounded by angle braces (< >). Optional parameters are represented in command input syntax surrounded by straight brackets ([ ]). For data of type array, the 'x' character as index of array in command input syntax means all indexes.

You must be logged in to the PDU before commands can be sent. See **Appendix A: CLI commands**, for a list of all CLI commands.

Logging in with the CLI

The CLI is an alternative method used to manage and control the PDU status and parameters, as well as basic administrative functions. With the CLI, you can:

- Reset the PDU
- Display PDU and network properties
- Configure the PDU and network settings
- Switch outlets on/off
- View user information

Logging in with HyperTerminal

To log in with HyperTerminal, set the COM settings to the following parameters:

- Bits per second—115200
- Data bits—8
- Parity—None
- Stop bits—1
- Flow control—None

Logging in with SSH through PuTTY

About this task

IMPORTANT: To use SSH directly on the Linux Box, upgrade the OpenSSH to 7.6p1 in the Linux OS. Upgrading the OpenSSH allows direct SSH command execution through the HPE command prompt.

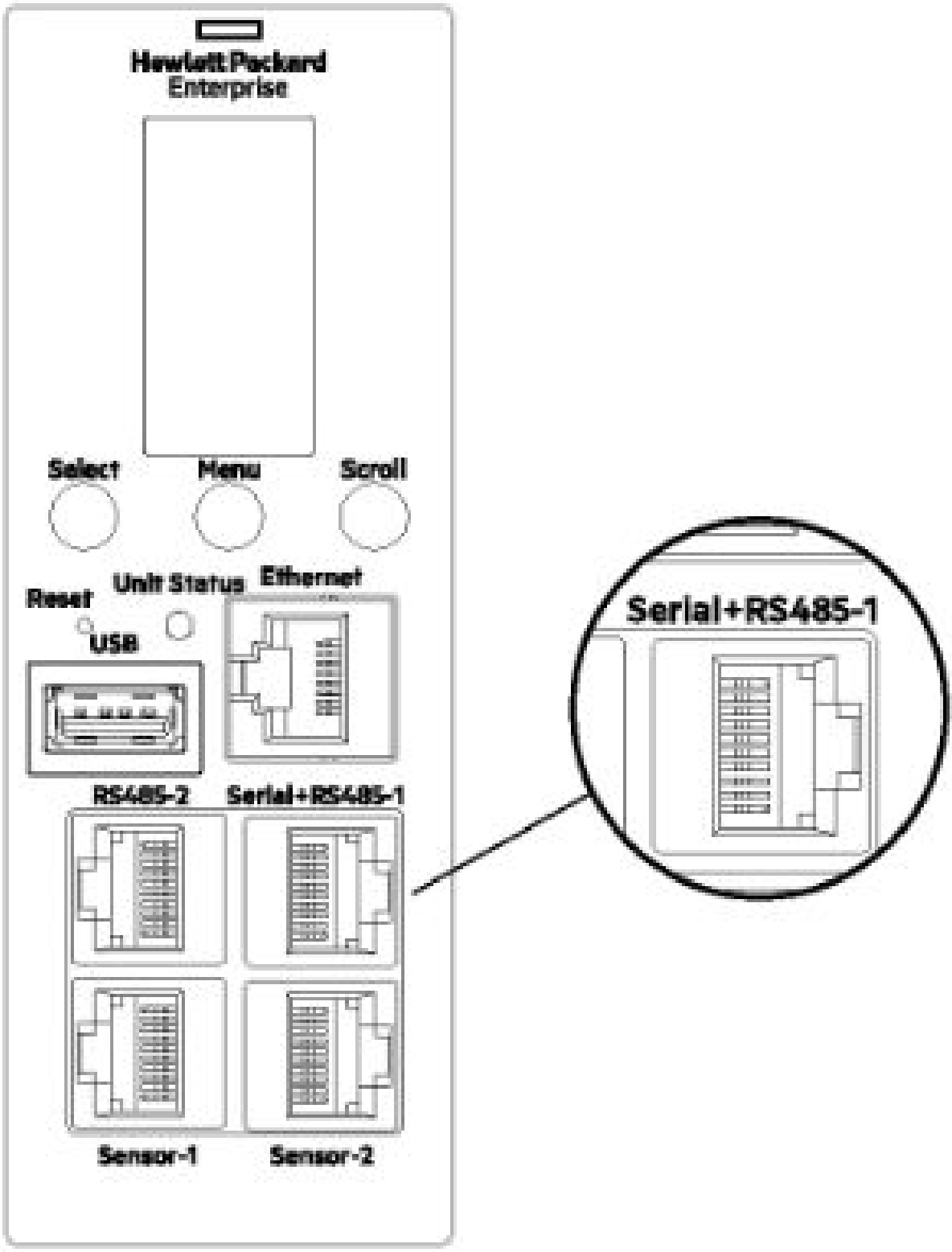
Procedure

1. Verify that SSH is enabled.
   a. With the GUI, navigate to **Device Configuration** > **Network Service** > **SSH**.
   b. Select the **Enable SSH Access** check box.
   c. Click **OK**.
2. Open an SSH client (PuTTY).
3. Enter the IP address in the Host Name field.
4. Select the connection type **SSH** and enter **22** in the **Port** field.

5. Click **Open**.
6. Enter your user name, and then press **Enter**.
7. Enter your password, and then press **Enter**.

   You are now logged in to the SSH. For CLI commands, see **Appendix A: CLI commands**.

NOTE: An SSH connection is not available when serial connection is enabled.


Hewlett Packard
Enterprise
Select
Menu
Scroll
Reset
Unit Status
Ethernet
USB
RS485-2
Serial+RS485-1
Sensor-1
Sensor-2
Serial+RS485-1

Controlling outlets using SSH

Procedure

1. Log into the PDU web UI.
2. Navigate to **Settings** > **Network Settings** and enable SSH Configuration with the default port.
3. Open PuTTY configuration, and then enter the host name and port number.
4. Enter the PDU credentials, and then connect to the PDU.
5. Type **`dev ?`** to list the device setting commands.
6. To check the status of the outlets and to control (turn on/off) the outlets, enter **`dev outlet pduID [status/ outletindex] [on/off]`**.
7. To check the status of the outlets of PDU1, enter **`dev outlet 1 status`**.
   - `Open` means On.
   - `Closed` means Off.
8. To turn on outlet2 and check the status, enter **`dev outlet 1 1 on`**.
9. To turn off outlet 2 and check the status, enter **`dev outlet 1 2 off`**.

Recovering passwords with the CLI/SSH

About this task

This procedure is for an administrative to recover a password with the CLI/SSH.

Procedure

1. Log in to the CLI with account manager credentials.
2. Enter `sys def`.
3. Press the reset button for eight seconds.

The PDU resets to the original default settings, allowing the administer to create passwords.

Working with NTP through CLI/SSH

About this task

NTP is used to synchronize the PDU time over the Internet. Either one or two valid NTP servers can be configured for the PDU.

Procedure

1. Log into the PDU web interface.
2. Navigate to **Network Settings** and enable SSH access.
3. Connect to SSH using PuTTY.
4. Choose to configure either one or two valid NTP servers.

To configure one NTP server, complete the following steps.

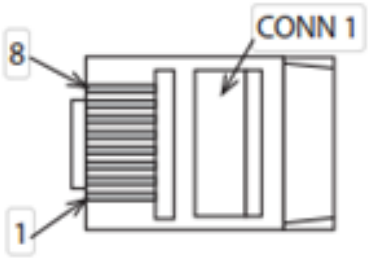
a. Enter `sys ntp ip1`.
For example, `sys ntp 123108.20.0.124`.

To configure two NTP servers, complete the following steps.

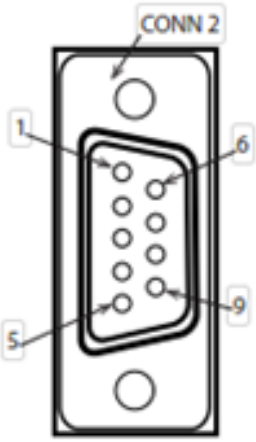
a. Enter `sys ntp ip1 ip2`.
For example, `sys ntp 123.108.200.124 95.216.192.15`.

Serial cable pinout to create your own cable

To make your own RJ45-to-DB9 serial cable, the connections are wired as shown in the following illustration.



CONN 1		CONN 2
Pin	Description	Pin
1		1
2	RS232 RX	2
3	RS232 TX	3
4		4
5	Ground	5
6		6
7		7
8		8
		9



Local display

This section contains operation information for the HPE G2 Series Metered, Switched, and Metered & Switched Power Distribution Units.

OLED display

The OLED display provides information about the PDU and connected devices. The OLED window flashes red when a critical alarm is active. Information about the basic configuration of some settings is available through the OLED. Information about the full configuration of all settings is available through the remote interfaces. The OLED display orientation can be changed using an OLED setting. The display can be rotated 0° and 180°.

The PDU has a three-button, graphical OLED interface panel. Use the buttons to change the screen display, retrieve specific performance data, or change configuration values. The display view can also change automatically. For example, the display changes to show active alarms as they occur, or particular displays update due to a change in operating state.

The OLED display has two modes.

- **Screensaver mode**—Cycles through a set sequence of screens that display current PDU values. Current values are refreshed every 10 seconds. The user cannot select a custom sequence of screens. The screensaver displays automatically after 30 seconds of inactivity from the start-up screen, a menu, or a submenu. Values are refreshed every five seconds.
- **Menu mode (OLED main menu)**—The settings that display under each high-level (main) menu depend on your PDU model.

Menu mode

Button	When in menu mode	When in screensaver mode
Menu	Select from the four main menus.	Returns to the previous display screen before entering the screensaver mode.
Scroll	Scrolls down through the list of menu items. **NOTE:** A highlighted menu item is ready to be selected.	Returns to the previous display screen before entering the screensaver mode.
Select	Opens the selected menu.	Returns to the previous display screen before entering the screensaver mode.

Power save mode

Standby mode

- The PDU enters Standby mode when there is no user activity for 30 seconds.
- The brightness level goes to level 1 during the Standby mode.

Power save mode

- The PDU enters Power Save mode (HPE Text on the OLED screen) when there is no user activity for one hour. In Power Save mode, if any key is pressed, time is reset again.
- The brightness level goes to level 1 during Power Save mode. If any key is pressed, brightness goes back to the level set by the user.
- The HPE text scrolls eight times to complete one cycle with three second intervals for each scroll.

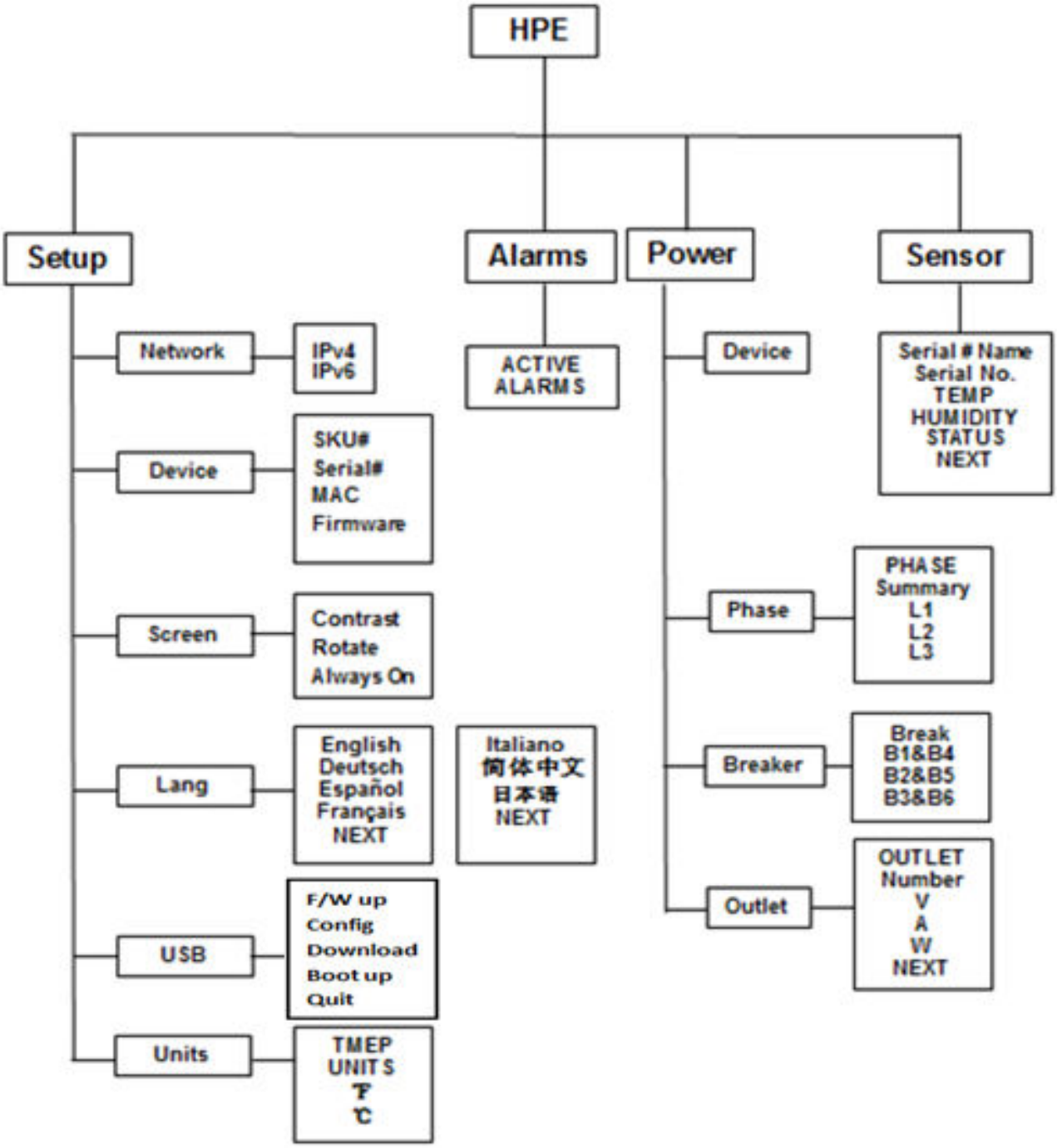
For example, if the user sets the contrast level to five and leaves it, the OLED enters standby mode after 30 seconds and the brightness level reduces to level 1 during this standby mode. When no key is pressed for one 1 hour, the OLED enters Power Save mode and the brightness remains in level 1. If any key is pressed after one hour, the brightness goes back to level 5, which was set previously by the user.

LED unit status

The LED will change colors depending on the state of the PDU.

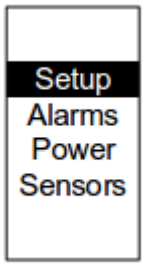
LED state	Description
Solid green	Normal operation
Solid red	Critical alarm
Solid orange	Warning Alarm
Blinking orange	Disconnected from network
Green, red, orange blinking	Upgrading
Off	In USB mode

OLED menu structure



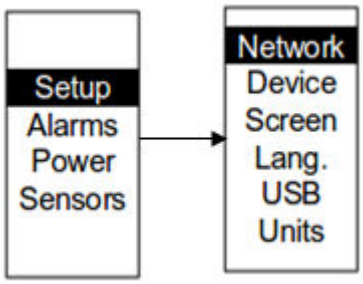
Main menu selections

The PDU menu selection hierarchy consists of Setup, Alarms, Power, and Sensors. On the main menu, scroll down to highlight Setup, and then press **Select**. Scroll down to select a submenu and press **Select** to display the submenu options. To return to the previous menu, press **Menu**.



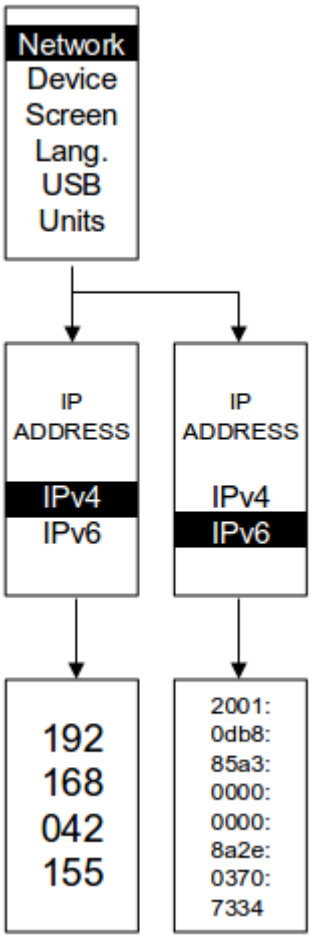
Setup menu

The Setup menu provides user configuration options including Network, Device, Screen, Language, USB, and Units. Depending on the assigned user privileges, only the available options will be displayed.



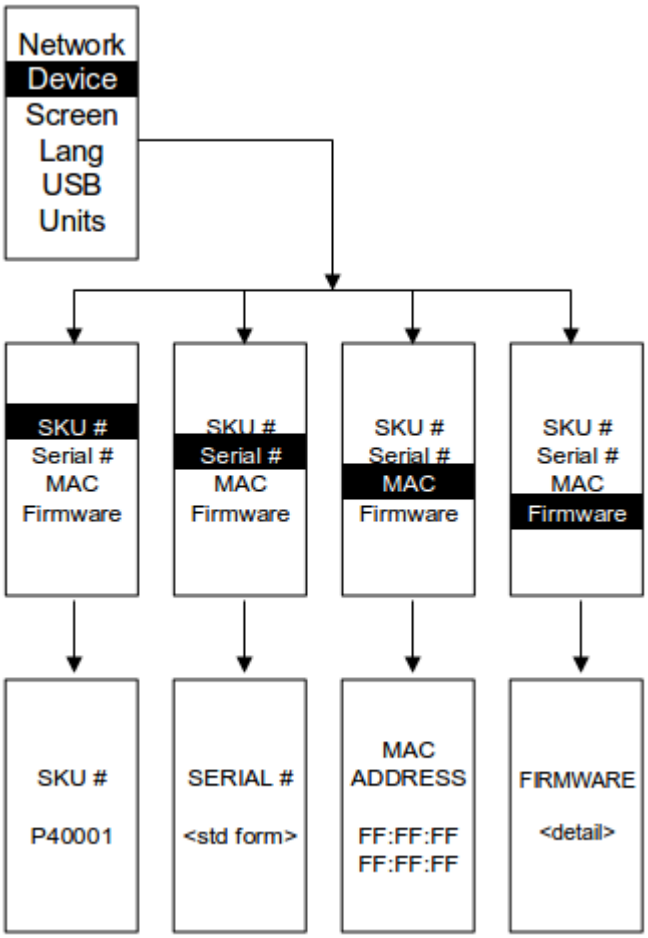
Network submenu

The Network submenu allows you to customize settings for IP address IPv4 or IPv6. On the Setup menu, scroll down to Network. Press **Select** to display the options screen. Scroll down to highlight the selected option from the menu. To set the values for the selected option, press **Select** to display the screens. After you select the values, press **Select** to set the values as displayed on the screen. To return to the previous menu press **Menu**.



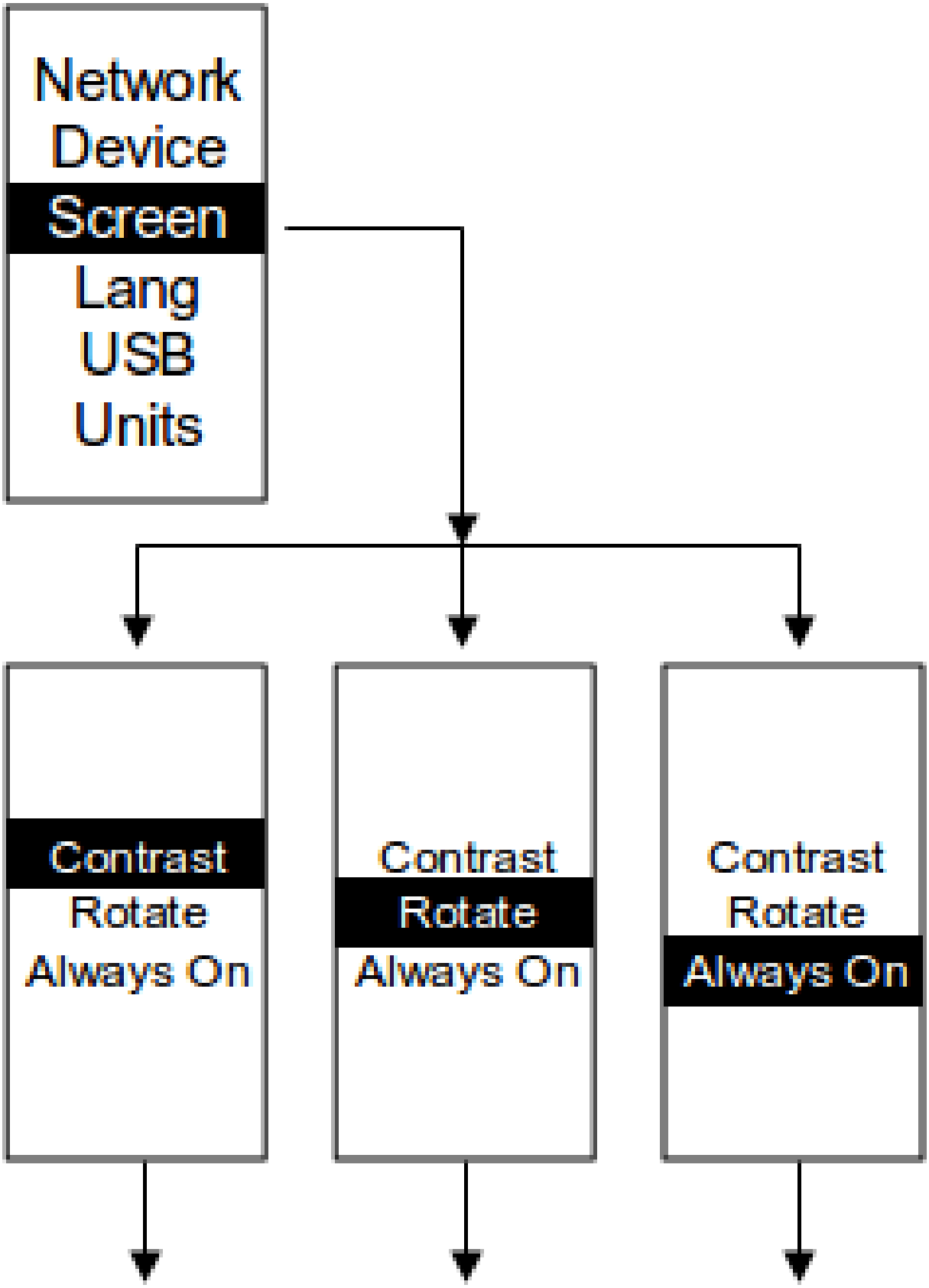
Device submenu

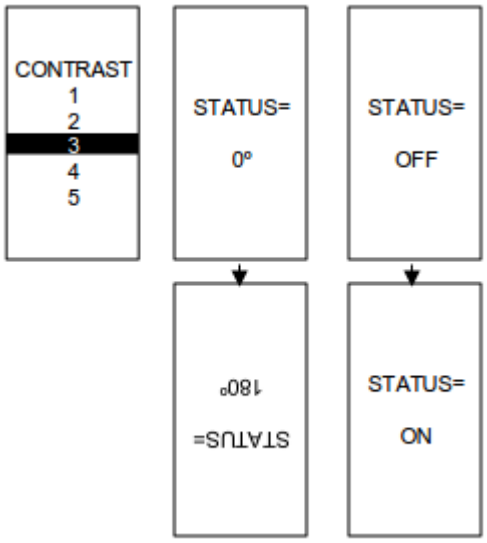
The Device submenu provides the SKU number, Serial number, MAC address, and Firmware version. On the Setup menu, scroll down to highlight the Device submenu. Press **Select** to display the options screen. To set the values for the selected option, press **Select** to display the screens. To return to the previous menu, press **Menu**.



Screen submenu

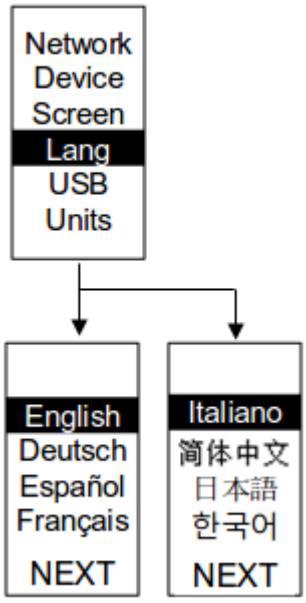
The Screen submenu allows you to customize settings for Contrast, Rotate, and Always On. On the Setup menu, scroll down to highlight Screen. To display the screens to set the values for the submenu, press **Select**. After you select the values, press **Select** to set the values as displayed on the screen. To return to the previous menu, press **Menu**.


