



Liebert® MPX™ Rack Power Distribution Unit

User Manual - Global Applications

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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IMPORTANT SAFETY INSTRUCTIONS

The following components are covered in this safety section:

- Liebert® MPX™ Power Rail Chassis (PRC)
- Liebert® MPX™ Power Entry Module (PEM)
- Liebert® MPX™ Branch Receptacle Module (BRM)
- Liebert® MPX™ Input Power Cord (IPC)
- Liebert® RPC-1000™ Communications Module
- Liebert® RPC2™ Communications Module

Saving These Instructions



WARNING!

The MPX rack PDU contains hazardous voltage that creates a risk of arc flash and electric shock resulting in equipment damage, injury or death. Follow the warnings and cautions in this document to avoid serious injury or death from electric shock.

Read this manual

This manual contains important safety instructions. Read all safety, installation and operating instructions before installing a Liebert® MPX™ rack PDU. Adhere to all cautions and warnings on the unit and in this manual. Upon installation, follow all operating and user instructions.

Installation location

Install the Liebert MPX rack PDU in a restricted-access location controlled and monitored by a responsible authority where access is only possible through the use of a tool, lock and key or other means of security.

Operate the Liebert MPX rack PDU only in an indoor environment within an ambient temperature range of 32°F to 140°F (0°C to 60°C) with a relative humidity of 5% to 95%, non-condensing. Install it in a clean environment, free of conductive contaminants, moisture, flammable liquids, gases and corrosive substances.

Qualified personnel

Vertiv strongly recommends that the MPX PEM be installed only by an individual who has been properly trained and qualified to perform electrical work.

Only allow personnel who understand the precautions in this manual into the Liebert MPX rack PDU's restricted access location.

Safety-critical applications

Do not use the Liebert MPX rack PDU for safety-critical situations. It is designed to deliver power to information technology and telecommunication equipment, and is not intended for use with life support or other critical devices. If you are uncertain about its application, consult your local dealer or your Vertiv representative.

MPX PEM installation



WARNING! The connectors on the bottom of the MPX PEM are energized with hazardous voltage when it is connected to power.



WARNING! Connect input power only after the MPX PEM is properly installed on the MPX PRC and the MPX IPC is properly connected to the MPX PEM.



WARNING! The MPX PEM is not hot swappable. Never remove an MPX PEM from the power distribution unit while input power is connected. Disconnect power before unlocking the connector screws that attach the MPX PEM to the MPX PRC.



WARNING! Connect only one MPX PEM to an MPX PRC. Failure to comply can result in serious injury or equipment damage.

Module cover removal and foreign objects

With exception of the communications module cover on the MPX PEM module, never open or remove the cover of any Liebert® MPX™ rack PDU.

Never insert a foreign object into an MPX module, particularly into the MPX PRC, with the exception of the RPC-1000™ and RPC2™ communications modules. Each module has a small hole between the display and sensor RJ45 connectors to reset the card.

MPX module service

Do not attempt to service the Liebert MPX rack PDUs. The modules do not contain user-serviceable parts. If you need support or have questions about your Liebert MPX rack PDU, contact Vertiv™ Technical Support or your local Vertiv representative.

1 INTRODUCTION

The Liebert® MPX™ is an adaptive rack power distribution unit (PDU) built with modular and scalable components that can be installed and reconfigured on-site to meet varying input and output power connectivity needs. For optimal flexibility, ensure that the modules match the power requirements of the application. Failure to do so could result in damage to the Liebert MPX rack PDU and connected components. The Liebert MPX adaptive rack PDU family consists of the following components:

- MPX™ Power Rail Chassis (PRC) - distributes intermodule power and communications and serves as the mounting base for all Liebert MPX rack PDU components.
- MPX™ Power Entry Module (PEM) - delivers power to the Liebert MPX rack PDU and includes provisions for remote and local communication options. Detachable and non-detachable cord models are available.
- MPX™ Input Power Cord (IPC) - a detachable input power cord required for some models of MPX PEM. A variety of single- and three-phase plug types are available.
- MPX™ Branch Receptacle Module (BRM) - distributes overload-protected output power to user loads. The hot swappable design allows for field reconfiguration with a choice of receptacle type, quantities and monitoring/control performance.
- RPC-1000™ and RPC2™ communications modules - optional network interface cards that provide network connectivity, monitoring and control capabilities to rack PDUs from a single network connection and serve as a rack accessory integration point. The communications modules can be installed in the MPX PEM communications card slot.

NOTE: The RPC-1000 and RPC2 communications modules cannot be used together in an array configuration.

NOTE: Effective December 1, 2016, Vertiv ended distribution of the RPC-1000 communications module. If you purchased an RPC-1000 communications module and the extended warranty on or before December 1, 2016, the last effective day of the extended warranty is December 1, 2021, or before, respective to your purchase date. After this date, Vertiv no longer supports the RPC -1000 communications module.

The Liebert MPX rack PDU also comes with an optional display module:

- RPC Basic Display Module (RPC BDM) - optional display for local monitoring of Liebert MPX rack PDUs. It is equipped with a supplied Ethernet cable. However, if the mounting location is not within reach of the supplied cable, a longer field-supplied cable may be used.

Figure 1.1 Liebert® MPX™ Rack PDU Assembly Diagram

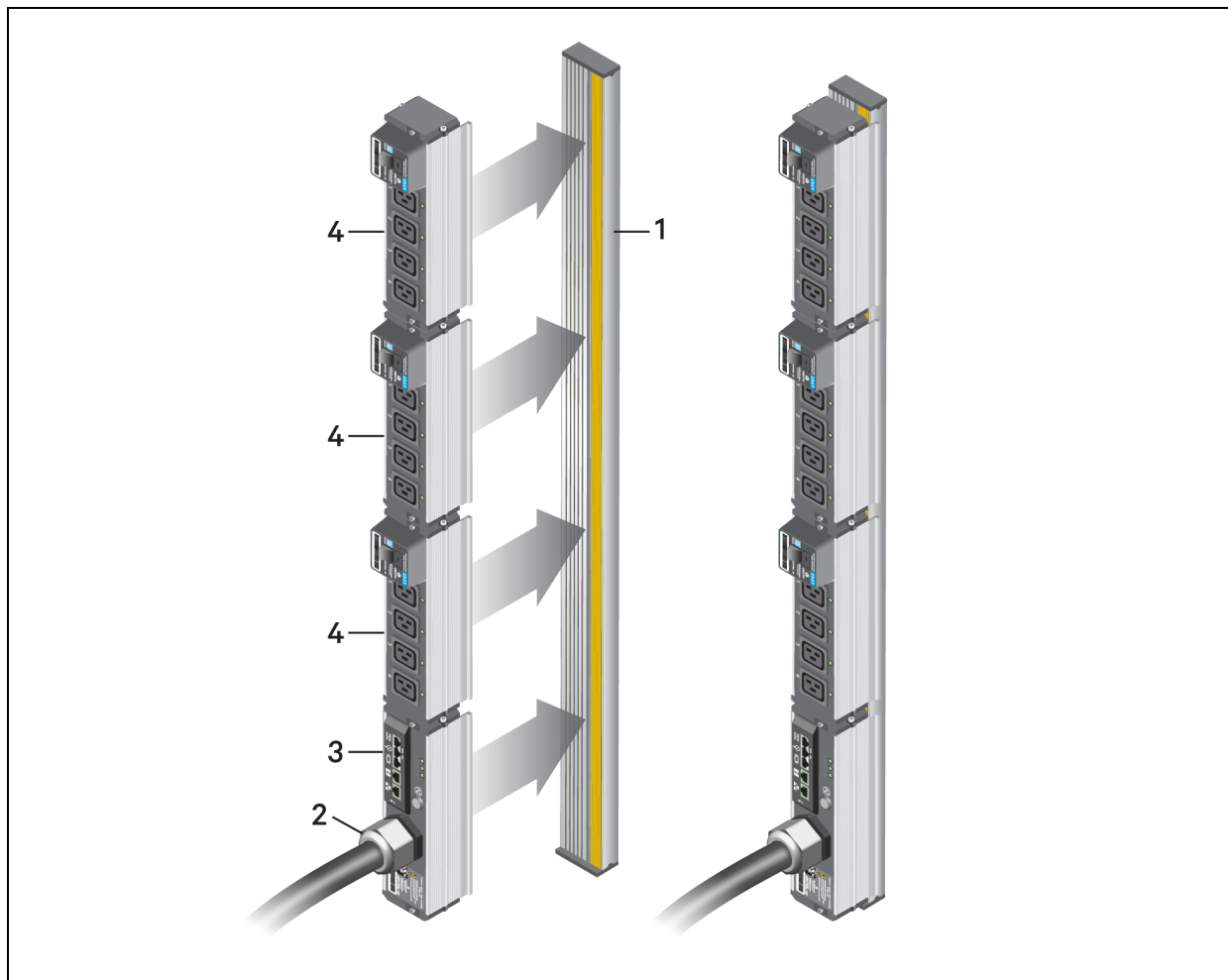


Table 1.1 MPX Assemblies

ITEM	DESCRIPTION
1	MPX PRC
2	MPX PEM
3	Rack PDU Card communications module (RPC2)
4	MPX BRM (three shown connected)

1.1 MPX™ PRC: Power and Communication Bus

The MPX™ PRC is the fundamental building block of the Liebert MPX rack PDU. Power and Communications buses are integrated into the length of the MPX PRC. The MPX™ BRM and MPX PEM lock onto the MPX PRC to facilitate power input and output, monitoring and management, depending on the type of module.

The MPX PRC is available in different lengths to accommodate a single MPXP PEM and up to seven MPX BRMs. The MPX PRC has five power bus channels that allow you to connect the MPX PEM and MPX BRM modules to up to three phases of line, neutral and protective earth. The communication bus allows the Liebert RPC, MPX PEM and MPX BRM modules to communicate with each other.

The MPX PRC has a module connector T-slot for securely attaching the MPX PEM and MPX BRM modules via two latching screws. Spacer covers are available to reserve unused sections of the MPX PRC's surface for future expansion.



WARNING!

Connecting multiple MPX PEMs to one MPX PRC can cause equipment damage, injury or death. Connect only one MPX PEM to an MPX PRC. Connecting more than one MPX PEM could cause cross-conduction. Cross-conduction can cause upstream overcurrent protective devices (OCPD) to trip or the resulting short circuit current to exceed the OCPD Ampere Interrupting Capacity (A.I.C.) ratings.

Items 1 and 2 in the following figure show the top and side view of the MPX PRC to illustrate how to properly seat the component on the MPX rack PDU.

Figure 1.2 MPX PRC Components

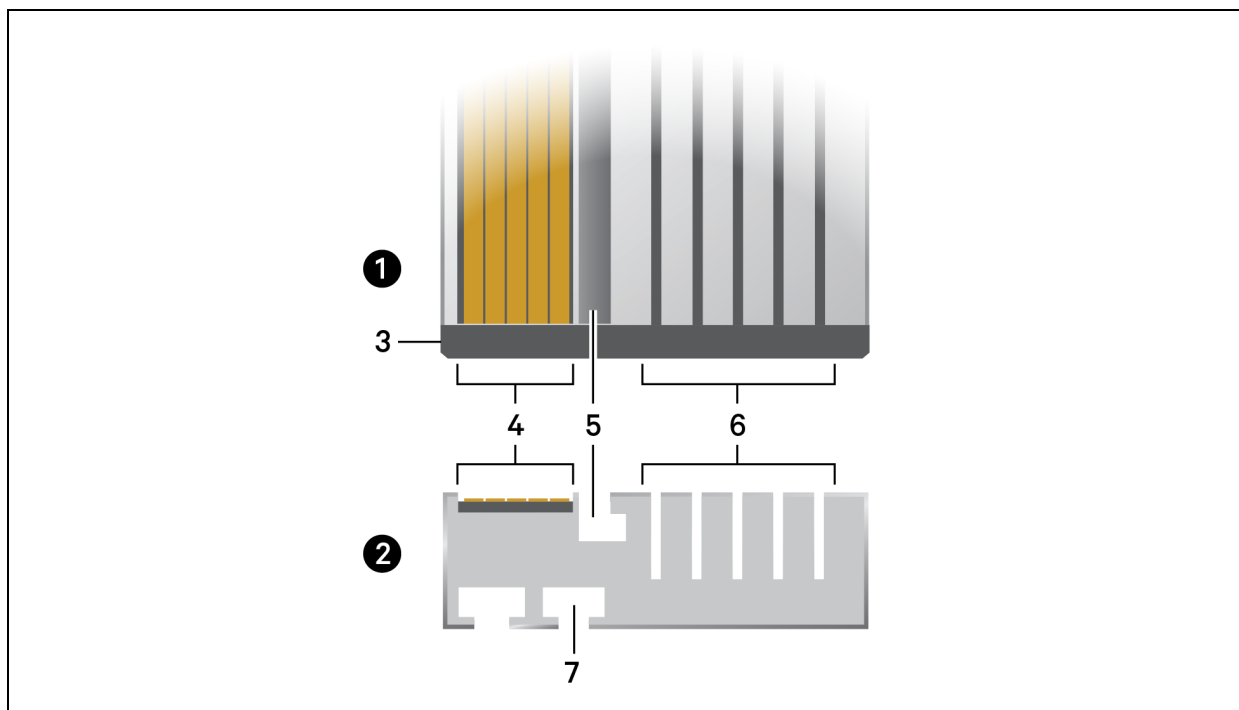


Table 1.2 MPX PRC Components

ITEM	DESCRIPTION
1	MPX PRC top view
2	MPX PRC side view
3	MPX PRC end cap
4	Communication bus
5	Module connector slot
6	Power bus
7	Rail connector T-slots to accommodate spring nuts for mounting

1.1.1 Mounting features

The back of the MPX™ PRC features T-slots running the length of the unit. These can be used for mounting the assembled units in racks.

1.2 MPX™ PEM: Power Input



WARNING! The MPX rack PDU contains hazardous voltage that creates a risk of arc flash and electric shock resulting in equipment damage, injury or death. The power conductors on the bottom of the MPX PEM are energized with hazardous voltage whenever the MPX PEM is connected to power.



WARNING! This unit must be properly and securely installed on the MPX PRC before power is applied. If the MPX PEM is not installed on the MPX PRC, live conductors will be exposed.



WARNING! Vertiv strongly recommends that the MPX PEM be installed only by an individual who has been properly trained and qualified to perform electrical work.



WARNING! Connecting two MPX PEMs to one MPX PRC can cause equipment damage, injury or death. Only connect one MPX PEM to an MPX PRC. Connecting more than one MPX PEM can cause cross-conduction. A cross-conduction will result in an upstream OCPD trip, and may result in a short circuit current that exceeds the OCPD A.I.C. ratings.

The MPX PEM securely fastens to the MPX PRC to deliver polyphase power from the power supply cord to the power bus. You can install the Liebert® RPC2™ communications module in the MPX PEM to monitor and configure the communication bus.

The North American MPX PEM models are available with variable-capacity or fixed-capacity. The European models are available with fixed-capacity only. The power supply cords for both configurations are available in a variety of single- and three-phase NEMA, Schuko and IEC plug styles and ratings. You must connect a detachable MPX™ IPC to the power inlet on the variable-capacity models. (See [Connecting the MPX™ IPC for variable capacity models](#) on page 8.) The power input ratings are determined by the plug type. An MPX IPC can be exchanged for an MPX IPC with a different plug type and rating (single phase, three-phase or ampacity) to adapt it for a different power service configuration.

