



# RPC2™ Communications Module

Network Interface Card for the Rack PDU Family of Power  
Distribution Products

Installer/User Guide

**Technical Support Site**

If you encounter any installation or operational issues with your product, check the pertinent section of this manual to see if the issue can be resolved by following outlined procedures. For additional assistance, visit <https://www.VertivCo.com/en-us/support/>.

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# 1 INTRODUCTION

The Rack PDU Card (RPC2™) Communications Module provides network connectivity to the Vertiv™ rack PDU family of products.

The RPC2™ communications module allows you to monitor the components connected to the rack PDU using various tools, including the module's web user interface and optional units, the Basic Display Module (BDM) device and Liebert® SN™ sensor. The handheld display, the RPC BDM, allows you to view monitored data and the Liebert® SN™ is a sensor that can be connected to rack PDUs to monitor temperature, humidity, door contacts and digital inputs.

The RPC2™ is factory installed in managed versions of the Vertiv™ MPH2™ Rack PDUs. It can be field-installed in Vertiv™ MPH™ and MPX™ rack PDUs to provide network monitoring and control capabilities. The communications module is factory set for service in DHCP-based applications. It can be configured for static IP applications.

In this guide, you will find sections dedicated to explaining how to use the web interface, as well as the optional devices. These devices, used in conjunction with the RPC2™ communications module, give you easy access to the data from the rack PDUs.

## 1.1 Features and Benefits

The RPC2™ communications module offers the following benefits and features for network connectivity to the family of Vertiv™ rack PDU products:

- Interoperability - Integrates network management of the MPH™ rack PDU family and environmental sensors with a local display interface. This ensures consistency of information available to both remote and local users — those in the data center — thus reducing mistakes during commission/decommission.
- Cable standardization - Uses standard cables. The LAN port is compatible with 1 Gbps Ethernet speeds with the recommended CAT5E or CAT6 Ethernet cabling. The USB port connection uses standard USB cabling.
- Consolidation of IP addresses - Can be used to create a rack PDU array by interconnecting multiple MPH2 Rack PDUs to minimize the number of IP addresses, consolidate monitoring and reduce overhead. The LAN port is compatible with 1 Gbps Ethernet speeds with the recommended CAT5E or CAT6 Ethernet cabling. The USB port connection uses standard USB cabling.
- Receptacle group control - Enables grouping receptacles to apply the same action to all receptacles in the group with one operation. It also permits monitoring and management of receptacle groups through Liebert Nform™ software.
- MPH2™ Rack PDU power conditioning monitoring - Enables monitoring of the Vertiv™ MPH2™, MPX™ and MPH™ rack PDUs. It provides rack PDU receptacle voltage and current draw, provides load-balancing capability and monitors rack environmental conditions.
- Energy metering - Reports power consumption (kWh) at the PDU, branch and receptacle levels as calculated by the MPH2™ rack PDUs circuitry.
- Receptacle load control - Interface permits controlling the power-up/wake-up state and sequencing of receptacles.
- Local display support - Provides an interface for a display option, the RPC BDM, to facilitate installation and local troubleshooting of interconnected MPH™ rack PDUs. The display may be user-mounted on or near racks for optimal placement and viewing.
- Receptacle load control - Sends comprehensive event notifications via Simple Network Management Protocol (SNMP), e-mail, SMS text messages and cellular paging. It also provides notification status via a web page.
- MPH2 Rack PDU management - Used to interact with a rack PDU by referencing the user-assigned receptacle labels or loads.
- Wide range of IT network capabilities - Provides a flexible set of IT networking capabilities, including DHCP, BOOTP, DNS, Simple Network Time Protocol (SNTP) and SNMP.
- Hot swappable - May be removed and reinserted without interrupting power from the rack PDU or affecting the connected load.
- Flash upgradeable firmware - Enables the user to easily update the firmware as new features and capabilities become available.
- Web support - Delivers web management and control to Vertiv™ rack PDUs. All authorized users will be able to view status information on their network.

- SNMP support - Enables SNMP management of Vertiv™ rack PDUs. To integrate the card into an SNMP implementation, compile the Liebert® Global Products MIB on the Network Management System (NMS). Visit [www.Liebert.com](http://www.Liebert.com) to download the Liebert Global Products MIB.
- Liebert Nform® - Utilizing the SNMP and web technologies built into the RPC2 communications module, Liebert Nform centrally manages event notifications, accesses critical system information and manages the power delivered to the connected load. Download the online edition at [www.nform.liebert.com](http://www.nform.liebert.com).
- Liebert SiteScan Web® - Integrates with Liebert SiteScan web software to monitor and analyze trends to ensure high availability operation of critical facilities. Visit [www.sitescan.liebert.com](http://www.sitescan.liebert.com) for more information on the Liebert SiteScan web.
- Monitoring and configuration overview - Vertiv™ rack PDUs are managed at three levels:
  - At the rack PDU level, it provides aggregate input power monitoring of the rack PDU.
  - At the branch level, it provides status information, including branch circuit breaker on some models, and aggregate power monitoring of branch receptacles.
  - At the receptacle level, it provides status information and power monitoring of a single receptacle on some models.

## 2 INSTALLATION AND CONFIGURATION

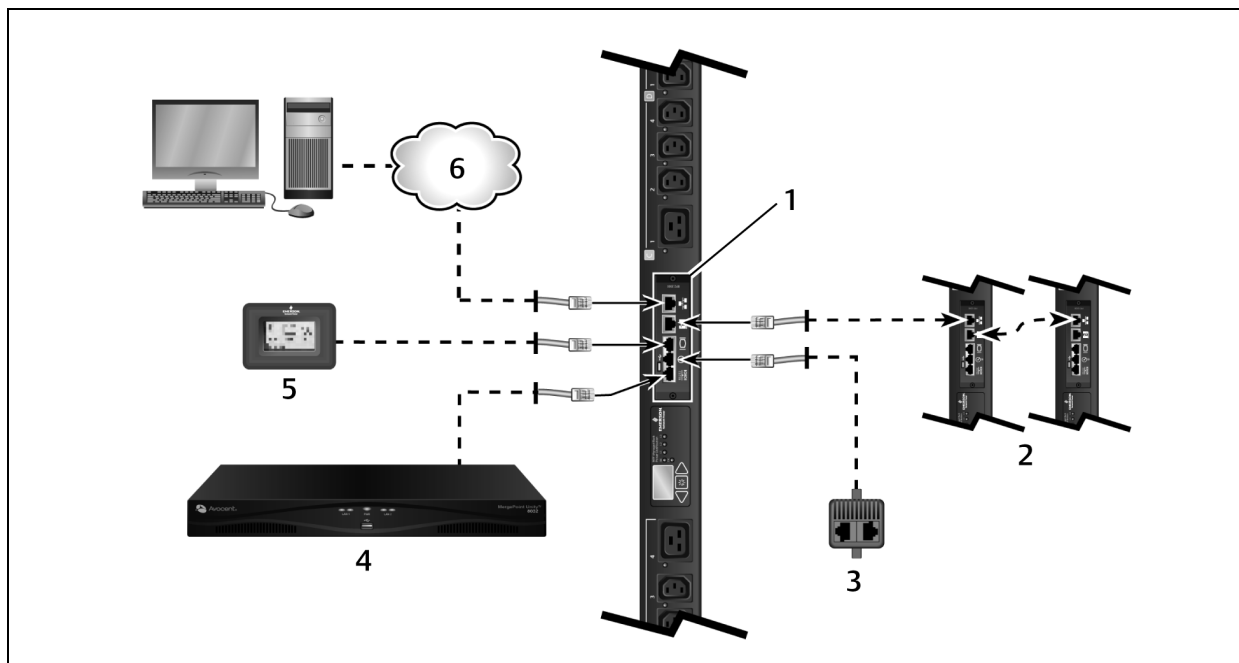
The following sections are provided to install and configure your RPC2 communications module.

### 2.1 Getting Started

The RPC2 communications module is factory installed on Vertiv® rack PDUs. If the module is being field-installed, see the following section, *Required cables*, to ensure you have all the necessary items for proper installation.

Installation and utilization of the RPC2 module is identical for vertical and horizontal rack PDUs. The following figure shows an RPC2 module installed in a vertical MPH2™ rack PDU.

**Figure 2.1** RPC2 Communications Module Configuration



**Table 2.1** RPC2 Communicatons Module Configuration Descriptions

ITEM	DESCRIPTION
1	RPC2 Communications Module
2	Additional MPH2 Rack PDUs configured in an array
3	Sensor
4	Console server or switch
5	Basic Display Module (BDM)
6	Network

#### 2.1.1 Required cables

The following cables are not included but are necessary for RPC2 communications module functionality:

- RJ45 cable for connection to the serial port
- RJ45/DB9F adaptor or equivalent is required to connect to Avocent™ appliances.
- RJ45 CAT5E or CAT6 Ethernet cable for the network port connection
- RJ45 CAT5 or better Ethernet cable for the link port connection

**NOTE:** Liebert 1-wire sensors and the local display, the RPC BDM, come with their own cables.

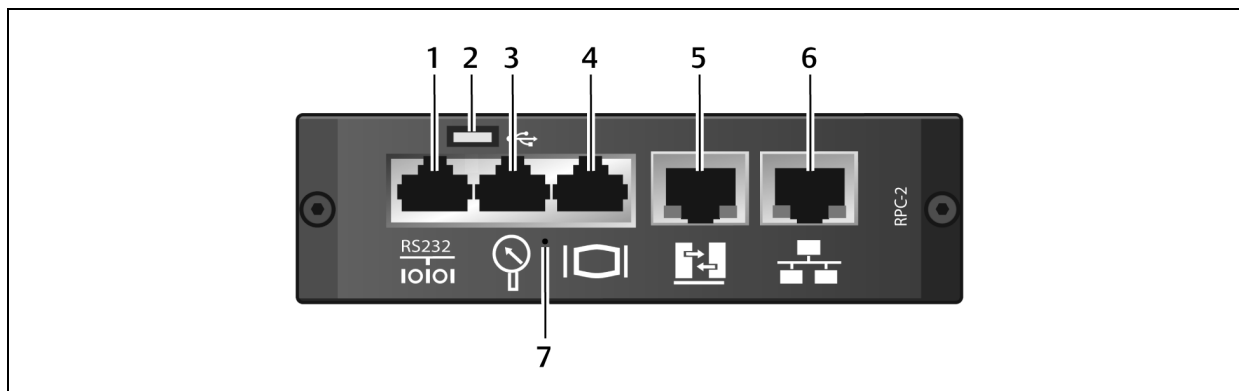
### Field installation of an RPC2 communications module

Locate the communications card bay on the rack PDU and insert the RPC2 communications module into the card bay. Secure it with the captive thumb screws.

## 2.2 RPC2 Communications Module Ports

The module has six ports designated by icons. The following figure shows each port with its icon underneath it.

**Figure 2.2** RPC2 Communications Module Ports



**Table 2.2** RPC Communications Module Ports Descriptions

ITEM	PORT	DESCRIPTION
1	Serial	Used for RS232 serial communication using the Command Line Interface (CLI).
2	USB Micro-AB	Used for USB applications.
3	Sensor	Used to plug in optional sensor accessories.
4	Display	Used to plug in the RPC BDM (Basic Display Module).
5	Link	Used for: <ul style="list-style-type: none"> <li>Local configuration through interconnection to a computer.</li> <li>Creating a rack PDU array by interconnecting additional rack PDUs.</li> </ul>
6	Network	Used for: <ul style="list-style-type: none"> <li>Plugging in the Local Area Network (LAN) via an Ethernet cable (not included).</li> <li>Creating a rack PDU array by interconnecting additional rack PDUs.</li> </ul>
7	Reset button access hole	Used to reboot or reset the module to its factory default settings.

To connect the module to your network:

Connect one end of an Ethernet cable (not included) to the network port and the other end to the network.

## 2.3 Monitoring and Configuration Overview

The following sections outline how rack PDUs are configured and managed.

### 2.3.1 Vertiv™ Rack PDU monitoring structure

Vertiv™ rack PDUs are managed at three levels:

- Rack PDU Level - provides aggregate input power monitoring of rack PDUs.
- Branch Level - provides status information of a branch circuit breaker and aggregate power monitoring of branch receptacles.



- Receptacle Level - provides status information and power monitoring of each receptacle (available on certain models of the Vertiv® MPH2™ and MPX™ rack PDUs).

### 2.3.2 Rack PDU component ID

An alphanumeric ID consisting of up to three parts helps you identify components when displayed on the web interface or the RPC BDM device. The component ID uses the format PDU-Branch-Receptacle. For example, the component ID 1-A-3 identifies PDU1, Branch A and Receptacle 3.

**NOTE: MPH2™ rack PDUs use alphabetical characters to designate a branch whereas MPX™ and MPH™ rack PDUs use numerical characters. So Branch A on an MPH2™ PDU is effectively Branch 1 on an MPX™ or MPH™ PDU.**

Figure 2.3 MPH2™ Branch and Receptacle Labeling Example

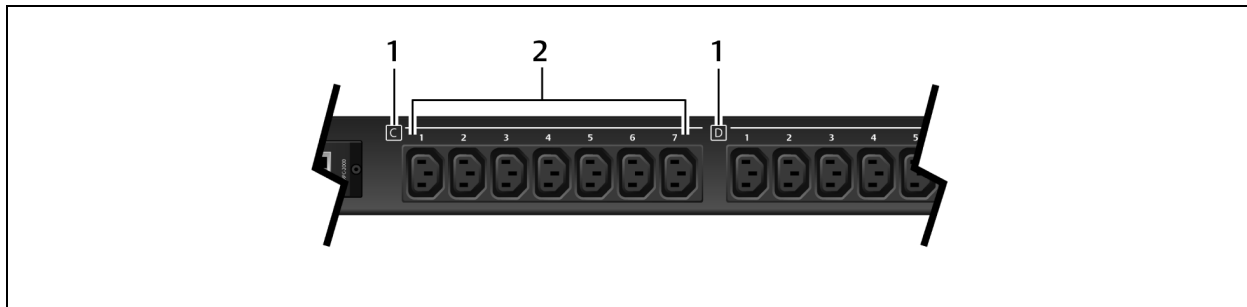


Table 2.3 Rack Component ID Descriptions

ITEM	DESCRIPTION
1	Letters displaying the branch level.
2	Numbers displaying the receptacle level.

### 2.4 Creating a Rack PDU Array

Up to four MPH2 or Liebert MPX rack PDUs may be integrated into a rack PDU array, which permits central control and monitoring of each rack PDU through a single web interface. Each rack PDU must have an RPC2 communications module installed.

**NOTE: Creating a Rack PDU array does not require rebooting or powering off either the MPH2 rack PDUs or the connected load. The level of monitoring and control depends on the model of rack PDU.**

To set up a rack PDU array:

1. Log in with the required privileges.
2. Connect an Ethernet cable from a computer or network switch to the Network port of the master RPC2 communications module.
3. Connect an Ethernet cable to the Link port of the master RPC2 communications module.
4. Connect the other end of the Ethernet cable to the network port of a slave RPC2 communications module on a second MPH2. This RPC2 module is a sibling unit, accessible through the master RPC2 module.

**NOTE: The RPC2 module connected to the LAN is the master and is positioned first in the rack PDU array.**

5. The second RPC2 communications module automatically detects the connections and is discovered as a sibling unit.

**NOTE: If the sibling order needs to be changed, disconnect the cabling for 30 seconds and then reconnect in the desired sequence. You do not need to reboot or power cycle the module.**

6. Connect additional RPC2 communications modules as shown in the following figure. The Ethernet cable attaches from the link port of an RPC2 module that has been added to the array to the next module's network port. Each newly added module is discovered as the next sibling.

Figure 2.4 Rack PDU Array Example

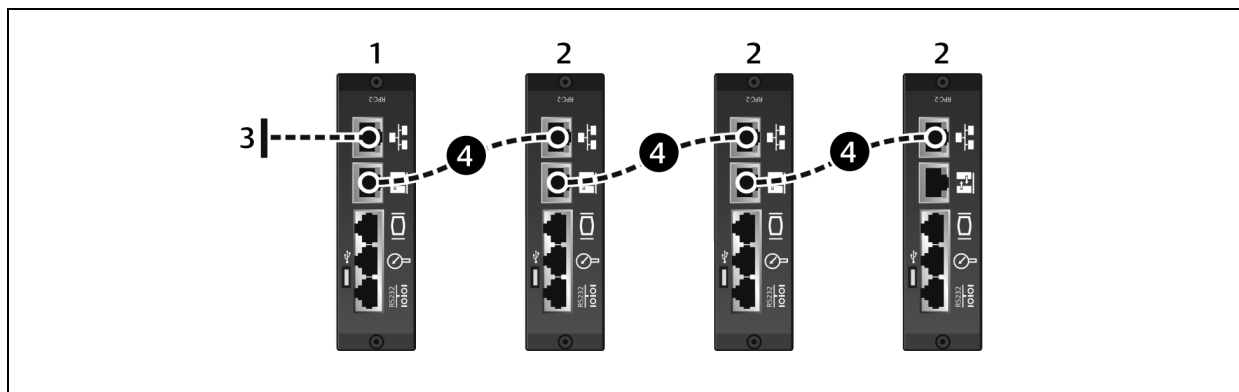


Table 2.4 Rack PDU Array Example Descriptions

ITEM	DESCRIPTION
1	RPC2 communications module in master rack PDU.
2	RPC2 communications modules in sibling rack PDUs.
3	Network connection.
4	Ethernet cable between Link port and Network port, connecting rack PDUs.