Network
Device
Screen
Lang
USB
Units
Contrast
Rotate
Always On
Contrast
Rotate
Always On
Contrast
Rotate
Always On



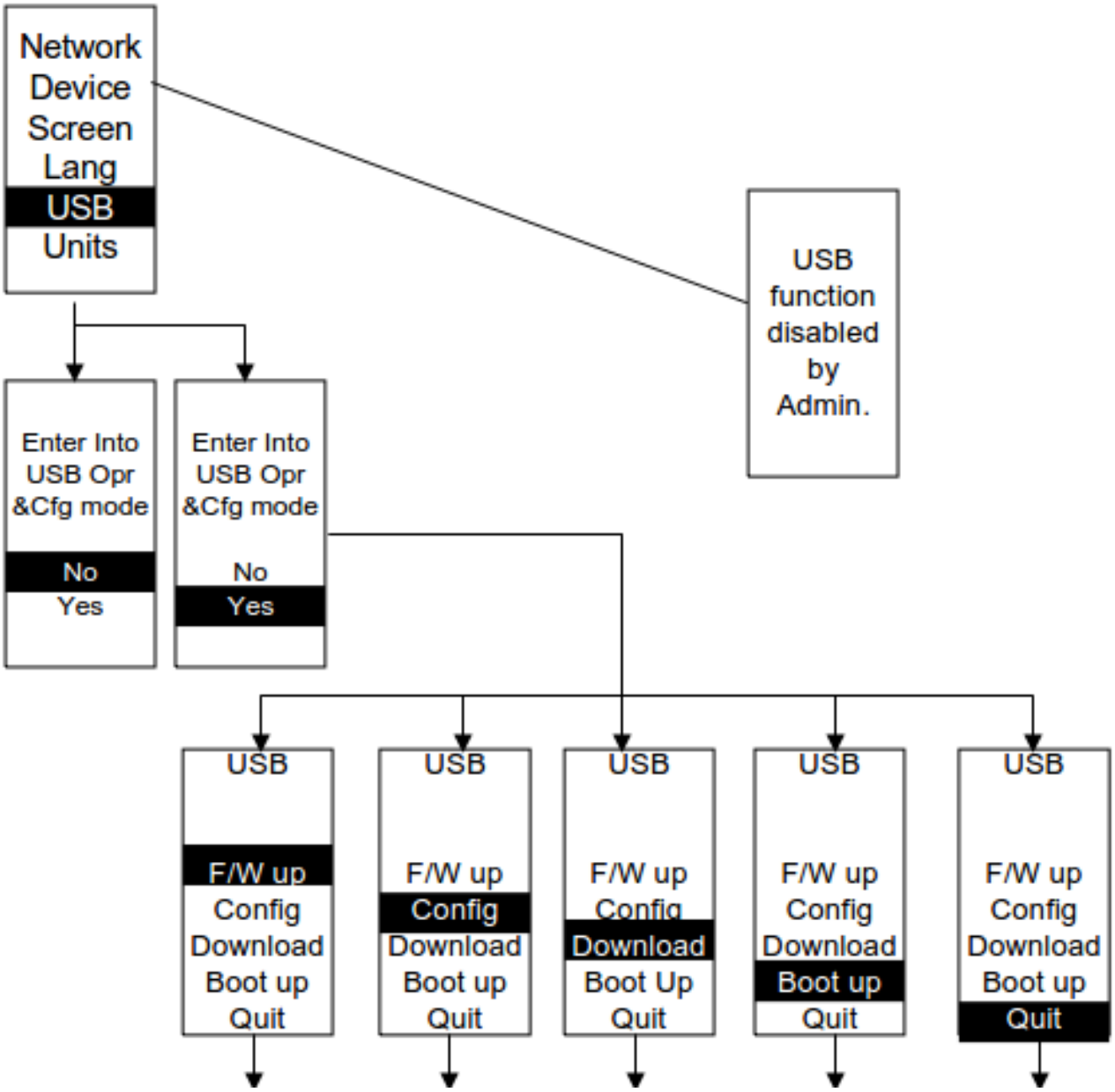
Language submenu

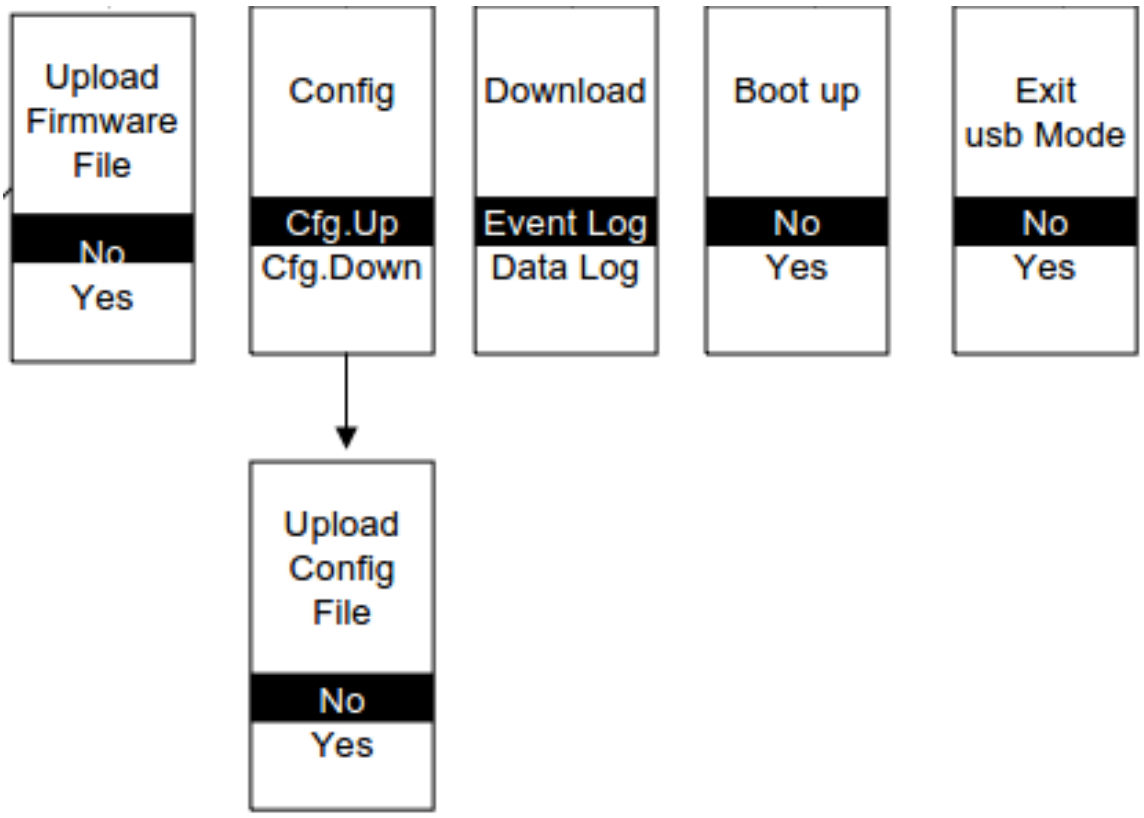
The Language submenu allows you to select the language. On the Setup menu, scroll down to highlight Lang. To display the screens to set the values for the submenu, press **Select**. After you select the values, to set the values as displayed on the screen, press **Select**. To return to the previous menu, press **Menu**.



USB submenu

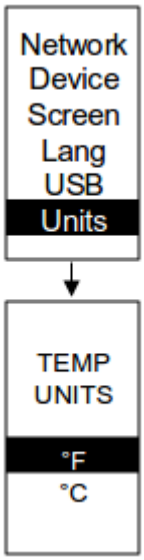
The USB submenu allows you to upload the firmware file and download the event or data logs. On the Setup menu, scroll down to highlight USB. To display the screens to set the values for the submenu, press **Select**. After you select **Yes**, to set the values as displayed on the screen, press **Select**. To return to the previous menu, press **Menu**.


Network
Device
Screen
Lang
USB
Units
USB
function
disabled
by
Admin.
Enter Into
USB Opr
&Cfg mode
No
Yes
Enter Into
USB Opr
&Cfg mode
No
Yes
USB
F/W up
Config
Download
Boot up
Quit
USB
F/W up
Config
Download
Boot up
Quit
USB
F/W up
Config
Download
Boot Up
Quit
USB
F/W up
Config
Download
Boot up
Quit
USB
F/W up
Config
Download
Boot up
Quit



Units submenu

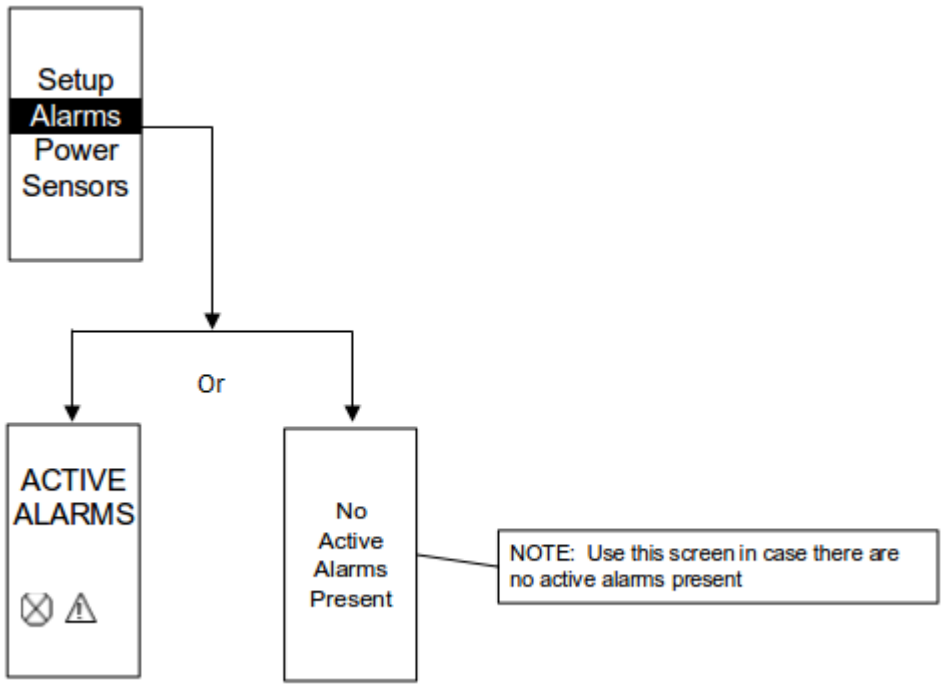
The Units submenu displays the temperature units. On the Setup menu, scroll down to highlight Units. To display the screens to set the values for the submenu, press **Select**. After you select the values, to set the values as displayed on the screen, press **Select**. To return to the previous menu, press **Menu**.



Alarms menu

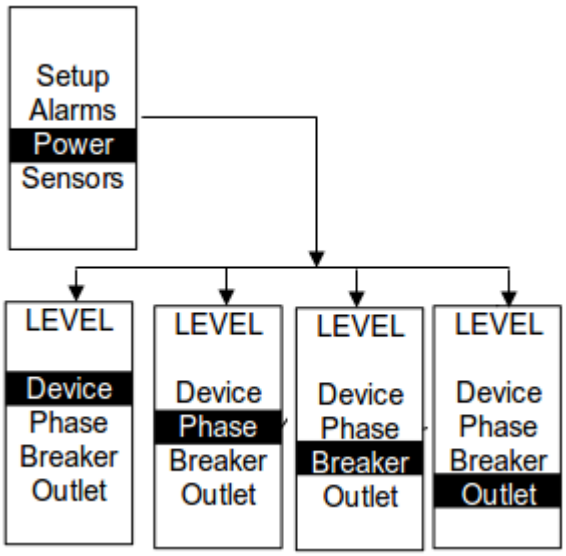
The Alarms menu filters and displays active alarms for the PDU. An active alarm screen has priority over other screens. When an alarm occurs, the active alarm screen replaces the current screen and the backlight flashes. On the Main Menu, scroll down to highlight **Alarms**. To display the first active alarm screen, press **Select** and scroll down to view active alarm data. When you

finish your review, to return to the main menu, press **Menu**. If the backlight was blinking red to indicate an active alarm, the backlight returns to normal.



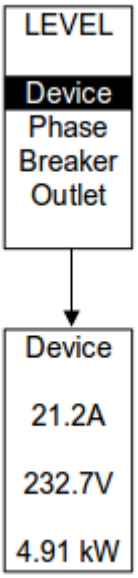
Power menu

The Power menu manages Device, Phase, Breaker, and Outlet functions. On the Main Menu, scroll down to highlight Power, and then press **Select**. To display the submenu options, scroll down to select a submenu and press **Select**. To return to the previous menu, press **Menu**.



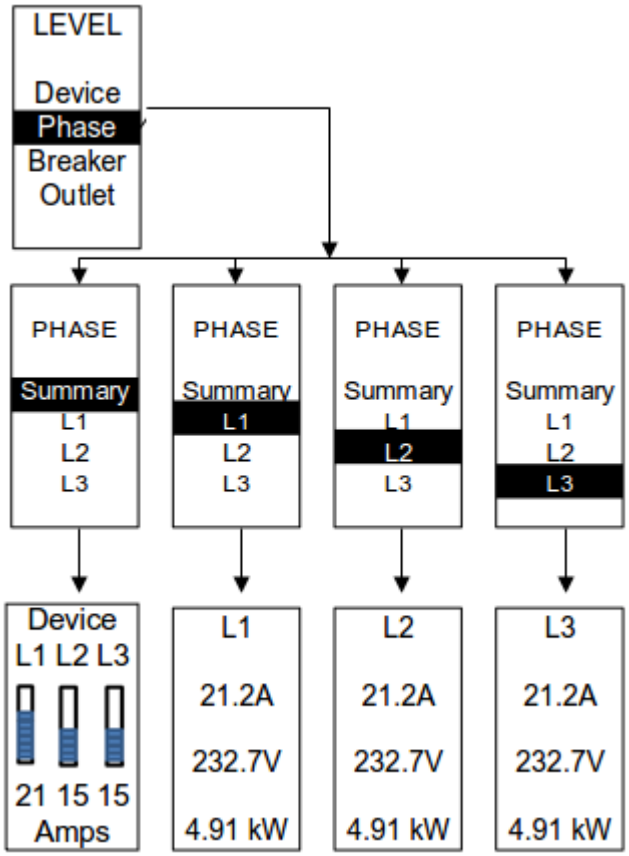
Device submenu

The Device submenu displays information about current, voltage, and power. On the Power menu, scroll down to highlight Device. To display the screens to set the values for the submenu, press **Select**. To return to the previous menu, press **Menu**.



Phase submenu

The Phase submenu displays information about the status of 3-phase power used by the system. On the Power menu, scroll down to highlight Phase and press **Select** to display the screens. After you select the values, press **Select** to set the values as displayed on the screen. To return to the previous menu, press **Menu**.



Breaker submenu

The Breaker submenu displays the breaker quantities of 1Ph or 3Ph PDUs. On the Power menu, scroll down to highlight Breaker and press **Select** to display the screens. After you select the values, press **Select** to set the values as displayed on the screen. To return to the previous menu, press **Menu**.

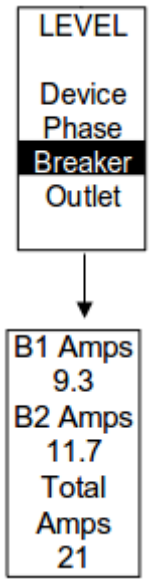


Figure 4: FOR 1Ph WITH BREAKERS

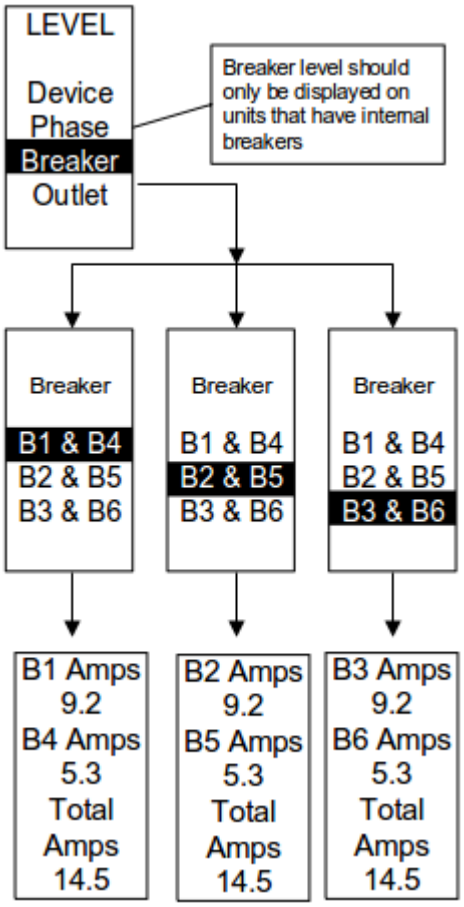
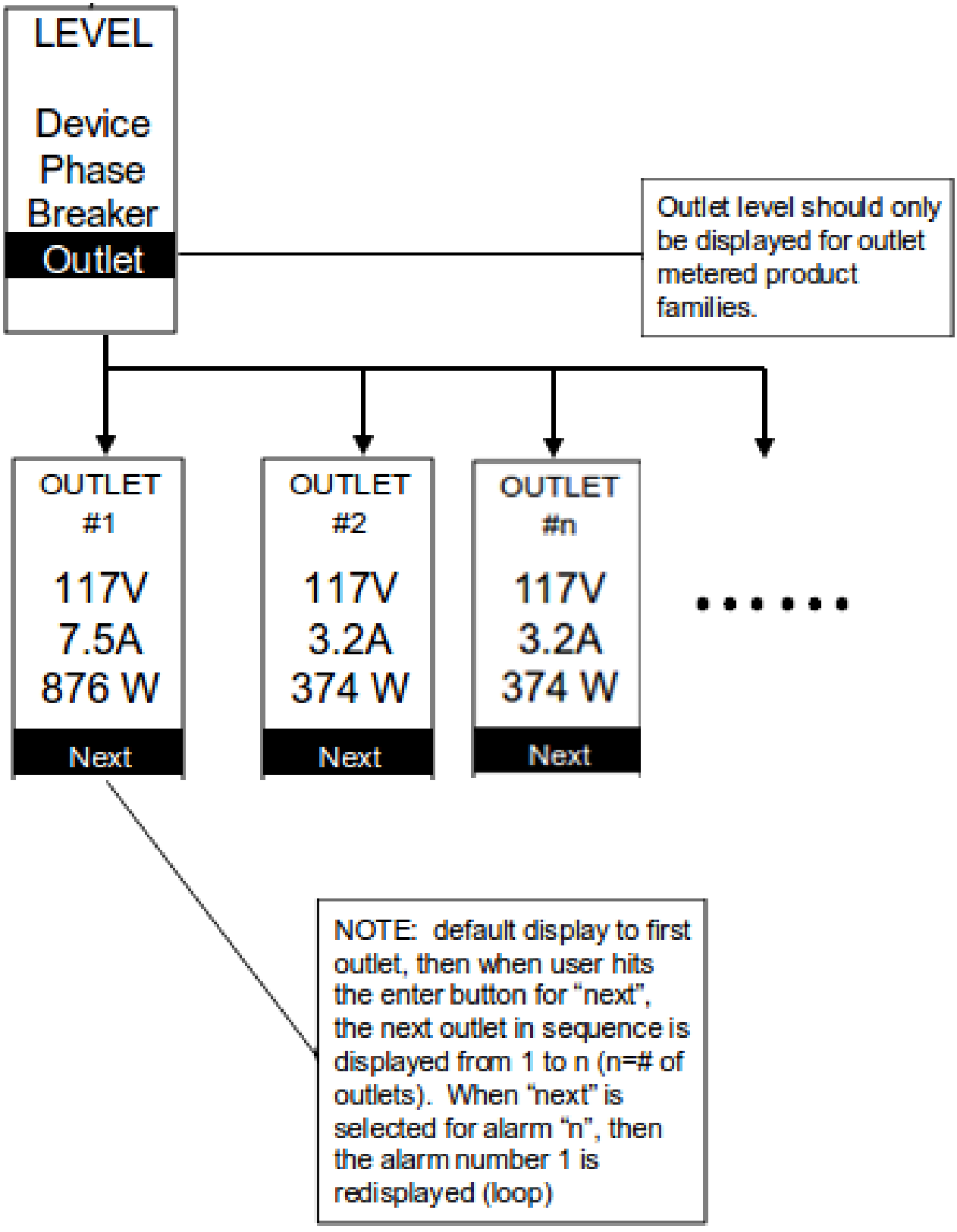


Figure 5: FOR 3Ph WITH 6 BREAKERS

Outlet submenu

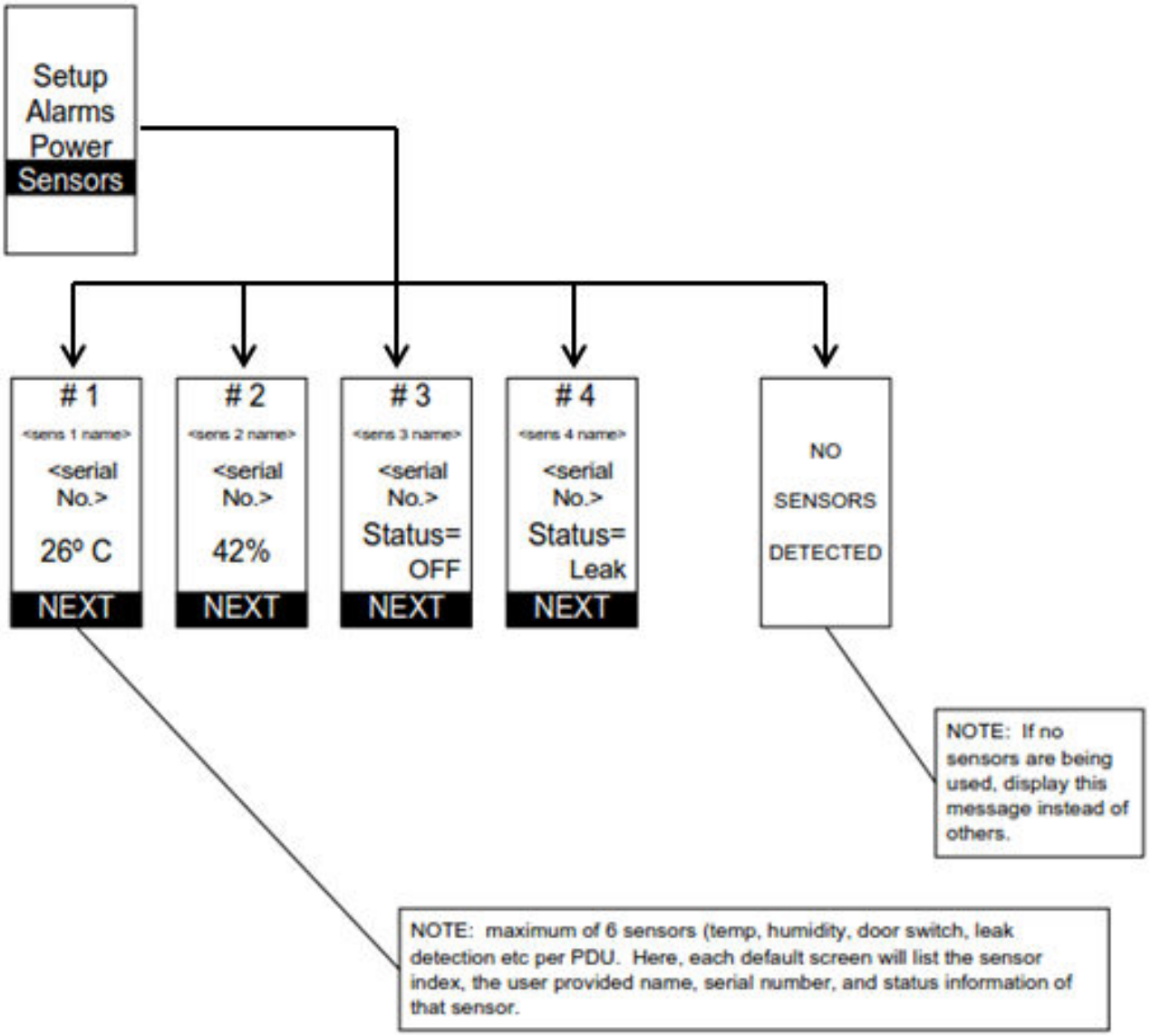
The Outlet submenu displays the voltage, current, and power from outlet number 1 to number 10. On the Power menu, scroll down to highlight Outlet and press **Select** to display the screens to set the values for the submenu. After you select the values, press **Select** to set the values as displayed on the screen. To return to the previous menu, press **Menu**.


LEVEL
Device
Phase
Breaker
Outlet
Outlet level should only be displayed for outlet metered product families.
OUTLET #1
117V
7.5A
876 W
Next
OUTLET #2
117V
3.2A
374 W
Next
OUTLET #n
117V
3.2A
374 W
Next
NOTE: default display to first outlet, then when user hits the enter button for "next", the next outlet in sequence is displayed from 1 to n (n=# of outlets). When "next" is selected for alarm "n", then the alarm number 1 is redisplayed (loop)

Sensors menu

The Sensors menu displays information about the temperature, humidity, door switch, and fluid leak. On the main menu, scroll down to highlight Sensors and press **Select**. To select a submenu, scroll down and press **Select** to display the submenu options. To return to the previous menu, press **Menu**.

NOTE: A maximum of six sensors can be configured per PDU.



Daisy chain configuration

In daisy chain mode, up to four PDUs can be connected through one IP address. Connecting PDUs allows users to gather information and data on all daisy-chained PDUs from the master PDU. The daisy chain functionality reduces network cost for PDUs. For example, a standard network switch used in a data center may contain 24 ports. Without using the daisy chain function, each port would supply network connection to one PDU. However, if using the daisy chain features, a typical network switch with 24 ports can supply network connections for up to 96 PDUs.

Setting up a daisy chain

About this task

The following procedure describes how to connect up to four PDUs of the same SKU through a single IP address.

Procedure

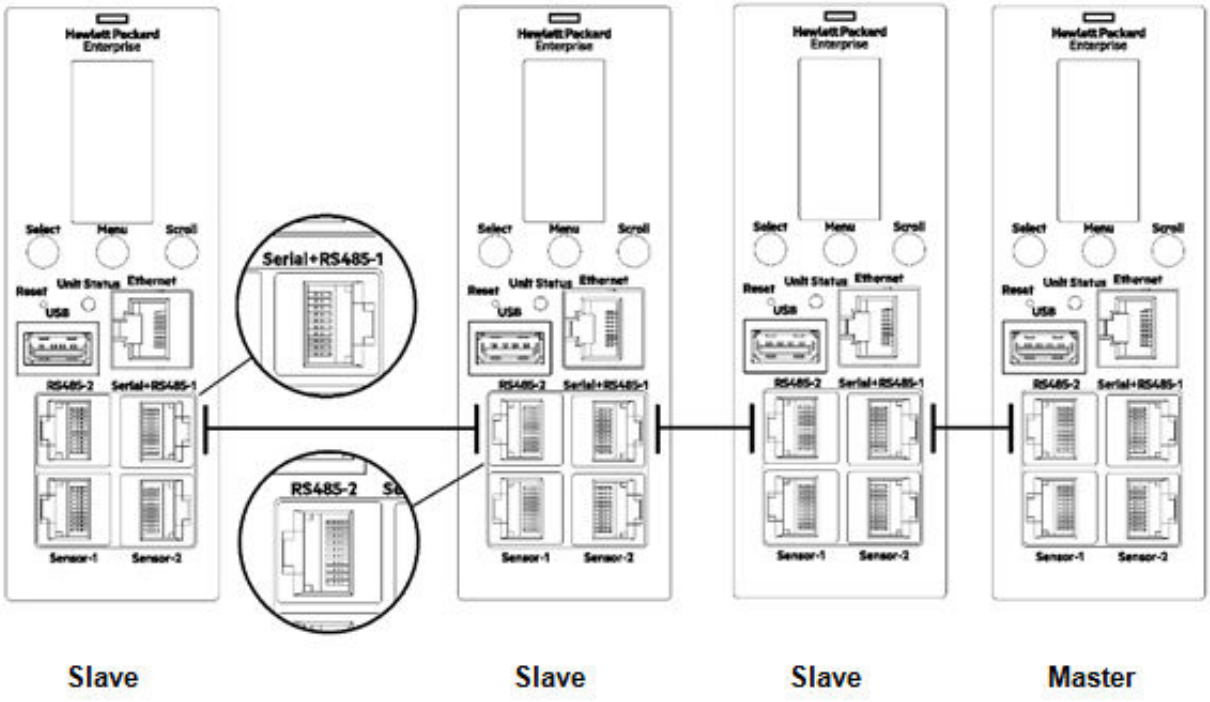
1. After the initial PDU is configured, connect an Ethernet cord from the RS485-2 port on the configured PDU to the Serial+RS485-1 port on the second PDU in the daisy chain line.
2. Repeat step 1, connecting PDUs from the RS485-2 port to the Serial+RS485-1 port for up to 4 PDUs.