NOTE: For fixed capacity, the North American models support up to 60 A (48 A) per phase and the European models support up to 63 A per phase. For variable capacity, the North American models support up to 30 A (24 A) per phase and the European models support up to 32 A per phase.

All models, except the elementary model, provide power metering of the polyphase inputs, including individual line voltages and currents, total kilowatts (kW) and total kilowatt hours (kW-h). Additionally, individual line current alarm and operation status are supported. Elementary models of the MPX PEM are available only in Europe and are not equipped with power metering capability.

Other important features include:

- Input phase LEDs to indicate the operational status of each phase of input power.

- Audible alarms that indicate an overcurrent condition. You can test or silence the audible alarm by pressing the *Alarm Silence/Test* button. The audible alarm can be tested by momentarily pressing the button when an alarm condition is not pending or active.
- The Silence/Test button is also used during troubleshooting to confirm the communications module is communicating with each MPX™ BRM (see [Restarting or resetting](#) on page 43).

You can reestablish communication with all the modules and reset the MPX™ PEM by pressing and holding the alarm silence button for more than 5 seconds when no active alarm condition is present. During an MPX PEM reset, the unit's input phase LEDs become dark. The MPX PEM reset function takes approximately 30 seconds. When complete, each MPX BRM displays a numeric value within its Branch Numeric Indicator display window. The MPX PEM reset function does not interrupt critical power to the MPX PEM or any of the MPX BRM modules.

Item 1 and 2 in the following figure shows the variable-capacity MPX PEM and the fixed-capacity MPX PEM. The variable-capacity MPX PEM has quick-connect couplings for a power input cable, while the fixed-capacity model is equipped with a hard-wired power input cable.

Figure 1.3 MPX PEM Features

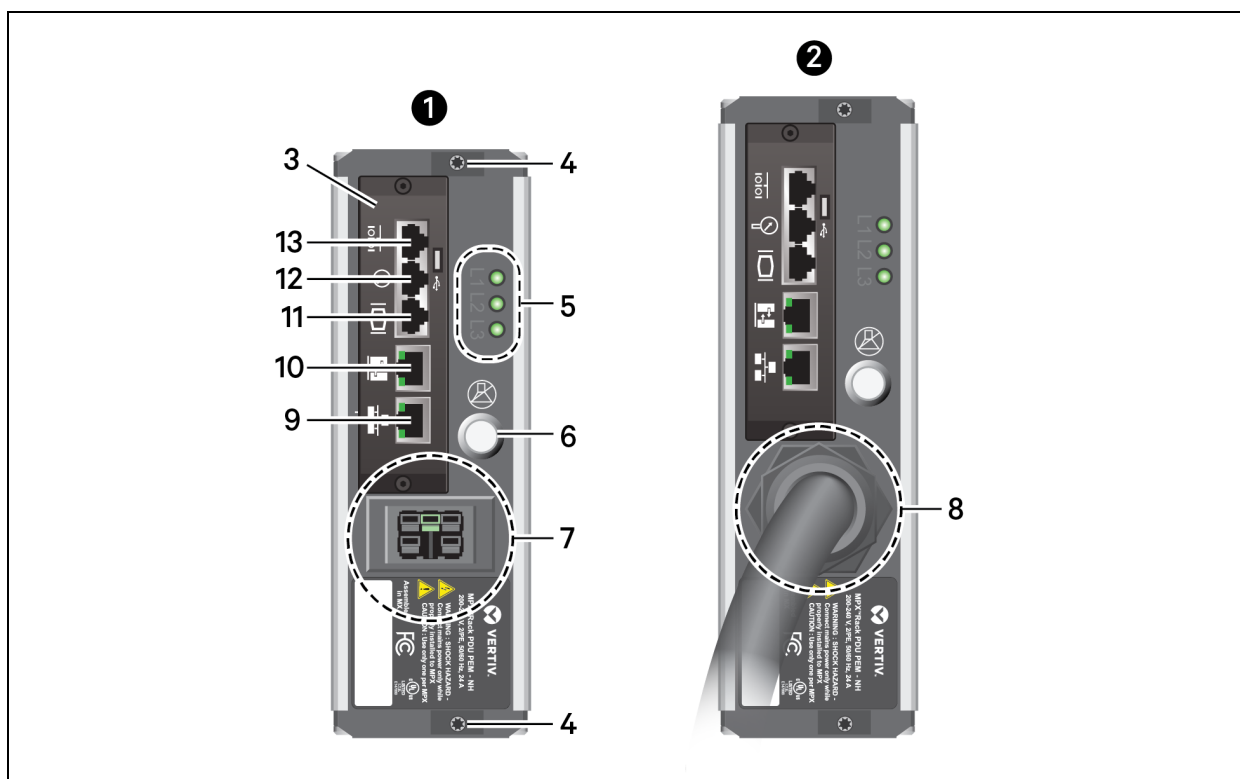


Table 1.3 MPX PEM Features

ITEM	DESCRIPTION
1	Variable-capacity MPX PEM
2	Fixed-capacity MPX PEM
3	RPC2 communications module
4	Latch screws

ITEM	DESCRIPTION
5	Input phase power indicators
6	Alarm Silence/Test button
7	Quick-connect couplings for power input cable (variable-capacity models)
8	Hard-wired power input cable (fixed-capacity models)
	Network port used for:
9	<ul style="list-style-type: none"> Plugging in the Local Area Network (LAN) via an Ethernet cable (not included) Creating a rack PDU array by interconnecting additional rack PDUs
	Link port used for:
10	<ul style="list-style-type: none"> Local configuration through interconnection to a computer Creating a rack PDU array by interconnecting additional rack PDUs
11	Display port used to plug in the optional RPC BDM
12	Port for optional Liebert® SN sensor accessories
13	Command Line Interface (CLI) Serial console port

1.2.1 Connecting the MPX™ IPC for variable capacity models

The MPX IPC is a detachable input power cord that permits changing the input power configuration of variable capacity models of the MPX™ PEM. These changes must be made during planned outages. For detailed installation steps, see the Liebert® MPX™ PEM Quick Installation Guide (SL-20821 Rev6/590-1624-501A).

The MPX IPC is offered only for North American (UL-listed) models. A variety of single- and three-phase NEMA and IEC plug types are also available. The MPX IPC is not compatible with the fixed-capacity MPX PEM.



WARNING! Do not connect the MPX IPC to input power until the MPX PEM is attached to the MPX PRC and the MPX IPC is attached to the MPX PEM. If the MPX PEM is not connected to the MPX PRC, conductors with live hazardous voltage are exposed when power is connected.

Exposed conductors with hazardous voltage can create a risk of arc flash and electric shock which can result in equipment damage, injury or death.

Figure 1.4 MPX IPC Clamp

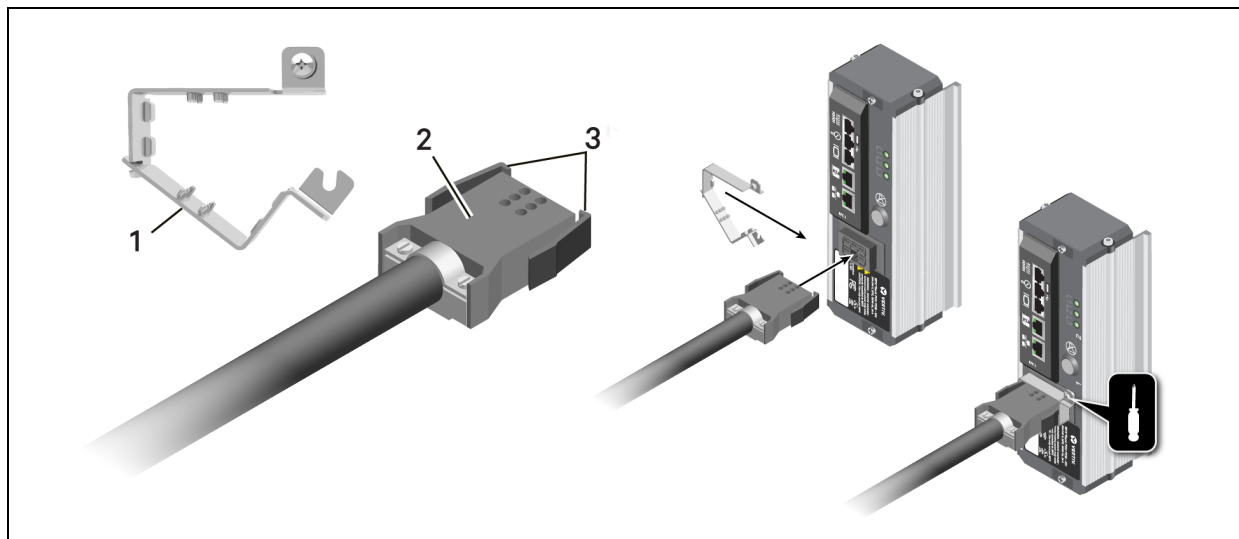


Table 1.4 MPX IPC Clamp

ITEM	DESCRIPTION
1	MPX IPC retention clamp to prevent accidental disconnection (included with MPX IPC assembly)
2	Quick connect power coupling
3	Integrated snap locks

1.3 MPX™ BRM: Power Output

The MPX BRM provides output power distribution to user load equipment. MPX BRMs are available with a variety of combinations of output receptacles such as NEMA, IEC, Schuko and other regional types that are overcurrent-protected by 100% rated hydraulic-magnetic circuit breakers.

MPX BRMs are hot-swappable to allow installation without powering down the Liebert MPX rack PDU. All MPX BRMs include an alphanumeric LED that uniquely identifies the individual module. Each MPX BRM's unique identification is assigned by the RPC2 communications module.

North American and European MPX BRM units are available in the following models:

- Elementary - provides power distribution only; power metering and alarming are not supported.
- Branch Monitoring - provides power distribution and branch power metering, including voltage, current, Watt and VA power, energy and power factor.
- Receptacle Management - provides the same features as the branch monitoring models, plus power metering, including crest factor, on/off control, current alarming and operational status of individual receptacles. The receptacles can be turned on or off remotely and programmed for automatic power-on sequencing.

MPX BRM features include:

- An alphanumeric LED to identify the module.
- The alphanumeric LED display on the branch monitoring and receptacle management models shows operational status of the branch current condition.

- A magnetic hydraulic circuit breaker. If necessary, the circuit breaker can be manually opened by inserting a flat-blade screwdriver into the integrated reset slot. Open circuit breaker detection causes the alphanumeric LED to flash on the Branch Monitoring and Receptacle Management models.
- Color-coded labeling to clearly identify the output-phasing configuration (L1-L2, L2-L3, L3-L1, L1-N, L2-N or L3-N) of the MPX™ BRM receptacles. Voltage phasing is determined by the power blade configuration on the bottom of each MPX BRM. The voltage phasing, for example, "L12", flashes three times on the alphanumeric LED display when the module is first attached.
- IEC C13 receptacle types support attachment of optional retaining clips to provide strain relief for the load's power supply cord.

The Branch Monitoring models provide current alarming and operational status of the branch. The unit displays an “o” for an overcurrent condition and a “u” for an undercurrent condition. The Receptacle Management models include additional LEDs for each receptacle to alert you of the operational status of the receptacle (on or off).

Figure 1.5 MPX BRM

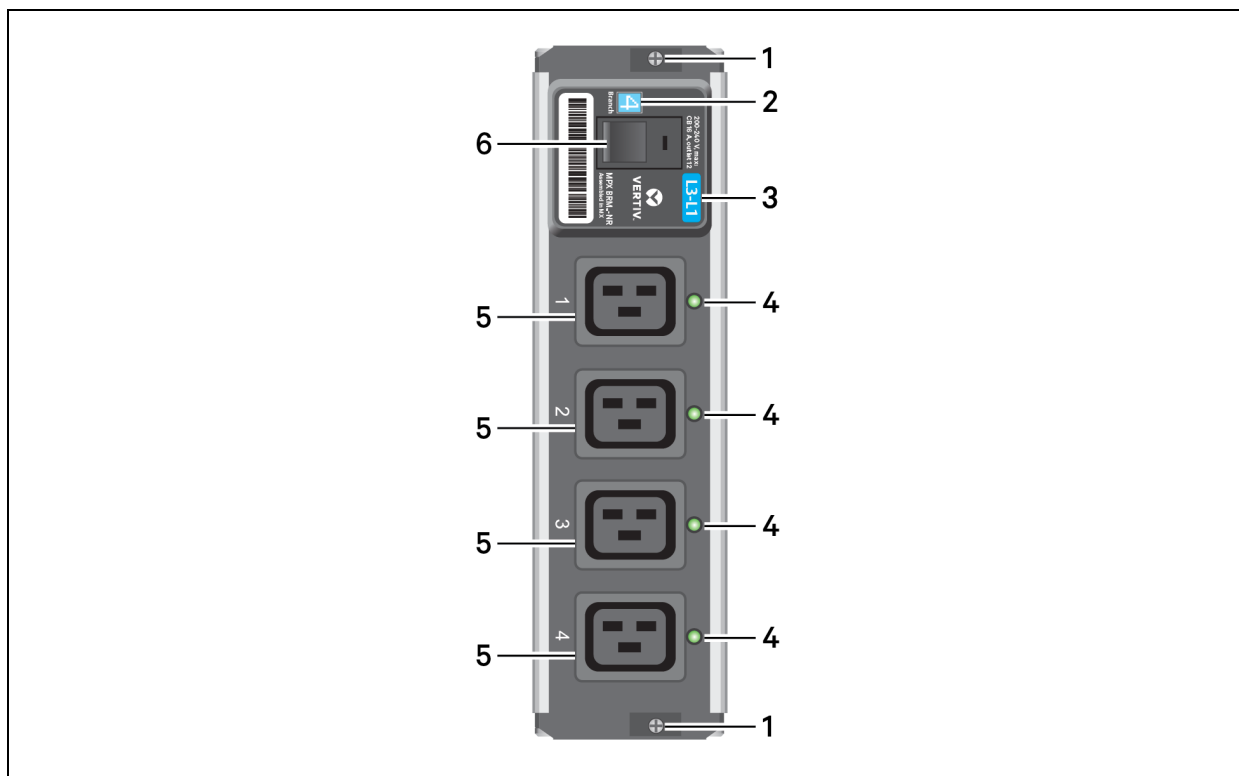


Table 1.5 MPX BRM

ITEM	DESCRIPTION
1	Latch screws
2	LED branch numeric indicator
3	Color-coded receptacle phase label
4	Receptacle on/off indicators (Receptacle Management units only)

ITEM	DESCRIPTION
5	Receptacles
6	Branch-rated circuit breaker (100% rated)

1.4 RPC-1000™ and RPC2™ Communications Modules

NOTE: Effective December 1, 2016, Vertiv ended distribution of the RPC-1000 communications module. If you purchased an RPC-1000 communications module and the extended warranty on or before December 1, 2016, the last effective day of the extended warranty is December 1, 2021, or before, respective to your purchase date. After this date, Vertiv no longer supports the RPC -1000 communications module.

The Liebert MPX rack PDU can be centrally managed, locally and remotely, via either the RPC-1000 or RPC2 communications modules. Refer to the following documents for more information:

- Liebert® RPC™ Web Card User Manual (SL-20825)
- Liebert® RPC2™ Communications Module Installer/User Guide (590-1380-501A)

You can control the Liebert® MPX™ rack PDU and attached devices through the communication module's web interface. For systems connected to an Ethernet network, the web interface uses Simple Network Management Protocol (SNMP). The communications module also serves as the connection point for multiple support capabilities and devices including:

- RPC Basic Display Module (RPC BDM)
- Various optional environmental sensors
- “Sibling” connections to other Liebert MPX or Liebert MPH rack PDU systems

For North American MPX models, the RPC-1000 or RPC2 communications modules are field-installed in the MPX PEM slot. European MPX models are equipped with factory-installed communications modules on monitored MPX PEMs.