Table 2.5 IP Addresses In A Rack PDU Array

IP ADDRESS	RACK PDU 1	RACK PDU 2	RACK PDU 3	RACK PDU 4
Link Port	192.168.1.10	192.168.1.6	192.168.1.2	192.168.1.14
Network Port	User Determined	192.168.1.9	192.168.1.5	192.168.1.1
Subnet Mask	255.255.255.252	255.255.255.252	255.255.255.252	255.255.255.252

## 2.5 Configuring an RPC2 Communications Module for Static IP

The RPC2 communications module is factory set for DHCP, making it ready for service immediately. The module can be configured for operation on a network using a static IP address.

To configure a module for a network that uses static IP:

1. Connect an Ethernet cable (not included) to the module's link port (see [Figure 1.1](#)).

**NOTE:** The card's Link port should be used only for local configuration through interconnection to a laptop. Do not connect the cable from the Link port to your company LAN.

2. Connect the other end of the Ethernet cable to a laptop.
3. Configure the laptop's IP settings to communicate on a 192.168.1.X network with the following settings:
  - IP address: 192.168.1.9
  - Subnet mask: 255.255.255.252
  - Default gateway: 192.168.1.1
4. Open a web browser and enter the proper IP address. See the following table for a list of static IP addresses.

Table 2.6 Static IP Settings for the RPC2 Communications Module Through the Link Port

DEVICE	RACK PDU 1	RACK PDU 2	RACK PDU 3	RACK PDU 4
Laptop Computer	192.168.1.9	192.168.1.5	192.168.1.1	192.168.1.13

DEVICE	RACK PDU 1	RACKPDU 2	RACK PDU 3	RACKPDU 4
Link Port	192.168.1.10	192.168.1.6	192.168.1.2	192.168.1.14
Subnet Mask	255.255.255.252	255.255.255.252	255.255.255.252	255.255.255.252

**NOTE: The RPC2 communications module configures sibling connections automatically but must be rebooted if the connection order is changed. For information about sibling connections, see "Creating a Rack PDU Array" on page 5.**

5. Enter **admin** for both the login and password, then click the Login icon or press **Enter**.
6. Click the *System* tab, then click *Settings - Network* in the navigation tree.
7. **Click the Edit icon in the right pane.**
8. (Optional) The default Speed/Duplex for the Ethernet port is Auto 1000 Mbs/Full Duplex (automatic). Use the Speed/Duplex drop-down menu to change this.
9. Enter the hostname in the Host Name field.
10. Select *Static* for the IPV4 Boot Mode and enter the IP Address, Subnet Mask and Default Gateway in the proper fields. See your network administrator for these settings.  
 -or-  
 Select *Static* for the IPV6 Boot Mode and enter the Subnet Prefix Length and Default Gateway in the proper fields.
11. Click the Save icon when finished and click the *Reboot* icon to restart the module.

## 2.6 User Level Privileges

The user interface's appearance is different for each user level.

The RPC2 communications module provides four user levels:

- Administrator - configures and controls all rack PDUs in the system
- Poweruser - configures rack PDUs; no receptacle control
- Appliance - configured through the serial command line interface (CLI) when connected to an Avocent appliance
- User - can view rack PDUs specified by the administrator; no receptacle control

**NOTE: It is recommended you change the password immediately to prevent unauthorized access to MPH2 rack PDUs.**

### 2.6.1 Using passwords

Access to the RPC2 communications module requires entering a username and password that are case sensitive. The default administrator level username and password is **admin**.

**To change an administrator's password:**

1. Open a web browser and enter the IP address of the RPC2 communications module.
2. Log in with the default username **admin** and the default password **admin**, or enter the previous administrator credentials.
3. Click the *System* tab, then click *Authorization - Change Password*.
4. Enter the new username and password, then confirm the new password.
5. Click the Save icon to make the change or click the *Cancel* icon to discard the changes.

### 2.6.2 Group membership and access

Adding a user to a default group automatically sets the user's access. For example, adding a user to the User group permits that user to view his/her receptacles only, but does not allow the user to configure systems settings and manage other receptacles. See "Authorization levels" on page 32.

## 2.7 Reboot and Reset to Factory Defaults

Restarting the RPC2 module can consist of a reboot of the system or a reset to factory defaults. To highlight the difference, a reboot may be required after network or configuration changes. In contrast, performing a reset to factory defaults reverts all configuration parameters to the original default state. The module can be rebooted manually on the module through the MPH2 rack PDU's LCD or via the module's reset button or web interface. To locate the reset button access hole on the module, see "RPC2 Communications Module Ports" on page 4 for an illustration of the module.

### To manually reboot the module:

Press the reset button once, holding it down for one second. After a short time, the network port status lights turn off briefly, indicating the module is restarting.

### To manually reset to factory defaults:

Press the reset button five times, one second apart. After a short time, the network port status lights turn off briefly, indicating the module is restarting.

**NOTE: Use a paper clip to press the reset button.**

### To reboot from the module's web interface:

1. From the side navigation tree of the System tab, click *Settings*.
2. Click the *Reboot* icon, then press *OK* to confirm the reboot.

**NOTE: The *Reboot* icon appears on any System tab window where a reboot is required.**

### To reboot from the on-board LCD:

1. Use the arrow keys to highlight the Information icon and press the **Select** key.
2. Use an arrow key to highlight *Reboot* and press the **Select** key.
3. Use the arrow keys to highlight an up or down arrow on the bottom-left and press the **Select** key to highlight *Reboot*.
4. Use the arrow keys to highlight the *Play* button and press the **Select** key.
5. At the confirmation screen, use the arrow keys to highlight the up or down arrow, and press the **Select** key to highlight *Yes/Reboot Now*, then press the **Select** key to reboot the system.

### To reset to factory defaults from the on-board LCD:

**NOTE: The LCD screen reset to factory default is only available for the MPH2 rack PDU. If you are using an RPC2 installed in an MPH or MPX rack PDU, you can only perform a reset to factory defaults using the recessed reset button on the module.**

1. Use the arrow keys to highlight the Information icon and press the **Select** key.
2. Use an arrow key to highlight the *Reboot/Restore-Defaults* icon and press the **Select** key.
3. Use the arrow keys to highlight an up or down arrow on the bottom-left and press the **Select** key to highlight *Restore Defaults*.
4. Use the arrow keys to highlight the *Play* button and press the **Select** key.
5. At the confirmation screen, use the arrow keys to highlight the up or down arrow, and press the **Select** key to highlight *Yes/Reboot to Default*, then press the **Select** key to restore the system default settings.

### 3 ACCESSING AN RPC2 COMMUNICATIONS MODULE VIA THE WEB INTERFACE

The RPC2 communications module can be accessed with a web browser once it is connected to a network. The browser obtains direct access to the RPC2 module via a graphical user interface. The data and view varies according to the type of rack PDU being viewed through the RPC2 module.

#### 3.1 Web Interface Overview for Administrators

To log in to the web interface:

1. Open a web browser and enter the IP address of the rack PDU.
2. Log in as an administrator and press **Enter** to open the web interface.

Figure 3.1 Web Interface Window



Table 3.1 Web Interface Window Descriptions

ITEM	AREA	DESCRIPTION
1	Tab bar	Displays the Summary, PDU Explorer, Device Explorer, Events and Systems tabs. The available tabs change based on user rights.
2	Side Navigation Tree	Menu options for configuration, viewing of system information and access to devices. The options change based on user rights. When the Summary tab is selected, the side navigation bar displays system information. When other tabs are selected, it displays links to additional content.
3	Content area	Displays content based on the options selected in the side navigation tree.

#### 3.2 RPC2 Communications Module Icons

The following table displays the icons used in the web UI. Hovering over an icon displays its description in the web UI.

**NOTE:** The checkmark, red x and blue plus sign icons have more than one function, depending on their location.

Table 3.2 RPC2 Communications Module Icon Descriptions

ICON	DESCRIPTION	ICON	DESCRIPTION
	Save System OK Normal Operation		Download
	Cancel Alarm Unacknowledged Change		Export
	Abnormal Operation		Flush
	Reset Selected Energy (at PDU level) Reset Energy (at branch and receptacle level)		Mixed State of Receptacles
	Reset All Energy (PDU level)		Warning
	Enable Receptacle Power		Open CLI
	Disable Receptacle Power		Print
	Cycle Receptacle Power		Reboot
	Edit Edit Group		Reset to Factory Default Settings
	Lock Receptacle		Restore Configuration
	Unlock Receptacle		Save Configuration
	Blink Receptacle LED		Verify SNMPv3 Change
	Synchronize Time Now		Verify Email
	Verify SMS		Edit Group-Receptacle
	Start Firmware Update		Edit User
	Device Acknowledgment Required		

### 3.3 Summary Tab

The Summary tab window displays aggregate information about the MPH2™ rack PDU status, including: Recent Events, Primary Sensor and PDU status. The side navigation tree displays the rack PDU's overall status and system information. The

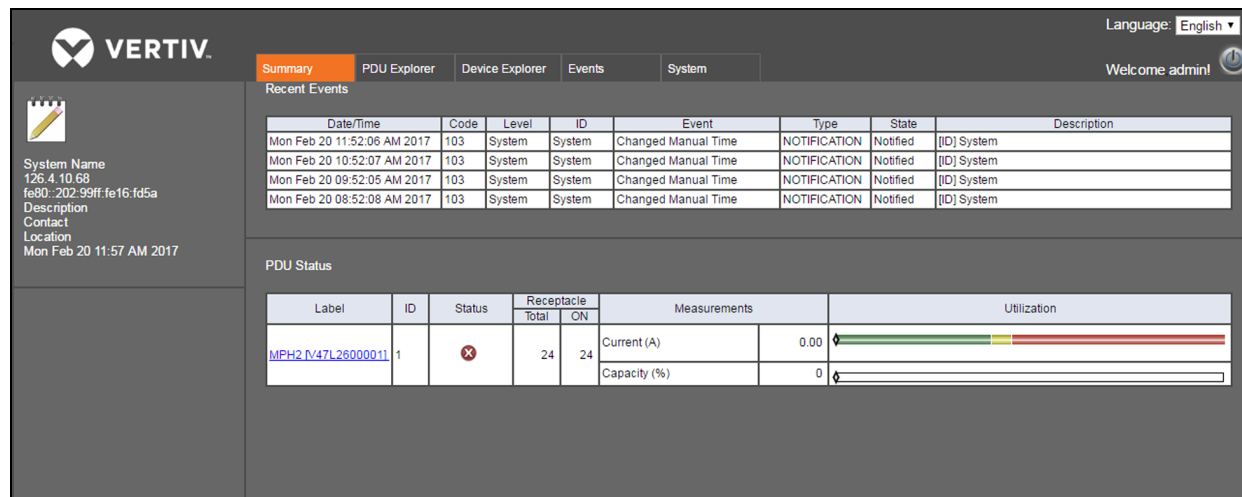
content area displays recent events, including event codes and status of events. It also displays primary sensor information and PDU status information, including a summary of the receptacle state and capacity utilization percentage.

**NOTE: Sensor information is selectable from the Sensor view of the PDU Explorer tab.**

### 3.3.1 Recent events

The Recent Events table displays information about branch, receptacle, sensor, PDU and system level events. You can view this table when you select a rack PDU.

**Figure 3.2 Summary Tab Example**



**Table 3.3 Recent Event Descriptions**

HEADING	DESCRIPTION
Date/Time	Date and time the event occurred
Code	Identifier for the event 100-199: System level events 200-299: PDU level events 300-399: Branch level events 400-499: Receptacle level events 500-599: Sensor level events
Level	Level where the event occurred: Receptacle, branch or system
ID	ID where the even occurred
Event	Listing of the event
Type	Severity type of the event: Notification, warning or alarm
State	Whether notification has been sent
Description	Information about the event

#### To view recent events:

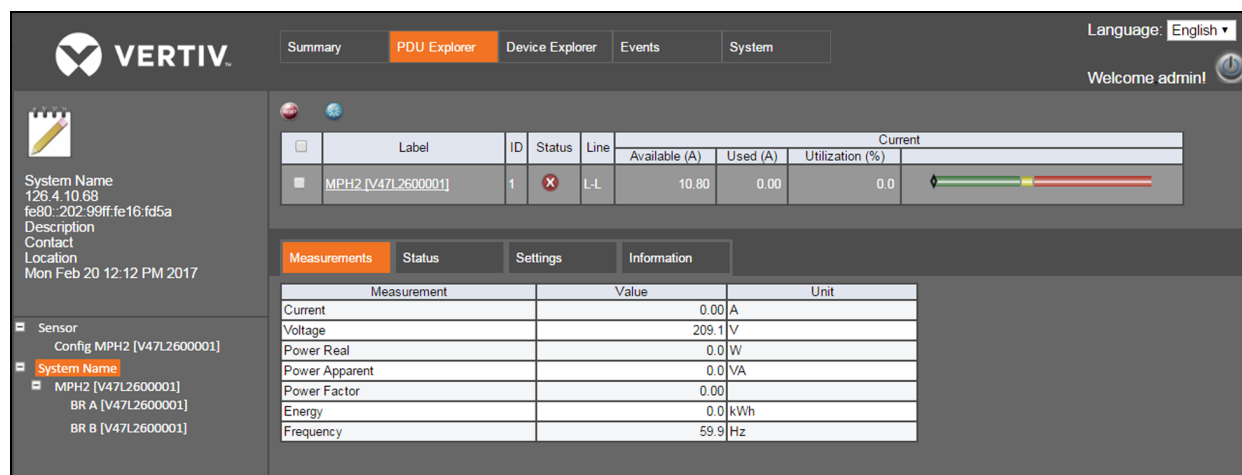
Under the PDU Summary tab, click a rack PDU in the Label column.

### 3.4 PDU Explorer Tab

The PDU Explorer window displays a hierarchical view of data from connected equipment. It also permits viewing sensors and editing sensor settings. The top of the window displays the Rack PDU view. You can navigate to the PDU, branch and receptacle levels from either using the link of the connected equipment or the side navigation tree.

At the top of the PDU Explorer window, the displayed buttons are used to perform functions according to the current, active level. At the PDU level, you can use the buttons to reset all energy or reset energy on a selected PDU. Use the buttons on the branch level to reset energy or return to the PDU level. Buttons that are displayed at the receptacle level are used to reset energy, enable or disable receptacle power, power cycle the receptacles, lock or unlock receptacles, blink a receptacle's LED or return to the branch level. The main PDU Explorer window shows detailed information about the rack PDU on the Measurement, Status, Settings and Information tab windows.

**Figure 3.3 PDU Explorer Tab Example**



**NOTE:** For single-phase models with a neutral connection, the Neutral OK status displays in the Status tab. A red circle with a white X signifies the line and neutral connections are swapped at the rack PDU plug's receptacle or upstream at the PDU.

### 3.4.1 Measurements

The PDU Explorer's Measurements tab presents available data about the rack PDU, branch or receptacle. The Measurements tab displays current, voltage, power real, power apparent, power factor and energy for all three levels. At the branch and receptacle levels, the crest factor is also displayed.

### 3.4.2 Status

The PDU Explorer's Status tab window provides the status of the rack PDU, branch or receptacle. The Over Current, Under Current and Hardware OK statuses are displayed for each of the three levels. At the Branch level, Under Voltage and Breaker Closed statuses are also displayed while Under Voltage and Neutral OK statuses display for the PDU level.

**Figure 3.4 PDU Explorer Icon Descriptions**

ICON	CONDITION
	Normal
	Warning
	Alarm
	Abnormal



### 3.4.3 Settings tab

The PDU Explorer's Settings window permits entering a customized name and settings for a rack PDU, branch or receptacle.

#### PDU settings

**Table 3.4 PDU Settings Descriptions**

SETTING	DESCRIPTION
Over Current Alarm Threshold	Percentage of input current rating to exceed before the corresponding event notification occurs.
Over Current Warning Threshold	Percentage of input current rating to exceed before the corresponding event notification occurs. The value must be less than the alarm threshold.
Under Current Alarm Threshold	Percentage of input current rating to fall below before the corresponding event notification occurs. The value must be less than the warning threshold. A zero value disables the alarm.
Software Over Current Protection (SWOCP)	If enabled, the SWOCP automatically turns off the receptacle power to non-critical and unloaded receptacles (no current draw) of all branches when the input over current alarm condition occurs. This mitigates the possible opening of circuit breakers in a PDU or upstream at the service. SWOCP is only displayed and configurable for models having receptacle management.

To edit a rack PDU:

1. Log in with the required privileges.
2. From the *PDU Explorer* tab, highlight the rack PDU to be edited by clicking in one of its fields.

**NOTE: Clicking a rack PDU opens its branch window.**

3. In the table in the lower section of the window, click the *Settings* tab.
4. Check the boxes next to the settings to be edited.
5. Click the Edit icon.
6. Enter the new values.

-or-

Use the drop-down menu to do one of the following:

- Enable or disable software overcurrent protection.
  - Change whether the receptacle is designated as critical or non-critical.
7. When finished, click the Save icon to make the change or click the Cancel icon to abort the change. The icons are in the column formerly occupied by the Edit icon.

The following table describes the settings at the PDU level.

### 3.4.4 Branch settings

The following procedures help you configure the branch settings. Review the table in this section for the branch settings descriptions.