   NOTE: The total length of the Ethernet cords connecting the PDUs must be less than 15m (49 ft.).
3. Go to the web interface (or management software) to manage and control the PDUs in the daisy chain.

Cabling a daisy chain

Procedure

1. Locate a CAT5 cable.
2. Connect one end of the cable to one PDU, and then connect the other end of the cable to the other PDUs.



3. Monitor the PDUs with the web interface or SNMP.

Connecting and configuring optional hardware

Hardware overview

HPE G2 Series Metered, Switched, and Metered & Switched Power Distribution Units monitor environmental conditions of a rack with the addition of HPE optional environmental sensors. Conditions such as temperature, humidity, leak detection, and intrusion can be monitored with the sensors. These conditions are all vital aspects of maintaining an efficiently performing data center. Users and administrators can monitor the status and view reports and alarms of specific conditions in and around a PDU or server rack.

The following environmental sensors are available:

- Temperature sensor
- Temperature and humidity sensor
- 3-temperature + 1-humidity sensor
- Open/Close door sensor
- Leak detection sensor
- Sensor port hub
- Leak detection sensor extension

Sensor	SKU	Description	Sensor Measurement
Temperature sensor	P9T00A	Monitors the temperature in the rack.	1
Temperature and humidity sensor	P9T01A	Monitors the temperature and relative humidity in the rack.	2
3-temperature + 1-humidity sensor	P9T02A	Monitors the temperature in three areas using three separate probes, and the relative humidity using one probe.	4
Open/Close door sensor	P9T03A	Sends an alarm or notification when a door on which the sensor is installed has been opened more than 10 mm. This kit includes two door contacts (one for the front and one for the rear door).	2
Rope fluid leak sensor	P9T04A	Monitors for early detection of liquid with a resistivity of less than 2M Ohms (including distilled water) in the monitored area. The kit includes a 6m rope, and optional additional rope can be added (see P9T08A).	1
Sensor port hub	P9T07A	Allows for up to three environmental sensors to be connected to the PDU.	N/A
Leak detection sensor extension	P9T08A	The kit includes one additional 6m length rope to pair with the leak detection sensor (P9T03A). A total of four extensions can be added to the leak detection sensor for a total length of 30m.	N/A

The optional environmental sensors can be installed before or after completing the PDU installation or startup, and can be installed without turning off power to the PDU or the devices connected. HPE G2 Series Metered, Switched, and Metered & Switched Power Distribution Units are designed to collect a maximum of eight environmental sensor measurements per PDU.

For example, the Environmental 3-temperature + 1-humidity sensor (P9T02A) collects four sensor measurements. See the table for the number of sensor measurements collected from each environmental sensor.

All HPE G2 Series Metered, Switched, and Metered & Switched Power Distribution Units have two physical sensor ports, and each PDU can collect a total of eight sensor measurements (or readings). For example, if a PDU has an Open/Close door sensor (P9T03A) and an Environmental 3-temperature + 1-humidity sensor (P9T02A) connected, both physical sensor ports are used with a total of five sensor measurements recorded. Up to six physical sensors can be supported per PDU with the addition of the optional sensor port hub (P9T07A).

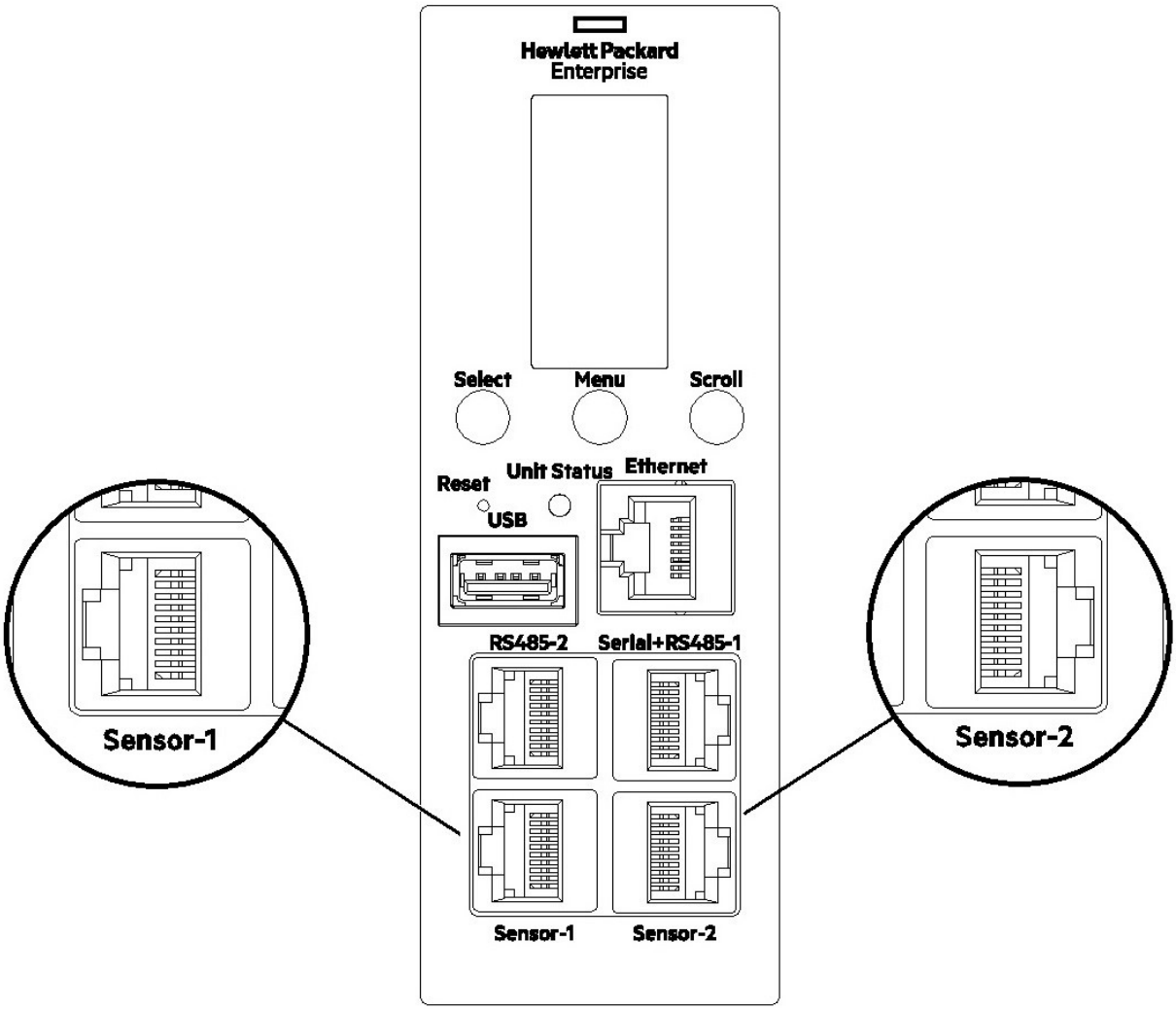


Figure 6: Sensor Ports for vertical PDU

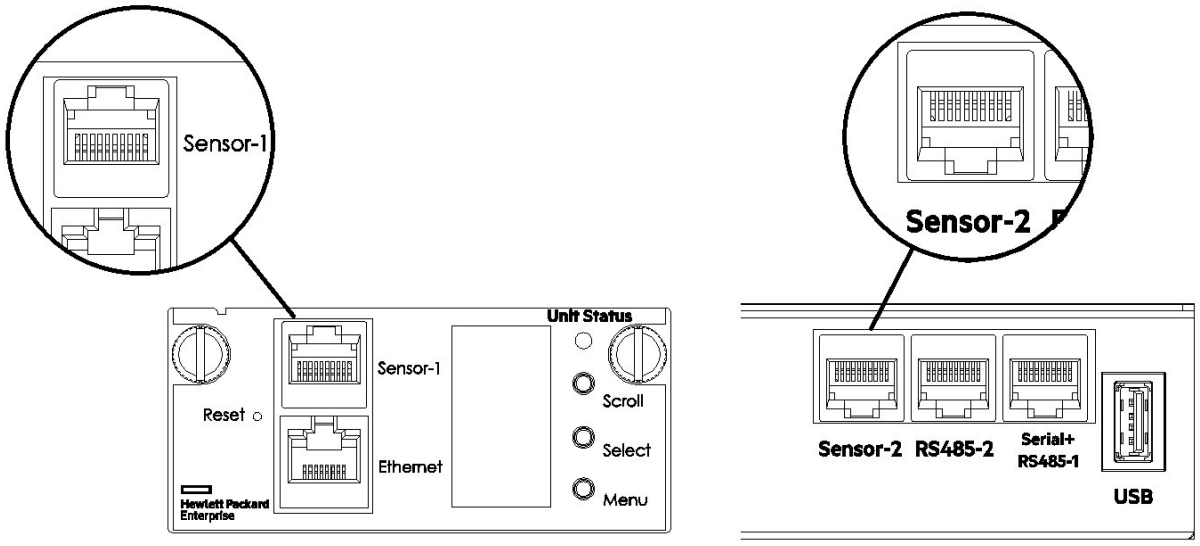


Figure 7: Sensor Ports for Horizontal PDU

Temperature sensor

If a temperature sensor is added to the PDU, the sensor units operate in the following ways:

- Temperature units can alternate between Fahrenheit or Celsius. A user can change the temperature units from either the **OLED display** or **User Accounts** screen.
  - Temperature units can only be changed from a Master PDU.
  - If a temperature unit is changed in a daisy-chained PDU, the temperature values will change on both master and slave PDUs.
  - If a temperature unit is changed, the respective threshold values get converted to that unit. Temperature threshold values include the following ranges:
    - Celsius—0°C to 68°C
    - Fahrenheit—15°F to 155°F
  - If a temperature unit is changed, the following modules are also updated.

Values Displayed	Navigation
OLED	Main menu->Sensors
Web interface	Dashboard
Thresholds	Settings->Thresholds
Data logs	Logs->View Datalogs
SSH	Dev sensor `[pduID]`

Table Continued

Values Displayed	Navigation
Serial	Dev sensor `[pduID]`
SNMp	pdu3TemperatureScale pdu3TemperatureTable

- Current temperature readings are displayed on the **Summary** page.

Connecting a temperature sensor

Procedure

1. Secure the sensor to the perforated area on the rack enclosure door by threading the provided cable tie through the recessed channel in the sensor box and through the door.
2. Secure the RJ45 cable along the desired path to the PDU using the remaining cable ties.
3. Use the RJ45 quick disconnect coupler and an Ethernet cable to extend the length of the sensor input cable and/or to serve as an easy disconnect point for the rack door removal.
4. Plug the sensor cable, or the connected Ethernet cable, into the Sensor-1 or Sensor-2 port on the PDU or into the sensor port hub, if applicable.

Connecting a temperature and humidity sensor

Procedure

1. Secure the sensor to the perforated area on the rack enclosure door by threading the provided cable tie through the recessed channel in the sensor box and through the door.
2. Secure the RJ45 cable along the desired path to the PDU using the remaining cable ties.
3. Use the RJ45 quick disconnect coupler and an Ethernet cable to extend the length of the sensor input cable and/or to serve as an easy disconnect point for the rack door removal.
4. Plug the sensor cable (or the connected Ethernet cable) into the Sensor-1 or Sensor-2 port on the PDU or into the sensor port hub, if applicable.

Connecting a 3-temperature and 1-humidity sensor

Procedure

1. Secure the sensor to the perforated area on the rack enclosure door by threading the provided cable tie through the recessed channel in the sensor box and through the door.
2. Secure the RJ45 cable along the desired path to the PDU using the remaining cable ties.
3. Secure the two additional temperature probes near the top and the bottom of the perforated rack enclosure door using the cable ties provided.

4. Use the RJ45 quick disconnect coupler and an Ethernet cable to extend the length of the sensor input cable and/or to serve as an easy disconnect point for the rack door removal.
5. Plug the sensor cable (or the connected Ethernet cable) into the Sensor-1 or Sensor-2 port on the PDU.

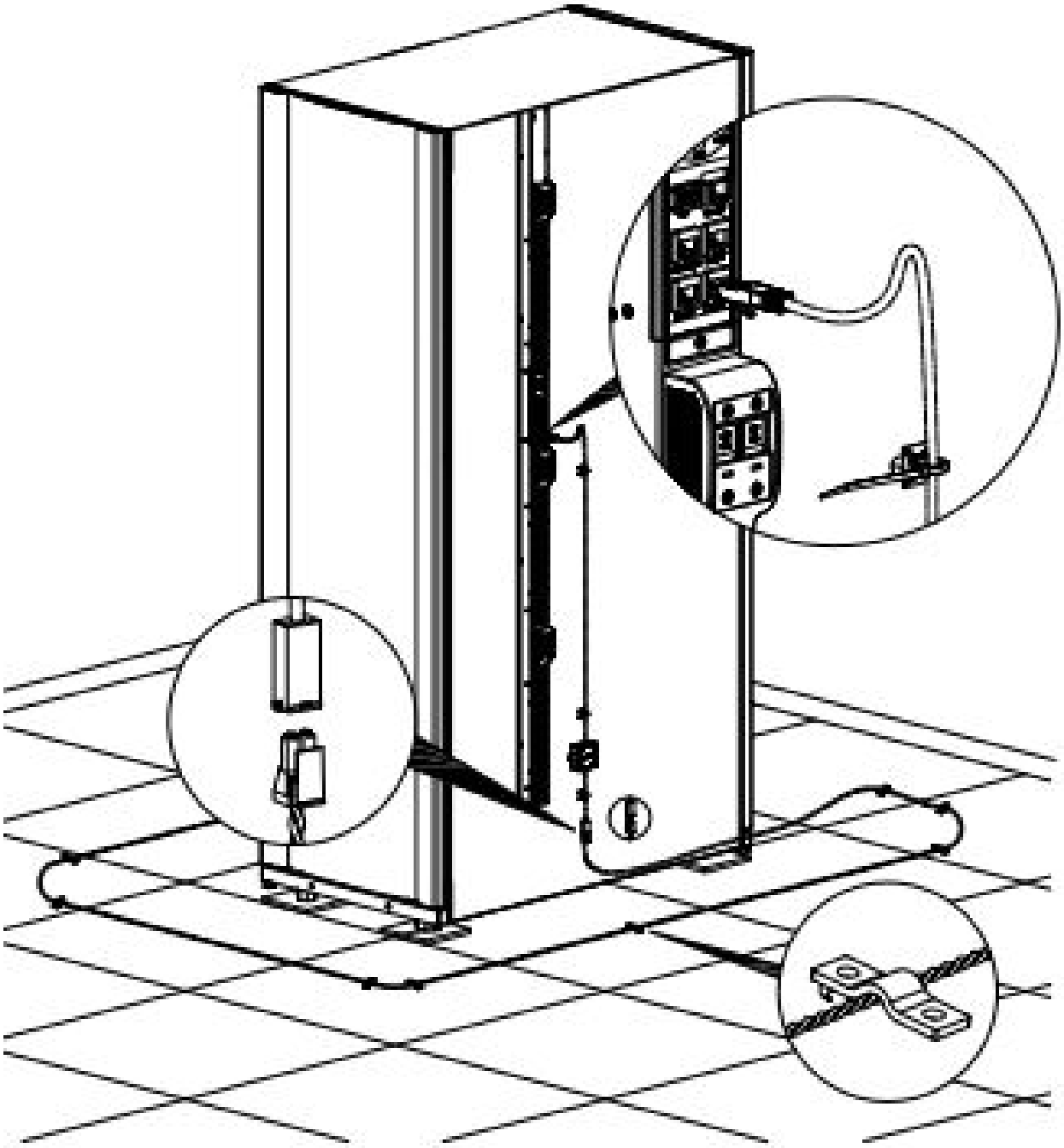
Connecting a rope fluid leak sensor

Procedure

1. Connect the RJ45 jack on the rope fluid leak sensor assembly to a sensor port on the PDU.
2. Thread the rope fluid leak sensor cable through the rack and along the desired path of detection.
3. Secure the rope fluid leak sensor cable to the rack and ground using the cable ties and/or adhesive mounting strips provided.

NOTE: This kit includes one 6m (19.69 ft) leak sensor rope. More length can be added using option kit P9T08A (includes one 6m (19.69 ft) leak sensor rope extension). Up to four of the 6m (19.69 ft) length leak sensor rope extensions can be connected together for a total of 30m (98.43 ft).

NOTE: The wire mount, as illustrated below, is for installation on the floor or ground surface. The wire mount must be used in the detection area.



NOTE: If mounting to a cabinet or wall, use the provided adhesive-backed mount. Use of the adhesive-backed mount in the detection area (floor) may prevent or delay leakage notification.

Using the leak sensor detector

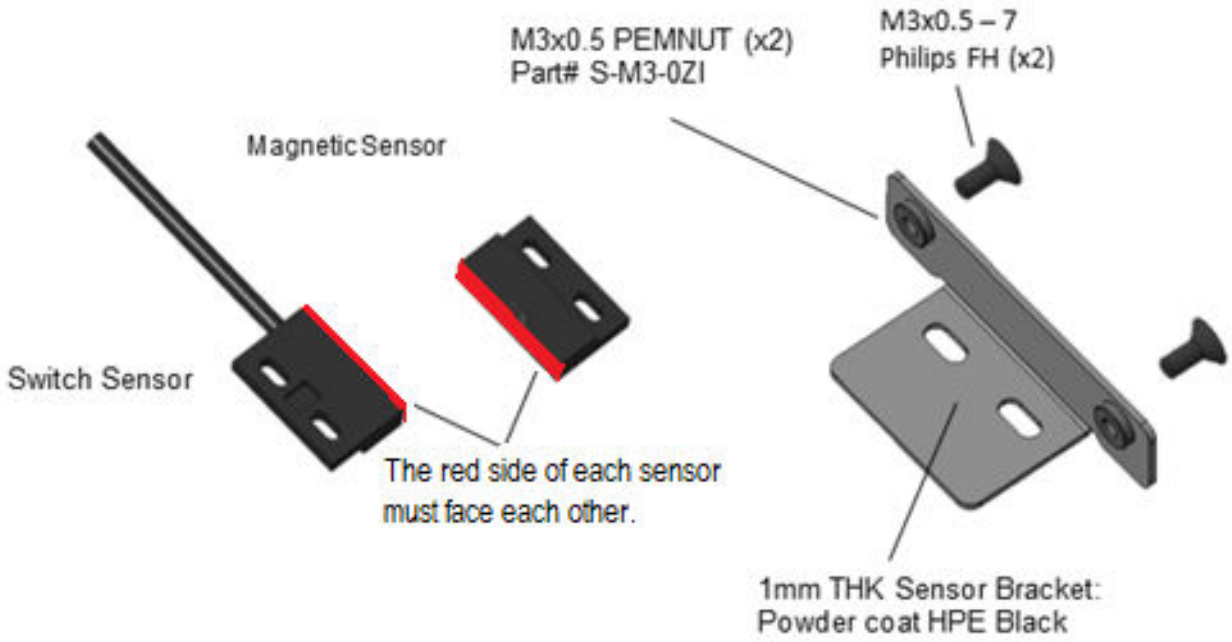
Procedure

1. Connect the leak sensor to the PDU.
2. Log into the web interface and verify "No-Leak" is listed on the Dashboard.

3. Navigate to **Settings>Thresholds** and enable the alarm for the leak sensor.
4. Navigate to **Settings>Trap Receiver** and enable the system IP to receive traps.
5. Navigate to **Settings>Email Setup** and enable the recipient address to receive emails.
6. Navigate to **Settings>Event Notifications** and enable the events for Traps and Emails.
7. Introduce a Leak by making the rope sensor contact water.
8. Navigate to the Dashboard. The alarm status will display "LEAK".
9. Verify that Traps are listed in the Trap Receiver.
10. Verify that an email was generated.
11. Verify that an alarm was generated.
12. Verify that event logs were generated.

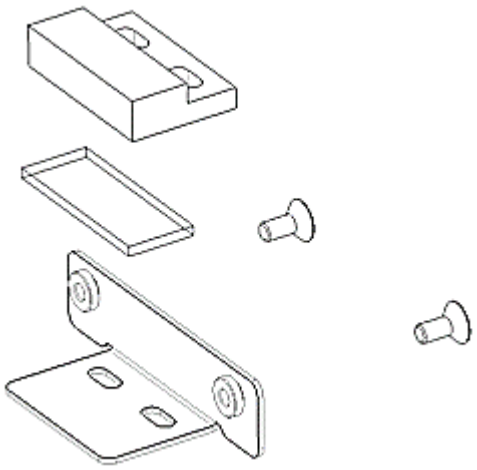
Connecting an Open door sensor

About this task

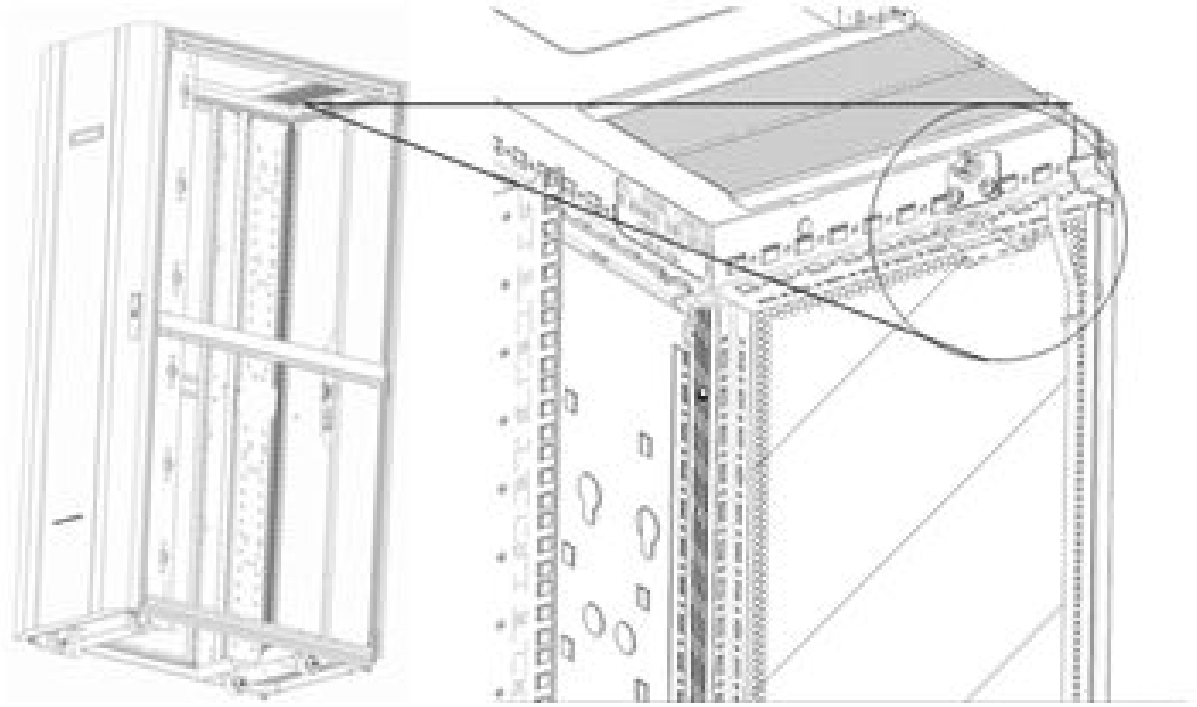


Procedure

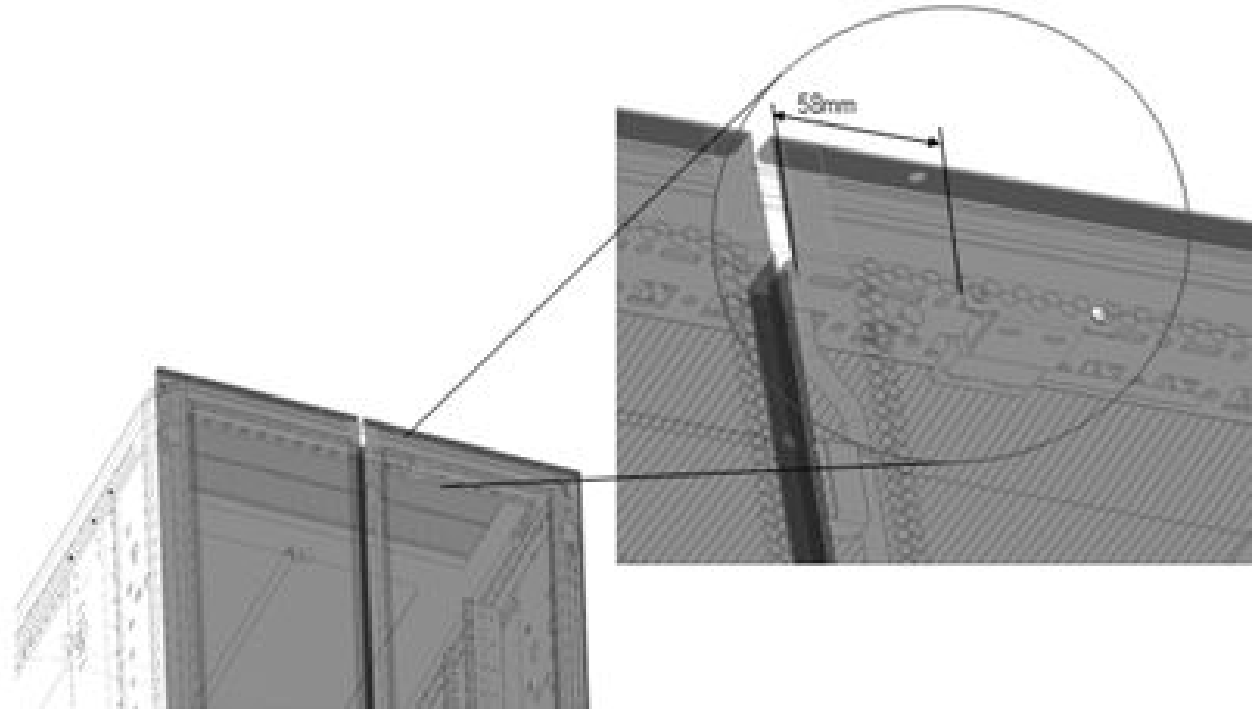
1. Assemble magnetic sensor to bracket. Adhere magnetic sensor to bracket using adhesive strip



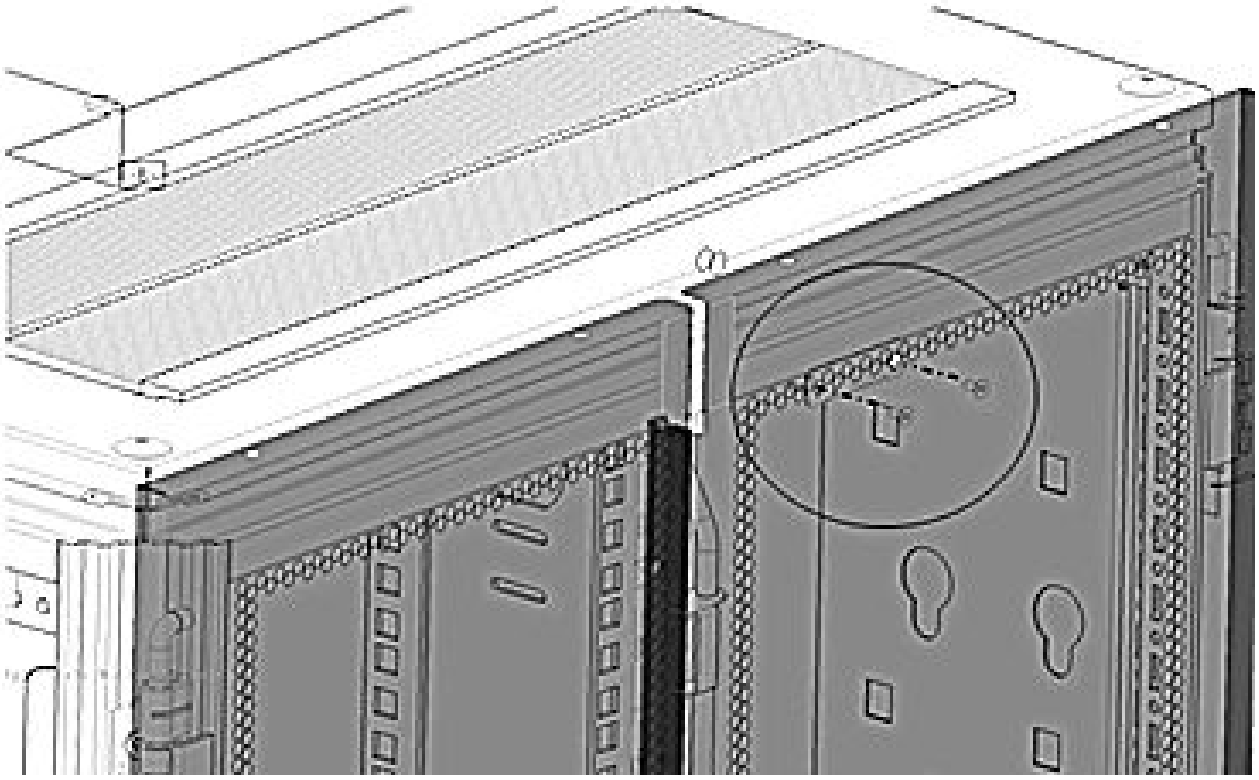
2. Mounting position of the rear door sensor is shown in the following illustration.