1.4.1 RPC-1000 Communications Module

The RPC-1000 communications module is equipped with two RJ45 jacks for connecting to external devices and requires no custom cables. See the following figure and table for port descriptions.

Figure 1.6 RPC-1000™ Communications Module

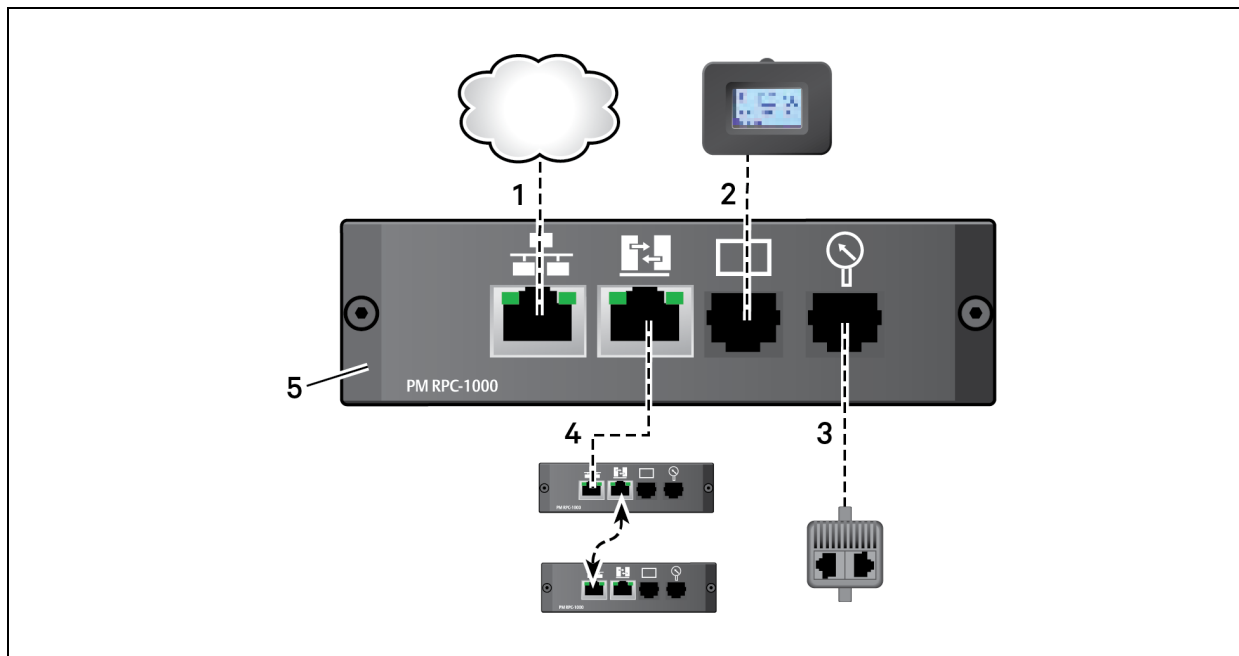


Table 1.6 RPC-1000 Communications Web Card Port Descriptions

ITEM	PORT	DESCRIPTION
1	Network	Used for: <ul style="list-style-type: none"> • 10/100 Mbps LAN connection via an Ethernet cable (not included). • Creating an optional rack PDU array by interconnecting additional Vertiv rack PDUs.
2	Display	Used to connect the optional RPC BDM.
3	Sensor	Used to connect optional Liebert® SN sensor accessories.
4	Link	Used for: <ul style="list-style-type: none"> • Local configuration through interconnection to a computer. • Creating an optional rack PDU array by interconnecting additional Vertiv rack PDUs.
5	Not applicable	RPC-1000 Communications web card

1.4.2 RPC2™ Communications Module

The RPC2 communications module has three RJ45 jacks for connecting to external devices and requires no custom cables. See the following table for port descriptions.

Figure 1.7 RPC2™ Communications Module

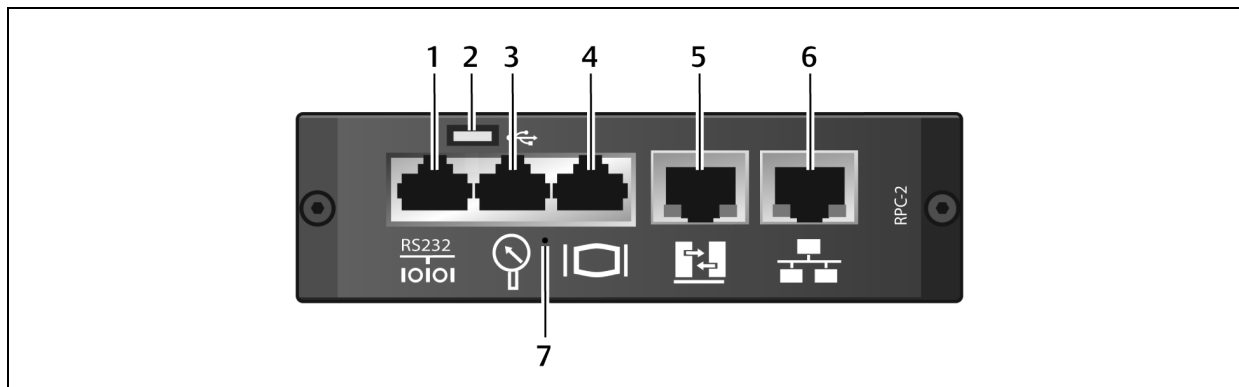


Table 1.7 RPC2 Communications Module Port Descriptions

ITEM	PORT	DESCRIPTION
1	Serial	Used for the RS232 serial console using the CLI
2	USB Micro-AB	Used for the USB memory stick
3	Sensor	Used to connect optional Liebert® SN sensor accessories
4	Display	Used to connect the RPC BDM
5	Link	Used for: <ul style="list-style-type: none"> Local configuration through interconnection to a computer Creating an optional rack PDU array by interconnecting additional Vertiv rack PDUs
6	Network	Used for: <ul style="list-style-type: none"> 10/100/1000 Mbps LAN via an Ethernet cable (not included) Creating an optional rack PDU array by interconnecting additional Vertiv rack PDUs
7	Reset button access hole	Used to reboot or reset the module to its factory default settings

1.4.3 Accessing information on the RPC BDM

The RPC BDM is an optional local display that shows monitored data from all connected Liebert® MPX™ and Liebert MPH rack PDU systems. You can access display information from a navigation switch on the RPC BDM. The switch is located beneath the Vertiv logo on the RPC BDM. It is connected by a cable to the communications module which allows you to locate the display for a local reading.

The RPC BDM comes with a connector cable and mounting provisions. You can connect up to four rack PDUs in a rack PDU array to a single display.

For detailed BDM operation instructions, see the Liebert® RPC2™ Communications Module Installer/User Guide.

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2 INSTALLATION AND ASSEMBLY



WARNING! You must complete all configuration steps before turning on equipment connected to the Liebert MPX rack PDU. Never work on energized equipment.

2.1 Installing the MPX™ PRC in a Rack

Vertiv™ recommends installing the MPX PRC in the rack before attaching the MPX™ PEM and MPX™ BRM modules to the MPX PRC.

Before installation, consider the number of cables to be routed in the rack. Placing the MPX PEM at the end of the MPX PRC that is nearest the entry point for its input power cable can ease cable routing and help separate control and power cables to reduce electromagnetic interference.

The following mounting hardware is included with the Liebert MPX rack PDU:

- Two Z-shaped brackets
- Two L-shaped bracket
- Six spring-nuts, M5
- Six screws, M5x10
- Two mounting screws

You will need the following tools for installation:

- Slotted screwdriver
- 4 mm Allen wrench

2.1.1 Preparing the Liebert MPX rack PDU for mounting

To prepare the Liebert MPX rack PDU for mounting:

1. Insert two spring nuts into the T-slot on the back of the MPX PRC, one near either end (see [Installing the MPX™ PRC Mounting Button](#) on page 16).
2. Position each spring nut where the bracket will be installed by pressing down on the spring nut with a small, pointed object and sliding it into place.

NOTE: Either the L- or Z-shaped brackets can be used to secure the MPX to the intended mounting position.

3. Thread an MPX mounting screw into the spring nut and tighten, but leave enough space for the bracket to slip over the screw's head to rest on the body of the screw.

Figure 2.1 Installing the MPX™ PRC Mounting Button

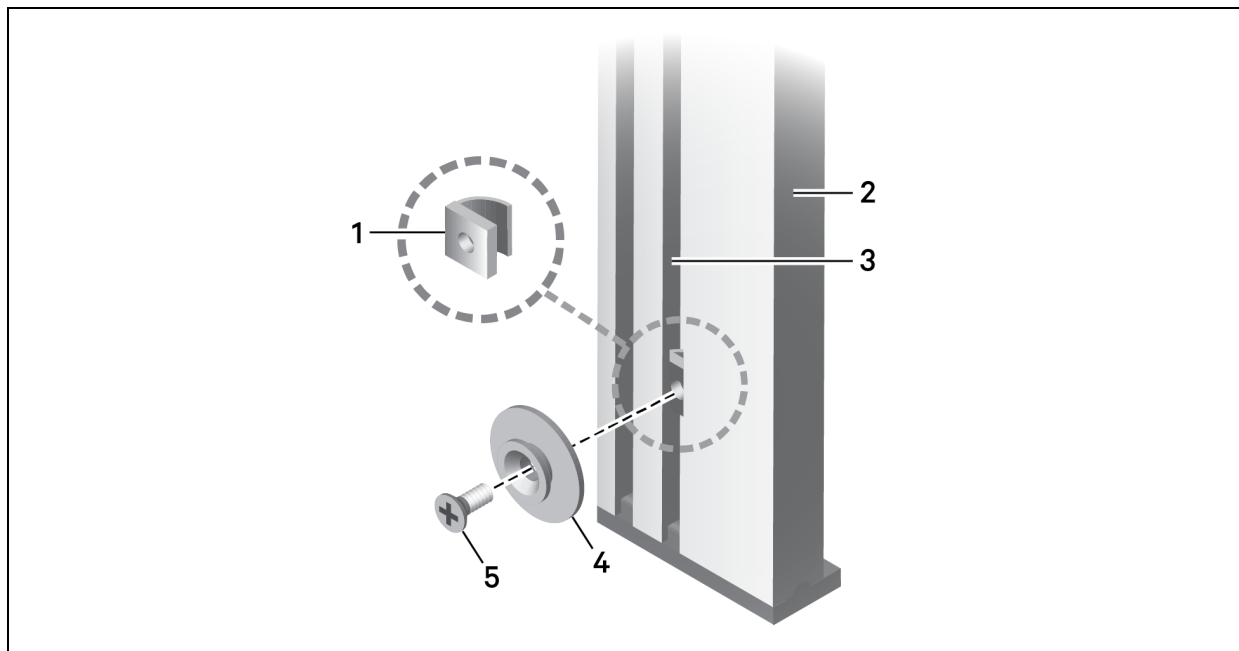


Table 2.1 MPX PRC Mounting Button Components

ITEM	DESCRIPTION
1	Spring nut
2	MPX PRC
3	T-slot
4	Mounting button
5	Mounting button screw

2.1.2 Attaching brackets

The brackets must be installed before the PDU is installed.

NOTE: The brackets will attach the Liebert MPX rack PDU more securely if one is near the top of the unit and one is near the bottom.

To attach brackets to an upright frame member:

1. Insert two spring nuts into the T-slot on a rear upright frame member.
2. Position the two spring nuts to accommodate screws inserted through the T-slots in the brackets. To move the spring nuts, press down on each with a small, pointed object and slide each into position.
3. Hold an L-shaped bracket in place and attach it with two of the M5x10 screws with hex heads.
4. Tighten the hex-head screws firmly with the Allen wrench.
5. Repeat steps 1 to 4 for the lower L-shaped bracket.
6. After the brackets are attached, hang the Liebert MPX rack PDU in the rack by inserting the mounting screws into the slots on the brackets.
7. Tighten the mounting screws securely.

Figure 2.2 Bracket Installation

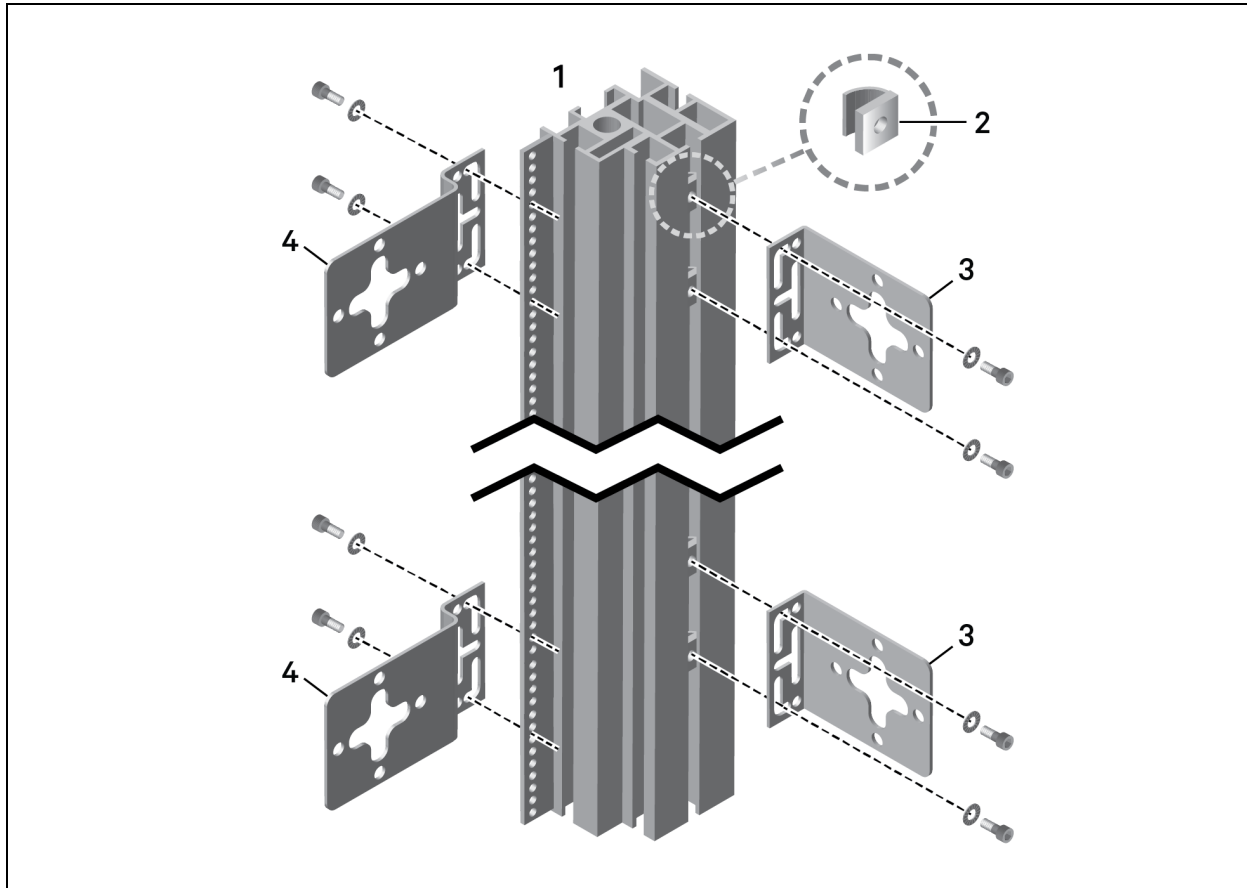


Table 2.2 Bracket Installation Components

ITEM	DESCRIPTION
1	Rack frame member
2	Spring nut
3	L-shaped bracket
4	Z-shaped bracket