**Table 3.5 Branch Settings Descriptions**

SETTING	DESCRIPTION
Over Current Alarm Threshold	Percentage of branchcurrent rating to exceed before the corresponding event notification occurs.
Over Current Warning Threshold	Percentage of branchcurrent rating to exceed before the corresponding event notification occurs. The value must be less than the alarm threshold.
Under Current Alarm Threshold	Percentage of branchcurrent rating to fall below before the corresponding event notification occurs. The value must be less than the warning threshold. A zero value disables the alarm.
Software Over Current Protection (SWOCP)	If enabled, the SWOCP automatically turns off the receptacle power to non-critical and unloaded receptacles (no current draw) of this branches when the branch over current alarm condition occurs. This

SETTING	DESCRIPTION
	mitigates the possible opening of circuit breakers in the unit or upstream at the service. SWOCP is only displayed and configurable for models having receptacle management.

**NOTE:** MPHX BRM, MPH2-C, MPH2-M and MPH2-R rack PDU models support the circuit breaker status. MPH2-B rack PDU models utilize a software Loss of Load detection, which detects a sudden reduction of branch current after its overcurrent alarm threshold is breached. This active event implies the circuit breaker has opened.

To edit a branch:

1. Log in with the required privileges.
2. From the *PDU Explorer* tab, click the rack PDU with the branch to be edited.
3. Click in a branch field to highlight the branch and open its receptacle window.
4. In the table at the bottom of the window, click the *Settings* tab.
5. Check the boxes next to the settings to be edited.
6. Click the Edit icon.
7. Enter the new values.

-or-

Use a drop-down menu to do one of the following:

- Enable or disable software overcurrent protection.
  - Change whether the branch is designated critical or non-critical.
8. When finished, click the Save icon to make the change or click the Cancel icon to abort the change. The icons will be in the column formerly occupied by the Edit icon.

### 3.4.5 Receptacle settings

The following procedures help you configure the receptacle settings. Review the table in this section for the receptacle settings descriptions.

**Table 3.6 Receptacle Settings Descriptions**

SETTING	DESCRIPTION
Over Current Alarm Threshold	Percentage of receptacle current rating to exceed before the corresponding event notification occurs.
Over Current Warning Threshold	Percentage of receptacle current rating to exceed before the corresponding event notification occurs. The value must be less than the alarm threshold.
Under Current Alarm Threshold	Percentage of receptacle current rating to fall below before the corresponding event notification occurs. The value must be less than the warning threshold. A zero value disables the alarm.
Power Up State	After mains power is applied, the receptacle is either immediately turned on, turned off or is restored to the last power state before the loss of power occurred and after the Power On Delay has expired. If the last power state was off, the power remains off.
Power On Delay	The amount of time, in seconds, before the receptacle power is restored after mains power is applied.
Power Cycle Delay	The amount of time, in seconds, that receptacle power is momentarily turned off.
Post On Delay	The amount of time, in seconds, before receptacle power is turned on.
Post Off Delay	The amount of time, in seconds, before the receptacle power is turned off.
Software Over Temperature Protection (SWOTP)	If enabled, affected receptacles automatically have power turned off after the measured temperature breaches the over temperature alarm threshold of a temperature sensor for at least the duration of the SWOTP delay. The SWOTP can be configured for local mode which is only affected by alarm of temperature sensor(s) connected to its RPC2 module, or array mode which is affected by alarm of temperature sensor(s) connected to any RPC2 module in the array.
Receptacle Criticality	If disabled, the receptacle automatically turns off if SWOTP is enabled and the condition is active. SWOTP automatically turns off receptacle power to non-critical and unloaded receptacles (no current draw) when input and/or branch overcurrent alarm conditions occur in order to mitigate a possible opening of circuit breakers in the unit or upstream at the service.

### To edit a receptacle:

1. Log in with the required privileges.
2. From the PDU Explorer tab, drill down to the receptacle to be edited by clicking on the rack PDU then the branch with the receptacle.
3. Click on the receptacle to highlight it.
4. In the table at the bottom of the window, click the *Settings* tab.
5. Check the box or boxes next to the settings to be edited.
6. Click the Edit icon .
7. Enter the new values.

-or-

Use the drop-down menu to do one of the following:

- Enable or disable software overcurrent protection.
  - Change whether the receptacle is designated critical or noncritical.
8. When finished, click the Save icon to make the change or click the Cancel icon to discard the change.

## Local Mass configuration

In addition to being able to configure a receptacle from its Settings window, an administrator can also configure one or multiple receptacles from the Device Explorer tab window.

Figure 3.5 Mass Configuration Screen

Label	ID	Type	Asset		Threshold (%)			Delay (seconds)				SWOTP	Critical	Power Up State
			Tag 01	Tag 02	Over Current Alarm	Over Current Warning	Under Current Alarm	Power ON	Power Cycle	Post ON	Post OFF			
RCP A-1 [V47L2600001]	1-A-1	RA			95	90	0	0	8	0	0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Restore ▼
RCP A-2 [V47L2600001]	1-A-2	RA			95	90	0	0	8	0	0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Restore ▼
RCP A-3 [V47L2600001]	1-A-3	RA			95	90	0	0	8	0	0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Restore ▼
RCP A-4 [V47L2600001]	1-A-4	RA			95	90	0	0	8	0	0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Restore ▼
RCP A-5 [V47L2600001]	1-A-5	RA			95	90	0	0	8	0	0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Restore ▼
RCP A-6 [V47L2600001]	1-A-6	RA			95	90	0	0	8	0	0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Restore ▼
RCP A-7 [V47L2600001]	1-A-7	RA			95	90	0	0	8	0	0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Restore ▼
RCP A-8 [V47L2600001]	1-A-8	RA			95	90	0	0	8	0	0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Restore ▼
RCP A-9 [V47L2600001]	1-A-9	RA			95	90	0	0	8	0	0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Restore ▼
RCP A-10 [V47L2600001]	1-A-10	RA			95	90	0	0	8	0	0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Restore ▼
RCP A-11 [V47L2600001]	1-A-11	RA			95	90	0	0	8	0	0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Restore ▼
RCP A-12 [V47L2600001]	1-A-12	RA			95	90	0	0	8	0	0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Restore ▼
RCP B-1 [V47L2600001]	1-B-1	RA			95	90	0	0	8	0	0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Restore ▼
RCP B-2 [V47L2600001]	1-B-2	RA			95	90	0	0	8	0	0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Restore ▼
RCP B-3 [V47L2600001]	1-B-3	RA			95	90	0	0	8	0	0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Restore ▼
RCP B-4 [V47L2600001]	1-B-4	RA			95	90	0	0	8	0	0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Restore ▼
RCP B-5 [V47L2600001]	1-B-5	RA			95	90	0	0	8	0	0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Restore ▼
RCP B-6 [V47L2600001]	1-B-6	RA			95	90	0	0	8	0	0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Restore ▼
RCP B-7 [V47L2600001]	1-B-7	RA			95	90	0	0	8	0	0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Restore ▼
RCP B-8 [V47L2600001]	1-B-8	RA			95	90	0	0	8	0	0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Restore ▼
RCP B-9 [V47L2600001]	1-B-9	RA			95	90	0	0	8	0	0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Restore ▼
RCP B-10 [V47L2600001]	1-B-10	RA			95	90	0	0	8	0	0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Restore ▼
RCP B-11 [V47L2600001]	1-B-11	RA			95	90	0	0	8	0	0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Restore ▼
RCP B-12 [V47L2600001]	1-B-12	RA			95	90	0	0	8	0	0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Restore ▼

To configure multiple receptacles:

1. From the side navigation tree of the Device Explorer tab window, click *Config* next to the rack PDU you want to configure.
2. Enter the desired settings for the receptacles you want to configure. You can configure threshold percentage, delay, power up state and enable or disable SWOTP or Receptacle Criticality.

-or-

To configure multiple receptacles with the same settings, enter the desired setting at the top of each column and click the Fill Down icon.

3. Click Save.

### 3.4.6 Sensors

Information for the primary sensor is displayed on the Summary tab window. Clicking a displayed sensor opens the sensor window under the PDU Explorer tab. From this window, you can set and configure the primary sensor. Sensors are automatically discovered when the RPC2 module reboots or when the first sensor is connected. After the initial sensor string is discovered, you must manually re-discover a change in the sensor configuration by clicking the *Discover* icon under the *PDU Explorer - Sensor* configuration window.

To set the primary sensor:

1. From the *Summary* tab, click the primary sensor to open the Sensor window in the PDU Explorer tab.
2. Click the radio button next to the sensor you want to be the primary sensor.
3. Click the *Set Primary Sensor* icon in the upper-left of the window.

### To discover sensors:

Click the PDU Explorer tab and from the side navigation tree, click *Sensor* to view a list of all the discovered sensors.

### To reorder sensors:

1. From the *PDU Explorer - Sensor* window, click the button next to the sensor you want to reorder.
2. Use the up and down arrows to reorder the sensor, then click the *Save* icon.
3. Repeat step 2 for any additional sensors to be reordered.
4. Click the *Discover* icon.

### To configure a sensor:

1. Put a checkmark in the box to the left of the sensor to be changed.
2. Click the *Edit* icon.
  - a. If assigning a label, enter the new label (the default is the sensor's serial number).
  - b. If changing the asset (sensor in this case), enter a new name for the sensor (default names are Tag01 and Tag02).
  - c. If changing the Alarm Config, click the drop-down menu and choose *Alarm when closed*, *Alarm when open* or *None*.
3. Click the *Save* icon to save the change.

-or-

Click the *Cancel* icon to discard the change.

### 3.4.7 Information

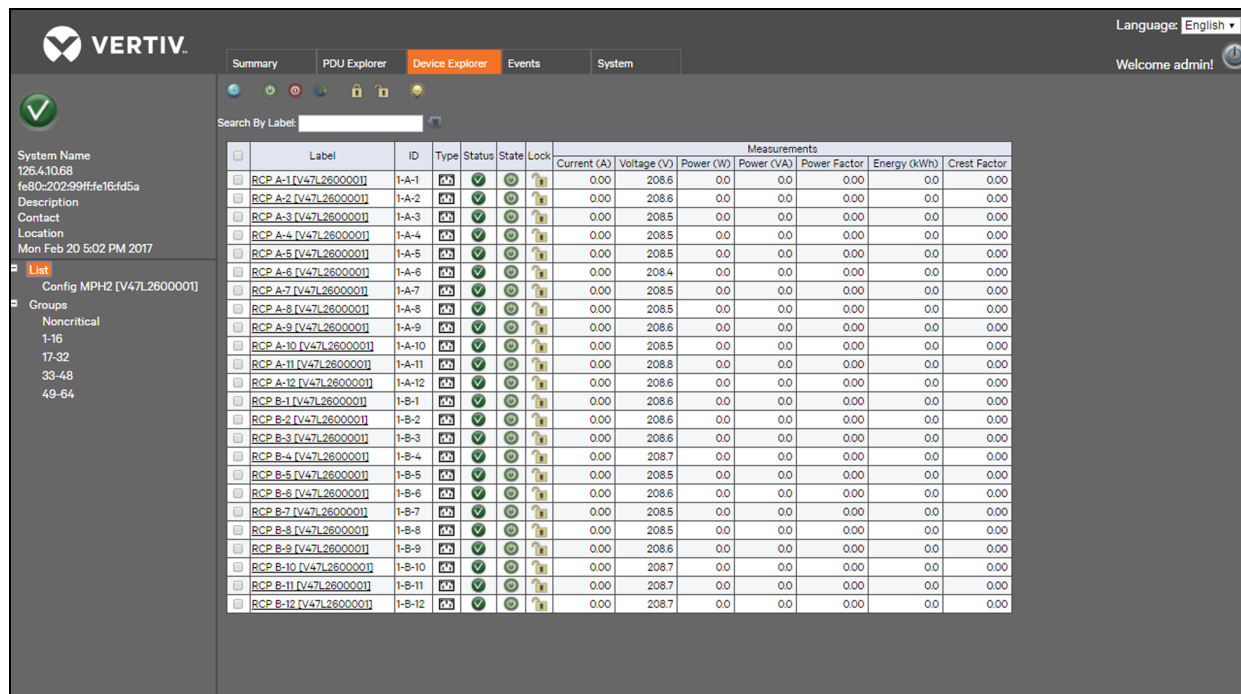
The PDU Explorer's Settings tab window displays read-only information about the rack PDU, branch or receptacle. At the PDU and branch levels, you can view the model number, serial number, rated voltage, rated current, rated frequency, plug pole/wire configuration, plug type, device firmware version and agent firmware version information. At the receptacle level, you can view current, voltage, power real, power apparent, power factory and energy information.

## 3.5 Device Explorer

The Device Explorer window displays the status of all receptacles on a rack PDU. Clicking a receptacle opens the PDU Explorer view of the selected receptacle. As with the PDU Explorer, use the icons in the upper-left of the window to reset the energy for a receptacle, enable/disable/cycle a receptacle's power, lock/unlock a receptacle or blink a receptacle's LED.

The RPC2 communications module presents only available data. If the MPH2 rack PDU does not support branch and receptacle capabilities, the RPC2 module displays grayed-out entries and that information is not shown.

Figure 3.6 Device Explorer Tab Example



**To reset energy for a receptacle:**

- From the Device Explorer window, click the checkbox in the row of the appropriate receptacle.  
-or-  
Click the checkbox in the upper-left of the table to select all the receptacles.
- Click the Reset Energy icon, then click *OK* on the pop-up window to confirm to reset the energy of the selected receptacle.  
-or-  
Click *Cancel* to return to the Device Explorer window without resetting the energy.
- From the pop-up window, click *OK* to acknowledge that the process completed successfully.

**To enable power for a receptacle:**

- From the Device Explorer window, click the checkbox in the row of the appropriate receptacle.  
-or-  
Click the checkbox at the top of the table to select all the receptacles in the table.
- Click the Enable Receptacle Power icon, then click *OK* on the pop-up window to confirm to enable power for the selected receptacle.  
-or-  
Click *Cancel* to return to the Device Explorer window without enabling the power for a receptacle.
- From the pop-up window, click *OK* to acknowledge that the process completed successfully.

**To disable power for a receptacle:**

- From the Device Explorer window, click the checkbox in the row of the appropriate receptacle.

-or-

Click the checkbox at the top of the table to select all the receptacles in the table.

2. Click the Disable Receptacle Power icon, then click *OK* on the pop-up window to confirm to disable power for the selected receptacle.

-or-

Click *Cancel* to return to the Device Explorer window without disabling the power for a receptacle.

3. From the pop-up window, click *OK* to acknowledge that the process completed successfully.

#### To cycle power for a receptacle:

1. From the Device Explorer window, click the checkbox in the row of the appropriate receptacle.

-or-

Click the checkbox at the top of the table to select all the receptacles in the table.

2. Click the Cycle Receptacle Power icon, then click *OK* on the pop-up window to confirm to cycle power for the selected receptacle.

-or-

Click *Cancel* to return to the Device Explorer window without cycling the power for a receptacle.

3. From the pop-up window, click *OK* to acknowledge that the process completed successfully.

#### To lock a receptacle:

1. From the Device Explorer window, click the checkbox in the row of the appropriate receptacle.

-or-

Click the checkbox at the top of the table to select all the receptacles in the table.

2. Click the Lock Receptacle icon, then click *OK* on the pop-up window to confirm to lock a selected receptacle.

-or-

Click *Cancel* to return to the Device Explorer window without locking a receptacle.

3. From the pop-up window, click *OK* to acknowledge that the process completed successfully.

#### To unlock a receptacle:

1. From the Device Explorer window, click the checkbox in the row of the appropriate receptacle.

-or-

Click the checkbox at the top of the table to select all the receptacles in the table.

2. Click the Unlock Receptacle icon, then click *OK* on the pop-up window to confirm to unlock a selected receptacle.

-or-

Click *Cancel* to return to the Device Explorer window without unlocking a receptacle.

3. From the pop-up window, click *OK* to acknowledge the process completed successfully.

#### To cause a receptacle's LED to blink:

1. From the Device Explorer window, click the checkbox in the row of the appropriate receptacle.

-or-

Click the checkbox at the top of the table to select all the receptacles in the table.

2. Click the Blink Receptacle LED icon, then click *OK* on the pop-up window to confirm to blink the LED on a selected receptacle.

-or-

Click *Cancel* to return to the Device Explorer window without causing the LED to blink on a receptacle.

3. From the pop-up window, click *OK* to acknowledge that the process completed successfully.

### 3.5.1 Device Explorer - receptacle groups

An administrator can create customized groups of rack PDU receptacles. The group appears in the side navigation tree and a summary of the parametric data from the group's receptacles is displayed in the window.

You can group receptacles on rack PDUs for management and monitoring purposes. When you group receptacles, it allows you to apply the same changes to all the receptacles in a group by performing a single operation. For example, you can turn all the receptacles on or off with one action, instead of performing this operation on each receptacle. Up to 64 receptacle groups, including non-critical groups, are possible. All group names, except for the standard Noncritical group name, can be changed.

**NOTE: No receptacles are grouped in the factory-default setup of the RPC2 communications module.**

#### Noncritical group

The Noncritical group is intended for linking receptacles powering non-essential equipment. This receptacle group can be shut down for power conservation and similar purposes, such as when utility power fails and a UPS is powering rack equipment.

All receptacles are critical by default. No receptacles can be in the Noncritical Group unless they are added by a user with administrative privileges.