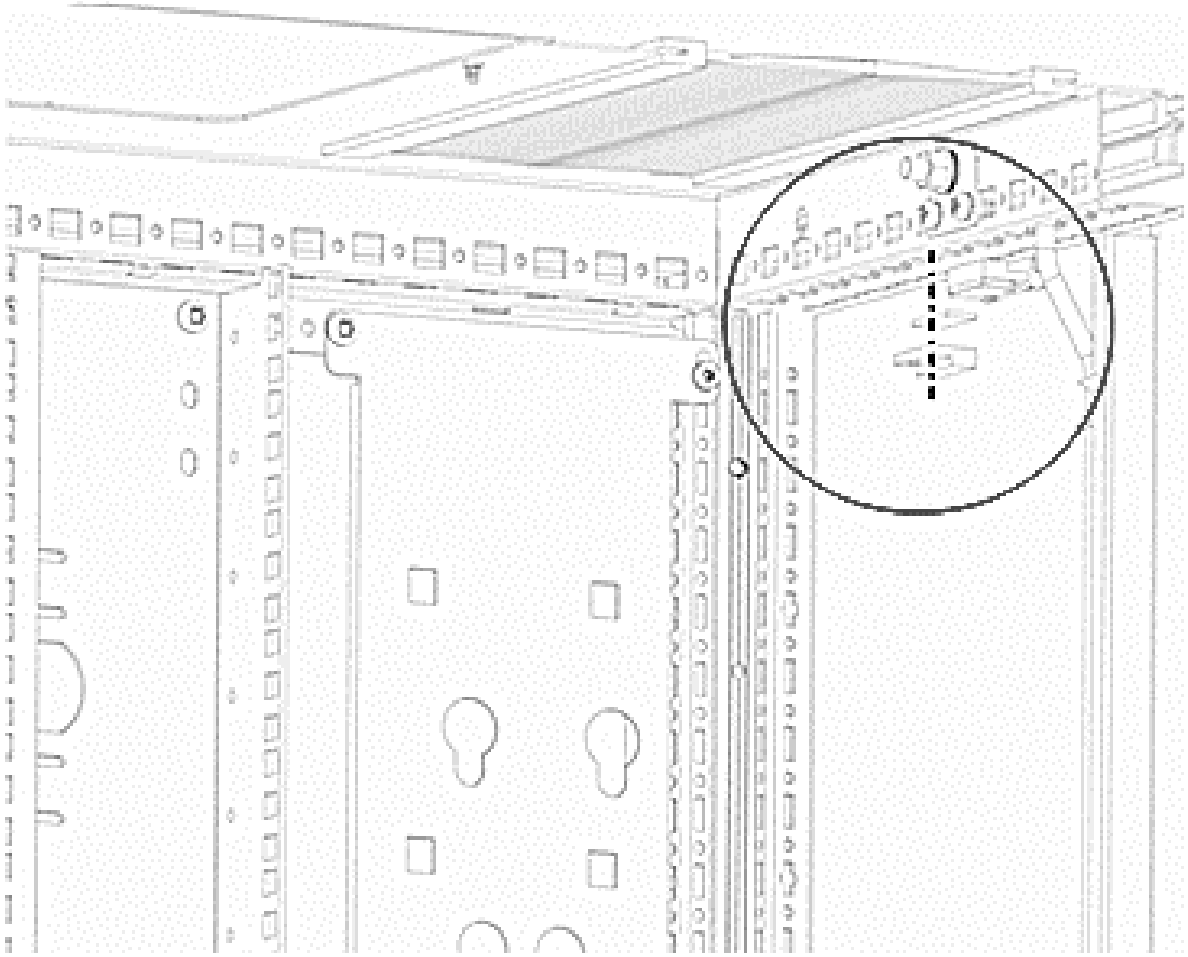
3. Mounting position of sensor bracket on the rear door is shown in the following illustration. Mount bracket with magnetic sensor to rear door at a distance around 58mm (2.28 in) from the center of the rack on the second row of perforated holes, using the flat-head screws provided.

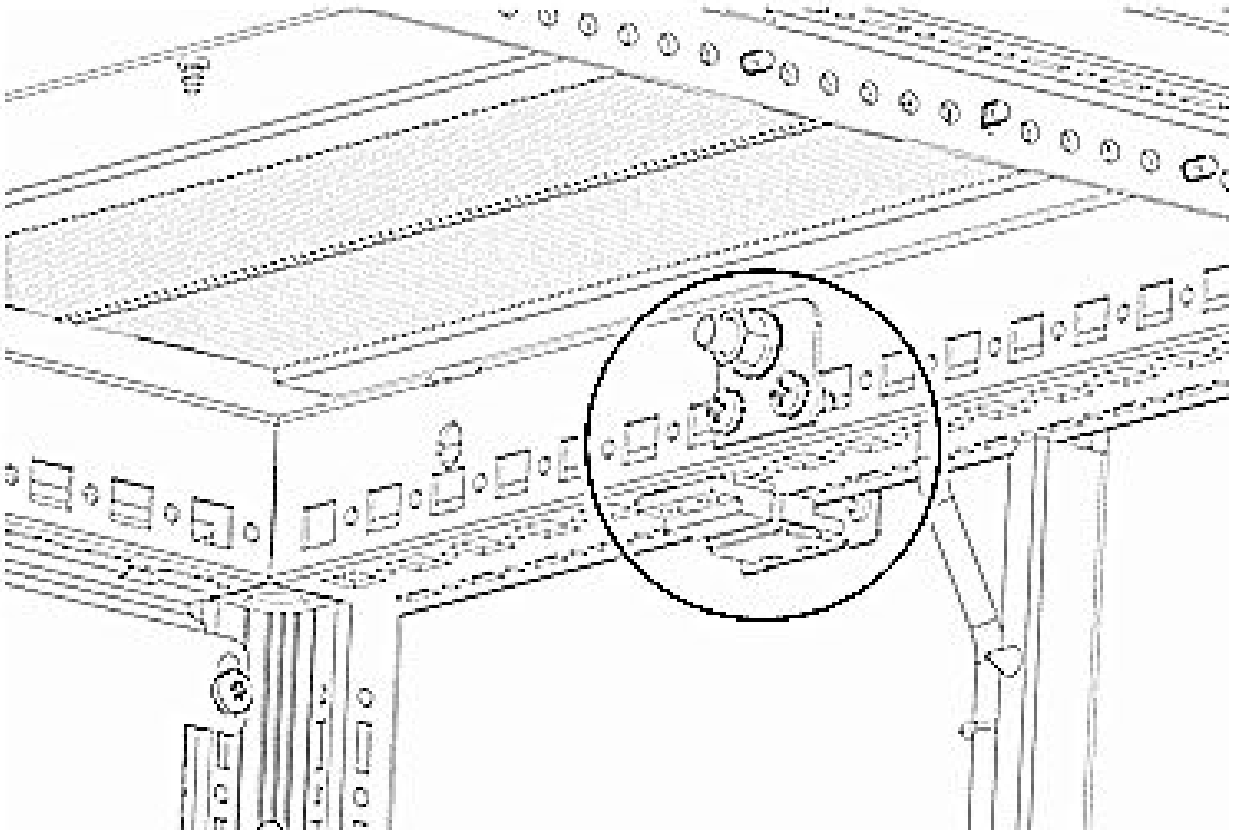


4. Use the two M3 screws to bolt sensor bracket to rack door.

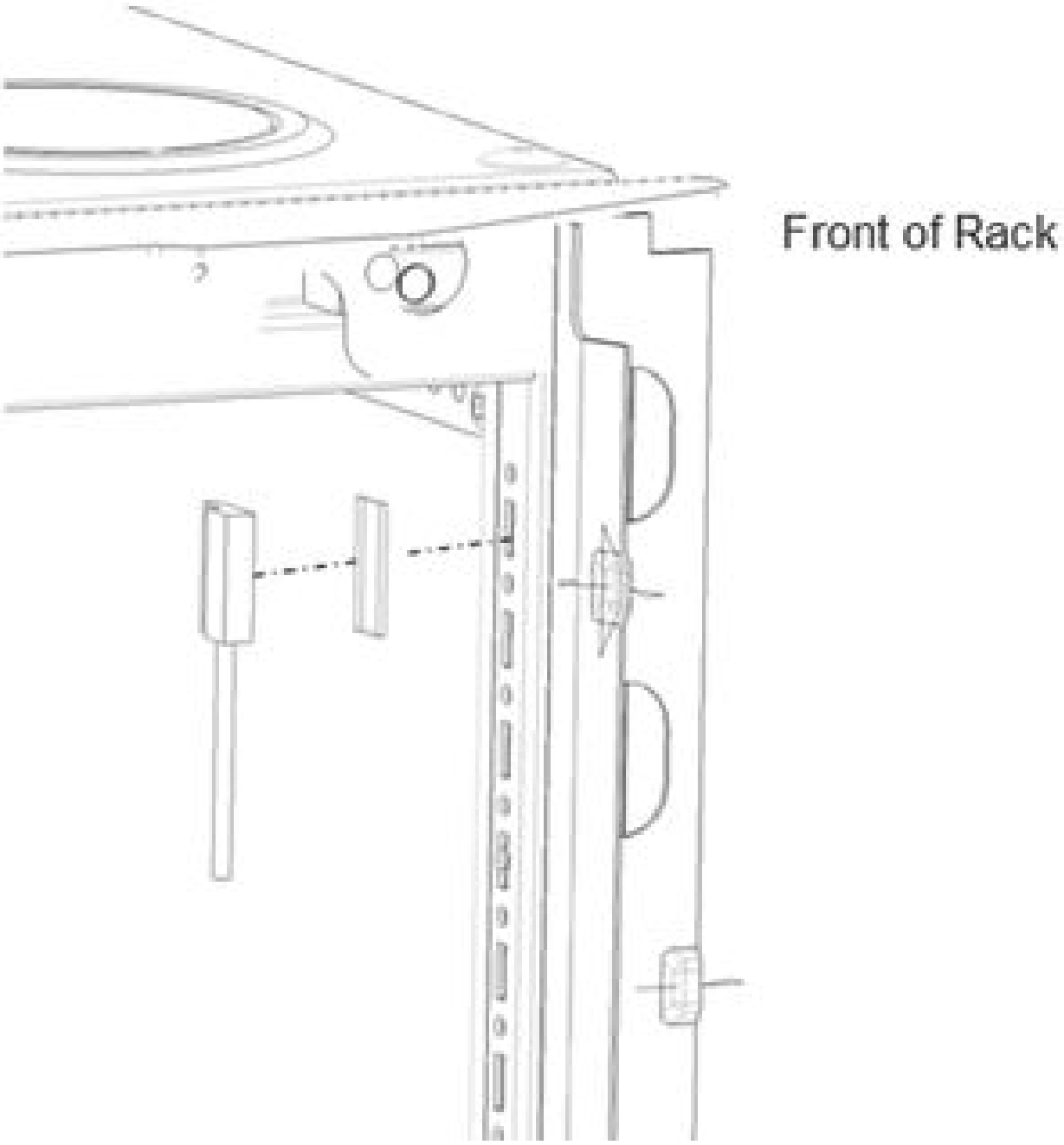


5. Adhere switch sensor to the inner frame of the rack while aligning it with the magnetic sensor mounted to the door.

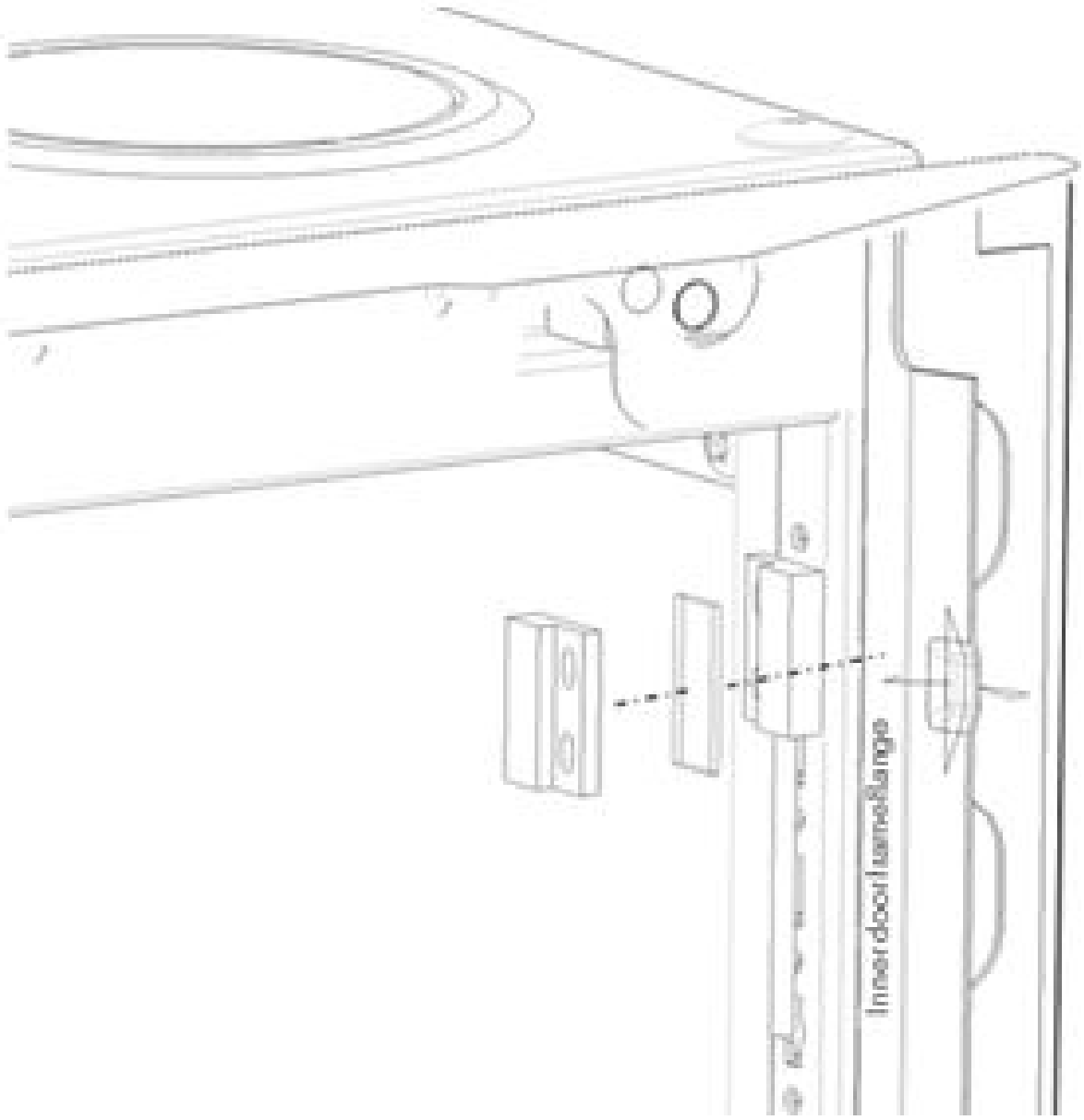




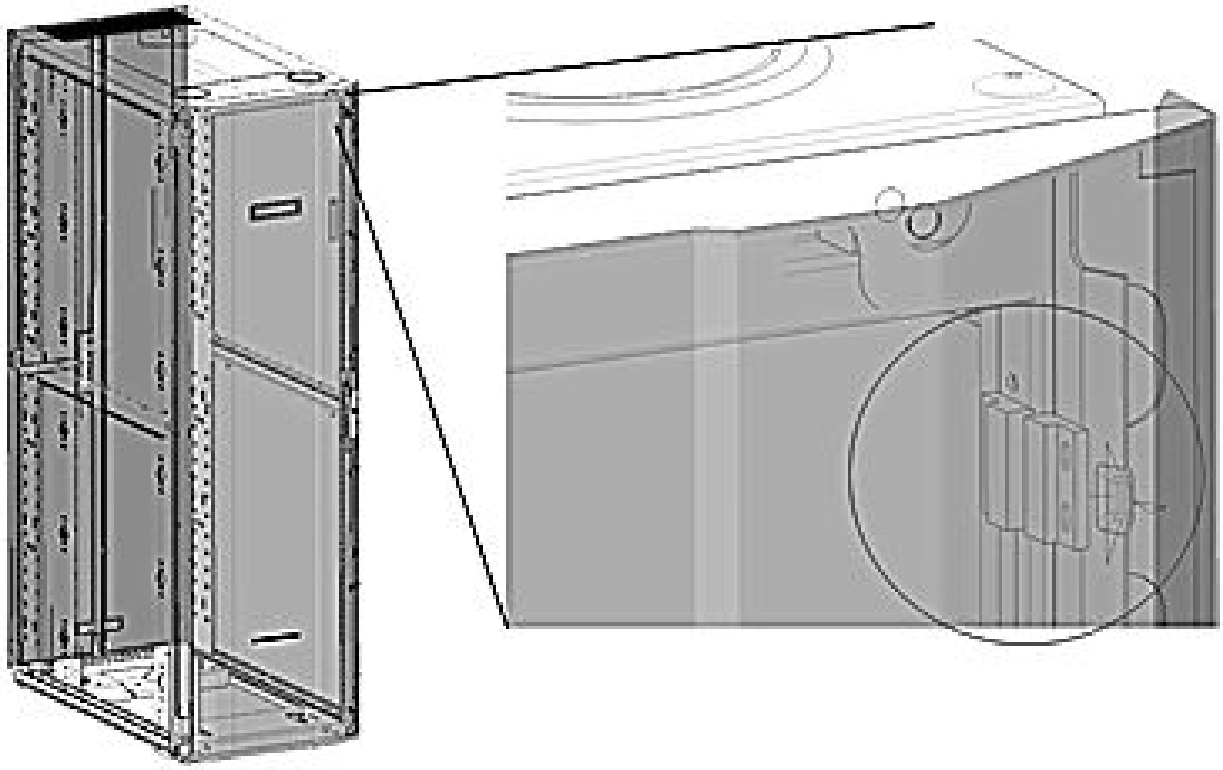
6. Adhere the switch sensor to rack frame using an adhesive strip. You can select the location, but it must be opposite the door hinge.



7. To mount the magnetic sensor to the front door, stick it to the inner door frame using the adhesive strip. Verify that it is aligned with the rack sensor.

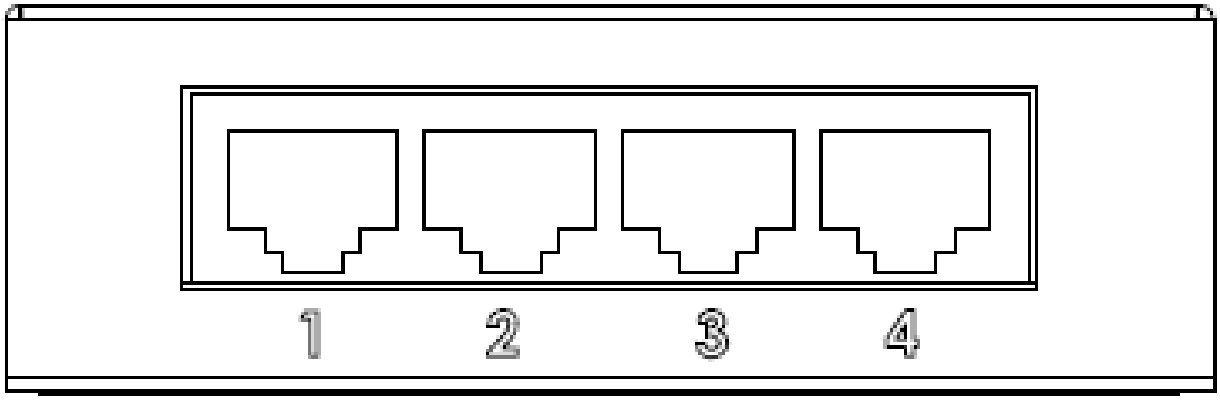


8. The following illustrations shows the mounting position of sensors to the front door.



Connecting the sensor hub

The sensor hub contains four parallel RJ45 ports, labeled 1 through 4, for connecting to the PDU and up to three sensors. Any of the RJ45 ports can be used to connect to the PDU or sensors. The numbered ports help when documenting which sensor is being used with the PDU.



Detecting environmental sensors

About this task

Environmental sensors are automatically detected when they are connected to the PDU.

Procedure

1. Open the Dashboard.
2. View the External Sensors section on the Dashboard page.

   The sensor type, name, PDU ID, PDU name, and PDU location is displayed for each sensor.
3. Confirm that the serial number on the sensor device matches the number in the sensor table.

Configuring environmental sensors

About this task

To configure the sensor name, location, alarms, notifications, and details, open the web interface.

Procedure

1. Open the Settings page.
2. View the Threshold section on the Settings page. To configure sensors, click **Threshold**.
3. To configure the desired sensors, click **Edit**.
4. In the **Edit Extension** dialog box, enter value of **`up critical`**, **`up warning`**, **`low warning`**, or **`low critical`**.
5. To exit the sensor setup, click **Save**.
6. Repeat this process for additional sensors.

Configuring door sensors

About this task

The door sensor status on the Dashboard page displays as OPEN/CLOSE.

Procedure

1. Navigate to **Thresholds** > **External Sensors**.
2. Select the door that you want to receive an alarm, trap, or event notification for, and then enable the alarm.

   - When the door is closed and the alarm is enabled for closed state, `165 - binary sensor 1 door is in CLOSE state` is the trap that is received.
   - When the door is open and the alarm is enabled for open state, `165 - The binary sensor 1 door is in OPEN state` is the trap that is received.

Spares

Ordering spares

Procedure

- To order a spare, visit the Hewlett Packard Enterprise website (**http://www.hpe.com/info/hpparts**).
- To replace parts under warranty, contact a Hewlett Packard Enterprise authorized service representative.