Figure 2.3 Installing a Liebert® MPX™ Rack PDU on a Bracket

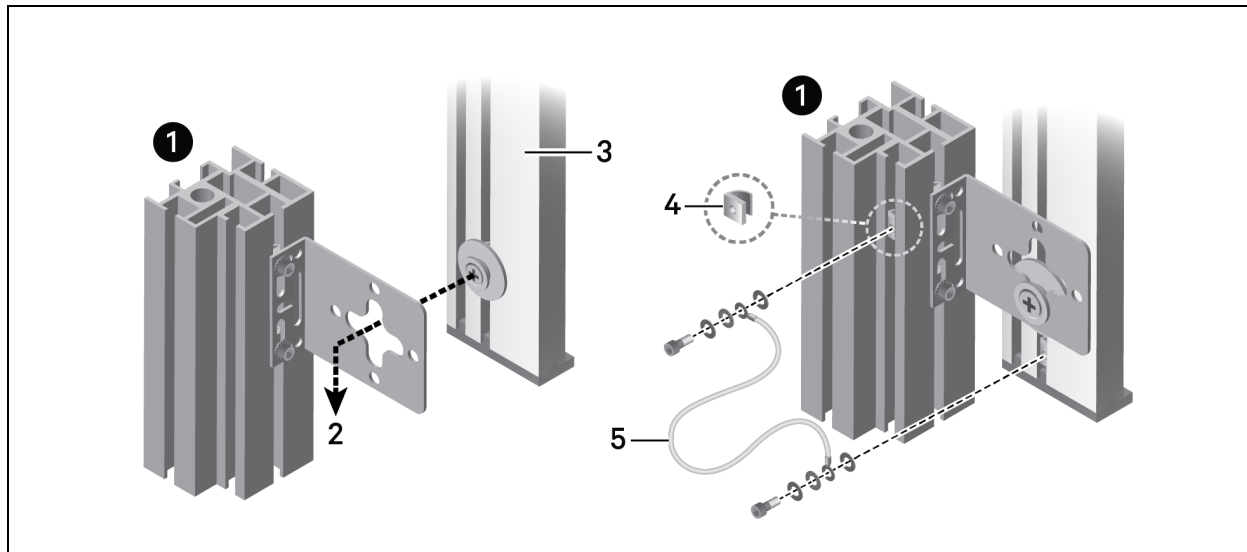


Table 2.3 Installing a Liebert MPX Rack PDU on a Bracket

ITEM	DESCRIPTION
1	Rack frame member
2	Mounting button inserted into rack bracket keyhole
3	MPX PRC
4	Spring nut into rack frame member
5	Grounding wire

2.2 System Assembly

The following sections provide guidance and references to documents required to assemble a Liebert MPX rack PDU system.

2.2.1 Installing an MPX™ PEM onto the MPX™ PRC

After the MPX PRC has been installed in the rack, it is ready for the installation of an MPX PEM.

Consider the following prior to beginning installation:

- **Elevated Operating Ambient** - If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment can be greater than the room ambient temperature. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (T_{ma}) specified by the manufacturer.
- **Reduced Air Flow** - Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.
- **Mechanical Loading** - Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.

- Circuit Overloading - Connection of the equipment to the supply circuit can affect circuit load, overcurrent protection and supply wiring. Adhere to equipment nameplate ratings to prevent circuit overloading.
- Reliable Earthing - Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit, for example, use of power strips.



WARNING! The MPX rack PDU contains hazardous voltage that creates a risk of arc flash and electric shock resulting in equipment damage, injury or death. The MPX PEM must be properly and securely installed on the MPX PRC. Vertiv strongly recommends that the MPX PEM be installed only by an individual who has been properly trained and qualified to perform electrical work.



WARNING! Connect only one MPX PEM to an MPX PRC. Connecting more than one MPX PEM could cause cross-conduction. Cross-conduction can cause damage to the MPX and cause the upstream OCPD to trip, or can result in circuit current levels that may exceed the OCPD A.I.C. ratings.



WARNING! Whenever the MPX PEM is connected to power, the connectors on the bottom are energized with hazardous voltage.



WARNING! Connect input power only after the MPX PEM is properly installed on the MPX PRC and the MPX IPC (Input Power Cord) is properly connected to the MPX PEM.



WARNING! Connect input power to the Liebert MPX rack PDU only after the MPX PEM is properly connected to the MPX PRC. Failure to do so may subject you to hazardous voltages.

Tools Required

The following tools are required for installation:

- Tamper-resistant No. 1 Torx® screwdriver bit, included with MPX PEM
- No. 1 PoziDriv® screwdriver bit, included with MPX PEM
- No. 1 Phillips® screwdriver, field-supplied

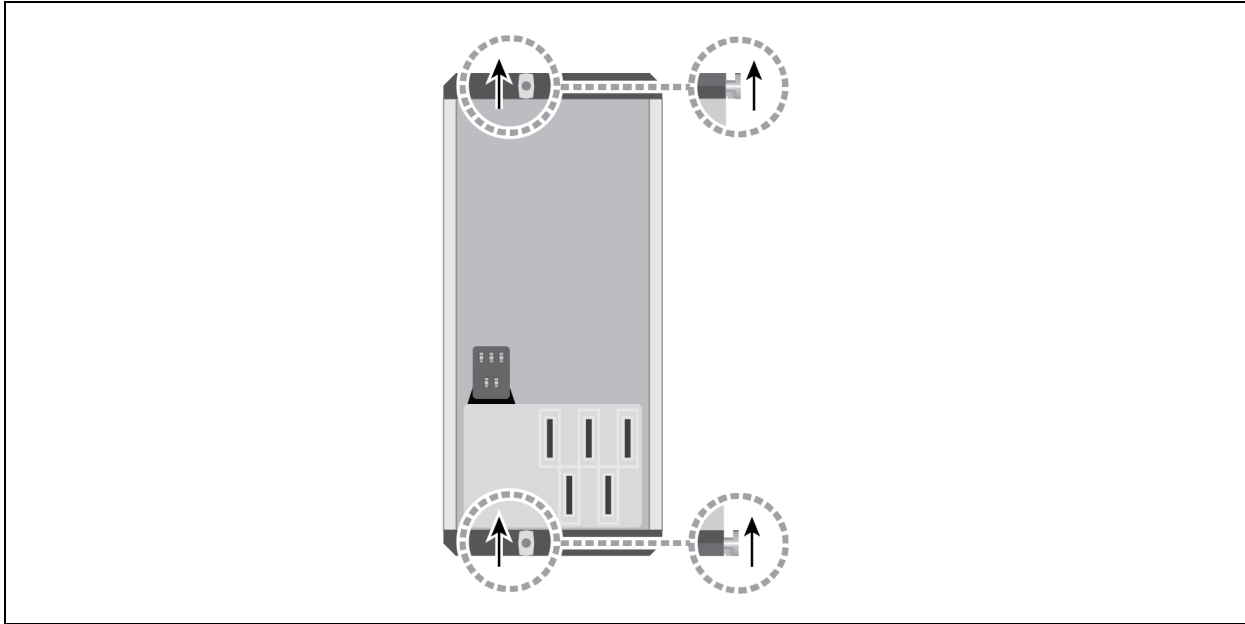
Before beginning to assemble the Liebert MPX rack PDU:

- Ensure that utility power is not connected to any module or component.
- Ensure that no equipment is connected to the MPX BRM. Observe all facility Lockout /Tagout procedures where applicable.
- Ensure that the circuit breaker on the MPX BRM is off.

To attach an MPX PEM to an MPX PRC:

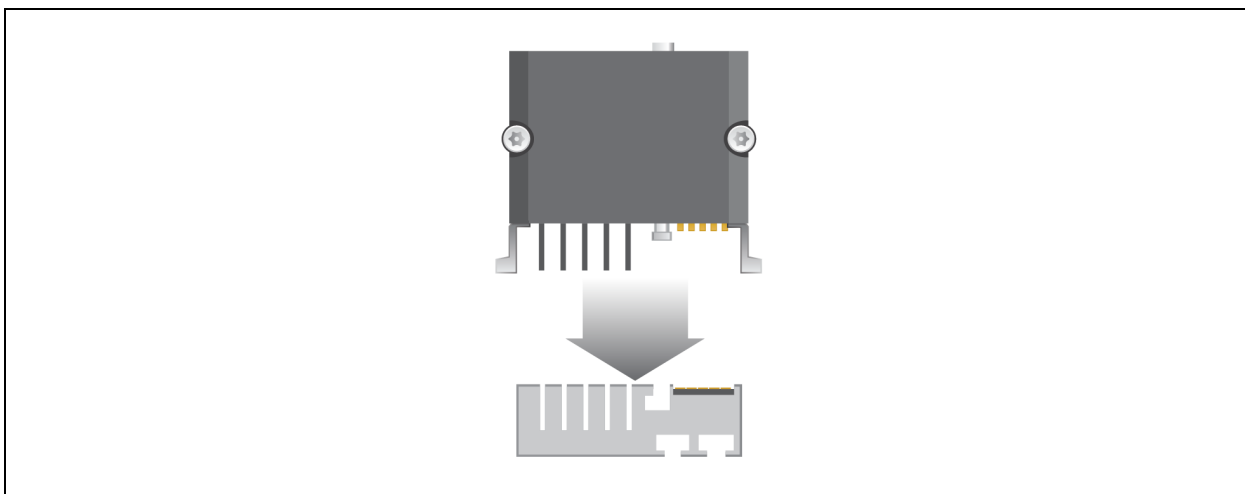
1. Ensure the module's circuit breaker is in the off/open position and the screw latches at each end of the MPX PEM are positioned to fit into the MPX PRC slot.

Figure 2.4 MPX™ PEM Bottom View



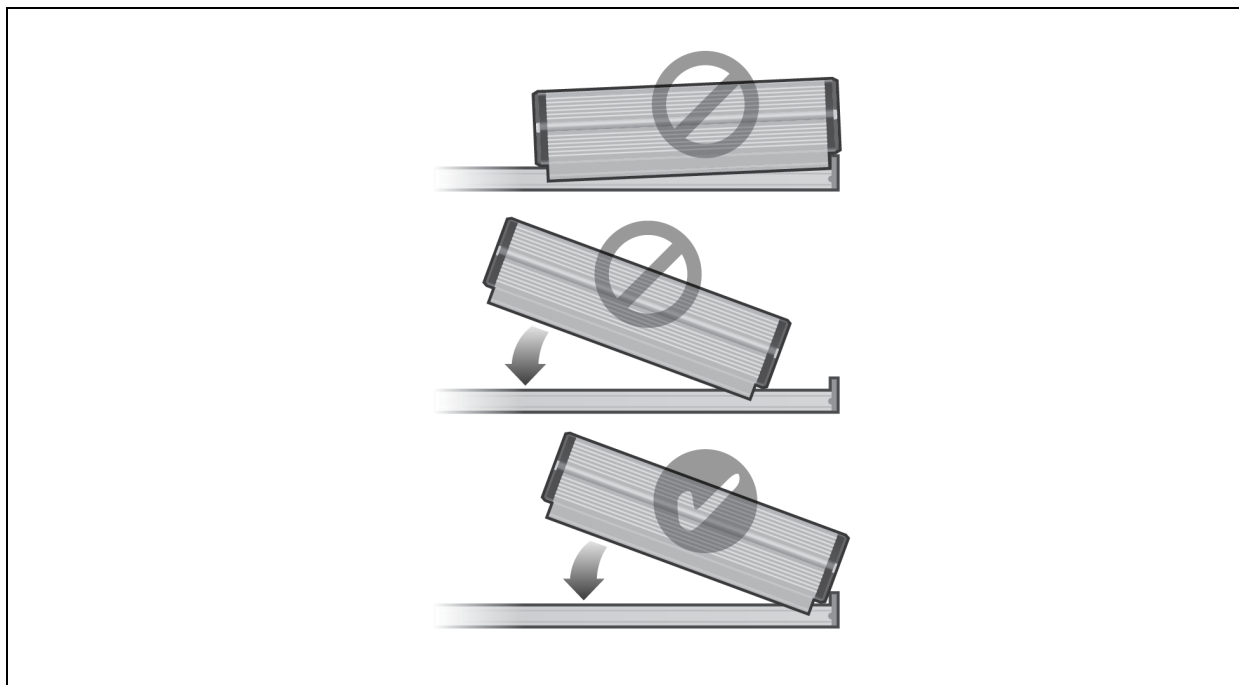
2. Position the MPX PEM so the power blades align with the power bus on the MPX™ PRC.

Figure 2.5 MPX PEM and PRC End View



3. Hold the MPX PEM at an angle against the MPX PRC end cap and press down so that the MPX PEM power blades engage firmly into the MPX PRC power bus.

Figure 2.6 MPX PRC End Cap Positioning



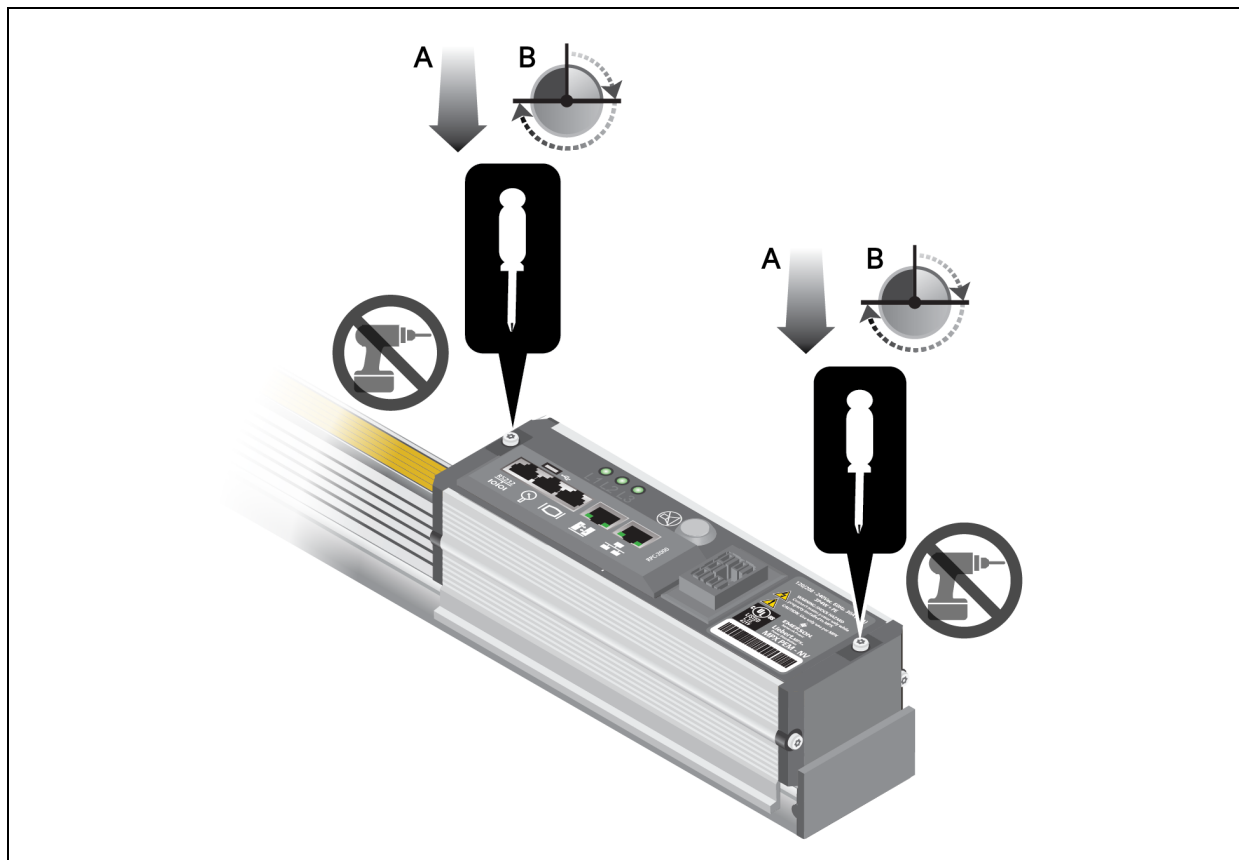
4. Use the provided tamper-resistant Torx® (TR20) screwdriver bit to press each screw latch downward. Turn the screw latch 90 degrees (one-quarter turn) to seat the locking tab. Secure the locking tab by turning the screw latch an additional 180 degrees (one-half turn) until it locks.