#### To create a receptacle group:

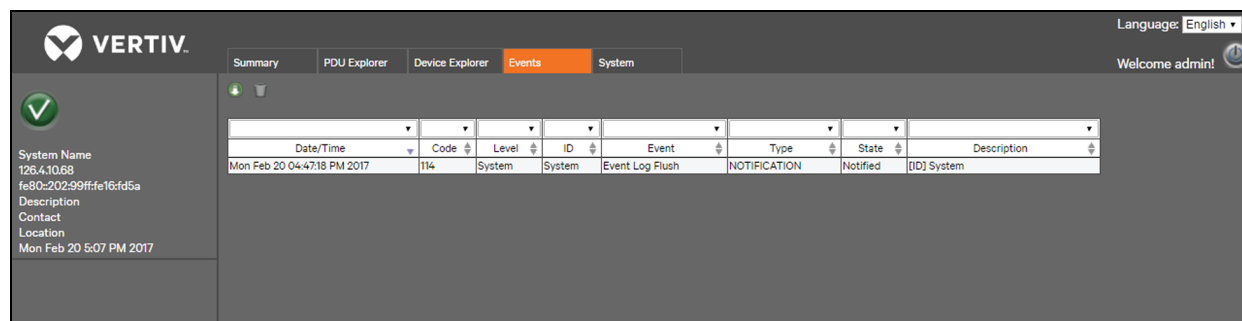
1. Navigate to the *Device Explorer* window and click *Groups* from the side navigation tree.
2. In the list of 64 empty groups, click the Edit icon next to the group you want to create.
3. In the list of receptacles, click to add a checkmark beside each receptacle to be added to the group.
4. Name the group or use one of the default group names.
5. Click the Save icon.
6. Repeat as needed for additional groups.

### 3.6 Events Tab

The Events window displays a list of events that have occurred on the MPH2 rack PDU system, with more recent events at the top of the list. When the number of events exceeds the limit of 6,000, the oldest events are removed first. Use the drop-down menus to filter events. Events can be configured for SNMP Traps, Syslog, Email and SMS in the *System* Tab.

Information available includes the date and time of occurrence, the event code, receptacle or branch where the event occurred, name or description of the event, severity level and the event status (active, notification sent, clear and so on).

Figure 3.7 Events Tab



Date/Time	Code	Level	ID	Event	Type	State	Description
Mon Feb 20 04:47:18 PM 2017	114	System	System	Event Log Flush	NOTIFICATION	Notified	[ID] System



### To download a log file for all events:

Click the Events tab, then click the Download icon at the top of the window to download a log file for all events.

**NOTE: A downloaded event log can be imported into Microsoft® Excel® and viewed as a spreadsheet.**

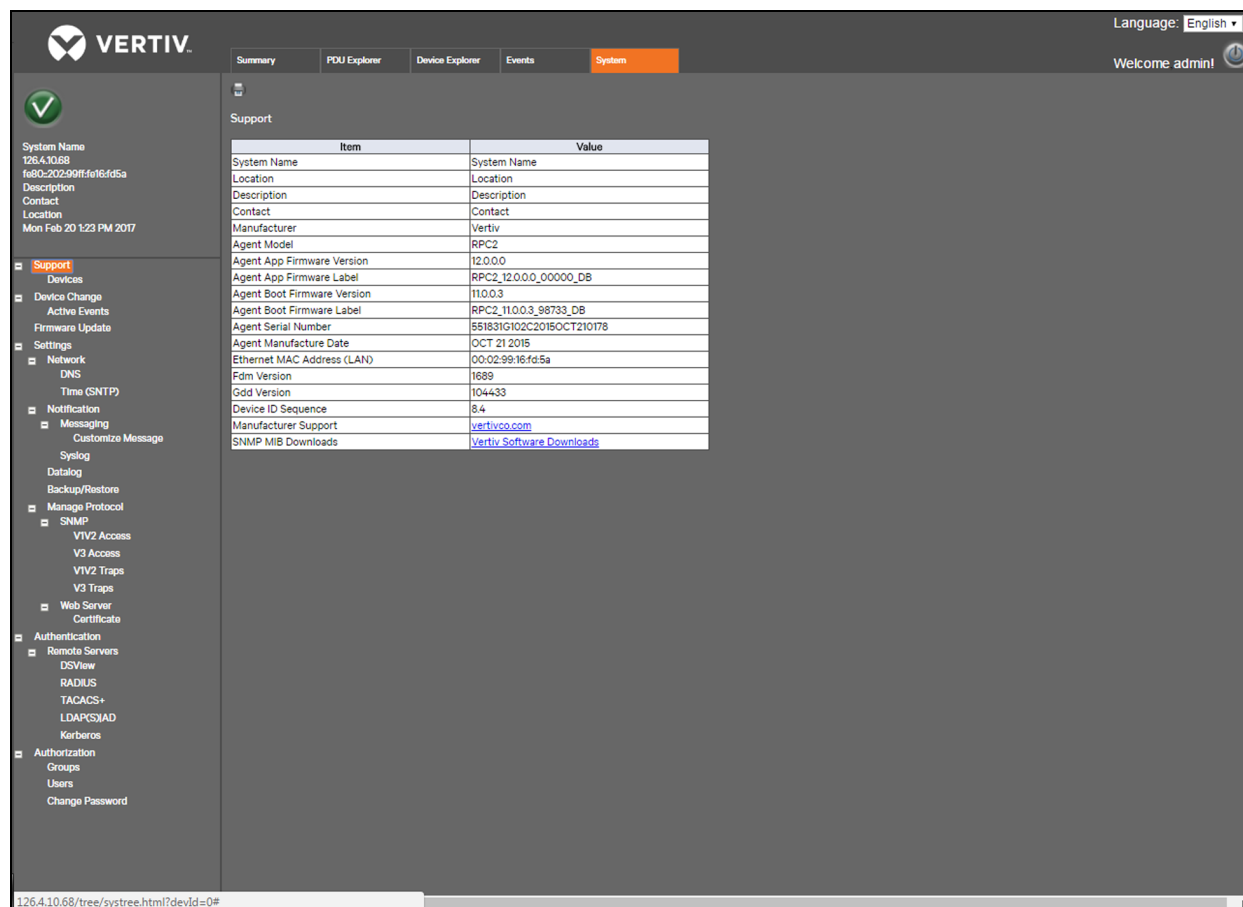
### To clear all events:

Click the Events tab, then click the Flush icon at the top of the window to clear all events except for active alarms.

## 3.7 System Tab

The System window is the control and configuration center for the RPC2 rack communications module. Links on the navigation tree allow you to update firmware, join networks, set security levels, add and remove users, set access privileges and alarm thresholds and set automatic messages for events and alarms. The System window also displays information about the RPC2 communications module and the PDU, where it is installed, including location, contact personnel, technical support, firmware version, serial number and MAC address. With administrative privileges, you can configure the RPC2 communications module's parameters, such as notifications and SNMP traps and access. You can also update the RPC2 communications module's firmware and change passwords.

Figure 3.8 System Tab



The screenshot shows the VERTIV System Tab interface. The top navigation bar includes Summary, PDU Explorer, Device Explorer, Events, and System (selected). The left navigation tree is expanded to the Support link. The main content area displays system information and a support table.

**System Information:**

- System Name: 126.4.10.68
- Location: fe80c20299ff-fef6fd5a
- Description: Location
- Contact: Mon Feb 20 1:23 PM 2017

**Support Table:**

Item	Value
System Name	System Name
Location	Location
Description	Description
Contact	Contact
Manufacturer	Vertiv
Agent Model	RPC2
Agent App Firmware Version	12.0.0.0
Agent App Firmware Label	RPC2_12.0.0.0_00000_DB
Agent Boot Firmware Version	11.0.0.3
Agent Boot Firmware Label	RPC2_11.0.0.3_98733_DB
Agent Serial Number	551831G102C2015OCT210178
Agent Manufacture Date	OCT 21 2015
Ethernet MAC Address (LAN)	00:02:99:f6fd5a
Fdm Version	1689
Gdd Version	104433
Device ID Sequence	84
Manufacturer Support	<a href="http://vertiv.com">vertiv.com</a>
SNMP MIB Downloads	<a href="#">Vertiv Software Downloads</a>

### 3.7.1 Support

The Support link in the navigation tree on the System tab is a read-only window. You can access this window to view information about the RPC2 communications module and print the summary table via the *Print* icon.

### 3.7.2 Devices

You can access the Devices window in the System tab navigation tree to view a read-only window about the rack PDU and the RPC2 communications module. Available information includes the System Name (user specified), system location, system description, contact personnel names, rack PDU manufacturer, the RPC2 serial number and firmware label and the rack PDU model, serial number and firmware version. You can also print the summary table via the *Print* icon at the top of the window.

### 3.7.3 Device change

Access the *Device Change* link in the System tab navigation tree to view device changes, such as a rack PDU array being added or removed, a rack PDU being added to an array, sensors being added or removed or a module added to a Liebert MPX. This window displays the module serial number and type and shows when modules are added and removed. You can use the *Acknowledge* icon to acknowledge changes and remove them from the window.

**NOTE: A notepad icon appears in the upper left corner when a device change is not acknowledged by the user. This occurs at initial startup, when the RPC2 communications module is installed for the first time, when a sensor is added or removed, when an MPXBRM is added or removed and after a reset to factory defaults is executed. After an event or change is acknowledged, the event may take a few seconds to clear and the icon changes to Normal. If an alarm condition is present, the Alarm icon appears.**

### 3.7.4 Firmware update

Firmware updates can be downloaded from the Downloads section of the Vertiv™ web site ([www.VertivCo.com/MPH2Downloads](http://www.VertivCo.com/MPH2Downloads)).

Once downloaded, the firmware update file is transferred to the RPC2 module's memory. The RPC2 module manages the firmware update process for any connected devices and then for itself.

The RPC2 communications module permits unattended firmware updates. The browser being used can be closed after the progress bar is displayed.

To update the module's firmware:

1. Click the *System* tab, then click *Support - Firmware Update* from the side navigation tree.
  2. Select whether to update from the web (http), FTP or TFTP.
  3. Click the *Browse* button to find and open the downloaded .epm file on the host PC or network. The selected file name is displayed in a text box.
  4. Click the *Start Firmware Update* icon to begin updating.
- or-
- Click the *Cancel* icon to clear the filename and begin again.
5. The firmware update progress is shown in the status. Once the process is finished, the system automatically restarts and resumes displaying rack PDU information.

**NOTE: The firmware update may take up to 15 minutes. If the update fails, try updating again. The previous working firmware is recoverable as the RPC2 module maintains the firmware image in its memory.**

### 3.7.5 Settings

With permissions, you can access the *Settings* link in the System tab's navigation tree to configure the settings for the RPC2 communications module. Use the icons at the top of the window to save or cancel the changes. The Settings window also permits resetting the RPC2 communications module to factory defaults, rebooting the system and opening a command line interface session.

To manage RPC2 communications module settings:

1. From the *System* tab, click *Settings* in the side navigation tree.
2. Enter a system name and description for the RPC2 communications module.
3. Enter a contact name and location.
4. Use the drop-down menu to display the temperature in either Celsius or Fahrenheit.

5. Use the drop-down menu to select either Local or PDU Array for SWOTP scope.
6. Enter the SWOTP delay (how long the module waits before turning off receptacles) in seconds.
7. Use the drop-down menu to select either a 12-hour or 24-hour time format.
8. Click the Save icon.

## Network

On the Network window, you can configure the speed/duplex, hostname, IPv4 or IPv6 static routes.

### To configure network parameters:

1. From the side navigation bar of the *System* tab, click *Network*.
2. Use the drop-down menu to select *Speed/Duplex*.
3. Enter the hostname in the Host Name field.
4. Select the default IPv4.  
  
-or -  
  
Check the IPv6 checkbox.
5. For IPv4 or IPv6, select either *Static* or *DHCP* for the boot mode and enter the IP Address, Subnet Mask and Default Gateway in the appropriate fields.
6. Click the Save icon.

## DNS

From the Domain Name Server (DNS) settings menu, an administrator can configure the servers the RPC2 communications module will use for hostname resolution. When configured, host addresses for SNMP, Network Time and Email/SMS can be specified in either full Domain Name format or host only format, provided that the appropriate Domain Name Suffix is used.

The DNS menu is used to set parameters for network access to the RPC card. Consult your network administrator for these settings.

### To configure DNS Server settings:

1. From the side navigation bar of the *System* tab, click *Network - DNS*.
2. Select whether to obtain DNS server addresses automatically or to enter them manually.
3. If they will not be obtained automatically, enter the primary and secondary DNS addresses.
4. Enter the domain name suffix. This suffix is used for assembling a fully-qualified domain name when a host-only name is specified.
5. Click the Save icon.

## DNS test

The DNS Test function checks whether the RPC2 communications module resolves a hostname to an IP address.

### To run a DNS test:

1. From the side navigation bar of the *System* tab, click *Network - DNS*.
2. Under the DNS Test heading, use the drop-down menu to select a fully-qualified domain name or an IP address.
3. In the Question field, enter a value for the DNS to answer.
4. Click the Query icon in the upper-left of the window to attempt a lookup with the provided information.

## Simple Network Time Protocol (SNTP)

The RPC2 communications module provides two options for setting the date and time. It can retrieve the date and time from an SNTP server, or the date and time can be set manually so that the internal clock of the rack PDU is used to provide time and date information.

### To set the date and time:

1. From the side navigation bar of the *System* tab, click *Network*.
2. Under the SNTP heading, select *NTP Server* to use an NTP server.  
  
-or-  
  
Select *Local* to manually set the date and time.
3. If using NTP, enter an NTP server site in the Time Server field.
4. Select either *Hourly* or *Daily* for the synchronize rate.
5. Use the drop-down menu to select the time zone.
6. If manually setting the date and time, enter the time in YYYY-MM-DD HH:MM:SS format in the System Date and Time field.
7. Click the Save icon.

**NOTE: To re-sync the time immediately, click the *Sync Time Now* icon at the top of the window.**

**NOTE: The date and time must be entered manually after every reboot or power cycle for MPX and MPH model PDUs with an RPC2 module installed and Local mode enabled.**

### Notification

The RPC2 communications module generates notifications for a wide variety of events. It can be configured to direct or store those event notifications for immediate use or for analysis later.

### To configure notifications:

1. From the side navigation bar of the *System* tab, click *Notification*.
2. For each notification type, check the boxes next to the type of notification to be sent.  
  
-or-  
  
Check the box next to the heading to select that type of notification for all events in the list: e-mail, SMS, SNMP Trap or SysLog notifications.
3. Click the Save icon.

### Messaging

An administrator can configure email and SMS settings to be used for notifications from the Messaging window.

### To verify the settings once configuration is complete:

1. From the side navigation bar of the *System* tab, click *Notification - Messaging*.
2. Check the box next to Email to enable the configuration of email settings.
3. Enter the sender and recipient's email addresses.
4. Check the radio button to either use the event or to create a custom subject for the email.
5. Enter the SMTP server and port number.
6. Click the Authentication checkbox to enable the subsequent fields.
7. Enter a username and then click the Password checkbox to enable the Modify Password field.
8. Enter a new password in the Modify Password field.
9. Choose the connection type from the drop-down list box.
10. Click the Save icon at the top of the window.
11. To verify the email configuration, click the Verify Email icon in the upper-left of the window.

### To configure SMS settings:

1. From the side navigation bar of the *System* tab, click *Notification - Messaging*.
2. Check the box next to SMS to enable the configuration of the SMS settings.

3. Enter the address sender and recipient's SMS notification addresses.
4. Check the radio button to either use the event or to create a custom subject for the email.
5. Enter the SMTP server and port number.
6. Click the Authentication checkbox to enable the subsequent fields.
7. Enter a username and then click the Password checkbox to enable the Modify Password field.
8. Enter a new password in the Modify Password field.
9. Choose the Connection Type from the drop-down list box.
10. Click the Save icon at the upper-left of the window.
11. To verify the SMS configuration, click the Verify SMS icon in the upper-left of the window.

### Customize Message

An administrator can customize an email or SMS message as well as configure emails and SMS event consolidation.

#### To customize a message:

1. From the side navigation bar of the *System* tab, click *Notification - Messaging - Customize Message*.
2. Under the Customize Message heading, check the items to be included for email and/or SMS messaging.
3. Click the Save icon.

#### To configure e-mail and SMS event consolidation:

1. From the side navigation bar of the *System* tab, click *Notification - Messaging - Customize Message*.
2. Under Configure Email/SMS Event Consolidation, check the boxes to enable email or SMS consolidation.
3. Enter the consolidation time limit using the number of seconds and enter the consolidation event limit in number of events.
4. Click the Save icon in the upper-left corner of the window.

### Syslog

Syslog notifications can be sent to up to four IPv4 or IPv6 addresses.

#### To enable Syslog notifications:

1. Log in with the required privileges.
2. From the side navigation bar of the *System* tab, click *Notification - Syslog*.
3. Check the box to enable either IPv4 or IPv6 addressing and enter up to four addresses.
4. Click the Save icon.

### Datalog

An administrator can enable data logging for rack PDUs, branches or receptacles, and export the data log to an FTP site.