Metered PDU spare parts list

SKU	Description	Spare part number
P9R45A	HPE G2 Mtrd 1.9kVA/C20 1U NA/J PDU	870286-001
P9R46A	HPE G2 Mtrd PDU 1.9kVA/C20 Vert N/J PDU	870287-001
P9R48A	HPE G2 Mtrd 2.8kVA/L5-30P Vt NA/J PDU	870288-001
P9R49A	HPE G2 Mtrd 2.8kVA/L5-30P 2U NA/J PDU	870289-001
P9R50A	HPE G2 Mtrd 3.6kVA/IEC C20 Hz WW PDU	870290-001
P9R51A	HPE G2 Mtrd Md 4.9kVA/L6-30P 1U N/J PDU	870291-001
P9R52A	HPE G2 Mtrd 4.9kVA/L6-30P 2U NA/J PDU	870292-001
P9R53A	HPE G2 Mtrd 4.9kVA/L6-30P Vt NA/J PDU	870293-001
P9R54A	HPE G2 Mtrd Md 7.3kVA/60309 1U INTL PDU	870294-001
P9R55A	HPE G2 Mtrd 7.3kVA/60309 2U INTL PDU	870295-001
P9R56A	HPE G2 Mtrd 7.3kVA/60309 Vt INTL PDU	870296-001
P9R57A	HPE G2 Mtrd 8.3kVA/CS8265C NA/J PDU	870298-001
P9R58A	HPE G2 Mtrd 3Ph 8.6kVA/L15-30P NA/J PDU	870300-001
P9R59A	HPE G2 Mtrd 3Ph 8.6kVA/L21-30P NA/J PDU	870301-001
P9R60A	HPE G2 Mtrd 3Ph 10kVA/CS8365C NA/J PDU	870302-001
P9R61A	HPE G2 Mtrd 3Ph 11kVA/60309 Vt INTL PDU	870304-001
P9R77A	HPE G2 Mtrd Md 8.3kVA/CS8265C N/J PDU	870297-001
P9R78A	HPE G2 Mtrd Md 3P 8.6kVA/1U NA/J PDU	870299-001
P9R79A	HPE G2 Mtrd Md 3P 11kVA/60309 INTL PDU	870303-001
P9R80A	HPE G2 Mtrd Md 3P 17.3kVA/1U NA/J PDU	870305-001
P9R81A	HPE G2 Mtrd Md 3P 22kVA/60309 INTL PDU	870131-001
P9R82A	HPE G2 Mtrd 3P 17.3kVA/18 C13 N/J PDU	870128-001
P9R83A	HPE G2 Mtrd 3P 17.3kVA/C13-C19 NA/J PDU	870130-001

Table Continued

SKU	Description	Spare part number
P9R84A	HPE G2 Mtrd 3P 22kVA/60309 Vt INTL PDU	870132-001
P9R85A	HPE G2 Mtrd 3P 22kVA/C13-C19 Vt INTL PDU	870134-001
P9R86A	HPE G2 Mtrd 3P 17.3kVA/12 C13 N/J PDU	870129-001
P9R87A	HPE G2 Mtrd 3P 22kVA/ 24 C13 C19 N/J PDU	870133-001

Switched PDU spare parts list

SKU	Description	Spare part number
P9S07A	HPE G2 Swtd 1.9kVA/C20 1U NA/J PDU	870275-001
P9S08A	HPE G2 Swtd 1.9kVA/C20 Vt NA/J PDU	870276-001
P9S09A	HPE G2 Swtd 2.8kVA/L5-30P Vt NA/J PDU	870277-001
P9S10A	HPE G2 Swtd 2.8kVA/L5-30P 2U NA/J PDU	870278-001
P9S11A	HPE G2 Swtd 3.6kVA/IEC C20 1U WW PDU	870279-001
P9S12A	HPE G2 Swtd 3.6kVA/IEC C20 Vt WW PDU	870280-001
P9S13A	HPE G2 Swtd 4.9kVA/L6-30P 2U NA/J PDU	870281-001
P9S14A	HPE G2 Swtd 4.9kVA/L6-30P Vt NA/J PDU	870282-001
P9S16A	HPE G2 Swtd 7.3kVA/60309 2U INTL PDU	870284-001
P9S17A	HPE G2 Swtd 7.3kVA/60309 Vt INTL PDU	870285-001

Metered & Switched PDU spare parts list

SKU	Description	Spare part number
P9S15A	HPE G2 Mtrd/Swtd 4.9kVA/L6-30P NA/J PDU	870283-001
P9S18A	HPE G2 Mtrd/Swtd 7.3kVA/60309 INTL PDU	870120-001
P9S19A	HPE G2 Mtrd/Swtd 3P 8.6kVA/C13 NA/J PDU	870121-001
P9S20A	HPE G2 Mtrd/Swtd 3P 11kVA/60309 INTL PDU	870122-001
P9S21A	HPE G2 Mtrd/Swtd 3P 14.4kVA/C13 NA/J PDU	870123-001
P9S22A	HPE G2 Mtrd/Swtd 3P 17.3kVA/NA/J PDU	870124-001
P9S23A	HPE G2 Mtrd/Swtd 3P 17.3kVA/C13 NA/J PDU	870125-001
P9S24A	HPE G2 Mtrd/Swtd 3P 22kVA/60309 INTL PDU	870126-001
P9S25A	HPE G2 Mtrd/Swtd 3P 22kVA/C13 INTL PDU	870127-001

Spare options

Description	Spare part number
PDU Horizontal Network Management Card Module	874564-001
PDU Vertical Network Management Card Module	874565-001
DB9 to RJ45 Cable	876724-001

Hardware options

For information on the supported hardware options, see the Hewlett Packard Enterprise website (**http://www.hpe.com/info/rackandpower**).

Support and other resources

Accessing Hewlett Packard Enterprise Support

- For live assistance, go to the Contact Hewlett Packard Enterprise Worldwide website:

  https://www.hpe.com/info/assistance

- To access documentation and support services, go to the Hewlett Packard Enterprise Support Center website:

  https://www.hpe.com/support/hpesc

Information to collect

- Technical support registration number (if applicable)
- Product name, model or version, and serial number
- Operating system name and version
- Firmware version
- Error messages
- Product-specific reports and logs
- Add-on products or components
- Third-party products or components

HPE product registration

To gain the full benefits of the Hewlett Packard Enterprise Support Center and your purchased support services, add your contracts and products to your account on the HPESC.

- When you add your contracts and products, you receive enhanced personalization, workspace alerts, insights through the dashboards, and easier management of your environment.
- You will also receive recommendations and tailored product knowledge to self-solve any issues, as well as streamlined case creation for faster time to resolution when you must create a case.

To learn how to add your contracts and products, see **https://www.hpe.com/info/add-products-contracts**.

Accessing updates

- Some software products provide a mechanism for accessing software updates through the product interface. Review your product documentation to identify the recommended software update method.
- To download product updates:

  Hewlett Packard Enterprise Support Center

  https://www.hpe.com/support/hpesc

My HPE Software Center

https://www.hpe.com/software/hpesoftwarecenter

- To subscribe to eNewsletters and alerts:

  https://www.hpe.com/support/e-updates

- To view and update your entitlements, and to link your contracts and warranties with your profile, go to the Hewlett Packard Enterprise Support Center **More Information on Access to Support Materials** page:

  https://www.hpe.com/support/AccessToSupportMaterials

IMPORTANT: Access to some updates might require product entitlement when accessed through the Hewlett Packard Enterprise Support Center. You must have an HPE Account set up with relevant entitlements.

Remote support

Remote support is available with supported devices as part of your warranty or contractual support agreement. It provides intelligent event diagnosis, and automatic, secure submission of hardware event notifications to Hewlett Packard Enterprise, which initiates a fast and accurate resolution based on the service level of your product. Hewlett Packard Enterprise strongly recommends that you register your device for remote support.

If your product includes additional remote support details, use search to locate that information.

HPE Get Connected

https://www.hpe.com/services/getconnected

HPE Tech Care Service

https://www.hpe.com/services/techcare

HPE Complete Care Service

https://www.hpe.com/services/completecare

Warranty information

To view the warranty information for your product, see the **warranty check tool**.

Regulatory information

To view the regulatory information for your product, view the *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products*, available at the Hewlett Packard Enterprise Support Center:

https://www.hpe.com/support/Safety-Compliance-EnterpriseProducts

Additional regulatory information

Hewlett Packard Enterprise is committed to providing our customers with information about the chemical substances in our products as needed to comply with legal requirements such as REACH (Regulation EC No 1907/2006 of the European Parliament and the Council). A chemical information report for this product can be found at:

https://www.hpe.com/info/reach

For Hewlett Packard Enterprise product environmental and safety information and compliance data, including RoHS and REACH, see:

https://www.hpe.com/info/ecodata

For Hewlett Packard Enterprise environmental information, including company programs, product recycling, and energy efficiency, see:

https://www.hpe.com/info/environment

Documentation feedback

Hewlett Packard Enterprise is committed to providing documentation that meets your needs. To help us improve the documentation, use the **Feedback** button and icons (at the bottom of an opened document) on the Hewlett Packard Enterprise Support Center portal (**https://www.hpe.com/support/hpesc**) to send any errors, suggestions, or comments. This process captures all document information.

Appendix

Appendix A: CLI commands

Help commands

HPE>?

Description

List all available PDU CLI commands.

Example output

```
HPE>?
sys  PDU system configure and setting
net  PDU net application configure and setting
usr  PDU user operation
dev  PDU device setting
pwr  PDU power setting
```

System commands

sys date [year-month-day]

Description

Query or set system date.

Example output

```
HPE>sys date 2013-09-19
E000
HPE>sys date
E000
Date: 2013-09-10
Time: 03:49:46
```

sys time [hour:min:sec]

Description

Query or set system time.

Example output

```
HPE>sys time
HPE>sys time 14:35:34
```

sys ntp <IP Address>

Description

Synchronize system date and time, with NTP server you set.

Example output

```
>sys ntp 69.25.96.13
```

NOTE: IP address must be a valid NTP server address.

sys ver

Description

Query system version information, including firmware, bootloader, language, and web.

Example output

```
HPE>sys ver
E000
Firmware version: 0.41
Bootloader version: 2.10
LANGUAGE version: 3.01
WEB version: 6.30
```

sys def

Description

Recover PDU back to default configuration.

Example output

```
HPE>sys def
E000
Recover
Press any key to cancel
```

sys rst

Description

Reset system.

Example output

```
HPE>sys rst
E801
System Reboot now, are you sure? (Y/N):Y
```

sys upd lan

Description

Update system firmware with existing `HPE.FW` file.

Example output

```
HPE>sys upd lan
E801
system will enter upgrade mode after reboot
System Reboot now, Are you sure? (Y/N):Y
```

NOTE: There must be a valid file named `HPE.FW`, existing under directory/fw.

NOTE: If in daisy-chain configuration, the master will also upgrade the firmware on all the slaves.

sys upd ser

Description

Upgrade system firmware through serial.

Example output

```
HPE>sys upd ser
E801
system will enter upgrade mode after reboot,
System Reboot now, Are you sure? (Y/N):Y
Enter PDU Serial upgrade mode, Waiting for upgrade file to be sent, make sure
transfer with Y modem protocol, PDU will enter system operation if idle mode
lasts 60 seconds
CCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCC
```

NOTE: Do not upgrade if salve's firmware exists.

sys upd conf

Description

Update system configuration.

Example output

```
HPE>sys upd conf
E801
system will enter upgrade mode after reboot
System Reboot now, Are you sure? (Y/N):Y
```

NOTE: There must be a valid file named `conf.ini` existing under directory/fw.

sys conf start

Description

Update system configuration through serial.

Example output

```
HPE>sys conf start
E801
system will enter into configure file upload mode after reboot
System Reboot now, Are you sure? (Y/N):Y
```

sys log del event

Description

Delete event log file.

Example output

```
HPE>sys log del event
E000
```

sys log del data

Description

Delete data log file.

Example output

```
HPE>sys log del data
E000
HPE>
```

Network commands

net ssh [on/off]

Description

Query or on/off SSH.

Example output

```
HPE>net ssh
E000,
SSH Port: 22
SSH Server is running
HPE>net ssh on
E000
```

```
HPE>net ssh off
E000
```

net FTPs [on/off]

Description

Query or on/off FTPs.

Example output

```
HPE>net FTPs
E000,
FTPSS Port: 21
FTPSS is running
```

net http [on/off]

Description

Query or on/off net http.

Example output

```
HPE>net http
E000,
HTTP Port: 80
HTTPS Port: 443
WEB Protocol: HTTP
HPE>net http off
E801
WEB protocol is changed, Please reboot to validate
System Reboot now, Are you sure? (Y/N):Y
```

net mac

Description

Query MAC address.

Example output

```
HPE>net mac
E000
MAC Addr: C8-45-44-66-2B-26
```

net tcpip

Description

Query network IP information.

Example output

```
HPE>net tcpip
E000
IPv4 Addr: 192.168.30.39
```

net tcpip <dhcp>

Description

Set network to DHCP mode.

Example output

```
HPE>net tcpip dhcp
E801
Network is reconfigured, Please reboot to validate
System Reboot now, Are you sure? (Y/N): Y
```

net tcpip<static ip, mask, gateway>

Description

Set static IP, mask, and gateway.

Example output

```
HPE>net tcpip static 192.168.30.39
255.255.255.0
192.168.30.1
E801
Network is reconfigured, Please reboot to validate
System Reboot now, Are you sure? (Y/N): Y
```

User commands

User list

Description

List all existing user accounts.

Example output

```
HPE>user list
E000
Usr                Role
-------------
admin         admin
user             user
```

User unlock<username>

Description

Unlock specified user.

Example output

```
HPE>usr unlock user
E000
HPE>usr unlock admin
E000
```

NOTE: Account is locked temporarily if login failures exceed the maximum allowed number of failed logins. Use this command to unlock it.

Device commands

dev usb [on|off]

Description

Query or on/off USB.

Example output

```
HPE>dev usb
HPE>dev usb off
HPE>dev usb on
```

dev daisy [dna|qna]

Description

Query or set daisy-chain mode.

Example output

```
HPE>dev daisy
E000
daisy chain unit number: 1
daisy chain address list: 000
Daisy mode: DNA
HPE>dev daisy qna
E801
System reboot now, are you sure? (Y/N): N
```

dev outlet <PDUID> status

Description

Query all outlet status with specified PDUID.

Example

```
HPE>Dev outlet 1 status
E000
```

```
Relay outlet status
Outlet#1: Close Outlet#2: Close Outlet#3: Close
Close
Outlet#4: CLose
Outlet#5: Close Outlet#6: Close Outlet#7: Close
Outlet#8: Close
Outlet#9 Close Outlet#10: Close Outlet#11:
Close
Outlet#12: Close
```

NOTE: This command is invalid for Metered PDUs.

NOTE: PDUIDs increment from 1. If in daisy chain mode, the master PDUID is 1 and the slave PDUIDs are 2 and 3.

dev outlet <PDUID> <outlet index> [on|off]

Description

Query or set specified PDUID and outlet status.

Example

```
HPE>Dev outlet 1 1 off
E000
```

NOTE: This command is invalid for Metered PDUs.

dev sensor

Description

List all sensors equipped.

Example output

```
HPE>dev sensor
E000
Sensor count 4
-----------------
Name Type, SN Value
T1, TEMP 012345678 27.5
T3, TEMP 012345678 27.2
T2, TEMP 012345678 27.3
RH HUMI     012345678 44
```

dev ver <slipaddr>

Description

Query sensor, power, or delay firmware version.

Example output

```
HPE>dev ver 1
HPE>dev ver 15
```

```
HPE>dev ver 35
```

NOTE: Relay: start from 1. Power: start from 15. Sensor: start from 35.

Power commands

pwr unit [idx]

Description

Query device information and query specified index unit electric information.

Example output

```
HPE>pwr unit
SKU: P9S20A,,,,,
Serial: ,,,,,
FuncType; PDU Metered
Rating: 220-24-V, 16A, 3.5-3.8kVA, 50/60Hz
Mac: C8:45:44:66:2B:26
Tcpip: 102:168:30:38
HPE>pwr unit 1
E000
PDU UNIT 1 power Feature
voltage: 0V
current: 0.0A
active power: 0W
apparent power: 0W
power factor: 0.00
energy: 0.000kWh
```

pwr phase [idx]

Description

Query specified phase electric information.

Example output

```
HPE>pwr phase 1
E000
PDU PHASE 1 power Feature
voltage: 0V
current: 0.0A
active power: 0W
apparent power: 0W
power factor: 0.00
energy: 0.000kWh
```

pwr cb [idx]

Description

Query specified circuit breaker electric information.

Example output

```
HPE>pwr cb 1
E000
PDU CB 1 power Feature
voltage: 0V
current: 0.0A
active power: 0W
apparent power: 0W
power factor: 0.00
energy: 0.000kWh
```

outlet [idx]

Description

Query specified outlet electric information.

Example output

```
HPE>pwr outlet 1
E000
PDU OUTLET 1 power Feature
voltage: 0V
current: 0.0A
active power: 0W
apparent power: 0W
```

NOTE: For Metered PDUs, this command is invalid.

System configure commands

sys date [yyyy-mm-dd]

Description

Set the user input date.

Example output

```
HPE>sys date 2013-08-12
SUCCESS
```

sys date

Description

Set the PDU date.

Example output

```
HPE>sys date
SUCCESS
Date:2013-08-12
```

```
Time:04:58:16
```

sys time[hh:mm:ss]

Description

Set the user input time.

Example output

```
HPE>sys time 09:20:50
SUCCESS
```

sys time

Description

Query PDU time.

Example output

```
HPE>sys time
SUCCESS
Date:2013-08-12
Time:09:20:53
```

sys ntp [primary_ip] [secondary_ip]

Description

Sets the NTP.

Example output

```
HPE>sys ntp 192.168.11.50 192.168.1.11
SUCCESS
```

sys ver

Description

Query on the system versions: firmware, web, bootloader, and language version.

Example output

```
HPE>sys ver
SUCCESS
Firmware Version: 2.0.0.A
Bootloader Version: 2.25
LANGUAGE Version 3.02
Web Version: 3.34
```

sys def

Description

Set the PDU system to default settings.

Example output

```
HPE>sys def
SUCCESS
Press reset button 8 seconds to finish PDU
configuration recover
Press any key to cancel...
```

sys rst

Description

Resets the PDU system.

Example output

```
HPE>sys rst
Reboot required for change to take effort
System Reboot now, Are you sure? (Y/N):
```

sys upd lan

Description

Updates the PDU language file.

sys upd conf

Description

Updates the configuration file.

Example

```
HPE>sys upd conf
Reboot required for change to take effort
System Reboot now, Are you sure?(Y/N):
```

sys upd boot

Description

Updates the boot file.

sys upd all

Description

Updates all the files.

Example

```
HPE>sys upd all
Reboot required for change to take effort
System Reboot now, Are you sure?(Y/N):
```

sys log [del/edit] [data/event]

Description

Edits or deletes the event and data file.

Example

```
HPE>sys log del event
SUCCESS

HPE>sys log del data
SUCCESS
```

sys log edit data [on [interval] | [off]

Description

Edits the data log configuration interval.

Example

```
HPE>sys log data on 5
SUCCESS

HPE>sys log edit data off 10
SUCCESS
```

Network application configure commands

net https [on/off]

Description

Sets https on/off.

Example output

```
HPE>net https
SUCCESS
HTTPS Port: 443
Status: OFF
HPE>net https on
Reboot required for change to take effort
WEB protocol is changed, Please reboot to validate
System Reboot now, Are you sure?(Y/N):
```

net redfish [on/off]

Description

Sets Redfish on/off.

Example output

```
HPE>net redfish
SUCCESS
Status: ON
HPE>net redfish off
SUCCESS
Status: OFF
```

net ip [v4/v6/all]

Description

Sets ipv4/ipv6 or both.

Example output

```
HPE>net ip
SUCCESS
IPV4,IPv6

HPE>net ip v4
Reboot required for change to take effort
IP protocol is changed, Please reboot to validate
System Reboot now, Are you sure?(Y/N):

HPE>net ip all
Reboot required for change to take effort
IP protocol is changed, Please reboot to validate
System Reboot now, Are you sure?(Y/N):
```

net phy [auto/1gbps/10/100mbps]

Description

Set the link speed to auto negotiation/1gbps/10/100mbps.

Example output

```
HPE>net phv
SUCCESS
link speed: auto negotiation

HPE>net phy 10100mbps
Reboot required for change to take effort
Phy speed is changed, Please reboot to validate
System Reboot now, Are you sure?(Y/N):
```

net cert [def]

Description

Updates the certificate file.

Appendix B: Firmware update procedure

Updating the PDU firmware using a USB connection

Procedure

1. Navigate to **www.hpe.com** and download the most recent firmware version, `HPE.FW`.

   Save this file to a USB flash drive.
2. Insert the flash drive into the USB port of the Network Management Module.
3. Enter USB mode on the PDU and press **Select**.
4. Navigate to **Setup** > **USB** and click **Yes** to confirm entering USB mode.
5. To upload the new firmware, select **F/W Up** and click **Yes**.
6. The OLED shows the firmware update progress.
7. When the update is complete, remove the USB drive.
8. From the USB menu, select **Quit** to exit USB mode.
9. Click **Yes** to confirm exit.

   The PDU automatically reboots.
10. To confirm that the firmware was uploaded successfully, navigate to **Setup** > **Device** > **Firmware**.

Updating the PDU firmware using a web interface

Procedure

1. Open the user interface in a web browser by entering the PDU IP address.
2. Log in with Administrator credentials.
3. Navigate to **System Management** > **Update** > **Firmware**.
4. In the **Firmware Update** dialog box, navigate to `HPE.FW` firmware file and then select click **OK**.

   NOTE: The firmware file must be named `HPE.FW`.
5. Select **Upload**. The system updates the newest firmware to the Network Management Module.
6. When the upload is complete, the system reboots automatically.

Updating the PDU firmware using a Serial CLI

Procedure

1. Connect to the PDU using a serial HyperTerminal connection, and then press **Enter**.
2. Log in with Administration credentials.
3. Enter **`sys upd ser`**.

The CLI displays the E801 message.

```
System will enter upgrade mode after reboot
System Reboot now
Are you sure?(Y/N) Y
```

4. From the HyperTerminal menu options, navigate to **Transfer** > **Send File**.
5. Navigate to the updated firmware file, `HPE.FW`.
6. Set **Protocol** to **Ymodem** and then select **Send**.

   Transfer window opens. When the transfer is complete, the window closes automatically.
7. When the upload is complete, the system reboots automatically.

Updating the PDU Firmware using FTP

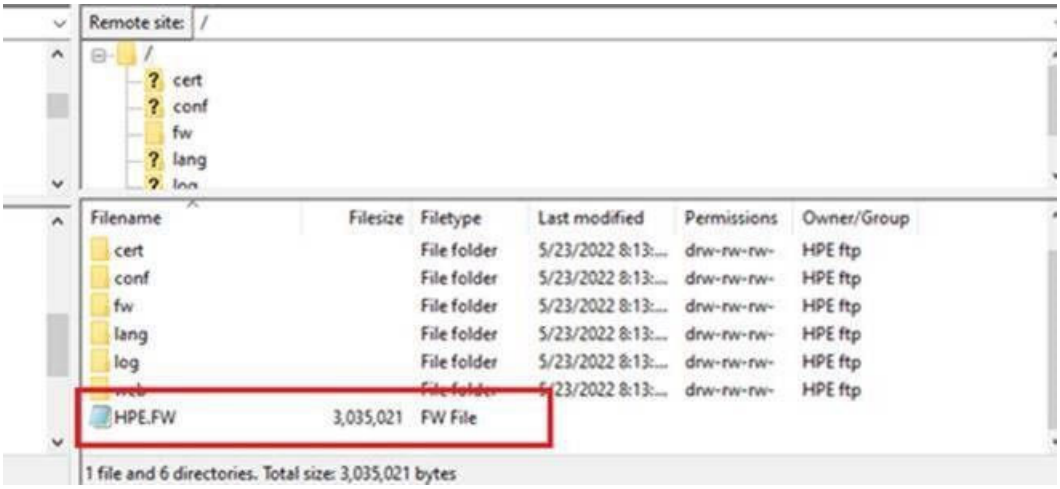
About this task

The PDU only supports FTPs (FTP Secure) protocol. To access a PDU using an FTP program, FTPs must be enabled through the PDU Web Interface or CLI.

Procedure

1. In the Web Interface, navigate to **Network Settings** > **SSH/FTPs Configuration**.
2. Enable FTP access. The PDU will reboot.
3. Connect to the FTP using the PDU credentials.
4. Transfer the updated `HPE.FW` file to outside the folder labeled `fw`, and then close the FTP.

NOTE: `HPE.FW` is the only file that should be used. Make sure there are no other files in the file system during the upgrade activity.



5. Connect to the PDU through SSH using a program such as Hyper-Term or PuTTY.
6. Log in with administration privileges.
7. Enter **`sys upd all`**.

The following message displays.

```
System will enter upgrade mode after reboot
System Reboot now
Are you sure?(Y/N)
```

8. Enter **Y**.

   When the upload is complete, the system reboots automatically.

9. It is not always required to update Web or Bootloader files when the firmware is updated. However, a user can upload these file types in SSH.

   a. Log in to an FTP program.

   b. Overwrite the outdated files with the updated web files, found on the customer login at **www.hpe.com** or from your regional sales manager.

Updating the PDU Firmware using Bootloader mode

Procedure

1. Navigate to **www.hpe.com** and download the most recent firmware version, `HPE.FW`.
2. Save this file to a USB drive.
3. Insert the USB drive into the USB port of the Network Management Module.
4. Press **Select** to enter USB mode on the PDU.
5. Navigate to **Setup** > **USB** and click **Yes** to confirm entering USB mode.
6. To upload the new firmware, select **F/W Up** and click **Yes**.
7. The OLED displays the firmware update progress.
8. When the update is complete, remove the USB drive.
9. To exit USB mode, select **Quit** from the USB menu.
10. To confirm exit, click **Yes**.
11. The PDU reboots automatically.
12. To confirm the firmware uploaded successfully, navigate to **Setup** > **Device** > **Firmware**.

Firmware recovery with bootloader mode

Firmware, configuration files, and bootloader files are updated following the instructions listed, but each update type must be done separately. Web files can be updated in conjunction with any of the other updates. For example, you can update firmware and web files in a single step, but firmware and configuration files must be done separately.

Upgrading configuration with bootloader mode

Procedure

1. Make the PDU accessible through the USB port.

a. Navigate to device **Configuration** > **USB Settings**.

b. Select **Enable USB Access**.

2. Upload the configuration.

a. Copy `conf.ini` to a USB drive.

b. Insert the USB drive to the PDU.

c. Enter the USB mode in the OLED display.

d. Select **Conf up**.

e. After the operation is complete, remove the USB drive.

f. Exit the USB mode.

Appendix C: PDU alarms

Type	Alarms
PDU unit	• PDU unit Active Power Above upper critical • PDU unit Active Power Above upper warning • PDU unit Active Power Below lower warning • PDU unit Active Power Below lower critical
Input phase	• Input Phase X Voltage Above upper critical • Input Phase X Voltage Above upper warning • Input Phase X Voltage Below lower warning • Input Phase X Voltage Below lower critical • Input Phase X Current Above upper critical • Input Phase X Current Above upper warning • Input Phase X Current Below lower warning • Input Phase X Current Below lower critical
Circuit breaker	• Circuit Breaker X Current Above upper critical • Circuit Breaker X Current Above upper warning • Circuit Breaker X Current Below lower warning • Circuit Breaker X Current Below lower critical • Circuit Breaker Status ON • Circuit Breaker Status OFF

Table Continued

Type	Alarms
Outlet	• Outlet X Active Power Above upper critical • Outlet X Active Power Above upper warning • Outlet X Active Power Below lower warning • Outlet X Active Power Below lower critical • Outlet X Immediate ON • Outlet X Delayed ON • Outlet X Immediate OFF • Outlet X Delayed OFF • Outlet X Delayed REBOOT • Outlet X Cancel Pending Command
External Sensor	• External Sensor X (numerical) Above upper critical • External Sensor X (numerical) Above upper warning • External Sensor X (numerical) Below lower warning • External Sensor X (numerical) Below lower critical • External Sensor X (state) Alarmed • External Sensor X (state) Communication lost

Table Continued

Type	Alarms
System	• System Event log cleared • System Data log cleared • System PDU configuration file imported • System PDU configuration file exported • System Firmware update completed • System Firmware update failed • System Firmware updated started • System Firmware validation failed • System LDAP error occurred • System Network interface link state is up • System Sending SMTP message failed • System Network Management Module reset • System Network Management Module start • System communication lost • Daisy-chain state changed • USB port
User activity	• User Activity User X Authentication failure • User Activity User X User logged in • User Activity User X Session timeout • User Activity User X User blocked
User administration	• User Administration Password changed • User Administration Password settings changed • User Administration User added • User Administration User deleted • User Administration User modified

Trap Codes assigned to Alarms List

Trap codes assigned for critical alarms

Trap class	Trap code	Description
	1	The PDU unit active power is ABOVE critical threshold value.
	2	The PDU unit active power is BELOW critical threshold value.
	3	The phase 1 voltage is ABOVE critical threshold value.
	4	The phase 2 voltage is ABOVE critical threshold value.
	5	The phase 3 voltage is ABOVE critical threshold value.
	6	The phase 1 voltage is BELOW critical threshold value.
	7	The phase 2 voltage is BELOW critical threshold value.
	8	The phase 3 voltage is BELOW critical threshold value.
	9	The phase 1 current is ABOVE critical threshold value.
	10	The phase 2 current is ABOVE critical threshold value.
	11	The phase 3 current is ABOVE critical threshold value.
	12	The phase 1 current is BELOW critical threshold value.
	13	The phase 2 current is BELOW critical threshold value.
Trap critical	14	The phase 3 current is BELOW critical threshold value.
	15-26	The circuit breaker (1~12) current is ABOVE critical threshold value.
	27-38	The circuit breaker (1~12) current is BELOW critical threshold value.
	39-50	The circuit breaker (1~12) is in OFF state.
	51-98	The outlet (1~48) active power is ABOVE critical threshold value.
	99-146	The outlet (1~48) active power is BELOW critical threshold value.
	147-152	The sensor 1~6 temperature/humidity is ABOVE critical threshold value.
	153-158	The sensor 1~6 temperature/humidity is BELOW critical threshold value.