WARNING! Do not use power tools or pneumatic equipment to secure the screw latch. Do not turn the screw latch more than 270 degrees (a three-quarter turn).

NOTE: If using a torque-limiting screwdriver, carefully press the screw downward first before turning. To prevent damage to the latches, do not exceed a maximum torque of 18 lbs/in (2 Nm).

Figure 2.7 Securing the MPX™ PEM to the MPX™ PRC



5. Conduct a visual inspection to verify the MPX PEM has been properly installed. A slight side-to-side rocking of the module should not cause separation from the MPX PRC surface.
6. (Optional for the MPXPEM-NVAXXAX model only) Insert the MPX IPC connector to the MPX PEM installed on the MPX PRC. See the Liebert® MPX™ IPC Quick Installation Guide for installation steps.
7. If used, install the optional RPC-1000 web card or RPC2 communications module. See the Liebert® RPC™ Web Card User Manual (SL-20825) or the Liebert® RPC2™ Communications Module Installer/User Guide for further instructions.

2.2.2 Installing an MPX IPC to a variable capacity MPX PEM

See the MPX™ IPC Quick Installation Guide (SL-20838 REV2/590-1599-501A) for detailed instructions to attach an MPX IPC to a North American variable capacity MPX PEM.

Variable-capacity MPX PEM models require an MPX IPC to connect to utility power. See [Connecting the MPX™ IPC for variable capacity models](#) on page 8 for a description. The MPX IPC is available with various input plugs for single-phase or three-phase power systems, up to 30A.

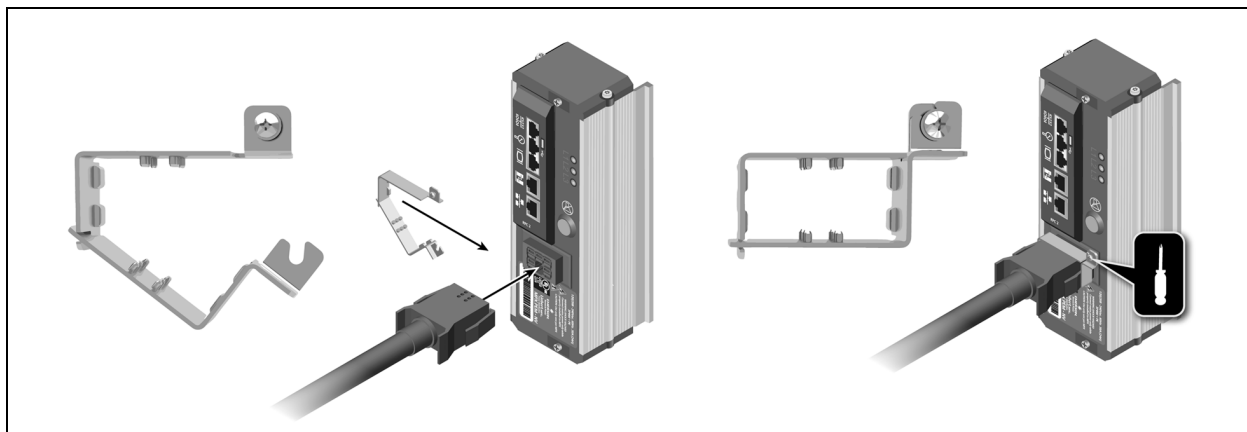
Quick-connect couplings are attached to the MPX™ IPC to ease proper connection to the MPX™ PEM. The connectors fit only one way, mating the proper input, ground and neutral wires on the power cord to the MPX PEM.

The locking clamp reduces the chance of accidental disconnection of the MPX IPC because the clamp must be removed before the connector can be disengaged. The locking clamp is optional and not required for typical Liebert® MPX™ system applications.

To attach the MPX IPC locking clamp:

1. Verify the NEMA plug is disconnected from power and insert the MPX IPC connector to the MPX PEM.
2. Rotate the lower arm of the clamp clockwise wide enough to place around the MPX IPC connector.
3. Wrap the clamp around the MPX IPC connector so the interior clamp prongs fasten to the MPX IPC connector and the retaining screw is in the upper right corner.
4. Rotate the lower arm of the clamp counterclockwise until the screw plate aligns with the retaining screw.
5. With the screw plate aligned, tighten the screw to hold the lower arm in place.

Figure 2.8 MPX IPC Clamp Installation



NOTE: The clamp can be installed in 180 degree orientation to easily access the retaining screw for the MPX system mounted on the opposite side of the rack space.

2.2.3 Installing an MPX™ BRM to an MPX™ PRC

During normal operation, MPX BRMs are hot-swappable only when unloaded. While adding or removing an MPX BRM, no user loads are to be connected to the MPX BRM. Attempting to do so may damage the Liebert MPX rack PDU or connected equipment.

To achieve load balancing, install MPX BRMs with an equivalent number of different line configurations (L1-L2, L2-L3, L3-L1, L1-N, L2-N, L3-N).

For detailed instructions to install the MPX BRM on an MPX PRC, see the Liebert® MPX BRM Quick Installation Guide (SL-20823_REV3/590-1623-501A).

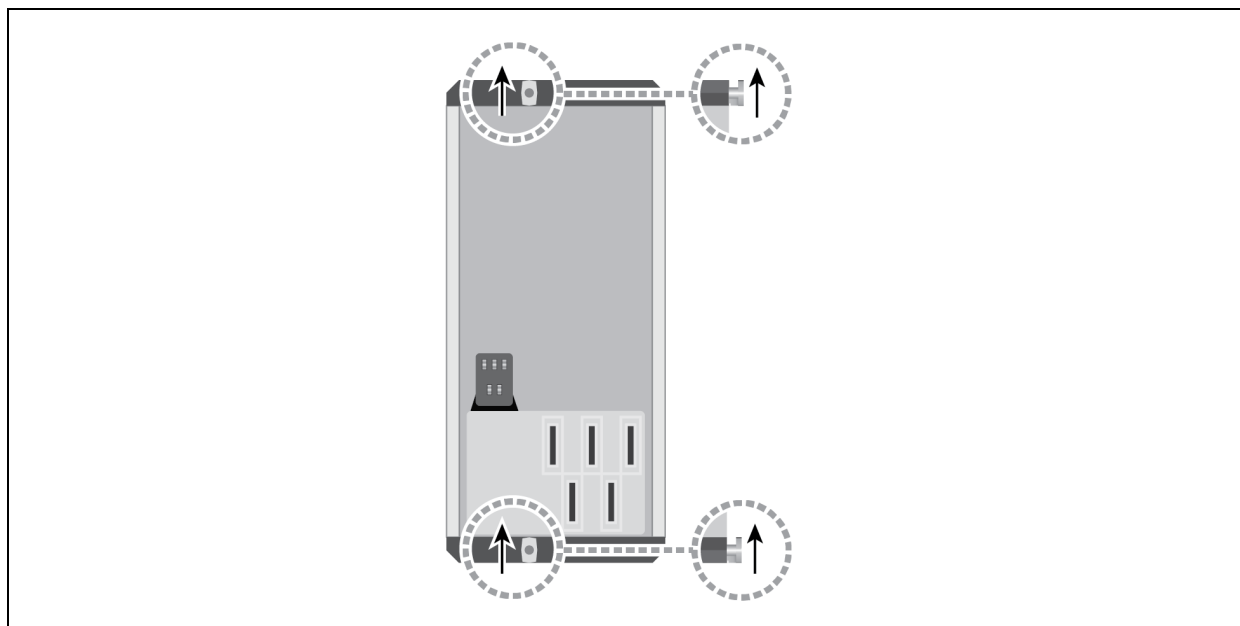
NOTE: The Liebert® MPX™ rack PDU operates properly with gaps between modules. However, leaving a gap between modules limits the number of modules you can mount. Decorative covers are available to reserve the adequate space on the MPX™ PRC and to protect any unused sections of the unit's surface.

! **WARNING!** The Liebert MPX rack PDU contains high voltage that can cause serious personal injury or death. The unit must be installed in a restricted-access location.

To attach an MPX™ BRM to the MPX PRC:

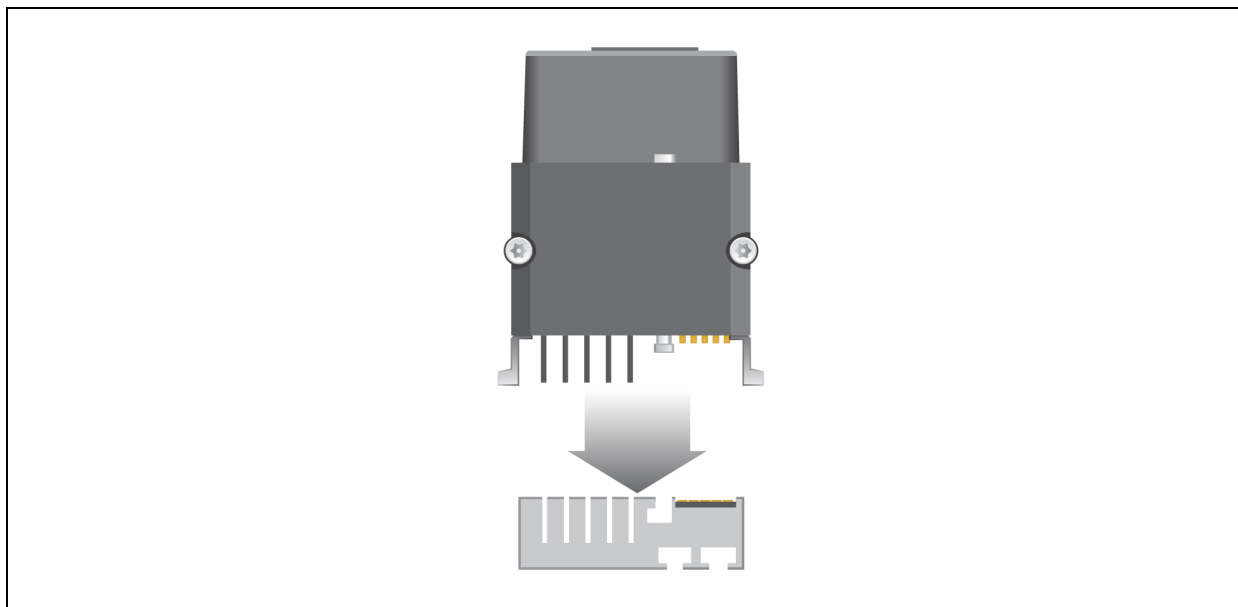
1. Ensure the module's circuit breaker is in the off/open position and ensure the screw latches at each end of the MPX branch receptacle module (BRM) are positioned to fit into the MPX power rail chassis (PRC) slot.

Figure 2.9 MPX™ BRM Bottom View



2. Position the module so the power blades fit into the power bus on the MPX PRC.
3. Press the module firmly onto the MPX PRC until the bottom of the MPX BRM is flush to the surface of the MPX PRC.

Figure 2.10 MPX™ BRM and PRC End View



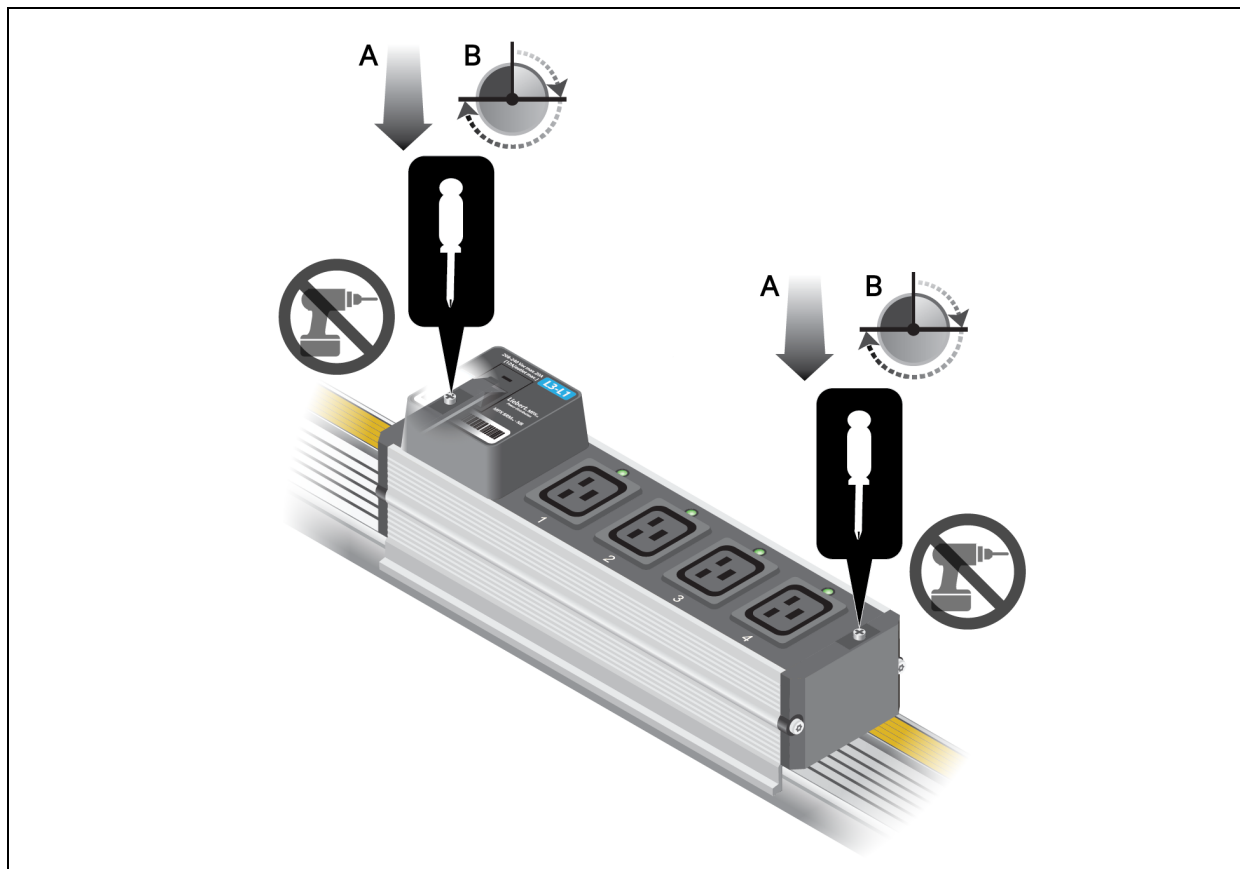
4. Use a Pozidriv® (PZ1) screwdriver to press each screw latch downward. Turn the screw latch 90 degrees (one-quarter turn) to seat the locking tab. Secure the locking tab by turning the screw latch an additional 180 degrees (one-half turn) until it locks.