#### To enable data logging:

1. Log in with the required privileges.
2. From the side navigation bar of the *System* tab, click *Notification - Datalog*.
3. Under the Datalog heading, check the box to enable data logging.
4. Use the drop-down menus to enable or disable PDU, branch or receptacle data logging.
5. Use the drop-down menu to enter the data logging interval using the number of minutes.
6. Click the Save icon.

#### To export a data log:

1. From the side navigation bar of the *System* tab, click *Notification - Datalog*.
2. Under the Export heading, enter the IP address, username and password for the FTP site to receive the data log.

3. Enter the path and filename for the data log.

**NOTE: The default filename is sys-data.log.**

4. Click the Export icon when finished.
5. Click the Flush or Download icon at the upper-left of the window to clear or download the data log.

## Backup and Restore

An administrator can configure an FTP site to back up a configuration file or restore a configuration from a backup file.

### To configure the backup file location:

1. From the side navigation tree of the *System* tab, click *Notification - Backup and Restore*.
2. Check the radio button next to the FTP Site and enter the IP address, username and password for the FTP site to receive the data log. Then enter the path and filename for the configuration file.

-or-

Check the radio button next to Local, click *Choose File*, browse to the location to save the file and enter a name for the configuration file.

3. Click the Save icon.

### To back up the configuration:

Click the Save Configuration icon at the upper-left of the window and click *OK*.

### To restore from the last saved configuration:

Click the Restore Configuration icon at the upper-left of the window and click *OK*.

## Using a USB memory stick

A memory stick can be inserted into the RPC2 module's USB port using a Type A female to micro A/B male adaptor. You can use a memory stick to facilitate the initial setup of networking, protocol and device configurations.

Each RPC2 module's .csv configuration file is uniquely saved according to its MAC ID. To facilitate mass configuration, multiple .csv files can be saved to the memory stick and then edited in a spreadsheet program before being loaded back into the respective module.

### To back up a configuration to a USB memory stick:

1. Insert a memory stick that does not already contain the module's unique configuration file into the module's USB port.
2. After a single beep, the module begins to save the configuration file to the memory stick.
3. After three consecutive beeps, the backup is complete and the memory stick is shut down for safe removal.
4. Remove the memory stick and repeat as desired for additional modules.

### To restore a configuration from a USB memory stick:

1. Insert a memory stick that contains the module's unique configuration file into the module's USB port.
2. After five consecutive beeps, the restoration begins. To abort the restoration, remove the memory stick before the fifth beep.
3. After three consecutive beeps, the restoration is complete and the memory stick is shut down for safe removal. The configuration file is automatically deleted from the memory stick after restoration, and the module reboots for the new configuration to take affect.

**NOTE: Wait a few minutes after the reboot completes to access to the unit.**

## Manage Protocol

From the Manage Protocol window, an administrator can enable or disable the velocity server, SNMP agent, SSH support, Telnet and web server. From this window, an administrator can also disable or set the inactive timeout and configure the maximum number of Telnet sessions allowed.

Modifying the Velocity or SNMP requires rebooting the RPC2 communications module. The RPC2 communications module can be rebooted by accessing *System - Settings - Reboot*.

## SNMP

An administrator can configure SNMP, which is needed if notifications are to be sent to an SNMP management application. The RPC2 communications module supports SNMP v1, v2 and v3.

### To configure SNMP:

1. Log in with the required privileges.
2. From the side navigation bar of the System tab, click *Manage Protocol - SNMP*.
3. Use the drop-down menu to enable or disable SNMPv1/v2.
4. Use the drop-down menu to select either SNMPv1 or SNMPv2 for the SNMP traps.
5. Enter the port number for the SNMP UDP port and the SNMP Traps UDP port.
6. Use the drop-down menu to enable or disable the Liebert Global Products (LGP) MIB and MIB traps for querying information in that MIB.
7. Use the drop-down menu to enable or disable the authentication trap. If enabled, an SNMP authentication trap is sent to all trap targets.
8. Use the drop-down menu to enable or disable the System Notify trap for system traps to be sent per the LGP MIB.

**NOTE: The LGP MIB must also be enabled to enable system notify traps.**

9. Disable or set the heartbeat interval using the number of minutes. This specifies how often a heartbeat trap is sent to show that a device is online and functioning normally.
10. Use the drop-down menu to enable or disable SNMPv3.
11. Click the Save icon.

## SNMPv1/v2 Access

From the side navigation bar of the *System* tab, click *SNMPv1/v2 Access* to configure the SNMPv1/v2 community's settings. Up to 20 devices can be configured with permission to access the RPC2 communications module, identified by IP address or hostname, read/write privileges and community string.

**Table 3.7 SNMPv1/v2 Access Description**

PARAMETER	DESCRIPTION
Entry	As many as 20 devices can be configured for access.
Network Name	The IP address of the target to receive traps.
Access	Click the <i>ReadOnly</i> radio button to allow users to view but not change data. Click the <i>ReadWrite</i> radio button to give full permissions for configuration, control and viewing.
Community	The community string used by the IP host for this entry.
Clear	Click <i>Clear</i> to delete all values for this entry.

**NOTE: A network name of 0.0.0.0 with write access and a public community grants access to any host computer.**

## SNMPv3 Access

From the side navigation bar of the *System* tab, click *SNMP-V3 Access* to configure the SNMPv3 community's settings. Up to 20 devices can be configured with permission to access the RPC2 communications module, identified by IP address or hostname, read/write privileges and a community string.

**Table 3.8 SNMPv3 Access Description**

PARAMETER	DESCRIPTION
Entry	As many as 20 devices can be configured for access.
User Enable	User Enable must be checked for each user to be configured for access. A maximum of 20 devices may be configured for access.
User Name	The IP address of the network host to receive access to device information or traps.
Authentication Type	Options are none, MD-5 or SHA.
Authentication Secret	Password between 8-64 characters for SNMPv3 request.
Privacy Type	Options are no encryption or DES.
Privacy Secret	Password of 8-64 characters for SNMPv3 request.
Access	No Access provides no access. ReadOnly provides only the ability to view data.
Source	Either an IP address or the network name of the host. To enable multiple hosts, enter network names separated by a comma.
Clear	Click <i>Clear</i> to delete all values for this entry.

**NOTE: A configuration with sources set to 0.0.0.0 with write access and no authentication grants access to any host computer.**

## SNMPv1/v2 Traps

An administrator can configure up to 20 users to receive notifications from the RPC2 communications module, identified by IP address or hostname, trap listen port and community string.

To configure SNMPv1/v2 traps:

1. From the side navigation bar of the *System* tab, click *Manage Protocol - SNMP - V1V2 Traps*.
2. Enter the network name, port number and community string in the appropriate fields.
3. Check the box to enable the heartbeat feature.
4. Click the Save icon in the upper-left of the window.
5. To verify the configuration, click the Verify icon at the upper-left of the window.

**Table 3.9 SNMPv1/v2 Trap Descriptions**

PARAMETER	DESCRIPTION
Entry	Enter up to 20 targets to receive traps.
Network Name	The IP address or network name of the target to receive traps.
Port	The Trap Listen Port where traps will be sent. Use 162 if the host computer uses standard ports.
Community	The community string used the by the IP host for this entry (case sensitive, up to 32 characters).
Heartbeat	Check the box to enable a heartbeat check.
Clear	Click <i>Clear</i> to delete all values for this entry.



## SNMPv3 Traps

An administrator can configure up to 20 users to receive notifications from the RPC2 communications module. Users must be identified by IP address or hostname, trap listen port and community string.

### To configure SNMPv3 traps:

1. From the side navigation bar of the *System* tab, click *Manage Protocol - SNMP - V3 Traps*.
2. Enter the user name, port number and destinations.
3. Use the drop-down menu to enable or disable notifications.
4. Check the box to enable the heartbeat feature.
5. Click the Save icon.
6. To verify the configuration, click the Verify icon.

**Table 3.10** SNMPv3 Traps Descriptions

PARAMETER	DESCRIPTION
Entry	Enter up to 20 targets to receive traps.
User Name	The IP address or network name of the host to receive traps.
Notify	Enable or disable notifications being sent to the user from the module.
Destination	The IP address or the network name of the network host to receive notifications from the module. Use a comma to separate multiple hosts.
Heartbeat	Check the box to enable a heartbeat check.
Port	The Trap Listen Port where traps are sent. Use 162 if the host computer uses standard ports.
Clear	Click <i>Clear</i> to delete all values for this entry.

## Web Server

An administrator can configure access to the module through the web interface.

### To configure access through the web interface:

1. From the side navigation bar of the *System* tab, click *Manage Protocol - Web Server*.
2. Use the drop-down menu to select either HTTP or HTTPS for the web server.
3. Enter the port number for the HTTP or HTTPS server.
4. Enter the amount of time in seconds the RPC2 communications module refreshes.
5. Click the Save icon when finished.

## Certificate

The Network Interface Card allows you to either generate a new self-signed certificate or upload a new certificate.

### To generate a new self-signed certificate:

1. From the side navigation bar of the *System* tab, click *Manage Protocol - Web Server - Certificate*.
2. Ensure the Generate a New Self-Signed Certificate radio button is selected.
3. Enter the certificate information in the following fields.
4. Click the Generate Certificate icon.

### To upload a new certificate (Windows):

1. Install Git for Windows from <https://git-for-windows.github.io/>.
2. Accept the default settings and check for the GitBASH run icon to be placed on your desktop.
3. Run GitBASH. After a few moments, GitBASH presents a bash prompt.
4. Create a folder to hold the script and PEM files.

5. Change the directory to the folder you created.
6. Copy the custom openssl script to your folder.

Example: Custom Openssl Script

```
#!/bin/bash workdir=/tmp/sslgenwd
keyfile="serverkey.key"
crtfile="servercert.crt"
pcksfile="serverpcks.p12"
pemfile="server.pem"
logfile="sslupwd.log"
installdir="C:\Users\emily2938\Desktop\Certificates"
dstkeyfile="serverkey.pem"
dstpemfile="server.pem"
p12filepw=123456
if [ $# -lt 6 ];then echo "1" > voutf exit 1 fi
subjarg="//C=$5\ST=$4\L=$3\O=$2\CN=$1\emailAddress=$6"
if [ ! -d $workdir ]; then mkdir $workdir fi
cd $workdir
echo -e "#STEP 1: Generate a key"
openssl genrsa -out $keyfile 1024
if [ $? -ne 0 ];then echo "1" > voutf exit 1 fi
echo -e "\n#STEP 2: Generate the self-signed certificate"
openssl req -new -x509 -key $keyfile -out $crtfile -days 3650 -subj $subjarg
if [ $? -ne 0 ];then echo "1" > voutf exit 1 fi
echo -e "\n#STEP 3: Combine key and crt into pem"
openssl pkcs12 -export -in $crtfile -inkey $keyfile -out $pcksfile -passout pass:$p12filepw
if [ $? -ne 0 ];then echo "1" > voutf exit 1 fi
openssl pkcs12 -in $pcksfile -nodes -out $pemfile -passin pass:$p12filepw
if [ $? -ne 0 ];then echo "1" > voutf exit 1 fi
echo -e "\n #STEP 4: Install file"
cp$workdir/$keyfile $installdir/$dstkeyfile -f
cp $workdir/$pemfile $installdir/$dstpemfile -f
#echo "0" > voutf#
rm $workdir -rfcd
```

7. Modify the PEM install path and days as desired in script and run the script.
8. Modify your parametric information and email address accordingly.

**NOTE: The four steps should complete without error and two PEM files should be created in your folder. Ensure that the RPC2 SNTP time is correct and in sync with the timestamp of the certificate.**

9. In the application, from the side navigation bar of the *System* tab, click *Manage Protocol - Web Server - Certificate*.
10. Select the Upload a New Certificate radio button and click *Choose File* to browse for the PEM file.
11. Click the Upload Certificate icon. If the process is successful, you are prompted to restart your screen.
12. Restart your system to complete the process.

### 3.7.6 Authentication

Authentication can be performed locally or on a remote Kerberos, LDAP, Radius or TACACS+ authentication server. If the rack PDU is managed by an Avocent® DSView™ Management Software server, DSView™ server authentication is also

supported.

The rack PDU also supports remote group authorizations for the LDAP, Radius and TACACS+ authentication methods.

An administrator can configure authentication using the web interface or the command line interface. The default authentication method for the rack PDU is Local. Any authentication method that is configured for the rack PDU is used for authentication of any user who attempts to log in through Telnet, SSH or the web manager.

### To select an authentication type:

1. From the side navigation bar of the *System* tab, click *Authentication*.
2. Use the drop-down menu to select the authentication type.
3. Click the Save icon in the upper-left of the window.

### Remote servers

Using a remote server requires configuring its IP address and, in most cases, other parameters before it can be used. The following remote servers require configuration:

- DSView™ server
- RADIUS™
- TACACS+™
- LDAP(S) AD™
- Kerberos™

### To configure a DSView™ authentication server:

1. From the side navigation bar of the *System* tab, click *Authentication - Remote Servers - DSView*.
2. Enter IP Address for the DSView™ servers.
3. Click the Save icon.
4. From the left navigation tree, click *Groups*.
5. Enable the Admin checkbox.
6. Click the Edit Users icon.
7. Enter the DSView username in the Remote User field and then click the right arrow to add the user to the Group-User List field.
8. Click the Save icon.

### To configure a RADIUS™ authentication server:

1. From the side navigation bar of the *System* tab, click *Authentication - Remote Servers - Radius*.
2. Enter the IP addresses of the First Authentication Server and First Accounting Server.
3. If used, enter the IP addresses for the Second Authentication Server and Second Accounting Server.
4. Enter the secret word or passphrase in the Secret field (applies to both first and second authentication and accounting servers), then re-enter the secret word or passphrase in the Confirm Secret field.
5. Enter the desired number of seconds for server time-out in the Timeout field.
6. Enter the desired number of retries in the Retries field.
7. Click the Save icon in the upper-left of the window.
8. From the left navigation tree, click *Groups*.
9. Enable the Admin checkbox.
10. Click the Edit Users icon.
11. Enter the RADIUS™ username in the Remote User field and then click the right arrow to add the user to the Group-User List field.
12. Click the Save icon.

### To configure a TACACS+™ authentication server:

1. From the side navigation bar of the *System* tab, click *Authentication - Remote Servers - TACACS+*.

2. Enter the IP addresses for the First Authentication Server and First Accounting Server.
3. If used, enter the IP addresses of the Second Authentication Server and Second Accounting Server.
4. Select the desired service (PPP, raccess or shell) from the Service drop-down menu.
5. Enter a secret word or passphrase in the Secret field (applies to both first and second authentication and accounting servers), then re-enter the secret word passphrase in the Confirm Secret field.
6. Enter the desired number of seconds for server time-out in the Timeout field.
7. Enter the desired number of retries in the Retries field.
8. Use the drop-down menu to select the TACACS+™ version.
9. Click the Save icon in the upper-left portion of the window.
10. From the left navigation tree, click *Groups*.
11. Enable the Admin checkbox.
12. Click the Edit User icon.
13. Enter the TACACS+™ username in the Remote User field and then click the right arrow to add the user to the Group-User List field.
14. Click the Save icon.

#### To configure an LDAP(S)|AD™ authentication server:

1. From the side navigation bar of the *System* tab, click *Authentication - Remote Servers - LDAP(S)|AD*.
2. Enter the IP address of the server.
3. Enter the base.
4. At the Secure drop-down menu, select *Off*, *On* or *Start\_TLS*.
5. Enter the database username, then enter and confirm the database password.
6. Enter the desired login attributes.
7. Click the Save icon in the upper-left of the window.
8. From the left navigation tree, click *Groups*.
9. Enable the Admin checkbox.
10. Click the Edit Users icon.
11. Enter the LDAP(S)|AD™ username in the Remote User field and then click the right arrow to add the user to the Group-User List field.
12. Click the Save icon.

#### To configure a Kerberos™ authentication server:

1. From the side navigation bar of the *System* tab, click *Authentication - Remote Servers - Kerberos*.
2. Enter the IP address (Realm) of the server.
3. Enter the Realm Domain Name (example: VertivCo.com).
4. Enter the Domain Name (example: VertivCo.com).
5. Click the Save icon in the upper-left of the window.
6. From the left navigation tree, click *Groups*.
7. Enable the Admin checkbox.
8. Click the Edit Users icon.
9. Enter the Kerberos™ username in the Remote User field and then click the right arrow to add the user to the Group-User List field.
10. Click the Save icon.

### 3.7.7 Authorization levels

User groups are given access and authorizations either by default or as assigned by an administrator. Administrators can alter the permissions and access rights of users belonging to the appliance or user groups, or create additional groups with custom permissions and access rights. Administrators can add, delete or modify permissions and access rights for users from any group at any time.

There are four default user groups on an RPC2 communications module.

- Admin
- Poweruser
- System User
- Custom User

## Groups

An administrator can create a custom group and assign receptacles to users in the custom group. A user in a custom group is able to view only the receptacles to which he is given access; the other receptacles do not appear. A user in a custom group can lock and unlock only the receptacles he has access to. A user can belong to more than one group. Members can be added or deleted from any group, but none of the default groups, (administrator, power user or system user) can be deleted.

**NOTE: Only one group can be modified at a time.**

### To add a group:

1. From the *System* tab's navigation tree, click *Authorization - Groups*.
2. To add a group, click the Add icon in the upper-left of the window, then enter the name for the new group.
3. Set the access level for members of the group by granting access to receptacles.
4. Click the Save icon.