Table Continued

Trap class	Trap code	Description
	159-170	Reserved
	171-?	Communication between xxx and xxx is lost.
	180	PDU firmware update failed.
	181	PDU firmware validate failed.
	182	Sending SMTP message failed.
	183-?	User xx authentication failed.

Trap codes assigned for warning alarms

Trap class	Trap code	Description
	200	The PDU unit active power is ABOVE warning threshold value.
	201	The PDU unit active power is BELOW warning threshold value.
	202	The phase 1 voltage is ABOVE warning threshold value.
	203	The phase 2 voltage is ABOVE warning threshold value.
	204	The phase 3 voltage is ABOVE warning threshold value.
	205	The phase 1 voltage is BELOW warning threshold value.
	206	The phase 2 voltage is BELOW warning threshold value.
	207	The phase 3 voltage is BELOW warning threshold value.
	208	The phase 1 current is ABOVE warning threshold value.
	209	The phase 2 current is ABOVE warning threshold value.
	210	The phase 3 current is ABOVE warning threshold value.
	211	The phase 1 current is BELOW warning threshold value.
	212	The phase 2 current is BELOW warning threshold value.
	213	The phase 3 current is BELOW warning threshold value.
Trap warning	214-225	The circuit breaker (1~12) current is ABOVE warning threshold value.
	226-237	The circuit breaker (1~12) current is BELOW warning threshold value.

Table Continued

Trap class	Trap code	Description
	238-249	The circuit breaker (1~12) is in OFF state.
	250-297	The outlet (1~48) active power is ABOVE warning threshold value.
	298-345	The outlet (1~48) active power is BELOW warning threshold value.
	346-350	The sensor 1~5 temperature/humidity is ABOVE warning threshold value.
	351-355	The sensor 1~5 temperature/humidity is BELOW warning threshold value.
	356-379	Reserved

Trap codes assigned for information alarms

Trap class	Trap code	Description
	380-391	The circuit breaker 1~12 is in ON state.
	392-439	The outlet 1~48 IMMEDIATE ON occurred.
	440-487	The outlet 1~48 DELAYED ON occurred.
	488-535	The outlet 1~48 IMMEDIATE OFF occurred.
	536-583	The outlet 1~48 DELAYED OFF occurred.
	584-631	The outlet 1~48 IMMEDIATE REBOOT occurred.
	632-679	The outlet 1~48 DELAYED REBOOT occurred.
	680-727	The outlet 1~48 Cancel Pending Commands occurred.
	728-739	Reserved.
	740	Event log cleared.
	741	Data log cleared.
	742	PDU configuration file imported.
	743	PDU configuration file exported.
	744	Firmware update completed.
Trap critical	745	Firmware update started.
	746	An LDAP error occurred.
	747	Network interface link state is up.
	748	Communication module reset.

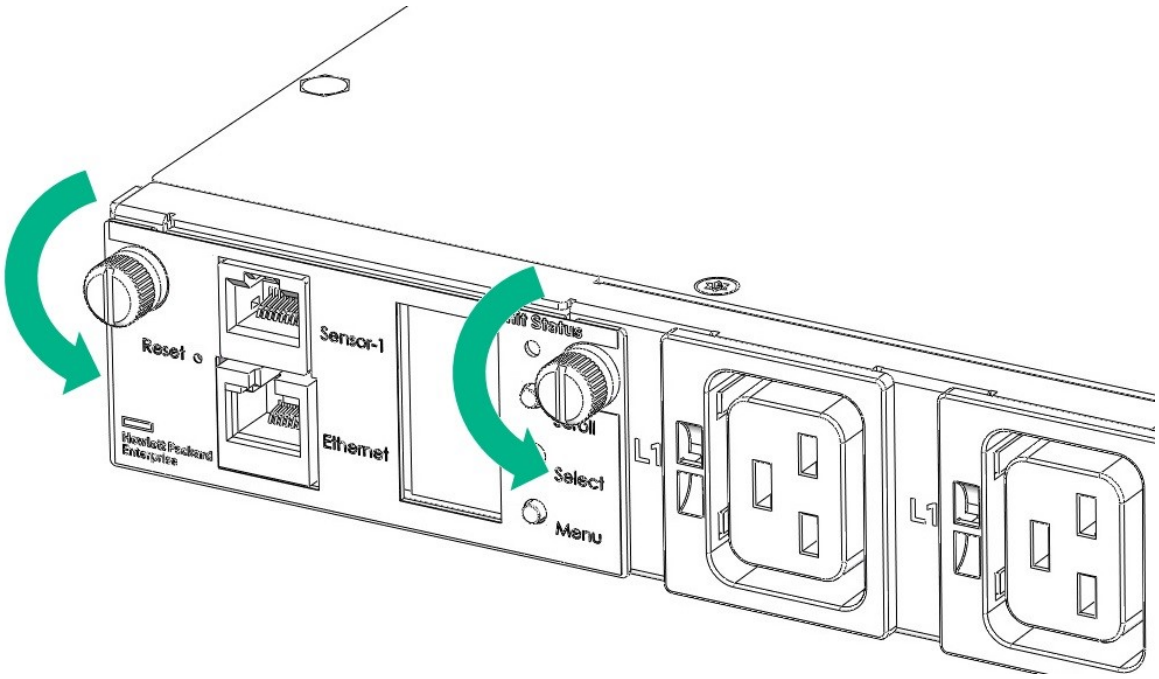
Table Continued

Trap class	Trap code	Description
	749	Communication module start.
	750	Daisy-chain state changed.
	751	USB Port?
	752	User xxx logged in.
	753	User xxx session timeout.
	754	User xxx blocked.
	755	User xxx password changed.
	756	User password settings changed.
	757	User xxx added.
	758	User xxx deleted.
	759	User xxx modified.
Clear traps	760	User admin logged out.
	770	The PDU unit active power alarm is cleared.
	773-775	The phase (1-3) voltage alarm is cleared.
	776-778	The phase (1-3) current alarm is cleared.
	791-838	The outlet (1-48) active power alarm is cleared.
	839-844	The sensor (1-6) temperature alarm is cleared

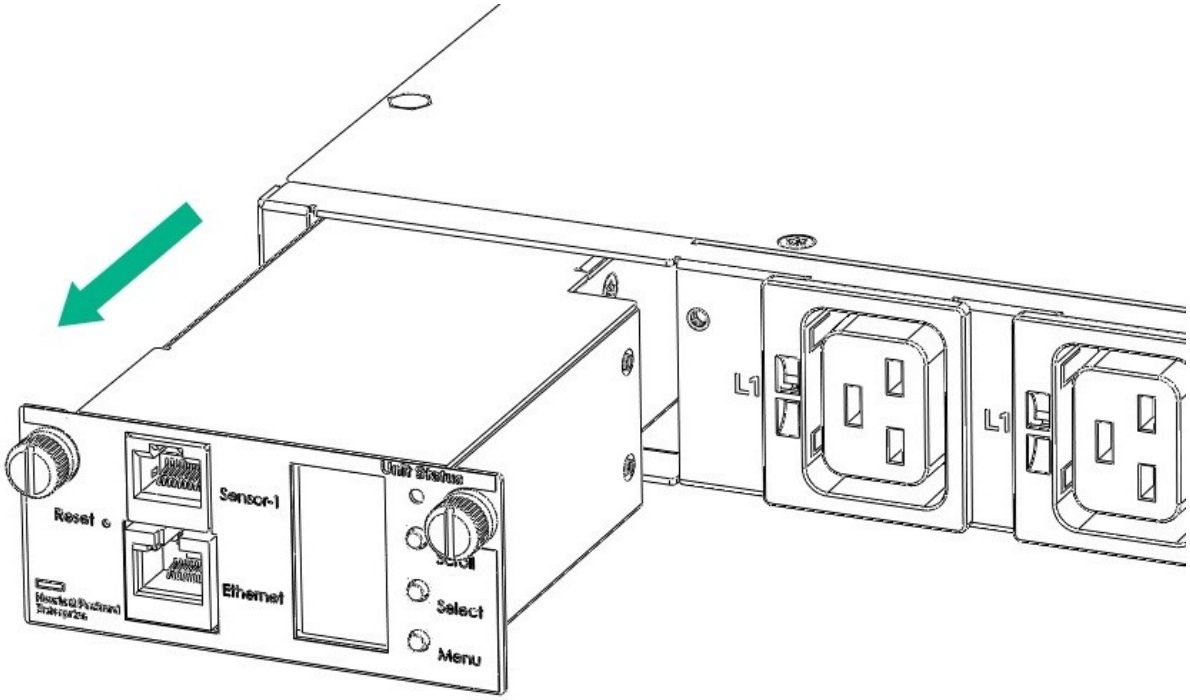
Appendix D: Horizontal Network Management Module Replacement

Procedure

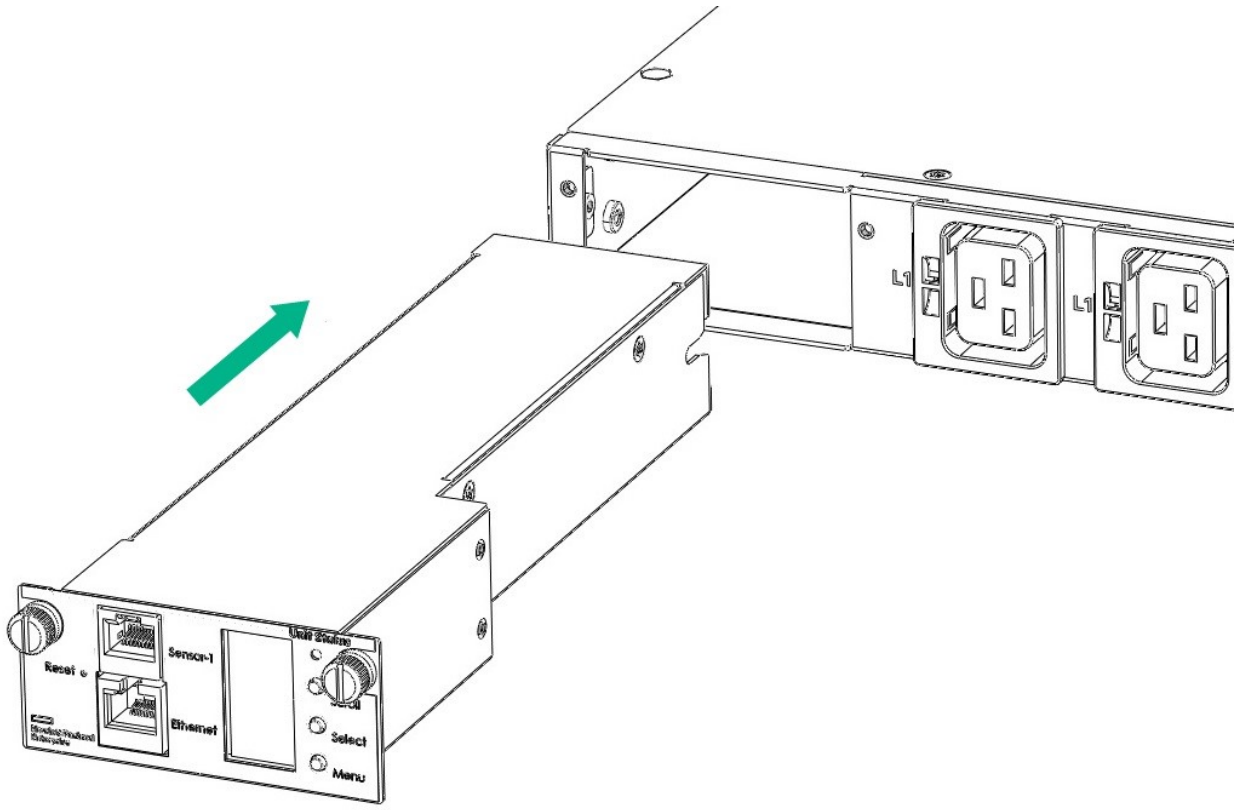
1. Loosen the left and right captive nuts on the Network Management Module by turning them counterclockwise.



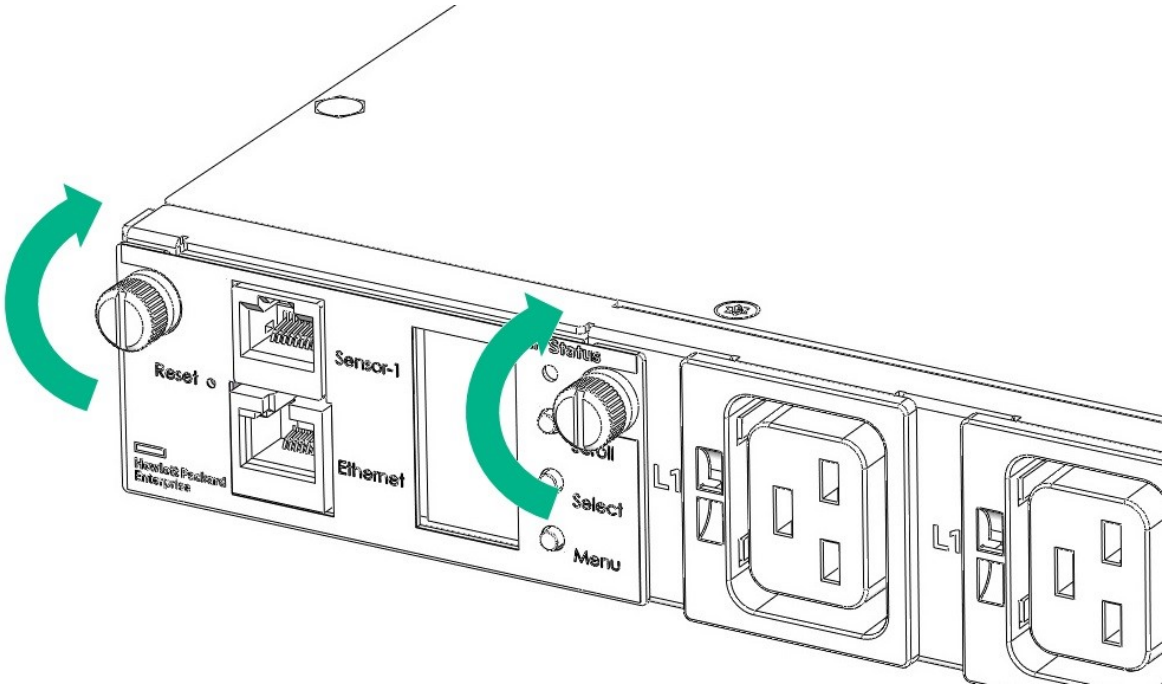
2. Pull out the Network Management Module from the PDU.



3. Insert the new Network Management Module.



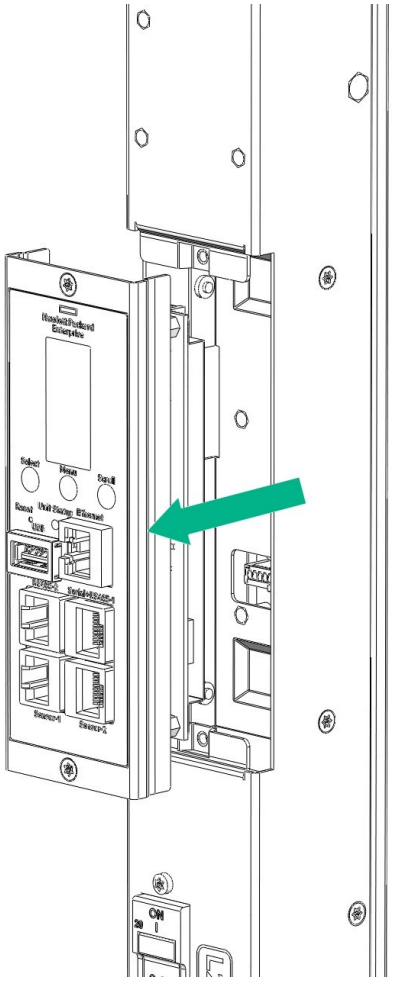
4. Align the Network Management Module and tighten the captive nuts by turning them clockwise.



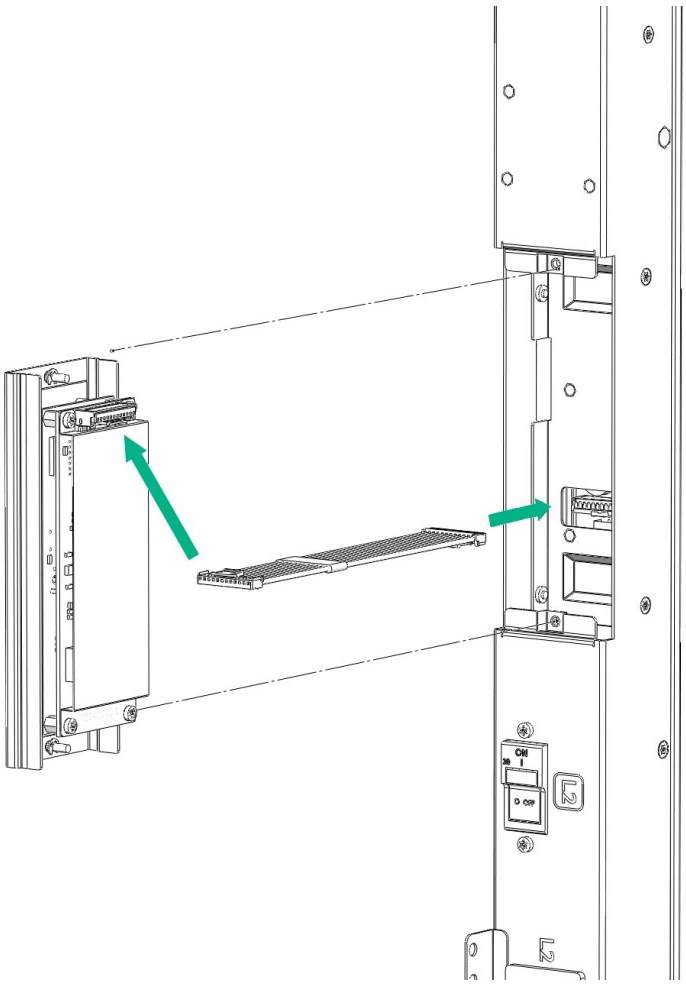
Appendix E: Vertical Network Management Module Replacement

Procedure

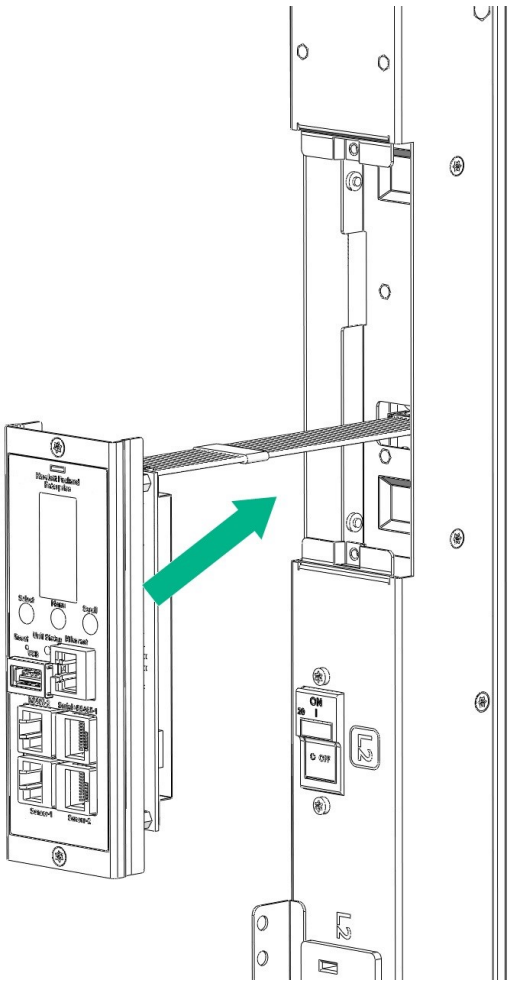
1. Use a T10 Torx screwdriver to remove the top and bottom screws from the Network Management Module.



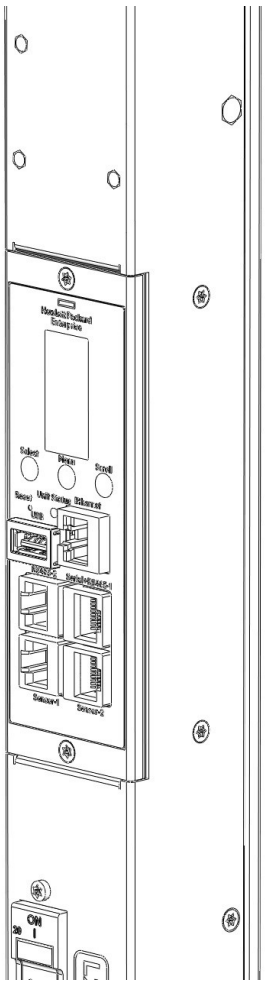
2. Press the release button on the ribbon cable and disconnect it from the Network Management Module and the PDU.



3. Connect the ribbon cable to the replacement Network Management Module and the PDU.



4. Insert the replacement Network Management Module into the PDU and tighten the two screws.



Appendix F: Systems Insight Manager Integration

Discovering the PDU

HPE SIM automatically detects PDUs as part of the device discovery process. If detected, a link is included on the SIM All Systems page for the PDU. The PDU must be installed and running before attempting discovery through SIM.

If the defaults are not used, a new entry can be made to the additional wsdisc.props file, located in the CONFIG directory in the SIM install directory, to allow SIM to correctly discover and identify the PDU. For more information on editing the additional wsdisc.props file, see the additionalwsdisc.txt file located in the same directory.

The following example is an ADDITIONALWSDISC.PROPS file with PDU entry.

```
# ----------------------------------------------------
# Additional Web Server Discovery Properties
#
# ----------------------------------------------------
# NOTE: See "additionalWsDisc_README.txt" for a description of entries in
# this file and how to add or remove additional web server ports used for
# discovery and identification.
# ----------------------------------------------------
#
# ----------------------------------------------------
# The following are actual web server ports enabled by default.
```

```
# To remove them from the discovery process, comment out the line with a '#'
# or remove it. You will need to restart the HPE SIM service for
# the changes to take effect. In addition you will need to run the Device
# Identification task to find any new ports that were defined.
# ------------------------------------------------
411=Director Agent, ,true,false, ,http
3201=Compaq TaskSmart, ,true,false, ,https
8008=Default Home Page, ,true,false, ,http
1311=Server
Administrator, ,true,false, ,https
1234=HP PDU, ,true,false, ,https
```

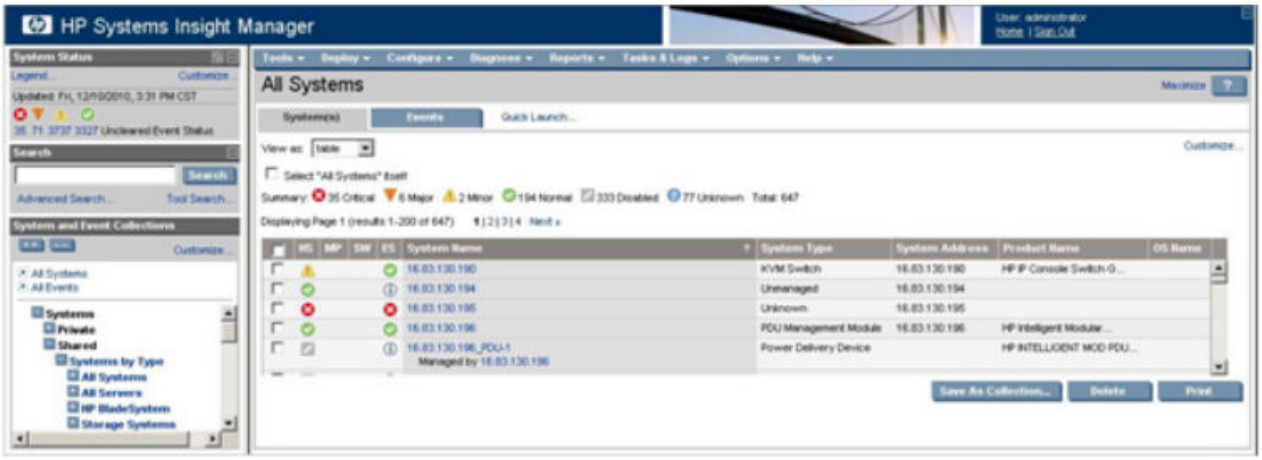
The last entry allows SIM to detect the PDU running on port 1234 and using HTTPS (Secure Socket Layer protocol).

SIM services must be restarted to apply the change.

Systems Insight Manager Overview

Use the Systems Insight Manager to complete the following tasks.

- Discover PDUs— As part of the discovery process, SIM can detect an installed PDU. The web interface for the discovered PDU can be launched from the SIM **All Systems** page.



- Receive SNMP traps from the PDU—The PDU can send event-based traps to SIM that include a URL in the trap. This functionality enables administrators to easily launch the web interface of the PDU in context. For example, if the PDU detects an alarm condition, the PDU can send a trap to SIM with an attached link that routes users directly to the **Overview** screen for the attached PDU.
- Launch the PDU web interface from within SIM.
  - **All Systems** page—All discovered PDUs appear on the **All Systems** page. To launch a browser session, click the link in the **System Name** column.
  - Event-based trap—A URL is included in each trap to link directly from SIM to the **Overview** screen for the specific device for which the trap was sent.