WARNING! Do not use power tools or pneumatic equipment to secure the screw latch. Do not turn the screw latch more than 270 degrees (a three-quarter turn).

NOTE: If using a torque-limiting screwdriver, carefully press the screw downward first before turning. To prevent damage to the latches, do not exceed a maximum torque of 18 lbs/in (2 Nm).

Figure 2.11 Securing the MPX™ BRM to the MPX™ PRC



5. Conduct a visual inspection to verify the MPX BRM has been properly installed. A slight side-to-side rocking of the module should not cause separation from the MPX PRC surface.

2.2.4 Installing a communications module

You can install a communications module in the North American MPX™ PEM models to monitor the Liebert® MPX™ rack PDU over a network or with an RPC BDM.

NOTE: The ports on the communications modules are designated by icons.

For complete details, refer to the Liebert® RPC™ Web Card User Manual (SL-20825) or the Liebert® RPC2™ Communications Module Installer/User Guide found on Vertiv's web site, www.vertivco.com.

To install a communication module:

NOTE: See [MPX PEM Features](#) on page 7 for a diagram of the MPX PEM.

1. Locate the communication module bay on the MPX PEM.
2. If necessary, remove the cover plate.
3. Insert the communications module into the MPX PEM and secure it with the provided screws.
4. Connect a user-supplied Ethernet cable to the LAN port.
5. Connect the Ethernet cable to a computer.

2.2.5 Installing optional temperature and humidity sensors

The Liebert® SN temperature and humidity sensors assist in monitoring conditions in the rack. You can install the sensors in any area to monitor temperature and humidity levels. The sensors are optional and designed for installation in a rack without tools. Each sensor connects to the communications module, which reads rack conditions based on Liebert MPX rack PDU monitoring methods. The following is a list of sensor types:

- SN-Z01 - Single cable with a single temperature sensor
- SN-Z02 - Single cable with three temperature sensors
- SN-Z03 - Single cable with three temperature and one humidity sensor
- SN-T - Modular with a single temperature sensor
- SN-TH - Modular with a single temperature and a single humidity sensor
- SN-2D - Modular with two-door contact inputs
- SN-3C - Modular with three dry contact inputs
- SN-L1 - Modular leak zone sensor with a one foot cable
- SN-L20 - Modular leak zone sensor with a 20 foot cable

Modular Liebert® SN sensors allow users to build custom configurations by connecting multiple sensors to a single communications module.

This manual describes the steps for attaching a single sensor with a bracket to a rack frame member. For details on other mounting locations and methods, refer to the Liebert® Integrated Sensors Quick-Start Guide (SL-20840) or the Liebert® RPC™ Web Card User Manual (SL-20825) available at Vertiv's web site, www.VertivCo.com.

2.2.6 Installing an optional RPC™ BDM

The RPC BDM can be mounted in the rack through the slot on the back of the module using the included hardware or with a cable tie. Both methods allow you to move the RPC BDM to a different place in the same rack or to another rack.

Included Hardware

The following hardware is included with the RPC BDM:

- One RPC BDM
- One M5 spring nut
- One spacer sleeve
- One mounting button
- One M5 screw
- One cable clip

Figure 2.12 RPC™ BDM

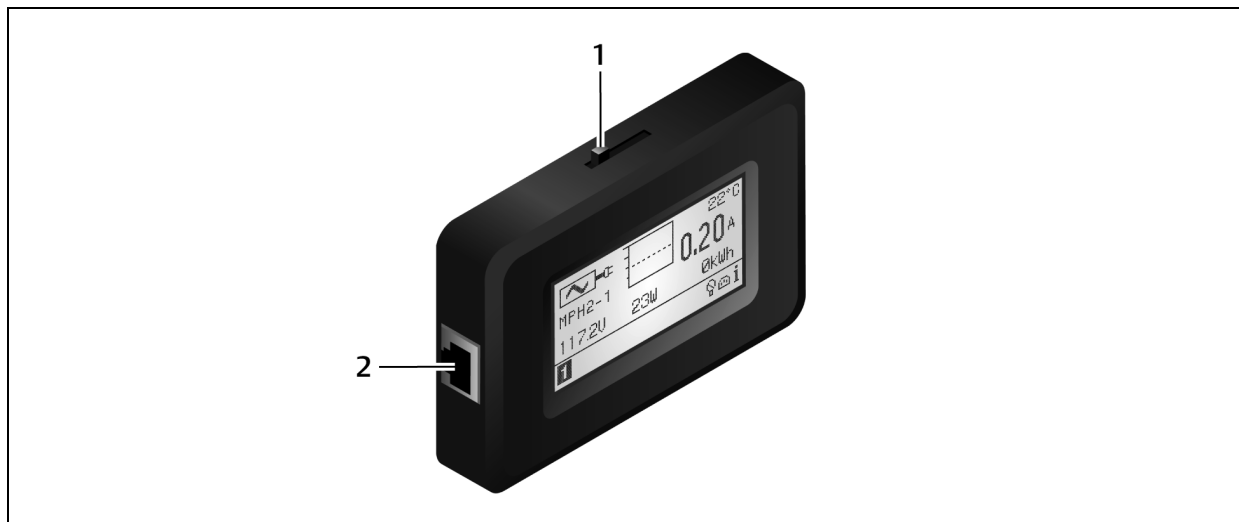


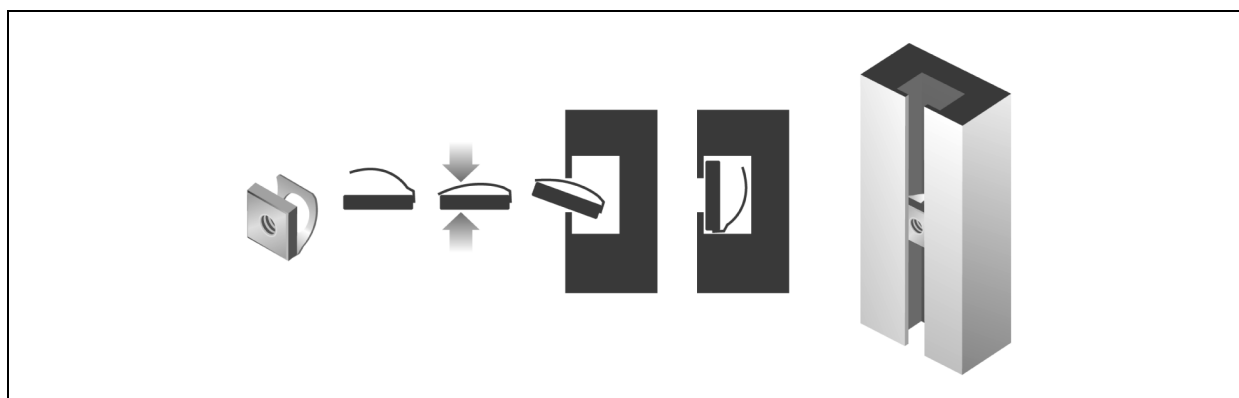
Table 2.4 RPC BDM Components

ITEM	DESCRIPTION
1	Scan switch
2	RJ45 communication and power input port

To install an RPC BDM on a rack frame:

1. Determine the mounting location on the frame member where the RPC BDM will be installed.
2. Insert a spring nut into a T-slot and flip it so that it is square in the slot as shown in the following figure.

Figure 2.13 Inserting a Spring Nut into a T-slot



3. Insert the MPX™ rack PDU screw into the spacer sleeve.
4. Insert the MPX rack PDU screw into the spring nut and tighten securely with a flat-head screwdriver.
5. Hang the RPC BDM on the screw with the hooded mounting slot on the back of the RPC BDM (see the following figure).
6. Connect the RPC BDM to the communications module with an Ethernet cable.

Figure 2.14 RPC BDM™ Installation

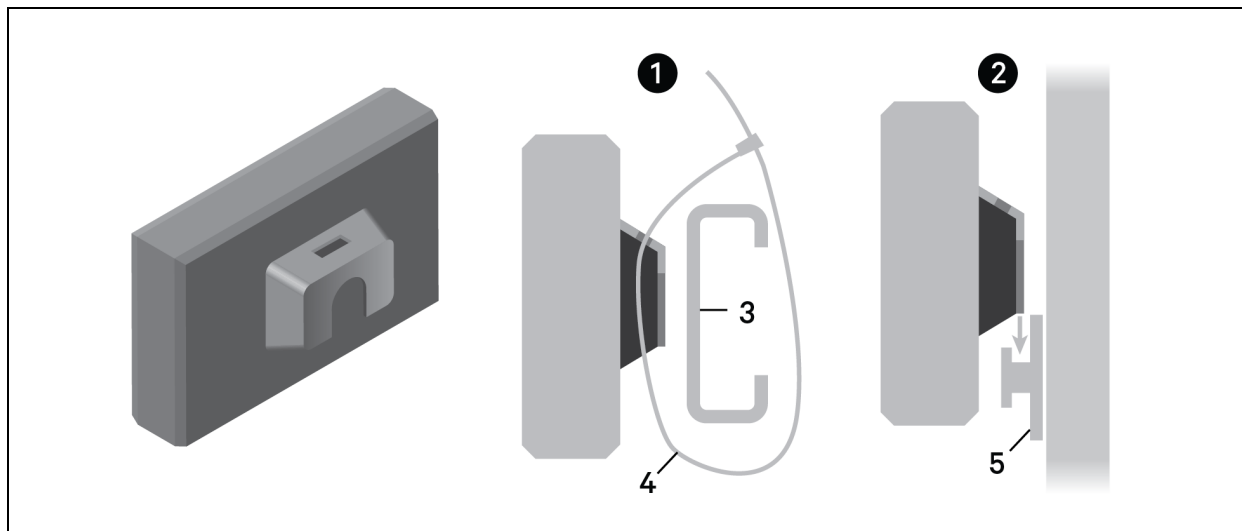


Table 2.5 RPC BDM Installation

ITEM	DESCRIPTION
1	Installation configuration with cable tie
2	Installation configuration with mounting button
3	Frame member
4	Cable tie
5	Mounting button attached with spring nut to frame member

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3 SYSTEM FUNCTIONAL TEST

The following section contains an assembly checklist and a functionality test for the Liebert® MPX™ rack PDU.

3.1 Assembly Checklist

Verify all components are properly assembled. Failure to do so could result in a serious injury or equipment damage. Ensure the following:

- MPX™ PRC is securely attached to the rack.
- MPX™ PEM is attached to the MPX PRC and is securely locked on to the MPX PRC (see [Installing an MPX PEM to an MPX PRC](#) on page 1).
- Power input cable is attached to the MPX PEM, if applicable.
- Optional communications module is installed in the MPX PEM.
- MPX™ BRMs are installed (see [Installing an MPX™ BRM to an MPX™ PRC](#) on page 23).
- Sum of electrical loads does not exceed maximum values shown on the Liebert MPX rack PDU rating labels.
- Input power supply ratings and connections are compatible with the specifications of the unit being installed.

3.2 Functionality Test

Perform the following steps to determine whether the Liebert MPX rack PDU is ready for use. Failure to follow these steps in the documented sequence could result in serious injury or equipment damage.

To conduct the functionality test:

1. Ensure that all circuit breakers on the MPX BRM units are off.
2. Verify the MPX PEM and MPX BRM operating voltages are the same and match the input power source:
 - Confirm that only one MPX PEM is installed on the MPX PRC.
 - Connect the Liebert MPX rack PDU to input power.
3. Attach the supplied communication cables to the communications module, if one is installed in the MPX PEM.
4. Check the phase power LEDs on the MPX PEM to verify that input power is present. The appropriate number of lights on the MPX PEM should be green and lit but not flashing:
 - If input power is single-phase, L1 is green.
 - If input power is single-phase 208-240VAC (North America only), L1 and L2 are green.
 - If input power is three-phase, L1, L2 and L3 are green.

NOTE: The LEDs are not provided on Elementary MPX PEM models.

5. Switch on the circuit breaker of each MPX BRM where the load is connected.
6. Verify that each attached MPX BRM is displaying a non-repeated identifying number in the Number LED window beside the circuit breaker.

NOTE: The identifying numbers' order in the display may not match the mapping of their physical location on the MPX PRC. Elementary MPX BRM models are not furnished with an LED identification window.

7. If any MPX™ BRM units are receptacle management models, the LEDs beside the receptacles are illuminated.
8. Make sure the equipment to be connected to the Liebert MPX rack PDU is switched off.
9. Connect the equipment to the MPX BRMs.
10. Switch on the test equipment or connected load to verify proper operation.

4 OPERATING AND CONFIGURING RACK PDU CARDS

The Liebert® RPC2™ communications module is an optional rack PDU card that allows you to monitor and configure components connected to the MPX™ unit through a web-based interface. The card provides enhanced monitoring and control, enabling you to manage rack equipment locally or from a remote location. With the rack PDU card, you can determine power usage, switch receptacles on some units on and off and troubleshoot input power supply problems.

The rack PDU card manages and monitors different types of MPX™ BRMs installed on the same Liebert MPX rack PDU. Additional features are beneficial for Liebert MPX rack PDUs that require closer monitoring. The RPC2 communications module also supports managing and monitoring the Liebert MPX rack PDU with SNMP, Liebert® Nform™, Liebert® SiteScan® and third-party management systems.

When connecting the rack equipment to the Liebert MPX rack PDU's receptacles, arrange cables and connections in a neat and workmanlike manner. When possible, route power lines away from the signal and communication lines. For power management purposes, record the receptacle where each piece of equipment is connected. Receptacles on the Liebert MPX rack PDU have a numerical designation. For a Liebert MPX rack PDU with more than one circuit, the outlets are named with numbers and are grouped by branch with a number referring to the proper circuit breaker.

4.1 Configuring Rack PDU Cards

4.1.1 Configuring the RPC2 communications module

The RPC2 communications module is factory set for Dynamic Host Configuration Protocol (DHCP), making it ready for service immediately. The module can also 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 a straight-through Ethernet cable (not included) to the module's link port.

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 [Static IP Settings for the RPC2 Communications Module Through the Link Port](#) on page 33 for a list of static IP addresses.

Table 4.1 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
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. You must disconnect the network cables for at least 30 seconds. The module reconfigures automatically upon

reconnection. For information about sibling connections, see the **RPC2™ Communications Module Installer/User Guide**.

5. Enter **admin** for both the login username 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 *Edit* in the right pane.
8. (Optional) The default speed/duplex for the Ethernet port is Auto 1000 Mbps/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.

4.1.2 Configuring the RPC-1000™ communications web card

The card is factory-set for DHCP. If you require a static or Boot Mode IP network configuration, be sure to change the Boot Mode, as follows.

To change the Boot Mode:

1. Insert an additional Ethernet cable (user-supplied) into the card's expansion/management port.



CAUTION: The card's expansion/management port should be used ONLY for local configuration through interconnection to a laptop. Do not connect the cable from the expansion/management port to your company LAN.