### To delete a group:

1. Check the box next to the group to be deleted.
2. Click the Delete icon.

### To add a user to a group:

1. From the *System* tab's navigation tree, click *Authorization - Groups*.
2. Check the box next to the group to be edited.
3. Click the Edit User icon.
4. In the Local User List or the Remote User List, select the user to be added and click the right arrow.
5. Click the Save icon.

### To delete a user from a group:

1. From the *System* tab's navigation tree, click *Authorization - Groups*.
2. Check the box next to the group to be edited.
3. Click the Edit User icon.
4. In the Group User List, select the user to be removed and click the left arrow.
5. Click the Save icon.

### To add a user to a group:

1. From the *System* tab's navigation tree, click *Authorization - Groups*.
2. Check the box next to the group to be edited.
3. Click the Edit User icon.
4. In either the Local User List or the Remote User List, select the user to be added and click the right arrow.
5. Click the Save icon.

### To delete a user from a group:

1. From the *System* tab's navigation tree, click *Authorization - Groups*.
2. Check the box next to the group to be edited.
3. Click the Edit User icon.
4. In the Group User List, select the user to be removed and click the left arrow.

5. Click the Save icon.

#### To assign receptacles to a user group:

1. From the *System* tab's navigation tree, click *Authorization - Groups*.
2. Check the box next to either the user group or a custom group where the receptacles are added.

**NOTE: Receptacles cannot be assigned to the administrator, poweruser or system user groups. Each of these default groups has its access level set in the software.**

3. Check the boxes next to the receptacles to be added to the group.

-or-

To assign all receptacles, click the box at the top of the column.

4. Click the Save icon.

#### Users

From the User Names window, an administrator can add or delete users and change user passwords.

**NOTE: The administrator's user password cannot be changed on this window.**

#### To add a user:

1. From the *System* tab's navigation tree, click *Authorization - Users*.
2. Click the Create Local User icon.
3. Enter the username and password and confirm the password.
4. Click the Save icon.

#### To delete a user:

1. From the *System* tab's navigation tree, click *Authorization - Users*.
2. Check the box next to the user to be deleted.
3. Click the Delete Local User icon.
4. Click *OK* when prompted.

#### To change a user password:

1. From the *System* tab's navigation tree, click *Authorization - Users*.
2. Check the box next to the user whose password needs to be changed.
3. Click the Change Local User's Password icon.

-or-

To change your own password, from the side navigation bar of the *System* tab, click *Authorization - Change Password*.

4. Enter and confirm the new password.
5. Click Save icon.

## 4 RPC BDM™ (OPTIONAL)

The RPC BDM is a small monitoring device that displays data from an Vertiv™ MPH2™, MPX™ or MPH™ unit through a connection to an RPC2 communications module. The BDM device provides another way to browse PDU data using the PDU Explorer and Device Explorer, as in the web interface. Views shown by the RPC BDM are essentially the same as those shown by the MPH2's onboard LCD.

**NOTE: The RPC BDM is a read-only display that can be used to view data but not to control or configure devices.**

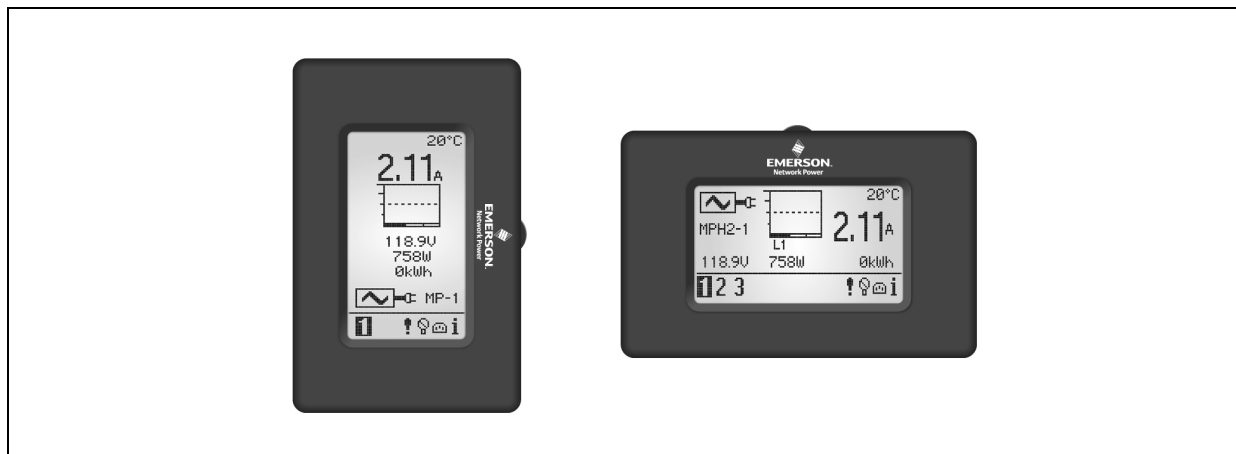
To perform control and configuration functions, use the web or SNMP interface. The display unit, which can be carried as a handheld device or mounted on a wall or in the rack, permits users to:

- View monitoring data
- Identify the load of PDU input lines, branch circuit breakers and receptacles (varies by model)
- Identify the load of PDU devices using the user-assigned label
- View Liebert® SN™ sensor readings for areas monitored by connected sensors
- Identify the IP address and MAC address of the PDU
- Browse user-assigned receptacle labels to view parametric information
- View the active events list
- Balance PDU line loads

### 4.1 Orientation of the RPC BDM

The RPC BDM can be rotated for vertical or horizontal display, as shown in the following figure. When in the vertical orientation, the connection port is on the top while the scroll button is on the side. In the horizontal orientation, the connection port is on the side with the scroll button on the top.

**Figure 4.1 Vertical or Horizontal Orientation**



To set the orientation:

Hold down the scroll button when first connecting the RPC BDM to the RPC2.

#### 4.1.1 Navigation Tips

To navigate and select items:

1. Use the scroll button to move the cursor to highlight an item on the screen.
2. Press the scroll button to select the highlighted item.

Figure 4.2 RPC BDM Scroll Button

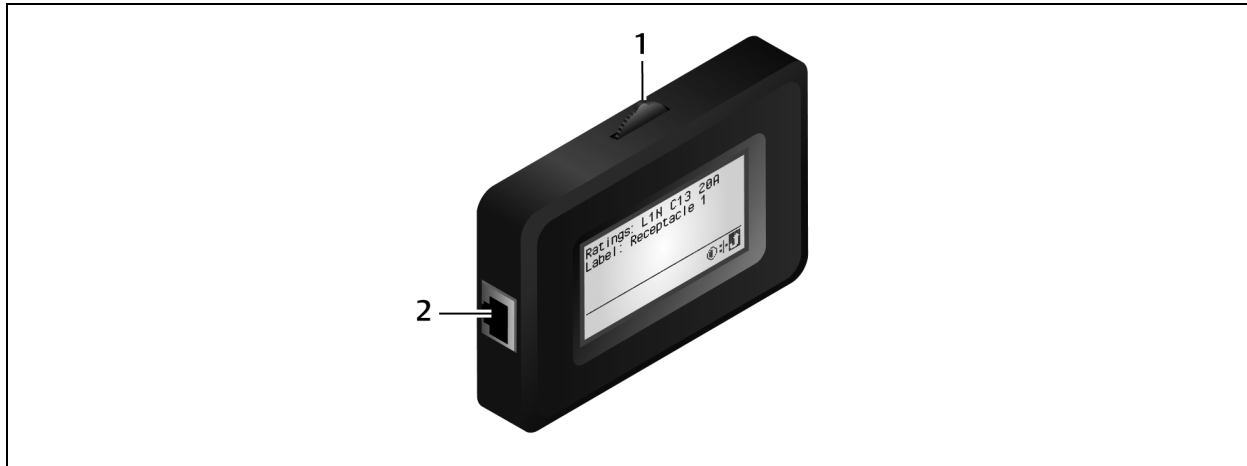


Table 4.1 BDM Descriptions

ITEM	DESCRIPTION
1	Scroll button
2	Connection port

### System options

The icons shown in the following figure are displayed in the bottom right of the screen. These icons provide access to further network information, system and screen options. Use the scroll button to highlight and select these icons.

Figure 4.3 System Option Icons

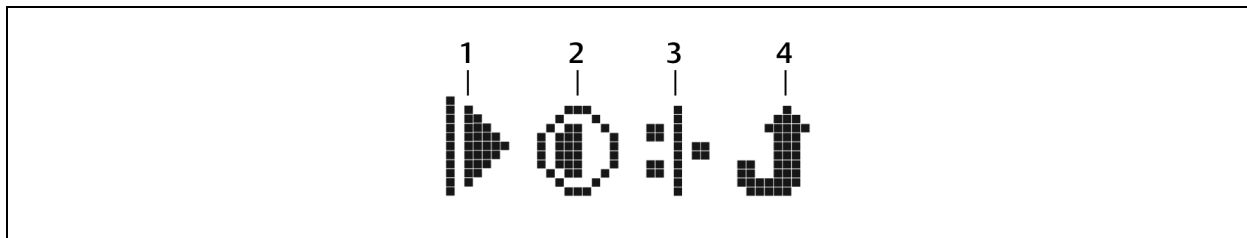


Table 4.2 System Option Icon Descriptions

ITEM	DESCRIPTION
1	Play icon
2	Adjust screen contrast icon
3	System network icon
4	Return to previous level icon

## 4.2 RPC BDM™ Installation

The RPC BDM comes with a factory-supplied Ethernet cable for connection to the RPC2. If additional or longer cables are needed, use standard Ethernet cables.



#### 4.2.1 Set the IP address for the RPC2 communications module

The RPC2 module and the RPC BDM may be used on a network or on standalone rack PDUs. Either mode requires initializing the RPC2 module with an IP address before the RPC BDM can display data.

Follow the appropriate steps to initialize the RPC2 module in a network or standalone environment.

##### To initialize an RPC2 module in a network environment:

1. Use an Ethernet cable to connect the network port to the network.
2. Use DHCP to have an IP address assigned to the network port automatically.

-or-

If DHCP is not used, use an Ethernet cable to connect the Expansion/Management port to a laptop. Then assign a static IP address to the network port. Click *Restart* to initialize the RPC2 module.

##### To initialize an RPC2 module in standalone mode (non-networked):

1. Use an Ethernet cable to connect the link port to a laptop.
2. Assign a static IP address to the LAN port, then click *Restart* to initialize the RPC2 module. After the RPC2 is initialized, the IP address can be viewed on the RPC BDM.

#### 4.2.2 Connect the RPC BDM to the RPC2 communications module

##### To connect the RPC BDM to an RPC2 communications module:

1. Connect one end of the factory-supplied Ethernet cable into the RPC BDM port.
2. Connect the other end of the cable into the display port of the RPC2 module. Once the rack PDU is turned on with these connections made, the RPC BDM is fully operational.

#### 4.3 Placement of the RPC BDM™

The RPC BDM can be mounted in various locations inside a rack for easy access and viewing. It can also be handheld and used as a portable device for connecting to different rack PDUs. The device can be rotated for vertical or horizontal display.

#### 4.4 RPC BDM Operation

The PDU Explorer hierarchy provides three levels for viewing Rack PDU data: PDU, branch and receptacle. The PDU level is the default view.

Figure 4.4 BDM Hierarchy

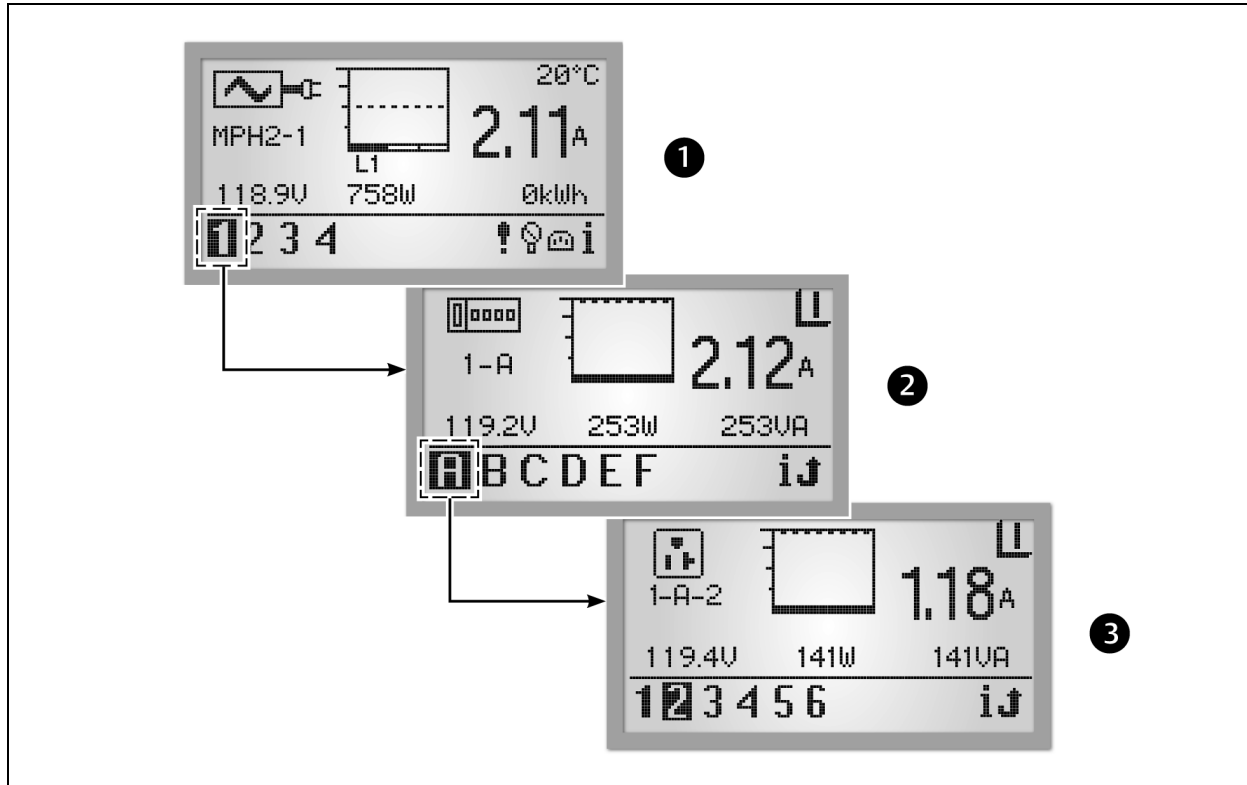


Table 4.3 BDM Hierarchy Descriptions

ITEM	DESCRIPTION
1	PDU Level
2	Branch Level
3	Receptacle Level

The icon in the upper-left corner of the screen identifies the component type, PDU, branch or receptacle. The highlighted ID number in the lower-left corner indicates which component is currently displayed, for example PDU 1, Branch A, Receptacle 5. A selected component blinks while data about it is displayed.

The component data includes a graph, amperage and status (V, W, VA for branch/receptacle). Navigation buttons appear in the lower-right corner of each screen. When any events are detected, the display changes to the PDU view and an Active Events icon appears in the lower-right corner.

#### 4.4.1 PDU level

Select a PDU number in the lower-left corner to highlight it. The screen displays information for the selected PDU. The following figure is an example of data for PDU #1, one of two PDUs that are communicating with the BDM unit. The PDU view displays information collected at the PDU input point for each of the three input phases: L1, L2 and L3. Up to three phases can be used.