Configuring HPE SIM to Receive Traps

Prerequisites

Before SIM can receive traps, the correct MIB file (`cpqpower.mib`) must be compiled into SIM. To download the Power MIB, visit the Hewlett Packard Enterprise website **http://www.hpe.com/info/rackandpower**.

Procedure

1. Copy the MIB file to the `HPE\Systems Insight Manager\mibs` folder.
2. From the `HPE\Systems Insight Manager\mibs` folder, run `mcompile cpqpower.mib` from the command line to compile the new MIB. A new file named `cpqpower.cfg` is created.
3. Register the new MIB by entering **`mxmib -a cpqpower.cfg`** from the `HPE\Systems Insight Manager\mibs` command line.
4. Enter **`HPE\Systems Insight Manager\mibs>mxmib`** at the command line and verify that the new MIB is listed.

NOTE: For more information on uploading and registering the MIB in SIM, see the Systems Insight Manager technical reference guide on the **Hewlett Packard Enterprise Information Library**.

Configuring the PDU to Send Traps to SIM

Procedure

1. On the PDU web interface, click the **Setup** tab.
2. Click the **Remote Management** menu.
3. Add the SIM server as an SNMP trap recipient on the **Trap Receivers** tab.
4. Configure the PDU to send alert notifications to SIM on the **Event Notifications** tab.

Appendix G: Redfish URLs support

This section contains operation information for Redfish URLs as per the DMTF Standards.

Supported Redfish services

URL: `https://<ip_addr>/redfish/v1/`

Description

This is the URI for the Redfish service root. Perform GET on this URI to fetch a list of available Redfish services.

Sample response

```
{
    "links": {
        "Session": {
            "@odata.id": "/redfish/v1/SessionService/Sessions"
        }
    },
    "SessionService": {
        "@odata.id": "/redfish/v1/SessionService"
    },
    "@odata.type": "ServiceRoot.v1_6_0.ServiceRoot",
    "JsonSchemas": {
        "@odata.id": "/redfish/v1/Schemas"
    },
    "DataService": {
```

```
        "@odata.id": "/redfish/v1/DataService"
    },
    "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
copyright policy, see http://www.dmtf.org/about/policies/copyright.",
    "Id": "RootService",
    "AccountService": {
        "@odata.id": "/redfish/v1/AccountService"
    },
    "Name": "Redfish Root Service",
    "@odata.id": "/redfish/v1",
    "Manager": {
        "@odata.id": "/redfish/v1/Managers"
    },
    "PowerDistribution": {
        "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs"
    },
    "EventService": {
        "@odata.id": "/redfish/v1/EventService"
    },
    "RedfishVersion": "1.6.0"
}
```


Sessions

URL: `https://<ip_addr>/redfish/v1/SessionService`

Description

This is the URL for PDU Session Services. Perform GET on this URL to get the PDU Session Service data.

Sample response


```
{
    "Status": {
        "State": "Enabled",
        "Health": "OK"
    },
    "@odata.id": "/redfish/v1/SessionService",
    "@odata.type": "#SessionService.1.1.6.SessionService",
    "id": "Session Service",
    "Name": "Session Service",
    "Description": "Session Service",
    "SessionTimeout": 10,
    "ServiceEnabled": true,
    "Sessions": {
        "@odata.id": "/redfish/v1/SessionService/Sessions"
    },
    "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
copyright policy, see http://www.dmtf.org/about/policies/copyright."
}
```


URL: `https://<ip_addr>/redfish/v1/SessionService/Sessions`

Description

This is the URL for PDU Active Sessions. Perform GET on this URL to list out the number of sessions active on the PDU.

Sample response


```
{
    "@odata.id": "/redfish/v1/SessionService/Sessions/",
    "@odata.type": "#SessionCollection.SessionCollection",
    "Name": "Session Collection",
    "Members@odata.count": 1,
    "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
copyright policy, see http://www.dmtf.org/about/policies/copyright.",
    "Members": [
        {
            "@odata.id": "/redfish/v1/SessionService/Sessions/1480096863"
        }
    ]
}
```


URL: `https://<ip_addr>/redfish/v1/SessionService/Sessions/{session_ids}`

Description

This is the URL for PDU Active Sessions. Perform GET on this URL to get the details of the Active Session ID.

Sample response


```
{
    "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
copyright policy, see http://www.dmtf.org/about/policies/copyright.",
    "@odata.type": "#Session.1.0.0.Session",
    "@odata.id": "/redfish/v1/SessionService/Sessions/1480096863",
    "UserName": "admin",
    "Name": "User Session",
    "Description": "adminUser Session",
    "Id": 1480096863
}
```


Accounts

URL: `https://<ip_addr>/redfish/v1/AccountService`

Description

This is the URL for PDU Account Services. Perform GET on this URL to get the details on the Account services.

Sample response


```
{
    "@odata.type": "#AccountService.1.7.0.AccountService",
    "AuthFailureLoggingThreshold": 3,
    "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
copyright policy, see http://www.dmtf.org/about/policies/copyright.",
    "Name": "Account Service",
    "@odata.id": "/redfish/v1/AccountService",
    "Status": {
        "State": "Enabled",
        "Health": "OK"
    },
    "Description": "Account Service",
    "ServiceEnabled": true,
    "Id": "Account Service",
```

```
    "AccountLockoutDuration": 10,
    "Accounts": {
        "@odata.id": "/redfish/v1/AccountService/Accounts"
    },
    "MinPasswordLength": 8,
    "AccountLockoutThreshold": 3,
    "Roles": {
        "@odata.id": "/redfish/v1/AccountService/Roles"
    }
}
```

URL: `https://<ip_addr>/redfish/v1/AccountService/Accounts`

Description

This is the URL for PDU Account Services. Perform GET on this URL to get the list of the Accounts present.

Sample response

```
{
    "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
copyright policy, see http://www.dmtf.org/about/policies/copyright.",
    "@odata.type": "#ManagerAccountCollection.ManagerAccountCollection",
    "@odata.id": "/redfish/v1/AccountService/Accounts",
    "Name": "Accounts Collection",
    "Members@odata.count": 3,
    "Members": [
        {
            "@odata.id": "/redfish/v1/AccountService/Accounts/1"
        },
        {
            "@odata.id": "/redfish/v1/AccountService/Accounts/2"
        },
        {
            "@odata.id": "/redfish/v1/AccountService/Accounts/3"
        }
    ]
}
```

URL: `https://<ip_addr>/redfish/v1/AccountService/Accounts/{user_id}`

Description

This is the URL for PDU Account Services. Perform GET on this URL to get the details on the Account ID.

Sample response

```
{
    "Locked": false,
    "Password": 0,
    "@odata.type": "#ManagerAccount.v1_5_0.ManagerAccount",
    "@odata.id": "/redfish/v1/AccountService/Accounts/1",
    "Description": "User Account",
    "Id": "1",
    "Name": "User Account",
    "Username": "admin",
    "Enabled": true,
    "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
```

```
copyright policy, see http://www.dmtf.org/about/policies/copyright.",
    "RoleId": "admin",
    "Links": {
        "Role": {
            "@odata.id": "/redfish/v1/AccountService/Roles/admin"
        }
    }
}
```


URL: `https://<ip_addr>/redfish/v1/AccountService/Roles`

Description

This is the URL for PDU Role Services. Perform GET on this URL to get the list of the roles present.

Sample response


```
{
    "@odata.type": "#RoleCollection.RoleCollection",
    "@odata.id": "/redfish/v1/AccountService/Roles",
    "Name": "Roles Collection",
    "Members@odata.count": 3,
    "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
copyright policy, see http://www.dmtf.org/about/policies/copyright.",
    "Members": [
        {
            "@odata.id": "/redfish/v1/AccountService/Roles/admin"
        },
        {
            "@odata.id": "/redfish/v1/AccountService/Roles/user"
        },
        {
            "@odata.id": "/redfish/v1/AccountService/Roles/manager"
        }
    ]
}
```


URL: `https://<ip_addr>/redfish/v1/AccountService/Roles/{rolename}`

Description

This is the URL for PDU Role Services. Perform GET on this URL to get the details and privileges of the role.

Sample response


```
{
    "@odata.type": "#Role.1.2.4.Role",
    "@odata.id": "/redfish/v1/AccountService/Roles/admin",
    "Description": "admin operation",
    "Id": "admin",
    "Name": "User Role",
    "OemPrivileges": [
        "OemClearLog",
        "OemPowerControl"
    ],
    "IsPredefined": true,
    "privilege": [
        "Change Data Logging Settings",
```

```
            "Change Date/Time Settings",
            "Change Event Settings",
            "Change External Sensors Configuration",
            "Change Local User Management",
            "Change Network Configuration",
            "Change Own Password",
            "Change PDU Settings",
            "Change SNMP Settings",
            "Change Security Settings",
            "Change USB Settings",
            "Firmware Update",
            "Network Card Reset",
            "Switch Outlet",
            "Operate Configuration File",
            "Change Input Phase Setting",
            "Change Circuit Breaker Setting",
            "Change Network Service",
            "Change SMTP Setting",
            "Change Server Reachability",
            "Disconnect Other User",
            "Run Diagnostics",
            "Clear Data/Event Log",
            "Change LDAP Setting",
            "Change Outlet Setting"
        ],
        "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
copyright policy, see http://www.dmtf.org/about/policies/copyright."
}
```


Managers

URL: `https://<ip_addr>/redfish/v1/Managers`

Description

Perform GET on this URL to get the list of the users having manager role.

Sample response


```
{
    "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
copyright policy, see http://www.dmtf.org/about/policies/copyright.",
    "@odata.type": "#ManagerCollection.ManagerCollection",
    "@odata.id": "/redfish/v1/Managers/",
    "Oem": {},
    "Members@odata.count": 1,
    "Name": "Manager Collection",
    "Members": [
        {
            "@odata.id": "/redfish/v1/Managers/manager"
        }
    ]
}
```


URL: `https://<ip_addr>/redfish/v1/Managers/manager`

Description

Perform GET on this URL to get the details of the supported Network Services.

Sample response


```
{
    "Name": "Manager",
    "@odata.id": "/redfish/v1/Managers/manager",
    "DateTime": "22-02-07T13:58:10+00:00",
    "Status": {
        "State": "Enabled",
        "Health": "OK"
    },
    "SerialConsole": {
        "ServiceEnabled": true,
        "MaxConcurrentSessions": 1,
        "ConnectTypesSupported": [
            "Serial",
            "SSH"
        ]
    },
    "@odata.type": "#Manager.1.7.0.Manager",
    "FirmwareVersion": "2.0.0.N",
    "NetworkProtocol": {
        "@odata.id": "/redfish/v1/Managers/1/NetworkService"
    },
    "Id": "manager",
    "Description": "Manager View",
    "DateTimeLocalOffset": "+00:00",
    "CommandShell": {
        "ServiceEnabled": true,
        "MaxConcurrentSessions": 1,
        "ConnectTypesSupported": [
            "SSH"
        ]
    },
    "PowerState": "On",
    "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
copyright policy, see http://www.dmtf.org/about/policies/copyright.",
    "GraphicalConsole": {
        "ServiceEnabled": true,
        "MaxConcurrentSessions": 1,
        "ConnectTypesSupported": "KVMIP"
    },
    "LogServices": {
        "@odata.id": "/redfish/v1/Managers/1/LogServices"
    },
    "Actions": {
        "#Manager.Reset": {
            "target": "/redfish/v1/Managers/1/Actions/Manager.Reset/"
        }
    }
}
```


URL: `https://<ip_addr>/redfish/v1/Managers/manager/NetworkProtocol`

Description

Perform GET on this URL to get the details on the support Network Protocols and the ports enabled.

Sample response


```
{
    "@odata.id": "/redfish/v1/Managers/1/NetworkProtocol/",
    "Name": "Manager Network Protocol",
    "Status": {
        "State": "Enabled",
        "Health": "OK"
    },
    "@odata.type": "#ManagerNetworkProtocol.v1_5_0.ManagerNetworkProtocol",
    "HostName": "10.10.106.111",
    "Description": "Manager Network Service",
    "HTTPS": {
        "ProtocolEnabled": true,
        "Port": 443
    },
    "Id": "NetworkProtocol",
    "SSH": {
        "ProtocolEnabled": true,
        "Port": 22
    },
    "SSDP": {
        "ProtocolEnabled": false,
        "NotifyMulticastIntervalSeconds": 0,
        "Port": 0,
        "NotifyIPv6Scope": "no",
        "NotifyTTL": 0
    },
    "FQDN": "no",
    "IPMI": {
        "ProtocolEnabled": false,
        "Port": 0
    },
    "HTTP": {
        "ProtocolEnabled": false,
        "Port": 80
    },
    "SNMP": {
        "ProtocolEnabled": true,
        "Port": 161
    },
    "VirtualMedia": {
        "ProtocolEnabled": false,
        "Port": 0
    },
    "Telnet": {
        "ProtocolEnabled": false,
        "Port": 0
    },
    "KVMIP": {
        "ProtocolEnabled": false,
        "Port": 0
    },
    "Oem": {},
```

```
    "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
copyright policy, see http://www.dmtf.org/about/policies/copyright."
}
```


URL: `https://<ip_addr>/redfish/v1/Managers/manager/1/LogServices`

Description

Perform GET on this URL to get the details on the Log Services.

Sample response


```
{
    "@odata.id": "/redfish/v1/Managers/1/LogServices",
    "@odata.type": "#LogServiceCollection.LogServiceCollection",
    "Name": "Log Service Collection",
    "Description": "Collection of Log Services for this Manager",
    "Members@odata.count": 1,
    "Members": {
        "@odata.id": "/redfish/v1/Managers/1/LogServices/Log"
    },
    "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
copyright policy, see http://www.dmtf.org/about/policies/copyright."
}
```


URL: `https://<ip_addr>/redfish/v1/Managers/manager/1/LogServices/Log`

Description

Perform GET on this URL to get the details on the Log Services.

Sample response


```
{
    "Name": "System Log Service",
    "DateTime": "22-02-07T14:14:51+00:00",
    "Status": {
        "State": "Enabled",
        "Health": "OK"
    },
    "@odata.id": "/redfish/v1/Managers/1/LogServices/Log",
    "MaxNumberOfRecords": 500,
    "Actions": {
        "#LogService.ClearLog": {
            "target": "/redfish/v1/Managers/1/LogServices/Log/Actions/
LogService.Reset"
        }
    },
    "@odata.type": "#LogService.v1_1_3.LogService",
    "ServiceEnabled": true,
    "Id": "Log",
    "OverWritePolicy": "WrapsWhenFull",
    "DateTimeLocalOffset": "+00:00",
    "Entries": {
        "@odata.id": "/redfish/v1/Managers/1/LogServices/Log/Entries"
    },
    "Oem": {},
```

```
    "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
copyright policy, see http://www.dmtf.org/about/policies/copyright."
}
```


URL: `https://<ip_addr>/redfish/v1/Managers/manager/1/LogServices/Log/Entries`

Description

Perform GET on this URL to get the entries of the Eventlogs.

Sample response

```
04/02/2022      19:16:14        External Sensor Measurement     External sensor T1 of PDU 1  asserted above upper critical
04/02/2022      19:16:10        External Sensor Measurement     External sensor T1 of PDU 1  deasserted above upper critical
04/02/2022      19:13:56        External Sensor Measurement     External sensor T1 of PDU 1  asserted above upper critical
04/02/2022      18:51:49        External Sensor Measurement     External sensor T1 of PDU 1  deasserted above upper critical
04/02/2022      18:51:09        External Sensor Measurement     External sensor T1 of PDU 1  asserted above upper critical
04/02/2022      18:27:01        External Sensor Measurement     External sensor T1 of PDU 1  deasserted above upper critical
04/02/2022      18:26:57        External Sensor Measurement     External sensor T1 of PDU 1  asserted above upper critical
04/02/2022      18:25:56        External Sensor Measurement     External sensor T1 of PDU 1  deasserted above upper critical
04/02/2022      18:25:29        External Sensor Measurement     External sensor T1 of PDU 1  asserted above upper critical
04/02/2022      18:06:47        External Sensor Measurement     External sensor T1 of PDU 1  deasserted above upper critical
04/02/2022      18:06:03        External Sensor Measurement     External sensor T1 of PDU 1  asserted above upper critical
04/02/2022      17:11:56        External Sensor Measurement     External sensor RH of PDU 2 HPE_2.0.0.N communication OK
04/02/2022      17:11:51        External Sensor Measurement     External sensor door of PDU 2 HPE_2.0.0.N communication OK
04/02/2022      17:11:46        System                          Daisy Chain  of PDU 2 HPE_2.0.0.N connected
04/02/2022      17:11:41        External Sensor Measurement     External sensor RH of PDU 1  communication OK
04/02/2022      17:11:28        External Sensor Measurement     External sensor T1 of PDU 1  communication OK
04/02/2022      17:11:20        External Sensor Measurement     External sensor T3 of PDU 1  communication OK
04/02/2022      17:11:18        External Sensor Measurement     External sensor T2 of PDU 1  communication OK
04/02/2022      17:11:17        External Sensor Measurement     External sensor DOOR SWITCH of PDU 1  communication OK
04/02/2022      17:11:11        System                          The 10.10.106.111 network interface link of PDU 1  is now up
04/02/2022      17:11:02        System                          Network Card of PDU 1  started
04/02/2022      15:51:51        External Sensor Measurement     External sensor RH of PDU 2 HPE_2.0.0.N communication OK
04/02/2022      15:51:51        External Sensor Measurement     External sensor T3 of PDU 2 HPE_2.0.0.N communication OK
04/02/2022      15:51:50        External Sensor Measurement     External sensor T1 of PDU 2 HPE_2.0.0.N communication OK
04/02/2022      15:51:49        External Sensor Measurement     External sensor T2 of PDU 2 HPE_2.0.0.N communication OK
04/02/2022      15:51:49        External Sensor Measurement     External sensor door of PDU 2 HPE_2.0.0.N communication OK
04/02/2022      15:51:48        External Sensor Measurement     External sensor T1 of PDU 1  communication OK
04/02/2022      15:51:46        System                          Daisy Chain  of PDU 2 HPE_2.0.0.N connected
```

Power Equipment

URL: `https://<ip_addr>/redfish/v1/PowerEquipment`

Description

This is the URL for the Power Equipment. Perform GET on this URL to get the supported Power Equipment details.

Sample response


```
{
    "@odata.id": "/redfish/v1/PowerEquipment",
    "Status": {
        "State": "Enabled",
        "HealthRollup": "OK"
    },
    "@odata.type": "#PowerEquipment.v1_0_0.PowerEquipment",
    "Id": "PowerEquipment",
    "Name": "DCIM Power Equipment",
    "Links": {},
    "RackPDUs": {
        "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs"
    },
    "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
```

```
copyright policy, see http://www.dmtf.org/about/policies/copyright."
}
```


URL: `https://<ip_addr>/redfish/v1/PowerEquipment/RackPDUs`

Description

Perform GET on this URL to get the list of Rack PDUs connected.

Sample response


```
{
    "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
copyright policy, see http://www.dmtf.org/about/policies/copyright.",
    "@odata.type": "#PowerDistributionCollection.PowerDistributionCollection",
    "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/",
    "Name": "RackPDU Collection",
    "Members@odata.count": 2,
    "Members": [
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/2"
        }
    ]
}
```


URL: `https://<ip_addr>/redfish/v1/PowerEquipment/RackPDUs/{pdu_id}`

Description

This is the URL for the Rack PDUs. Perform GET on this URL to get the details of the Rack PDU and the supported URLs.

Sample response


```
{
    "Model": "230V, 32A, 22.1kVA, 50/60Hz",
    "@odata.type": "#PowerDistribution.v1_0_0.PowerDistribution",
    "Mains": {
        "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Mains"
    },
    "ProductionDate": "2022-02-04T14:40:04Z",
    "UUID": "NULL",
    "FirmwareVersion": "2.0.0.N",
    "OutletGroups": {
        "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/OutletGroups"
    },
    "Outlets": {
        "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets"
    },
    "Branches": {
        "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Branches"
    },
    "EquipmentType": "RackPDU",
    "Id": 1,
    "AssetTag": "NULL",
    "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1",
    "Status": {
```

```
        "State": "Enabled",
        "Health": "OK"
    },
    "Name": "",
    "Sensors": {
        "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors"
    },
    "SerialNumber": "SERIAL1",
    "Version": "1.6.0",
    "Manufacturer": "CIS",
    "PartNumber": "P9S25A",
    "Location": {
        "Placement": {
            "Row": ""
        }
    },
    "Metrics": {
        "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Metrics"
    },
    "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
copyright policy, see http://www.dmtf.org/about/policies/copyright."
}
```


Branches

URL: `https://<ip_addr>/redfish/v1/PowerEquipment/RackPDUs/{pdu_id}/Branches`

Description

This is the URL for the Rack PDUs-Branches. Perform GET on this URL to get the list of Branches (Circuit Breaker) present on the PDU.

Sample response


```
{
    "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Branches/",
    "@odata.type": "#CircuitCollection.CircuitCollection",
    "Name": "Branch Circuit Collection",
    "Members@odata.count": 6,
    "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
copyright policy, see http://www.dmtf.org/about/policies/copyright.",
    "Branch": [
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Branches/A"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Branches/B"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Branches/C"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Branches/D"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Branches/E"
        },
```

```
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Branches/F"
        }
    ]
}
```

URL: `https://<ip_addr>/redfish/v1/PowerEquipment/RackPDUs/{pdu_id}/Branches/{Branch_ID}`

Description

This is the URL for the Rack PDUs-Branches. Perform GET on this URL to get the readings of the PDU from Branch level and the Outlets belonging to this Branch.

Sample response

```
{
    "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Branches/A",
    "Name": "Branch Circuit A",
    "Status": {
        "State": "Enabled",
        "Health": "OK"
    },
    "PolyPhasePowerWatts": {
        "Line1ToNeutral": {
            "DataSourceUri": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/
PowerA",
            "Reading": 0.0,
            "PowerFactor": 1.0,
            "ApparentVA": 0.0,
            "ReactiveVAR": 0.0
        }
    },
    "@odata.type": "#Circuit.v1_0_0.Circuit",
    "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
copyright policy, see http://www.dmtf.org/about/policies/copyright.",
    "PolyPhaseCurrentAmps": {
        "Line1": {
            "DataSourceUri": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/
CurrentA",
            "Reading": 0.0
        },
        "PowerWatts": {
            "DataSourceUri": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/
PowerA",
            "Reading": 0.0,
            "PowerFactor": 1.0,
            "ApparentVA": 0.0,
            "ReactiveVAR": 0.0
        }
    },
    "PhaseWiringType": "ThreePhase5Wire",
    "Id": "1",
    "CurrentAmps": {
        "DataSourceUri": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/
CurrentA",
        "Reading": 0.0
    },
```

```
    "CircuitType": "Branch",
    "RatedCurrentAmps": 32,
    "NominalVoltage": "AC230V",
    "BreakerState": "Normal",
    "PolyPhaseVoltage": {
        "Line1ToNeutral": {
            "DataSourceUri": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/
VoltageAL1N",
            "Reading": 227.41299438476564
        }
    },
    "FrequencyHz": {
        "DataSourceUri": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/
FrequencyA",
        "Reading": 50.020000457763672
    },
    "EnergykWh": {
        "DataSourceUri": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/
EnergyA",
        "Reading": 0.0
    },
    "Outlets": [
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/OUTLET1"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/OUTLET2"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/OUTLET3"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/OUTLET4"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/OUTLET5"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/OUTLET6"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/OUTLET7"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/OUTLET8"
        }
    ],
    "Actions": {
        "#Circuit.BreakerControl": {
            "target": "/redfish/v1/PowerEquipment/RackPDUs/1/Branches/A/
Circuit.BreakerControl"
        },
        "#Outlet.ResetMetrics": {
            "target": "/redfish/v1/PowerEquipment/RackPDUs/1/Branches/A/
Circuit.BreakerControl"
        }
```

```
    }
}
```


Outlets

URL: `https://<ip_addr>/redfish/v1/PowerEquipment/RackPDUs/{pdu_id}/Outlets`

Description

This is the URL for the Rack PDUs-Outlets. Perform GET on this URL to get the number of Outlets and it supported URLs.

Sample response


```
{
    "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets",
    "@odata.type": "#OutletCollection.OutletCollection",
    "Name": "Outlet Collection",
    "Members@odata.count": 48,
    "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
copyright policy, see http://www.dmtf.org/about/policies/copyright.",
    "Outlets": [
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/OUTLET1"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/OUTLET2"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/OUTLET3"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/OUTLET4"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/OUTLET5"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/OUTLET6"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/OUTLET7"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/OUTLET8"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/OUTLET9"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET10"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET11"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
```

```
OUTLET12"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET13"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET14"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET15"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET16"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET17"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET18"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET19"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET20"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET21"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET22"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET23"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET24"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET25"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET26"
```

```
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET27"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET28"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET29"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET30"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET31"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET32"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET33"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET34"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET35"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET36"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET37"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET38"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET39"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET40"
        },
```

```
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET41"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET42"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET43"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET44"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET45"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET46"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET47"
        },
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/
OUTLET48"
        }
    ]
}
```


URL: `https://<ip_addr>/redfish/v1/PowerEquipment/RackPDUs/{pdu_id}/Outlets/OUTLET#`

Description

This is the URL for the Rack PDUs-Outlets. Perform GET on this URL to get the details and readings of the queried outlet.