2. Insert the other end of the Ethernet cable into a laptop.
3. Configure the laptop's IP settings to communicate on a 192.168.1.X network:
 - IP address: 192.168.1.9
 - Subnet mask: 255.255.255.252
 - Default gateway: 192.168.1.1
4. Open a web browser, enter the IP address of the expansion/management port, then press **enter**:
 - For a single Rack PDU or Rack PDU #1 in a Rack PDU Array, enter **http://192.168.1.10**.
 - Each PDU is factory-configured as PDU #1. This requires assigning a new number to specify the position of each additional rack PDU in a rack PDU array and rebooting the card. This process automatically assigns the IP addresses and subnet masks shown in [IP Addresses in a Rack PDU Array](#) on page 35 for rack PDU #2, 3 and 4.

Table 4.2 IP Addresses in a Rack PDU Array

IP ADDRESS	POSITION IN RACK PDU ARRAY			
	RACK PDU 1	RACK PDU 2	RACK PDU 3	RACK PDU 4
Expansion/Management Port	192.168.1.10	192.168.1.6	192.168.1.2	192.168.1.14
LAN Port	User-configured	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

5. Click the *Configure* tab, then click *Network Settings* in the left navigation pane.
6. When prompted for a username and password, enter **Liebert** (case-sensitive) for both. Click *OK*, then read the message in the next window.
7. Click *Edit* in the right pane and update the following settings:
 - The default Speed/Duplex for the Ethernet port is Auto (automatic). To change this, choose from the Speed/Duplex drop-down list.
 - Choose the Boot Mode: Static or BootIP. (The default is DHCP.)
8. Click *Save* to save any changes (or *Reset* to cancel). A Notice window displays a reminder to reinitialize the card. Click *OK*.
9. Make other changes as needed in the *Configure* tab.
10. To complete the configuration, click *Restart* in the left pane, then click the *Restart* button in the right pane to commit the changes and reboot the card.
11. After the rack PDU array is configured as shown in [IP Addresses in a Rack PDU Array](#) on page 35, use [Laptop IP Settings for Liebert® RPC™ Addresses](#) on page 35 to make changes to the cards in the array using the expansion/management port. [Laptop IP Settings for Liebert® RPC™ Addresses](#) on page 35 details the laptop IP settings to use with the corresponding rack PDU card IP addresses.

Table 4.3 Laptop IP Settings for Liebert® RPC™ Addresses

IP ADDRESS	POSITION IN RACK PDU ARRAY			
	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
Expansion/Management 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

4.1.3 Indicators

NOTE: Do not continue to use the Liebert MPX™ rack PDU if the monitoring interface LEDs are not in accordance with these operating instructions. Refer all faults to your local dealer, Vertiv representative or Vertiv Distributed Processing Applications Engineering.

One or more phase power LEDs on the MPX™ PEM are illuminated steady green when input power is present and within tolerance. If input power is three-phase, all three phase power LEDs are illuminated steady green.

Each MPX™ BRM displays a unique identifying number on the branch numeric indicator display adjacent to the circuit breaker. If any MPX BRMs are receptacle management models, the LEDs adjacent to the receptacles are lit.

4.2 Operating Rack PDU Cards

Depending on the model of the communications module, see the Liebert® RPC™ Web Card User Manual (SL-20825) or the RPC2™ Communications Module Installer/User Guide for instructions to operate a Liebert MPX™ rack PDU equipped with a communications module.

You can download the manuals from the Vertiv Web site www.VertivCo.com.

4.2.1 Connecting to the rack PDU cards

After the RPC2 communications module is installed and configured, the card is ready to monitor and manage Liebert MPX rack PDU receptacles.

If the card is not installed and configured, refer to [Installing a communications module](#) on page 26 and [Configuring Rack PDU Cards](#) on page 33.

To connect to the rack PDU cards:

1. In a web browser go to <http://192.168.1.10> to display the Liebert MPX rack PDU's web page.
2. When prompted for a username and password, enter the factory default values as noted in the Liebert® RPC2™ Communications Module Installer/User Guide.

NOTE: For the RPC-1000 communications web card, the configuration capabilities are protected by a username and password combination.

3. After entering the factory default username and password, change both for security purposes.
4. Configure or access information about the Liebert MPX rack PDU in the Device Explorer view.

4.3 Operation without Rack PDU Cards

Operating the Liebert MPX rack PDU without the optional rack PDU cards limits functionality.

To operate the MPX rack PDU without a rack PDU card:

1. After the unit is installed and assembled, verify the rack equipment is turned off.
2. Connect the rack equipment to the receptacles.
3. Connect input power to the MPX™ PEM and switch on the circuit breaker on each MPX™ BRM.
4. Turn on the rack equipment according to the manufacturer's instructions.

5 MAINTENANCE

Vertiv recommends setting up a maintenance schedule that includes the following:

- Remove dust from the unit's exterior with a clean, dry cloth.
- Check all module and cabling connections to ensure they are secure.

NOTE: If a faulty MPX PEM connection is suspected, all input power to the unit must be removed before making any adjustment to the MPX PEM. See [Installing an MPX PEM to an MPX PRC](#) on page 1, if adjustments are required.

5.1 No User-Serviceable Parts

The Liebert® MPX™ rack PDU contains no user-serviceable parts. If you need support or have questions about your Liebert MPX rack PDU, contact Vertiv™ Technical Support or your local Vertiv representative. Do not attempt to service this product yourself.

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6 TROUBLESHOOTING

This section contains troubleshooting information for the Liebert® MPX™ rack PDU and the RPC-1000™ and RPC2™ communications modules.

6.1 Liebert MPX Rack PDU

This section covers various symptoms you may encounter when using the Liebert MPX rack PDU and provides a troubleshooting guide to identify the source of the problem and remedial action for the situation. If the fault persists, contact Vertiv Technical Support.

NOTE: The MPX contains no user-serviceable parts. Vertiv advises against disassembling and attempting to repair any damaged MPX module.

6.1.1 MPX™ PEM indicators and LEDs

The phase power LEDs on the MPX PEM provide information about the input power conditions to the Liebert MPX rack PDU. The LEDs illuminate green in a steady state when normal input power configurations are available.



WARNING! Never remove an MPX PEM from the MPX PRC while input power is connected. The MPX PEM is not hot swappable. An MPX PEM contains live conductors on the MPX PRC side; exposure to these conductors while under power can result in severe injury and death.

Table 6.1 MPX PEM LED Indications

CONDITION	PROBABLE CAUSE	CORRECTIVE ACTION
Phase power indicators are green and steady.	Unit is receiving acceptable input power.	<ul style="list-style-type: none"> No action is required; Normal operation. L1 indicator = single-phase, L-N. L1-L2 indicators = single-phase, L-L (NA models only). L1-L2-L3 indicators = three-phase, L-L-L.
Phase power indicators are off.	Input under voltage or input power unavailable.	<ul style="list-style-type: none"> Confirm the input power cord is securely connected to a valid power source. Check if the upstream circuit breaker(s) feeding power into the MPX have tripped. Reset the upstream breaker and/or correct the site condition that caused the breaker to trip. If the breaker is tripped, disconnect the equipment plugs from the MPX BRMs and reset the circuit breaker. If the breaker trips with no equipment connected to it, verify system configuration using this manual. If the problem persists, contact Vertiv. If the breaker does not trip, restore the equipment plugs one at a time to determine if the system is overloaded. Confirm the input supply voltage is within spec and the source is not operating outside of the acceptable limits.
Audible alarm sounds and phase power indicator flashes.	Input overcurrent or undercurrent condition.	<ul style="list-style-type: none"> Review the PDU overcurrent or undercurrent warning and alarm thresholds (these are user-set). If an undercurrent condition is indicated, check whether the loads have been removed, are operating in an unexpected low power mode or were turned off. If an overcurrent condition is indicated, reduce the current draw from one or more receptacles.

Alarm Silence/Test button

The MPX PEM Alarm Silence/Test button has multiple modes of operation. Pressing the *Alarm Silence/Test* button tests or silences audible alarms. Functions include:

- Alarm silence function - Momentarily pressing the button when an alarm condition is present silences the audible alarm.

- Alarm test function - The audible alarm can be tested by momentarily pressing the button when an active alarm condition is not present.
- MPX™ PEM reset function - This function is useful during troubleshooting to confirm the communications module is communicating with each MPX™ BRM.

Pressing and holding the alarm silence button for more than five seconds when an active alarm condition is not present causes the communications module to re-establish communication with all the modules, the MPX PEM to reset and its line LEDs to go dark momentarily.

When you initialize an MPX PEM reset, the branch numeric indicator display cycles for each MPX BRM. The MPX PEM reset function takes approximately 30 seconds. When complete, each MPX BRM displays a unique numeric value within its branch numeric indicator display window.

NOTE: The MPX PEM reset function does not interrupt critical power to the MPX PEM or any of the MPX BRM modules.

6.1.2 MPX BRM indicators and LEDs

MPX BRMs have a branch numeric indicator display window that uniquely identifies each module.

Table 6.2 MPX BRM Branch Numeric Indicator Display Numbers

CONDITION	PROBABLE CAUSE	CORRECTIVE ACTION
A persistent dot appears in the MPX BRM display window. MPX BRM ID# / numeric value is not displayed.	MPX BRM is not communicating with the communications module.	<ul style="list-style-type: none"> • Confirm MPX BRM module is properly seated on the MPX PRC. Refer to the MPX BRM Quick Start Guide. • If all MPX BRMs display the dot, confirm the MPX PEM module is properly seated on the MPX PRC. Refer to the MPX PEM Quick Start Guide. WARNING: Never remove an MPX PEM from the power distribution unit while input power is connected. The MPX PEM is not hot-swappable.
A persistent dot and MPX BRM ID# / numeric value appear together in the MPX BRM display window.		<ul style="list-style-type: none"> • Remove MPX BRM from the MPX PRC. Turn the MPX BRM over and check for signs of physical damage to the power and communications contacts. • Ensure the communications bus in the MPX PRC is clean and free of dirt and debris. If necessary, disconnect power and wipe the bus with a dry, lint-free cloth. • If the communications bus appears damaged, contact Vertiv support.
MPX BRM ID# / numeric value displayed is "0".	A firmware update to the MPX BRM is in process.	<ul style="list-style-type: none"> • Allow the firmware update to finalize. This may take several minutes depending on the MPX configuration and network performance.
MPX BRM ID# / numeric value is flashing.	A circuit breaker in the MPX BRM is open.	<ul style="list-style-type: none"> • Close circuit breaker. • One or more of the MPX BRM receptacles is overloaded. Reduce current draw from one or more receptacles.
MPX BRM ID# / numeric value is alternated with a "u", and audible alarm.	Branch under-current condition.	<ul style="list-style-type: none"> • Review the branch undercurrent alarm thresholds (these are user-set). • Check whether the loads have been removed, are operating in an unexpected low power mode or were turned off.
MPX BRM ID# / numeric value is alternated with an "o", and audible alarm.	Branch over-current condition.	<ul style="list-style-type: none"> • Review the branch overcurrent alarm thresholds (these are user-set). • Reduce the current draw from one or more receptacles.
Audible alarm sounds and phase power indicator flashes.	Input over-current or under-current condition.	<ul style="list-style-type: none"> • Review the receptacle overcurrent or undercurrent warning and alarm thresholds (these are user-set). • If an undercurrent condition is indicated, check whether the loads have been removed, are operating in an unexpected low power mode or were turned off. • If an overcurrent condition is indicated, reduce the current draw from the affected receptacle.

"Lights-out" condition

After updating or changing your MPX™ system, you may observe an operating condition in which none of the LEDs on any of the modules are illuminated. Although the MPX system is receiving power, all of its LED indicators are off. This condition is indicative of an incomplete firmware update.

The MPX™ PEM and the MPX™ BRMs operate in bootloader mode when the firmware fails to update completely. In bootloader mode, all LEDs are off, and the module appears non-functional. However, the bootloader is still in communication with the communication module and the normal operating mode can be restored.

To recover from "Lights-out" condition:

1. Assemble a test system that comprises a known-working MPX PEM with a known-working communication module installed onto the MPX PRC.
2. Install the malfunctioning MPX BRMs exhibiting lights-out behavior in which no LEDs are lit when powered on.

NOTE: It is recommended to attempt to troubleshoot one MPX BRM at a time, until successful results are achieved.

3. Establish network communications with the communication module according to the Liebert® RPC™ Web Card User Manual (SL-20825) or the Liebert® RPC2™ Communications Module Installer/User Guide (590-1380-501A).
4. Copy the firmware file (*.epm) to a folder on your laptop.

NOTE: If necessary, the firmware can be obtained from the Vertiv website <https://www.VertivCo.com/>

5. Browse to the <http://192.168.1.10> URL.

NOTE: The System Status area displays an alert that a firmware update is required.

6. Perform a firmware update according to the Liebert® RPC™ Web Card User Manual (SL-20825) or the Liebert® RPC2™ Communications Module Installer/User Guide (590-1380-501A).



WARNING! If you are running a firmware upgrade for an RPC-1000 communication module, do not change the browser URL, close the browser window or interrupt the network connection until the firmware update is complete!

NOTE: The firmware update can take several minutes, depending on the MPX configuration and network performance.

7. If the firmware update completes successfully, the MPX BRM's LED numeric value display will display a number. If the MPX BRM is a Receptacle Managed MPX BRM, all receptacle LEDs will be lit solid green, unless the MPX BRM was previously configured with some receptacles to be powered off. After the communications module restarts, the system is fully operational.

-or-

If the firmware update completes with an error and there is no change in the LED state of the MPX BRMs, then the affected MPX BRMs need to be replaced. Please contact Vertiv Technical Support or your Vertiv Sales office.

When you have successfully recovered one MPX BRM, repeat the steps with the same MPX PEM and communications module to recover any additional MPX BRMs exhibiting the lights-out condition. You can push a firmware update to up to six MPX BRMs at a time using the MPX test system. It can take several minutes to update multiple MPX BRMs, depending on the MPX configuration and network performance.

6.2 RPC-1000™ Communications Web Card Basic Troubleshooting

This section contains troubleshooting procedures for the RPC-1000 communications web card. See the Liebert® RPC2™ Communications Module Installer/User Guide (590-1380-501A) for detailed troubleshooting procedures for the RPC2 communications module.

The Liebert® RPC-1000 and RPC 2 communications modules enable you to update the firmware of the communications modules, as well as the firmware of each individual module on the MPX™ PDU, as new features and capabilities or service patches become available. A firmware update may take several minutes, depending on the MPX configuration and network performance.

During the update, the communications module upgrades all connected MPX components, including the MPX™ PEM, MPX BRMs and the optional RPC BDM. If a component is not connected, it will not be upgraded and the firmware update process must be repeated when the component is added to the system.

Maintaining dissimilar firmware on one or more components of an MPX PDU may cause intermittent or undesirable operation such as loss of parametric information, or conflicts with the numeric indicator assignments on the MPX BRM modules.

Upgrade firmware can be downloaded from the Vertiv website at www.VertivCo.com.

6.2.1 Basic troubleshooting

The following table lists common issues that can occur with the RPC-1000 communications web card.