Figure 4.5 PDU Level View

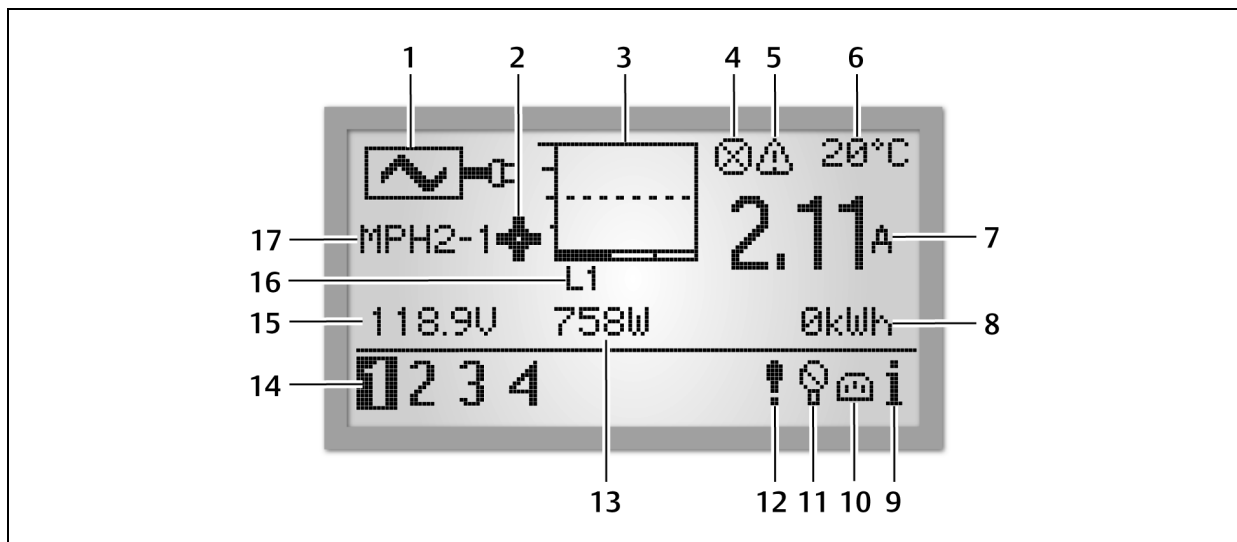


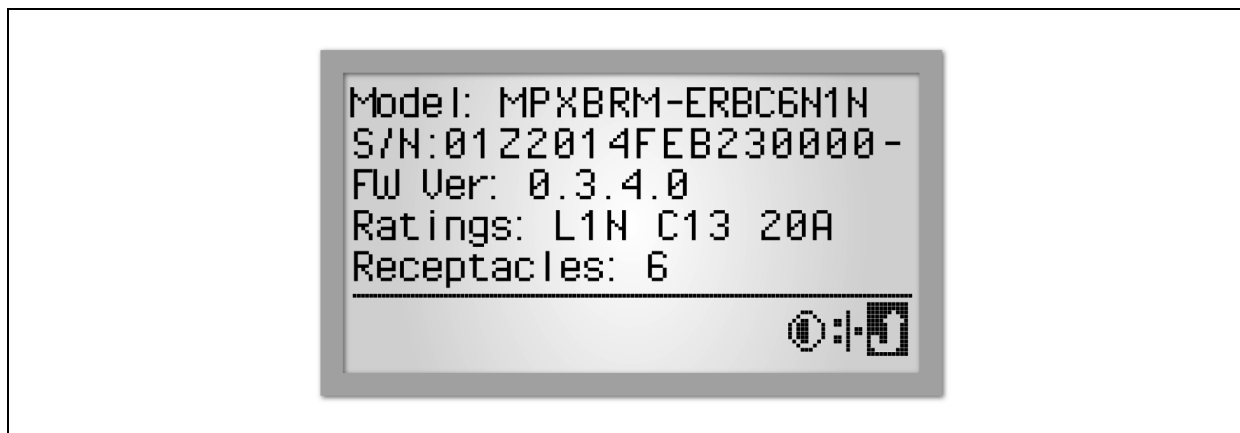
Table 4.4 PDU Level View Descriptions

ITEM	DESCRIPTION	ITEM	DESCRIPTION
1	Input-level metered information icon	9	Information icon
2	Configuration wheel	10	Receptacle icon
3	Bar graph of input current	11	Sensor icon
4	Active alarm	12	Alarm icon
5	Active warning	13	Real Power (Watts)
6	Temperature	14	Unit identification
7	Current	15	Voltage
8	Energy	16	Voltage phase
		17	Unit identifier

NOTE: On the PDU level, the BDM device displays temperature in Celsius or Fahrenheit if a temperature sensor is attached.

NOTE: The unit identification always shows 1 if connected to a single rack PDU, or shows all units (up to four) if connected to a rack PDU array.

Figure 4.6 PDU System Information Screen



To view PDU system information:

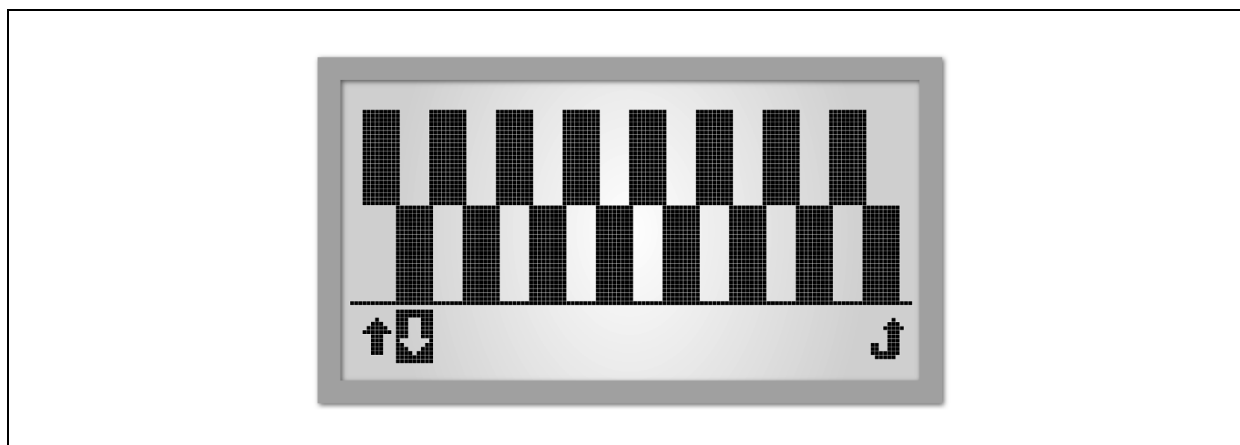
1. Use the scroll button to highlight the *Information* icon.
2. Press the scroll button to display the PDU model number, serial number, firmware version, power rating and number of receptacles.

**NOTE:** The energy measurement (#8 in the PDU Level View Descriptions table) reaches a display limit at 99.99 MW-h. The unit's energy display must be reset to restore the displayed values.

#### 4.4.2 RPC BDM contrast

The RPC BDM is factory set to be easily viewed in common lighting conditions. Contrast adjustment may improve screen legibility in a highly lit environment.

Figure 4.7 Contrast Screen



**NOTE:** Both lighting conditions and high-temperature operation can affect contrast and, as a result, require an adjustment.

To adjust the contrast of the RPC BDM:

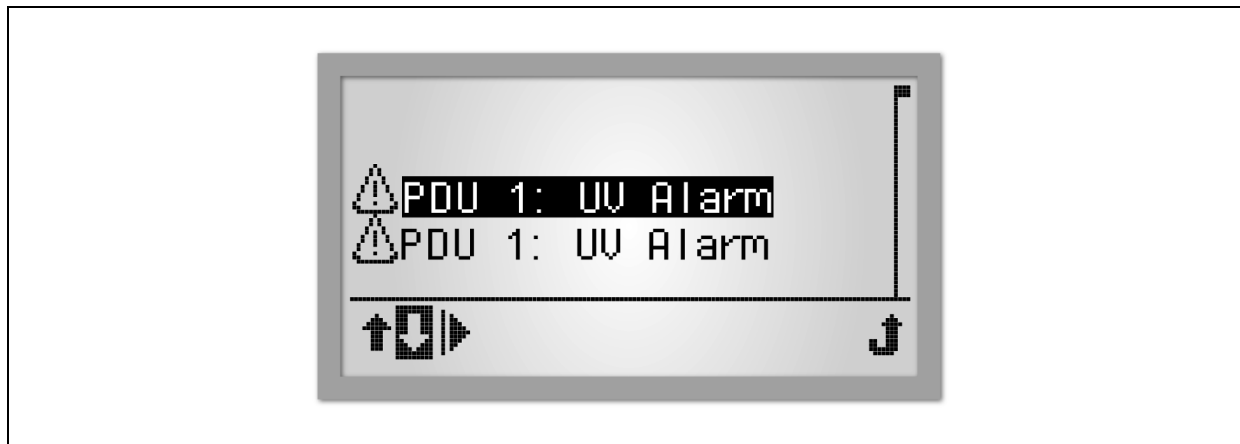
1. Use the scroll button to highlight the *Information* icon.
2. Press the scroll button to display the *Information* screen. Use the scroll button to highlight the *Contrast* icon and press the scroll button to display the *Contrast* screen.

- Use the scroll button to highlight the up or down arrow keys, then press the scroll button to increase or decrease the contrast. When the contrast of the pattern on the screen is satisfactory, use the scroll button to highlight the Return icon and press the scroll button to return to the Information screen.

#### 4.4.3 Active alarms

The most recent alarms appear at the top of the list. Use the device's scroll button to review the list of active alarms.

Figure 4.8 Alarm List Screen



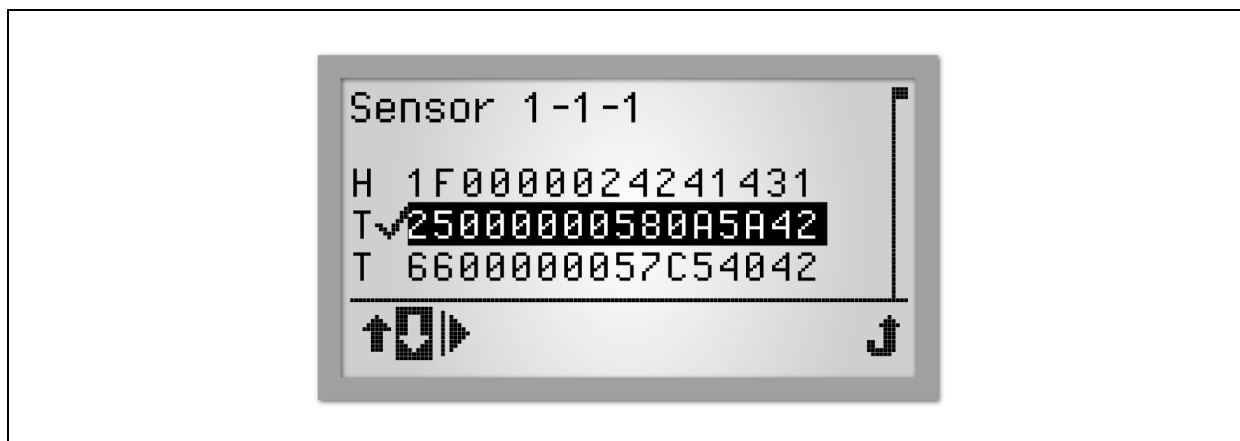
To view active alarms:

- Use the scroll button to highlight the Alarm icon.
- Press the scroll button to display a list of active alarms.
- Use the scroll button to highlight the up or down arrow keys to highlight an alarm.
- Use the scroll button to highlight the Play button and press the scroll button to display the alarm details.

#### 4.4.4 Sensors

The default label is the sensor's serial number, but it can be changed through the web interface.

Figure 4.9 Sensor List Screen

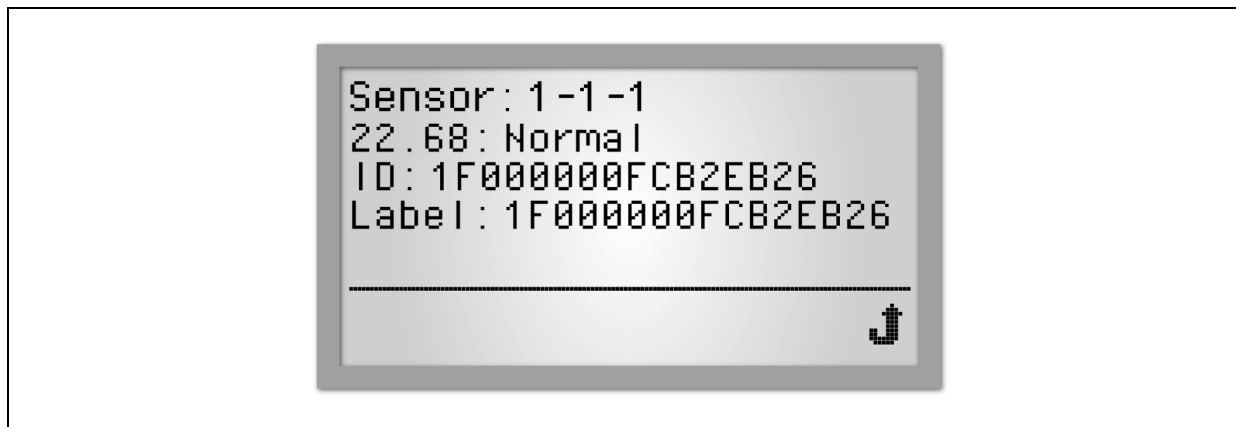


To view sensor information:

- From the PDU level, use the scroll button to highlight the sensor icon and then press the scroll button to display a list of sensors in the order of their identification number.

2. Use the arrow keys to highlight a receptacle and press the scroll button to select it.
3. Highlight the Play button and press the scroll button to display the sensor information. The following example shows temperature sensors and one humidity sensor.

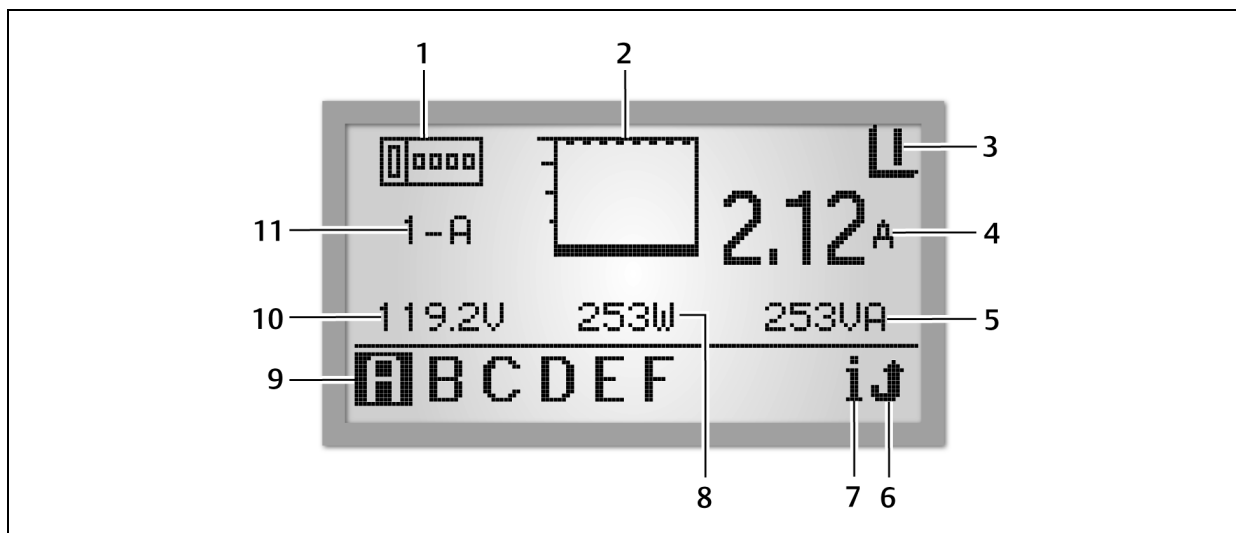
**Figure 4.10 Sensor Information Screen**



### Branch level

The availability of branch information depends on the capabilities of the PDU. Branch information and PDU information are the same for rack PDUs without branch management; that information is seen at the PDU view level. The following figure is an example having data for Branch A, with one of two branches on PDU #1 communicating with the RPC BDM unit. You can view the information by selecting a branch. For MPH2 PDUs, the branch level is represented by alphabetical characters. For MPH and MPX PDUs, the branch level is represented by numerical characters.

**Figure 4.11 Branch PDU Level View**



**Table 4.5 Branch Level View Descriptions**

ITEM	DESCRIPTION	ITEM	DESCRIPTION
1	Branch-level information icon	7	Information icon
2	Current bar graph	8	Real Power (Watts)

ITEM	DESCRIPTION	ITEM	DESCRIPTION
	Branch circuit-breaker status icon.		
3	I = closed circuit breaker O = open circuit breaker	9	Branch ID
4	Amperage (A)	10	Voltage (V)
5	Apparent Power (VA)	11	Branch identifier
6	Return icon		

To view data for a branch module:

1. Use the scroll button to highlight a letter in the lower-left corner.
2. Press the scroll button to display the data for the selected branch module.

### Receptacle level

The availability of receptacle information depends on the capabilities of the rack PDU. The following figure is an example of data for Receptacle 2, which is one of six receptacles on Branch A of PDU 1 that are communicating with the RPC BDM unit.