Sample response


```
{
    "RatedCurrentAmps": 32,
    "IndicatorLED": "Lit",
    "Name": "Outlet OUTLET1, Branch Circuit A",
    "Status": {
        "Health": "OK",
        "State": "Enabled"
    },
    "@odata.type": "#Outlet.v1_0_0.Outlet",
    "PolyPhaseCurrentAmps": {
        "Line1": {
            "DataSourceUri": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/
CurrentOUTLET1",
            "Reading": 0.0
        }
```

```
    },
    "PhaseWiringType": "ThreePhase5Wire",
    "Id": "OUTLET1",
    "OutletType": "IEC_60320_C19",
    "VoltageType": "AC",
    "Actions": {
        "#Outlet.PowerControl": {
            "target": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/OUTLET1/
Outlet.PowerControl"
        },
        "#Outlet.ResetMetrics": {
            "target": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/OUTLET1/
Outlet.ResetMetrics"
        }
    },
    "PowerOffDelaySeconds": 0,
    "PowerOnDelaySeconds": 0,
    "NominalVoltage": "AC230V",
    "Links": {
        "BranchCircuit": {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Branches/A"
        },
        "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/OUTLET1",
        "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
copyright policy, see http://www.dmtf.org/about/policies/copyright."
    },
    "PowerState": "On",
    "PowerEnabled": true,
    "Voltage": {
        "DataSourceUri": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/
VoltageOUTLET1",
        "Reading": 227.38600158691408
    },
    "PolyPhaseVoltage": {
        "Line1ToNeutral": {
            "DataSourceUri": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/
VoltageOUTLET1",
            "Reading": 227.38600158691408
        }
    },
    "CurrentAmps": {
        "DataSourceUri": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/
CurrentOUTLET1",
        "Reading": 0.0
    },
    "PowerWatts": {
        "DataSourceUri": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/
PowerOUTLET1",
        "Reading": 0.0,
        "PowerFactor": 0.0,
        "ApparentVA": 0.0,
        "ReactiveVAR": 13.774999618530274
    },
    "FrequencyHz": {
        "DataSourceUri": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/
FrequencyOUTLET1",
        "Reading": 50
```

```
    },
    "EnergykWh": {
        "DataSourceUri": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/
EnergyOUTLET1",
        "Reading": 0.0
    }
}
```


Mains

URL: https://<ip_addr>/redfish/v1/PowerEquipment/RackPDUs/{pdu_id}/Mains

Description

This is the URL for the Rack PDUs-Mains. Perform GET on this URL to get the details of the URL supported.

Sample response


```
{
    "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Mains",
    "@odata.type": "#CircuitCollection.CircuitCollection",
    "Name": "Branch Circuit Collection",
    "Members@odata.count": 1,
    "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
copyright policy, see http://www.dmtf.org/about/policies/copyright.",
    "Members": [
        {
            "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Mains/AC1"
        }
    ]
}
```


URL: https://<ip_addr>/redfish/v1/PowerEquipment/RackPDUs/{pdu_id}/Mains/AC1

Description

This is the URL for the Rack PDUs-Mains. Perform GET on this URL to get the details of the Phase level readings.

Sample response


```
{
    "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Mains/AC1",
    "Name": "Mains AC Input",
    "Status": {
        "Health": "OK"
    },
    "PolyPhasePowerWatts": {
        "Line1ToNeutral": {
            "DataSourceUri": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/
PowerMains1-4",
            "Reading": 227,
            "PowerFactor": 0.0,
            "ApparentVA": 0,
            "ReactiveVAR": 0
        },
        "Line2ToNeutral": {
            "DataSourceUri": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/
PowerMains1-5",
            "Reading": 229,
```

```
            "PowerFactor": 0.0,
            "ApparentVA": 0,
            "ReactiveVAR": 0
        },
        "Line3ToNeutral": {
            "DataSourceUri": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/
PowerMains1-6",
            "Reading": 229,
            "PowerFactor": 0.0,
            "ApparentVA": 0,
            "ReactiveVAR": 0
        }
    },
    "@odata.type": "#Circuit.v1_0_0.Circuit",
    "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
copyright policy, see http://www.dmtf.org/about/policies/copyright.",
    "PolyPhaseCurrentAmps": {
        "Line1": {
            "DataSourceUri": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/
CurrentMains1-1",
            "Reading": 0
        },
        "Line2": {
            "DataSourceUri": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/
CurrentMains1-2",
            "Reading": 0
        },
        "Line3": {
            "DataSourceUri": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/
CurrentMains1-3",
            "Reading": 0
        }
    },
    "PhaseWiringType": "ThreePhase5Wire",
    "Id": "AC1",
    "CircuitType": "Mains",
    "RatedCurrentAmps": 32,
    "NominalVoltage": "AC230V",
    "BreakerState": "Normal",
    "PolyPhaseVoltage": {
        "Line1ToNeutral": {
            "DataSourceUri": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/
VoltageMains1-4",
            "Reading": 227
        },
        "Line2ToNeutral": {
            "DataSourceUri": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/
VoltageMains1-5",
            "Reading": 229
        },
        "Line3ToNeutral": {
            "DataSourceUri": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/
VoltageMains1-6",
            "Reading": 229
        }
    },
    "FrequencyHz": {
```

```
        "DataSourceUri": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/
FreqMains",
        "Reading": 49
    },
    "Actions": {
        "#Outlet.ResetMetrics": {
            "target": "/redfish/v1/PowerEquipment/RackPDUs/1/Mains/AC1/
Circuit.ResetMetrics"
        }
    }
}
```

Metrics

URL: `https://<ip_addr>/redfish/v1/PowerEquipment/RackPDUs/{pdu_id}/Metrics`

Description

This is the URL for the Rack PDUs-Metrics. Perform GET on this URL to get the readings of the PDU Power and Energy data.

Sample response

```
{
    "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Metrics",
    "Actions": {
        "#PowerDistributionMetrics.ResetMetrics": {
            "target": "/redfish/v1/PowerEquipment/RackPDUs/1/Metrics/
PowerDistributionMetrics.ResetMetrics"
        }
    },
    "@odata.type": "#PowerDistributionMetrics.v1_0_0.PowerDistributionMetrics",
    "Id": "Metrics",
    "Name": "Summary Metrics",
    "PowerWatts": {
        "DataSourceUri": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/
PDUPower",
        "Reading": 0,
        "PowerFactor": 0.0,
        "ApparentVA": 0,
        "ReactiveVAR": 0
    },
    "EnergykWh": {
        "DataSourceUri": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/
PDUEnergy",
        "Reading": 4
    },
    "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
copyright policy, see http://www.dmtf.org/about/policies/copyright."
}
```

Sensors

URL: `https://<ip_addr>/redfish/v1/PowerEquipment/RackPDUs/{pdu_id}/Sensors/Power{Branch#}`

Description

This is the URL for the Rack PDUs-Sensors. Perform GET on this URL to get the readings of the PDU Power from Branch (Circuit Breaker) level.

Sample response


```
{
    "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/PowerA",
    "Thresholds": {
        "UpperCritical": {
            "Reading": 0,
            "Activation": "NULL",
            "DwellTime": "N/A"
        },
        "UpperCaution": {
            "Reading": 0,
            "DwellTime": "N/A"
        }
    },
    "Name": "Power Branch Circuit A",
    "Status": {
        "State": "Enabled",
        "Health": "OK"
    },
    "SensingInterval": "N/A",
    "Precision": 0,
    "ApparentVA": 932,
    "@odata.type": "#Sensor.v1_1_0.Sensor",
    "ReadingRangeMin": 536919,
    "ElectricalContext": "Line1ToNeutral",
    "Id": "PowerA",
    "ReadingRangeMax": 536919,
    "ReactiveVAR": 54,
    "ReadingUnits": "W",
    "ReadingType": "Power",
    "Reading": 931.0,
    "PowerFactor": 0.99800002574920656,
    "Accuracy": 0.0,
    "PhysicalContext": "Chassis",
    "Oem": {},
    "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
copyright policy, see http://www.dmtf.org/about/policies/copyright."
}
```


URL: `https://<ip_addr>/redfish/v1/PowerEquipment/RackPDUs/{pdu_id}/Sensors/Current{Branch#}`

Description

This is the URL for the Rack PDUs-Sensors. Perform GET on this URL to get the readings of the PDU Current from Branch (Circuit Breaker) level.

Sample response


```
{
    "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/CurrentA",
    "Thresholds": {
        "UpperCritical": {
```

```
            "Reading": 14,
            "Activation": "Decreasing",
            "DwellTime": "N/A"
        },
        "UpperCaution": {
            "Reading": 11,
            "Activation": "Decreasing",
            "DwellTime": "N/A"
        }
    },
    "Name": "Current Branch Circuit A",
    "Status": {
        "State": "Enabled",
        "Health": "OK"
    },
    "SensingInterval": "N/A",
    "Precision": 0,
    "@odata.type": "#Sensor.v1_1_0.Sensor",
    "ReadingRangeMin": 0,
    "ElectricalContext": "Line1",
    "Id": "CurrentA",
    "ReadingRangeMax": 32,
    "ReadingUnits": "A",
    "ReadingType": "Current",
    "Reading": 4.1310000419616696,
    "Accuracy": 0.0,
    "PhysicalContext": "Chassis",
    "Oem": {},
    "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
copyright policy, see http://www.dmtf.org/about/policies/copyright."
}
```


URL: `https://<ipaddr>/redfish/v1/PowerEquipment/RackPDUs/{pdu_id}/Sensors/Voltage{CB#}L1N`

Description

This is the URL for the Rack PDUs-Sensors. Perform GET on this URL to get the readings of the PDU Phase Voltage from Branch (Circuit Breaker) level.

Sample response


```
{
    "Thresholds": {
        "UpperCritical": {
            "Reading": 0,
            "Activation": "NULL",
            "DwellTime": "N/A"
        },
        "UpperCaution": {
            "Reading": 0,
            "DwellTime": "N/A"
        },
        "LowerCritical": {
            "Reading": 0,
            "DwellTime": "N/A"
        },
        "LowerCaution": {
```

```
            "Reading": 0,
            "DwellTime": "N/A"
        },
        "Oem": {},
        "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/
VoltageAL1N",
        "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
copyright policy, see http://www.dmtf.org/about/policies/copyright."
    },
    "Name": "Voltage Branch A Line1ToNeutral",
    "Status": {
        "State": "Enabled",
        "Health": "OK"
    },
    "SensingInterval": "N/A",
    "Precision": 0,
    "@odata.type": "#Sensor.v1_1_0.Sensor",
    "ReadingRangeMin": 200,
    "ElectricalContext": "Line1ToNeutral",
    "Id": "VoltageAL1N",
    "ReadingRangeMax": 240,
    "ReadingUnits": "V",
    "ReadingType": "Voltage",
    "Reading": 225.0,
    "Accuracy": 0.0,
    "PhysicalContext": "Chassis"
}
```


URL: `https://<ip_addr>/redfish/v1/PowerEquipment/RackPDUs/{pdu_id}/Sensors/CurrentOUTLET#`

Description

This is the URL for the Rack PDUs-Sensors. Perform GET on this URL to get the readings of the PDU Outlet Current.

Sample response


```
{
    "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/CurrentOUTLET3",
    "Thresholds": {
        "UpperCritical": {
            "Reading": 0,
            "Activation": "NULL",
            "DwellTime": "N/A"
        },
        "UpperCaution": {
            "Reading": 0,
            "Activation": "NULL",
            "DwellTime": "N/A"
        }
    },
    "Name": "Current Outlet OUTLET3",
    "Status": {
        "State": "Enabled",
        "Health": "OK"
    },
    "SensingInterval": "N/A",
```

```
    "Precision": 0,
    "@odata.type": "#Sensor.v1_1_0.Sensor",
    "ReadingRangeMin": 0,
    "ElectricalContext": "Line1",
    "Id": "CurrentOUTLET3",
    "ReadingRangeMax": 32,
    "ReadingUnits": "A",
    "ReadingType": "Current",
    "Reading": 4.0,
    "Accuracy": 0.0,
    "PhysicalContext": "Chassis",
    "Oem": {},
    "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
copyright policy, see http://www.dmtf.org/about/policies/copyright."
}
```


URL: `https://<ip_addr>/redfish/v1/PowerEquipment/RackPDUs/{pdu_id}/Sensors/VoltageOUTLET#`

Description

This is the URL for the Rack PDUs-Sensors. Perform GET on this URL to get the readings of the PDU Outlet Voltage.

Sample response


```
{
    "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/VoltageOUTLET3",
    "Thresholds": {
        "UpperCritical": {
            "Reading": 0,
            "Activation": "NULL",
            "DwellTime": "N/A"
        },
        "UpperCaution": {
            "Reading": 0,
            "DwellTime": "N/A"
        },
        "LowerCritical": {
            "Reading": 0,
            "DwellTime": "N/A"
        },
        "LowerCaution": {
            "Reading": 0,
            "DwellTime": "N/A"
        }
    },
    "Name": "Voltage reading for outlet OUTLET3",
    "Status": {
        "State": "Enabled",
        "Health": "OK"
    },
    "SensingInterval": "N/A",
    "Precision": 0,
    "@odata.type": "#Sensor.v1_1_0.Sensor",
    "ReadingRangeMin": 200,
    "ElectricalContext": "Line1ToNeutral",
```

```
    "Id": "VoltageOUTLET3",
    "ReadingRangeMax": 240,
    "ReadingUnits": "V",
    "ReadingType": "Voltage",
    "Reading": 225.0,
    "Accuracy": 0.0,
    "PhysicalContext": "Chassis",
    "Oem": {},
    "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
copyright policy, see http://www.dmtf.org/about/policies/copyright."
}
```


URL: `https://<ip_addr>/redfish/v1/PowerEquipment/RackPDUs/{pdu_id}/Sensors/PowerOUTLET#`

Description

This is the URL for the Rack PDUs-Sensors. Perform GET on this URL to get the readings of the PDU Outlet Power.

Sample response


```
{
    "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/PowerOUTLET3",
    "Thresholds": {
        "UpperCritical": {
            "Reading": 0,
            "Activation": "Increasing",
            "DwellTime": "N/A"
        },
        "UpperCaution": {
            "Reading": 0,
            "DwellTime": "N/A"
        }
    },
    "Name": "Power reading for outlet OUTLET3",
    "Status": {
        "State": "Enabled",
        "Health": "OK"
    },
    "SensingInterval": "N/A",
    "Precision": 0,
    "ApparentVA": 932.0,
    "@odata.type": "#Sensor.v1_1_0.Sensor",
    "ReadingRangeMin": 19,
    "ElectricalContext": "Line1ToNeutral",
    "Id": "PowerOUTLET3",
    "ReadingRangeMax": 23,
    "ReactiveVAR": 0,
    "ReadingUnits": "W",
    "ReadingType": "Power",
    "Reading": 931.0,
    "PowerFactor": 0.99892705678939824,
    "Accuracy": 0.0,
    "PhysicalContext": "Chassis",
```

```
    "Oem": {},
    "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
copyright policy, see http://www.dmtf.org/about/policies/copyright."
}
```


URL: `https://<ip_addr>/redfish/v1/PowerEquipment/RackPDUs/{pdu_id}/Sensors/EnergyOUTLET#`

Description

This is the URL for the Rack PDUs-Sensors. Perform GET on this URL to get the readings of the PDU Outlet Energy.

Sample response


```
{
    "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/EnergyOUTLET3",
    "Status": {
        "State": "Enabled",
        "Health": "OK"
    },
    "@odata.type": "#Sensor.v1_1_0.Sensor",
    "Id": "EnergyOUTLET3",
    "Name": "Energy for outlet OUTLET3",
    "PhysicalContext": "Chassis",
    "ReadingUnits": "kW.h",
    "ReadingType": "EnergykWh",
    "ElectricalContext": "Total",
    "Oem": {},
    "Reading": 0.66000002622604368,
    "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
copyright policy, see http://www.dmtf.org/about/policies/copyright."
}
```


URL: `https://<ip_addr>/redfish/v1/PowerEquipment/RackPDUs/{pdu_id}/Sensors/PowerMains1-4`

Description

This is the URL for the Rack PDUs-Sensors. Perform GET on this URL to get the readings of the PDU Phase Power.

Sample response


```
{
    "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/PowerMains1-4",
    "Thresholds": {
        "UpperCritical": {
            "Reading": 0,
            "Activation": "Decreasing",
            "DwellTime": "N/A"
        },
        "UpperCaution": {
            "Reading": 0,
            "DwellTime": "N/A"
        },
        "LowerCritical": {
            "Reading": 0,
```

```
            "DwellTime": "N/A"
        },
        "LowerCaution": {
            "Reading": 0,
            "DwellTime": "N/A"
        }
    },
    "Name": "Mains Power L1LN",
    "Status": {
        "State": "Enabled",
        "Health": "OK"
    },
    "SensingInterval": "N/A",
    "Precision": 0,
    "ApparentVA": 932,
    "@odata.type": "#Sensor.v1_1_0.Sensor",
    "ReadingRangeMin": 19,
    "ElectricalContext": "Line1ToNeutral",
    "Id": "PowerMains1-4",
    "ReadingRangeMax": 23,
    "ReactiveVAR": 45,
    "ReadingUnits": "W",
    "ReadingType": "Power",
    "Reading": 932.73297119140624,
    "PowerFactor": 0.99800002574920656,
    "Accuracy": 0.0,
    "PhysicalContext": "Chassis",
    "Oem": {},
    "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
copyright policy, see http://www.dmtf.org/about/policies/copyright."
}
```


URL: `https://<ip_addr>/redfish/v1/PowerEquipment/RackPDUs/{pdu_id}/Sensors/CurrentMains1-1`

Description

This is the URL for the Rack PDUs-Sensors. Perform GET on this URL to get the readings of the PDU Phase Current.

Sample response


```
{
    "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/
CurrentMains1-1",
    "Thresholds": {
        "UpperCritical": {
            "Reading": 28,
            "Activation": "Decreasing",
            "DwellTime": "N/A"
        },
        "UpperCaution": {
            "Reading": 22,
            "Activation": "Decreasing",
            "DwellTime": "N/A"
```

```
        }
    },
    "Name": "Current Mains Line1",
    "Status": {
        "State": "Enabled",
        "Health": "OK"
    },
    "SensingInterval": "N/A",
    "Precision": 0,
    "@odata.type": "#Sensor.v1_1_0.Sensor",
    "ReadingRangeMin": 0,
    "ElectricalContext": "Line1",
    "Id": "CurrentMains1-1",
    "ReadingRangeMax": 32,
    "ReadingUnits": "A",
    "ReadingType": "Current",
    "Reading": 4.1290001869201664,
    "Accuracy": 0.0,
    "PhysicalContext": "Chassis",
    "Oem": {},
    "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
copyright policy, see http://www.dmtf.org/about/policies/copyright."
}
```


URL: `https://<ip_addr>/redfish/v1/PowerEquipment/RackPDUs/{pdu_id}/Sensors/VoltageMains1-4`

Description

This is the URL for the Rack PDUs-Sensors. Perform GET on this URL to get the readings of the PDU Phase Voltage.

Sample response


```
{
    "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/
VoltageMains1-4",
    "Thresholds": {
        "UpperCritical": {
            "Reading": 250,
            "Activation": "Decreasing",
            "DwellTime": "N/A"
        },
        "UpperCaution": {
            "Reading": 250,
            "DwellTime": "N/A"
        },
        "LowerCritical": {
            "Reading": 180,
            "DwellTime": "N/A"
        },
        "LowerCaution": {
            "Reading": 190,
            "DwellTime": "N/A"
```

```
        }
    },
    "Name": "Voltage Mains Line1ToNeutral",
    "Status": {
        "State": "Enabled",
        "Health": "OK"
    },
    "SensingInterval": "N/A",
    "Precision": 0,
    "@odata.type": "#Sensor.v1_1_0.Sensor",
    "ReadingRangeMin": 200,
    "ElectricalContext": "Line1ToNeutral",
    "Id": "VoltageMains1-4",
    "ReadingRangeMax": 240,
    "ReadingUnits": "V",
    "ReadingType": "Voltage",
    "Reading": 225.85299682617188,
    "Accuracy": 0.0,
    "PhysicalContext": "Chassis",
    "Oem": {},
    "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
copyright policy, see http://www.dmtf.org/about/policies/copyright."
}
```


URL: `https://<ip_addr>/redfish/v1/PowerEquipment/RackPDUs/{pdu_id}/Sensors/FreqMains`

Description

This is the URL for the Rack PDUs-Sensors. Perform GET on this URL to get the readings of the PDU Frequency.

Sample response


```
{
    "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/FreqMains",
    "Thresholds": {
        "UpperCritical": {
            "Reading": 0.0,
            "Activation": "NULL",
            "DwellTime": "N/A"
        },
        "UpperCaution": {
            "Reading": 0.0,
            "DwellTime": "N/A"
        },
        "LowerCritical": {
            "Reading": 0.0,
            "DwellTime": "N/A"
        },
        "LowerCaution": {
            "Reading": 0.0,
            "DwellTime": "N/A"
```

```
        }
    },
    "Name": "Frequency Mains",
    "Status": {
        "State": "Enabled",
        "Health": "OK"
    },
    "SensingInterval": "N/A",
    "Precision": 0,
    "@odata.type": "#Sensor.v1_1_0.Sensor",
    "ReadingRangeMin": 50,
    "Id": "FreqMains",
    "PhysicalContext": "Chassis",
    "ReadingRangeMax": 60,
    "ReadingUnits": "Hz",
    "ReadingType": "Frequency",
    "Reading": 50.020000457763672,
    "Accuracy": 0.0,
    "Oem": {},
    "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
copyright policy, see http://www.dmtf.org/about/policies/copyright."
}
```


URL: `https://<ip_addr>/redfish/v1/PowerEquipment/RackPDUs/{pdu_id}/Sensors/PDUPower`

Description

This is the URL for the Rack PDUs-Sensors. Perform GET on this URL to get the readings of the PDU Power.

Sample response


```
{
    "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1/Sensors/PDUPower",
    "Thresholds": {
        "UpperCritical": {
            "Reading": 0,
            "Activation": "Increasing",
            "DwellTime": "N/A"
        },
        "UpperCaution": {
            "Reading": 0,
            "DwellTime": "N/A"
        }
    },
    "Name": "Power reading for the PDU",
    "Status": {
        "State": "Enabled",
        "Health": "OK"
    },
    "SensingInterval": "N/A",
```

```
    "Precision": 0,
    "ApparentVA": 932.0,
    "@odata.type": "#Sensor.v1_1_0.Sensor",
    "ReadingRangeMin": 0,
    "ElectricalContext": "Total",
    "Id": "PDUPower",
    "ReadingRangeMax": 23040,
    "ReactiveVAR": 43.0,
    "ReadingUnits": "W",
    "ReadingType": "Power",
    "Reading": 931.0,
    "ReadingTime": "2022-02-04T14:40:04+00:00",
    "PowerFactor": 0.99892705678939824,
    "Oem": {},
    "LoadPercent": 4.212669849395752,
    "Accuracy": 0.0,
    "PhysicalContext": "Chassis",
    "@Redfish.Copyright": "Copyright 2014-2018 DMTF. For the full DMTF
copyright policy, see http://www.dmtf.org/about/policies/copyright."
}
```


POST Method

URL: `https://<ip_addr>/redfish/v1/SessionService/Sessions`

Description

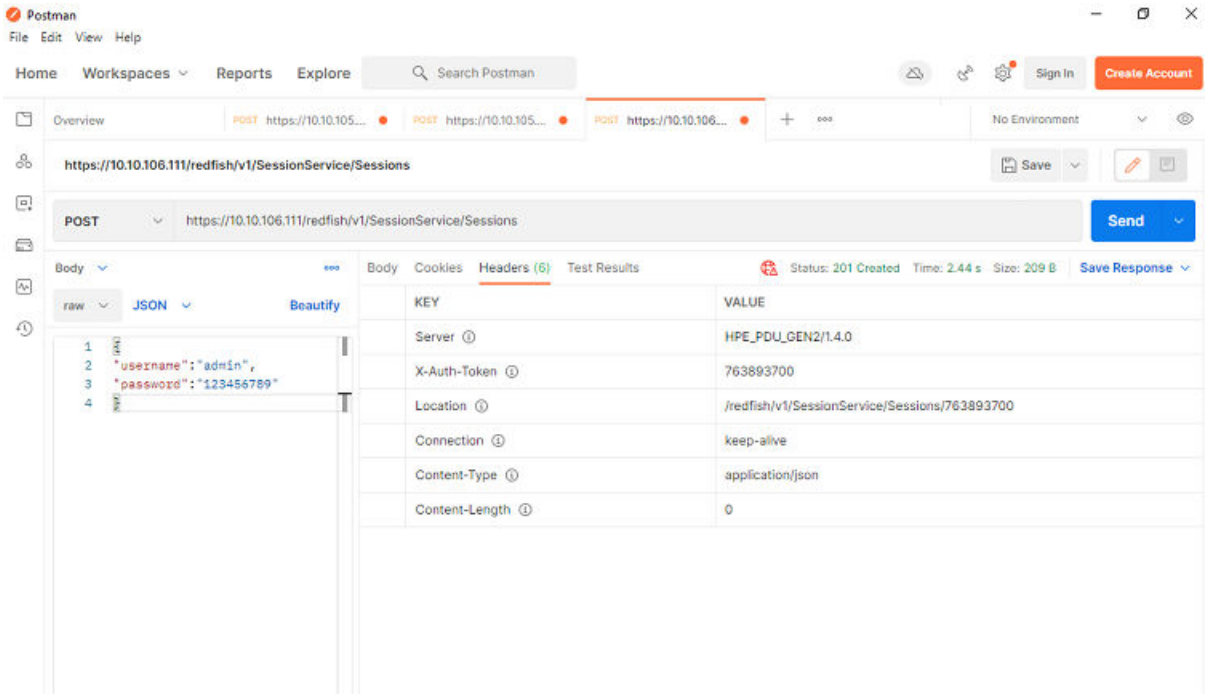
This URL is used to Generate the X-Auth-Token. Perform POST on this URL with the below Request Body to get the X-Auth-Token.

Request Body


```
{
"username":"admin",
"password":"123456789"
}
```


Response

Returns with Status 201 Created. X-Auth-Token will be generated and present at Response Headers. Add this X-Auth-Token at the Request Headers.



URL: `https://<ip_addr>/redfish/v1/AccountService/Accounts`

Description

Perform POST on this URL with the Request Body to create users for the PDU.

Request Body

```
{
"username":"new_user",
"password":"11223344",
"email":"superman@krypton.com",
"chkenable":true,
"frpasschk":true,
"rolename":"manager",
"temperature":1
}
```

Response Body

```
{
    "user added": "new_user"
}
```

URL: `https://<ip_addr>/redfish/v1/PowerEquipment/RackPDUs/1/Outlets/OUTLET3/Outlet.PowerControl`

Description

Perform POST on this URL with the Request Body to control the outlets on the PDU.

Request Body

```
{
"OutletNumber":3,
"StartupState":"off",
"Outletname":"OUTLETThree",
```

```
"OnDelay":5,
"OffDelay":6,
"RebootDelay":7,
"OutletStatus":"off"
}
```

Response Body

```
{
    "OutletNumber": 3,
    "OutletStatus": "off"
}
```

DELETE Method

URL: `https://<ip_addr>/redfish/v1/AccountService/Accounts/{username}`

Description

Perform DELETE on this URL along with the X-Auth-Token to delete the username.

Response Body

```
{
    "User Deleted": "new_user"
}
```

URL: `https://<ip_addr>/redfish/v1/SessionService/Sessions/{session_id}`

Description

Perform DELETE on this URL along with the X-Auth-Token to delete the active session ID.

Response Body

```
{
    "Session Deleted": 1470970371
}
```