Figure 4.12 Receptacle Level View

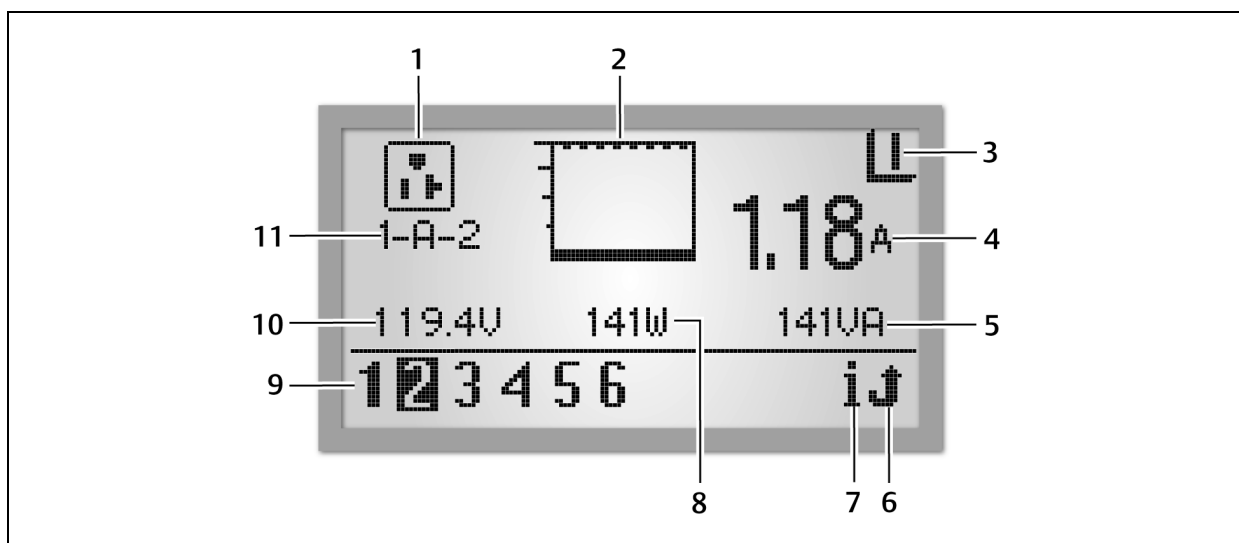


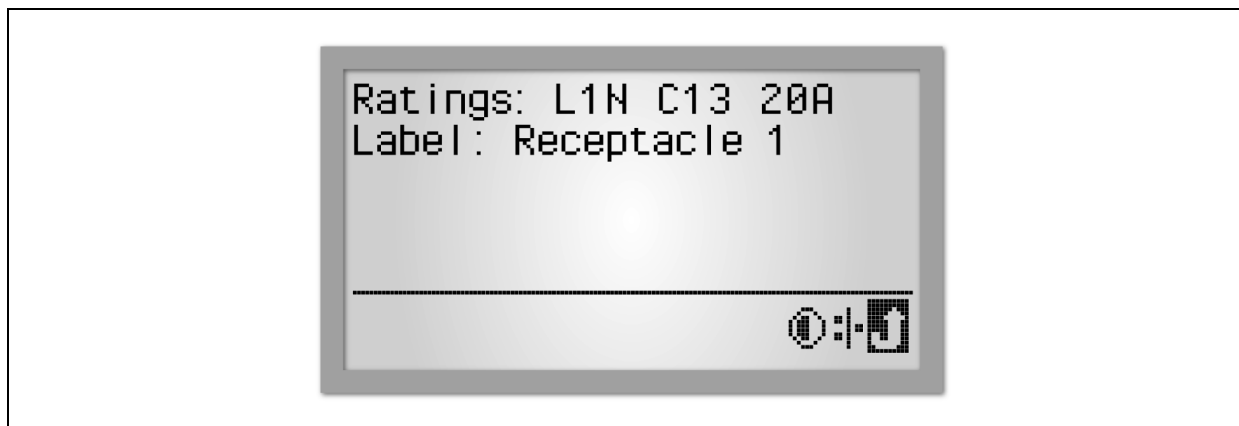
Table 4.6 Receptacle Level View Descriptions

ITEM	DESCRIPTION	ITEM	DESCRIPTION
1	Component Identification	7	Information icon
2	Current bar graph	8	Real Power (Watts)
3	Receptacle Power Status	9	Receptacle ID
4	Amperage (A)	10	Voltage (V)
5	Apparent Power (VA)	11	Receptacle identifier
6	Return icon		

To view data for a receptacle:

1. Use the scroll button to highlight a receptacle number in the lower-left corner.
2. Press the scroll button to display the data for the selected branch module.

Figure 4.13 Receptacle Information Screen



To view receptacle level information:

1. Select the Information icon in the receptacle view.
2. Select the receptacle to be viewed.
3. Use the RPC BDM's scroll button to highlight a receptacle in the list. If a scroll bar appears on the right, use the page up and page down icons to display the rest of the list.
4. Press the scroll button to select the highlighted receptacle. The screen displays the PDU Explorer view for the selected receptacle.

#### 4.4.5 Types of data available at PDU, branch and receptacle levels

The following table shows the types of data available at each level. Branch and Receptacle data may vary depending on the rack PDU capabilities.

Table 4.7 Monitoring Data Available on the RPC BDM Via the PDU Explorer

DATA AVAILABLE	PDU	BRANCH	RECEPTACLE
Bar graph of power utilization	Yes (each phase)	Yes	Yes
Amperage of selected module	Yes (each phase)	Yes	Yes
Voltage of selected module	Yes	Yes	Yes
Wattage of selected module	Yes	Yes	Yes
VA of selected module	No	Yes	Yes
State: On/Off	Not applicable	Yes	Yes

#### 4.4.6 Viewing active events

When an event is detected, the display switches to the PDU view with an Active Events icon in the lower-right corner of the screen. The information view displays a list of events with icons to indicate severity.

To view an active event:

1. Scroll to the Active Events icon, then press the scroll button to select it.
2. Scroll to an event, then press the scroll button to view the event's details.



## 5 LIEBERT® SN™ SENSOR INSTALLATION (OPTIONAL)

The RPC2 module is designed to monitor Liebert® SN™ integrated and modular sensors:

- Integrated sensors are attached to a single cable. These Liebert® SN™ sensors are available in several varieties, including single or multiple temperature sensors.
- Modular sensors are separate probes shipped with a cable for connection to the RPC2 communications module.
- Liebert® SN™ sensors can be connected in a string, including a combination of modular and integrated sensors.
- The maximum string length is 65.6 ft. (20 m).
- The maximum number of probes that can be connected to a Vertiv™ MPH™ or MPX™ is 10. Refer also to the quick-start guides for integrated (SL-20840) and modular (SL-52405) sensors. See the sensor quick-start guides for details on the number of probes in each type of sensor. Liebert® SN™ sensors can be placed in any area, for example, in a Knurr® rack, to monitor conditions such as temperature and humidity levels or the state of a contact.

### 5.1 Record the Sensor Address

During configuration, the web interface displays the addresses of all connected sensors. You need to be able to identify which address belongs to each sensor. Be sure to make a note of each sensor's address before mounting and connecting sensors. The sensor address can be found on the sensor itself (modular sensors) or the RJ45 end of the sensor cable (integrated sensors).

### 5.2 Mount the Sensor

The sensor may be mounted in a Vertiv™ rack or another type of rack. For temperature and humidity sensors, be sure to choose a place with unobstructed airflow, for example, on the rack door. Check to make sure the sensor does not cover any vents that might impede airflow.


Search for Liebert®SN™ Sensors at [www.VertivCo.com](http://www.VertivCo.com) and refer to the modular or integrated sensor quick-start guide for detailed instructions on each of the following four options:

- Mount on a Knurr rack frame or 19-inch rail
- Mount the sensor on the rack door
- Mount the sensor on a flat surface
- Mount the sensor on the rack rails

### 5.3 Connect the Sensor

Each sensor is shipped with a cable to connect to the Liebert® SN™ port on your Liebert® product. The RPC2 must be installed before the sensor can be connected.

**Table 5.1 Liebert® SN™ Port Description**

ICON	NAME	DESCRIPTION
	Liebert® SN™ Port	Use this port ONLY to plug in optional sensor accessories.

To connect the sensor:

1. After securely mounting the sensor, determine the location of the Liebert® SN™ port, identified by the icon in the previous table.
2. Insert the RJ45 connector end of the sensor cable into the Liebert® SN™ port on the Liebert® product.

**NOTE: When adding sensors to a string, disconnect the entire string from the sensor port and wait one minute, then reconnect the string to the port. When the string is reconnected to the sensor port, all information is retained for sensors existing in a string prior to adding the new sensor.**

## 5.4 Confirm the Module Change

After connecting the sensor, you must acknowledge the change via the web interface before the sensor can be monitored. The viewing area in the right pane displays the data in the following table. Module changes must be acknowledged before remote management is enabled or disabled.

**Table 5.2 Module Change Descriptions**

ELEMENT	DESCRIPTION
Module Serial Number	Displays the serial number for each listed module.
Module Type	Indicates the kind of component, for example, auxiliary sensor string.
Added	Indicates a module is connected to the rack PDU.
Removed	Indicates a module is disconnected from the rack PDU.

To confirm the module change:

1. From the System tab, click *Device Change* in the left pane to display a list of the added or removed PDU components that are not acknowledged.
2. Click the Acknowledge icon to accept the changes.

**NOTE:** After a module is disconnected from the rack PDU and the change is acknowledged in the Device Change window of the System tab, the module's information is removed from the system. If that same module is later reinstalled, it must be reconfigured as a new module. Acknowledge the addition of the reconnected module in the Module Changes option of the Control tab, then make other configuration changes as needed.

## 6 APPENDICES

The following tables display electrical and physical specifications and also communication interfaces and agency approval.

### Appendix A: Specifications

**Table 6.1 Electrical and Physical Specifications**

PARAMETER	LIMITS
Voltage	7-12 V DC
Power	6.5 W Maximum
Operating Temperature Range,	41 to 140 (5 to +60) °F (°C)
Ambient Storage Temperature Range,	-40 to 140 (-40 to +60) °F (°C)
Relative Humidity	0% to 95% (non-condensing)
Maximum Operating Altitude, ft. (m)	6560 (2000)
Dimensions, WxDxH, in. (mm)	4.0 x 0.84 x 1.78 (101.6 x 21.3 x 45.2)

**Table 6.2 Communication Interfaces and Agency Approval**

COMMUNICATION PORTS	DESCRIPTION
Ethernet	2 (one 10/100/1000Mbps Port; one 10/100Mbps Port)
I2C	1 (interface to the RPC BDM)
EIA562 RS-232	1 (interface to Avocent appliances)
1-Wire	1 (interface to Liebert 1-wire sensors)
USB	1 (supports memory stick configuration)
Safety Standards	(Vary by model and region) IEC 60950-1:2005 (2nd Edition) + Amendment 1:2009 CSA C22.2 NO. 60950-1-07 (2nd Edition) + Amendment 1:2009 UL 60950-1 (2nd Edition) + Amendment 1:2009 IECEE CB Full Certification Scheme
EMC Standards	(Vary by model and region) FCC Class A, Part 15, Industrial EN55022:2006+A1:2007, Class A, Industrial EN55024:1998+A1:2001+A2:2003, Class A, Industrial IEC61000-3-2:2006, IEC61000-3-3:1995+A1:2001+A1:2005 IEC61000-4-2/3/4/5/6/8/11
Agency Approvals	(Vary by model and region) UL, cUL, CE, BV, PSE, CB, RoHS, REACH, WEEE

## Appendix B: Troubleshooting

The following table contains recommended actions for troubleshooting.

**Table 6.1 Troubleshooting**

CATEGORY	ISSUE	RECOMMENDED ACTION
Configuration	The USB memory stick does not cause the rack PDU to beep when first inserted.	<p>Confirm the USB Type A connector is firmly connected to the Micro Type B adaptor.</p> <p>Confirm the memory stick is not full.</p>
Login	Login fails but the correct credentials were entered.	<p>If logging in as an administrator, confirm using the default administrator credentials (<b>admin/admin</b>).</p> <p>Delete the browser cache and restart the browser, then retype the IP address in the URL field. Login window may be slow to display the first time.</p>
	Session closes unexpectedly.	Confirm the Inactive Session Timeout from the System-Manage Protocol window is configured with the desired value.
Firmware Update	Displays an error screen before the image is uploaded.	Restart the RPC2 module and try again.
	Networking disruption occurs in the middle of an update.	Browse to the refreshed URL and try again. The RPC2 module and its devices are fully recoverable.
Notification	Power outage occurs in the middle of an update.	Wait for restart of the RPC2 module and try again. The RPC2 module and its devices are fully recoverable.
	A large error icon displays but the source of the error is not found.	<p>Check the Sensor window for errors caused by improperly configured thresholds.</p> <p>Acknowledge a device change, if any are pending.</p>
Settings	Email and SMS From and To fields do not accept entries.	Confirm the text string does not exceed 124 characters.
	Settings change did not take effect.	<p>The green checkmark must be clicked to save changes.</p> <p>Confirm whether a power cycle or restart of the RPC2 module is required.</p>
	When local time is configured for an MPH or MPX rack PDU, the time is incorrect after a restart or power cycle.	The MPH and MPX rack PDUs do not support real-time clock hardware. Configure the time using an NTP server.
Rack PDU Array	The SNMP community string is not accepted.	Do not use a semicolon in the name.
	Default SNMP community strings are not working.	Confirm using the default ENPRackPDU_RO and ENPRackPDU for read and write community strings.
	After login, not all devices' measurements are shown.	<p>Wait a few minutes until the rack PDU array is fully discovered and ready to report all data.</p> <p>Confirm the link cable is connected to the link port.</p> <p>Disconnect the link cable to the upstream RPC2 module, wait 30 seconds and reconnect.</p> <p>Perform a hardware reset of the upstream unit or remove and reinstall it to cause a power cycle.</p>
General	The sibling RPC2 module is not discovered.	<p>Delete the browser cache and restart the browser. The login window may be slower to display.</p> <p>Increase the window size to view all tabs.</p> <p>Check the browser compatibility in the firmware release notes.</p>
	Graphics don't display correctly or show incomplete information.	<p>Confirm the device and agent firmware versions are the latest releases from the System-Support-Devices window. Read the RPC2 module release notes for a description of new features, changes and fixes. Perform a firmware update if needed.</p>
	Some features are not working correctly or are unavailable.	

CATEGORY	ISSUE	RECOMMENDED ACTION
Network Ports	The LAN facing RPC2 module does not report a valid IP address in the subnet range, but displays 192.168.1.x on the MPH2 rack PDU onboard LCD or RPCBDM-1000 module.	<p>Confirm the LAN cabling is connected to the LAN port.</p> <p>Confirm the link LED is solid green and the status LED is flashing yellow.</p> <p>Disconnect the LAN cable, wait 30 seconds and reconnect.</p>
	Cannot access the link port using the client computer.	<p>Confirm the LAN cable is connected to the LAN port.</p> <p>Confirm the computer's network adaptor's IPv4 properties are compatible with the RPC2 module position in the array. See the laptop IP settings for the RPC2 module addresses.</p>
	Sensors are not discoverable.	<p>Confirm the sensor cable is connected to the sensor port.</p> <p>If adding a sensor to any existing string, make sure to click the discover button on the sensor configuration window.</p> <p>Confirm no more than 10 sensors are connected to a single RPC2 module.</p> <p>Check that sensor cabling is routed away from the power and networking cables.</p> <p>Read RPC2 module technical bulletins about sensor compatibility issues.</p>
Serial Port	There is no serial communication with an Avocent® appliance.	<p>Confirm serial cabling is connected to the serial port.</p> <p>Confirm the correct serial adaptor is used.</p>
Display Port	The BDM is not turned on.	<p>Confirm the BDM cabling is connected to the BDM port.</p> <p>For MPX rack PDUs, confirm the modules are also discovered. If not, then check the integrity of module installation and examine the databus of the MPXPRC for possible debris bridging the traces.</p>
	No data is displayed for MPH2 rack PDUs.	<p>If the BDM was previously used with an RPC-1000 module, attach the BDM to any RPC2 module and perform an RPC2 firmware update to make it compatible. The compatible BDM firmware version is briefly displayed on the splash screen.</p>

## Appendix C: Factory Default Settings

The following table displays the current factory default settings.

**Table 6.1 Factory Default Settings**

LEVEL	SETTING	DEFAULT VALUE
Settings	System Name	System Name
	Description	Description
	Contact Name	Contact
	Location	Location
	Temperature Display	Celsius
	SWOTP Scope	Local
	SWOTP Delay (seconds)	10
	Audible Alarm	Enabled
Network	Time Format	12 hour
	Speed/Duplex	Auto (1000 Mbs/Full Duplex)
	Host Name	RPC2-551831G102C2015DEC150246
	IPv4	DHCP
DNS	IPv6	DHCP
	IPv4	Obtain DNS server automatically
	IPv6	Obtain DNS server automatically
Time	DNS Test	Fully Qualified Domain Name
	External Time Source	NTP Server
	Time Server	pool.ntp.org
Messaging	Synchronize Rate	Hourly
	Email Port	25
	SMS Port	25
	Consolidation Time (seconds)	60 (email and SMS)
Datalog	Consolidation Event Limit (events)	10 (email and SMS)
	Enabled	Yes
	PDU	Enabled
	Branch	Enabled
	Receptacle	Enabled
Manage Protocol	Logging Interval (minutes)	15
	Velocity v.4 Server	Enabled
	SNMP Agent	Enabled
	SSH Support	Enabled
	Telnet	Enabled
	Web Server	Enabled
	Inactive Session Timeout	5 minutes
Maximum Telnet Sessions	5	

LEVEL	SETTING	DEFAULT VALUE
SNMP	SNMP v1/v2	Enabled
	SNMP Traps	SNMP V1
	SNMP UDP Port	161
	SNMP UDP Port	162
	Liebert Global Products MIB	Enabled
	Liebert MIB Traps	Enabled
	Authentication Traps	Enabled
	System Notify Trap	Enabled
	Heartbeat Interval	5 minutes
	SNMPv3	Enabled
Web Server	Web Server	HTTPS
	HTTP Port	80
	HTTPS Port	443
	Refresh Interval (seconds)	30
Authentication	Type	Local
Credentials	Admin	Username: admin
		Password: admin
	Poweruser	Username: pwrusr
		Password: pwrusr
PDU	Over Current Alarm Threshold L1, L2, L3, N	45%
		Over Current Warning Threshold L1, L2, L3, N
	Under Current Alarm Threshold L1, L2, L3	0%
		Unbalanced Load Alarm Threshold
	Branch	Over Current Alarm Threshold
Over Current Warning Threshold		90%
Under Current Alarm Threshold		0%

LEVEL	SETTING	DEFAULT VALUE
Receptacle	State	On
	Over Current Alarm Threshold	95%
	Over Current Warning Threshold	90%
	Under Current Alarm Threshold	0%
	Power Up State	Restore
	Power On Delay	0 seconds
	Power Cycle	8 seconds
	Post On Delay	0 seconds
	Post Off Delay	0 seconds
	SWOTP	Disable
Receptacle Criticality	Critical	









VertivCo.com | Vertiv Headquarters, 1050 Dearborn Drive, Columbus, OH, 43085, USA

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