Table 6.3 Common Issues and Corrective Actions for the RPC-1000 Communications Web Card

CONDITION	PROBABLE CAUSE	CORRECTIVE ACTION
Unable to reach the web interface of the RPC-1000 communications web card. No LED indicators are on the RPC-1000 communications web card.	<ul style="list-style-type: none"> Bad network cable. Communications module not properly seated. IP address has changed. Incorrect configuration. Card is in Null State. Card was reset to factory default. 	<ul style="list-style-type: none"> Verify the LEDs on the RPC-1000 communications web card: A solid green (network connectivity) and flashing amber (packet activity) are normal. Flashing green, or the absence of flashing amber, indicates intermittent connectivity or a bad communications module. Reseat the communications module. Verify the network cable is good. Swap the non-functioning communications module with a known working communications module. If a previously working communications module fails, replace the cable and/or confirm a connection to the network switch. Verify the cable connections at the RPC-1000 communications web card and the network switch. Verify network settings on RPC-1000 communications web card. For detailed steps, see the Liebert® RPC™ Web Card User Manual, Section 4.0. Verify DNS Settings. For detailed steps, see the Liebert® RPC™ Web Card User Manual, Section 9.5. Verify the communications module duplex setting matches the network switch. See the Liebert® RPC™ Web Card User Manual, Section 9.5.
Not Receiving Parametric Information.	<ul style="list-style-type: none"> Network connectivity. SNMP not setup correctly. 	<ul style="list-style-type: none"> Verify the cable connections at the RPC-1000 communications web card and the network switch. Verify the network cable is good per the “Unable to reach Web Interface” issue. Verify the LEDs on RPC-1000 communications web card per the “Unable to reach Web Interface” issue.

CONDITION	PROBABLE CAUSE	CORRECTIVE ACTION
	<ul style="list-style-type: none"> Card is in a Null State. Incorrect configuration. 	<ul style="list-style-type: none"> Verify the SNMP setup on the RPC-1000 communications web card. For detailed steps, see the Liebert® RPC™ Web Card User Manual, Section 9.6. Verify the PDU setup in monitoring software with matching SNMP community strings. Reseat the card. Verify the network settings on the RPC-1000 communications web card. For detailed steps, see the Liebert® RPC™ Web Card User Manual, Section 4.0. Verify the DNS settings. For details, see the Liebert® RPC™ Web Card User Manual, Section 9.5. Verify the communications module duplex setting matches the network switch. See the Liebert® RPC™ Web Card User Manual, Section 9.5.

6.2.2 Array configurations

The following table lists array configuration issues that can occur with the communications module.

Table 6.4 Array Configuration Issues and Corrective Actions

CONDITION	PROBABLE CAUSE	CORRECTIVE ACTION
Sibling PDU is not being displayed the in web interface.	<ul style="list-style-type: none"> Bad network cable. 	<ul style="list-style-type: none"> Verify the network cable is good. Verify the cable is inserted in the correct port.
Not receiving parametric information from Sibling PDU.	<ul style="list-style-type: none"> PDU array is not setup correctly. 	<ul style="list-style-type: none"> Confirm the array setup. For details, see the Liebert® RPC™ Web Card User Manual (SL-20825) or the Liebert® RPC2™ Communications Module Installer/User Guide (590-1380-501A).

6.2.3 Restarting or resetting

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 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.

For additional information, see the Liebert® RPC™ Web Card User Manual (SL-20825). or the Liebert® RPC2™ Communications Module Installer/User Guide (590-1380-501A).

APPENDICES

Appendix A: Agency Approvals

The MPX units comply with the following North American and European standards.

A.1 North American units

The 120 V and 240 V single-phase and 120/208-240 V three-phase North American MPX™ units have the following agency approvals:

- UL 60950-1 Standard for Safety: Information Technology Equipment - Safety - Part 1: General Requirements
- CSA C22.2 No. 60950-1: Information Technology Equipment - Safety, Part 1 General Equipment - Safety - Part 1: Requirements
- FCC, Title 47, Part 15 Subpart B for Class A operation as defined by ANSI Standard C63.4.
- ISTA Procedure 1A and 2A
- RoHS Compliant

A.2 European units

The 230 V single-phase and 400 V three-phase European MPX units have the following agency approvals:

- CE Compliant according to:
 - Low-Voltage Directive 2014/35/EU
 - Electromagnetic - Compatibility Directive 2014/30/EU (EMD)
 - RoHS Directive 2011/65/EC
 - WEE Directive 2012/19/EU
- ISTA Procedure 1 A and 2A
- ROHS and WEEE Compliant, Basic Test for Purchased Products according to International Safe Transit Association

A.1 Electrical and Environmental Specifications

SPECIFICATION	PARAMETER
Power Consumption	22 W maximum per fully configured 42U model (RPC, RPC BDM, MPX PEM, 6xBRM-R): 3 W per RPC; 0.4 W per module + 0.4 W per open control (energized condition)
Maximum Ratings	Maximum 240/415 V, 50/60 Hz, 63 A; dependent on MPX PEM selection
Insulation	Class I, Basic Earthed SELV
Electric Strength	2200 VDC
Overcurrent Protection	UL489 Overcurrent Circuit Breaker per Branch, 20 A, 5000 A A.I.C
Operating Temperature	Up to 140° F (60° C)
Humidity	5-95%, non-condensing
Altitude	6560 ft (2000 m) without derating
Storage Temperature Range	-13° F to 185° F (-25° C to 85° C)

A.2 Metering Performance

MEASUREMENT	POWER ENTRY MODULE (PEM)	BRANCH RECEPTACLE MODULE (BRM)	
		BRANCH	RECEPTACLE
	Volts, V	±1	
Accuracy, %	Current, A	±2%, from 1% to <10% Loading	
		±1%, from 10% to 125% Loading	
Phase Voltage, 0.1 V	√	N/A	√
Line Voltage, 0.1 V	√	N/A	N/A
Line Current, 0.01 A	√	√	√
Neutral Current, 0.01 A	√ (3-phase only)	N/A	N/A
Total Real Power, 0.1 W	√	N/A	N/A
Total Real Energy, 0.1 kW-hr	√	N/A	N/A
Real Power, 0.1 W	N/A	√	√
Apparent Power, 0.1 VA	N/A	√	√
Real Energy, 0.1 kW-hr	N/A	√	√
Power Factor, 0.01	N/A	√	√
Crest Factor, 0.01	N/A	N/A	√
Frequency, 0.1 Hz	√	N/A	N/A

Appendix B: Dimensional Drawings

Figure B.1 Liebert® MPX™ Rack PDU Assembly Dimensions, 74 in (1880 mm) Model

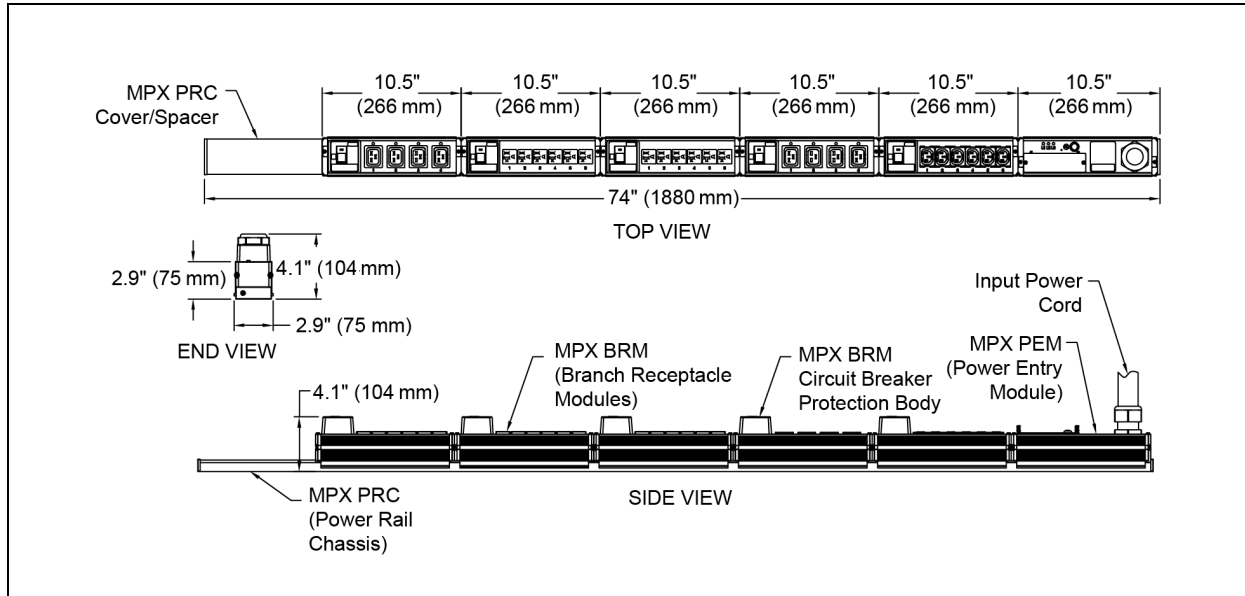


Figure B.2 Liebert MPX Rack PDU Assembly Dimensions, 40.6 in (1035 mm) Models

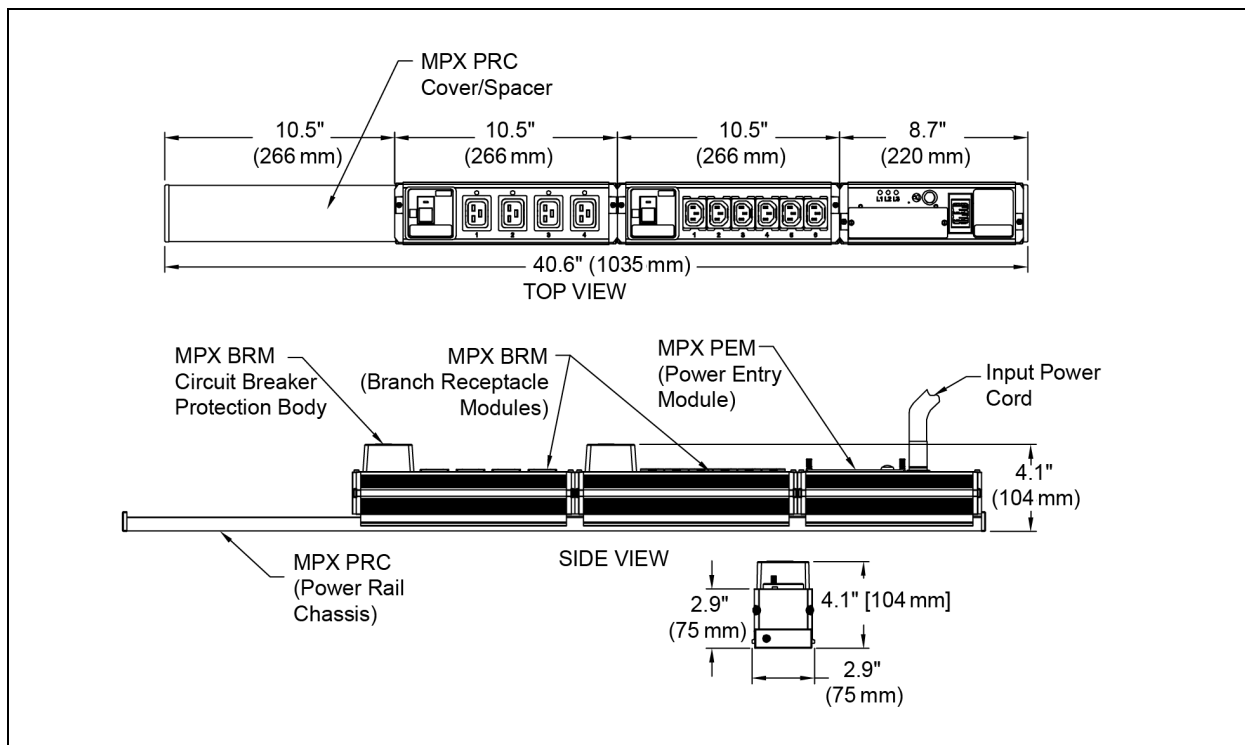
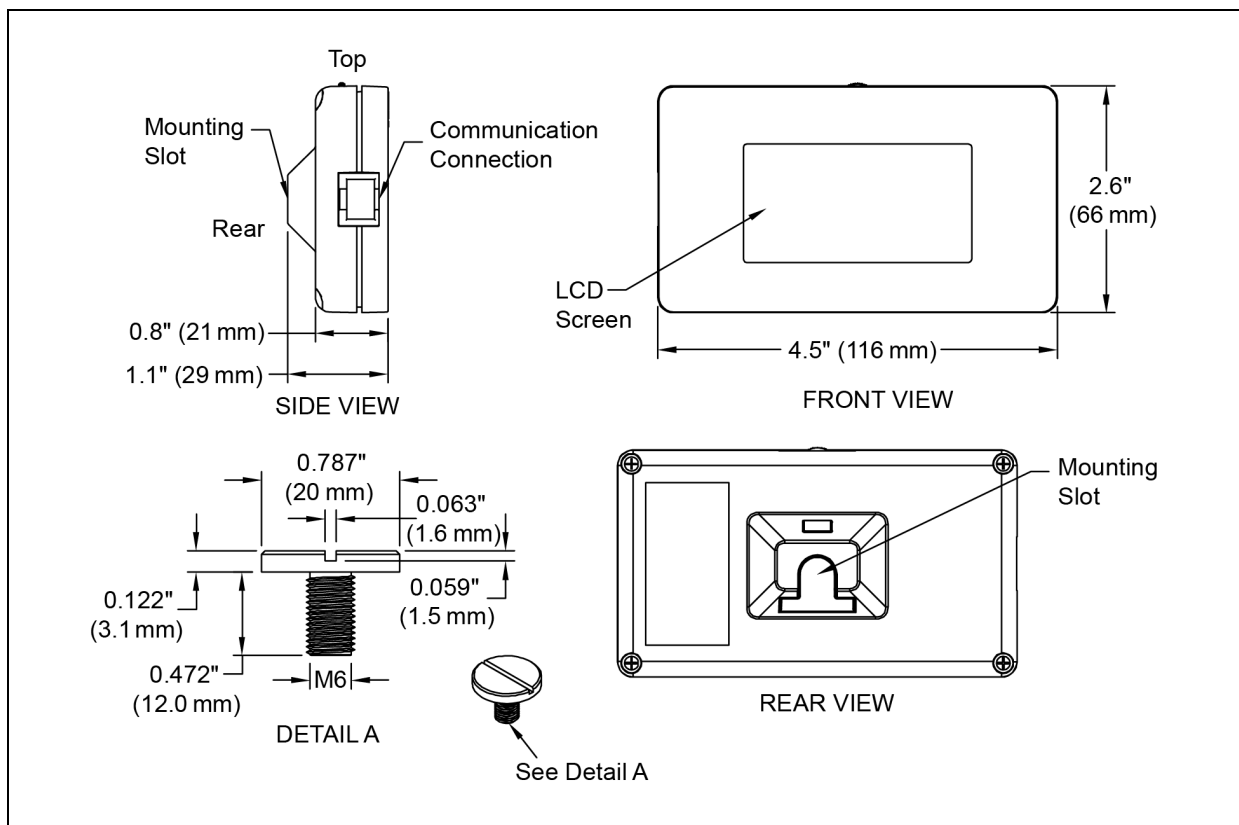


Figure B.3 RPC BDM Dimensions



Appendix C: Recycling, Compliance and Modifications Information

C.1 Notice to European Union Customers: Disposal of Old Appliances

This product has been supplied from an environmentally aware manufacturer that complies with the Waste Electrical and Electronic Equipment (WEEE) Directive 2012/19/EU.

This product uses components that are dangerous for the environment, such as electronic cards and other electronic components. Any component that is removed must be taken to a specialized collection and disposal center. If this unit must be dismantled, it must be done by a specialized center for collection and disposal of electric and electronics appliances or other dangerous substances.

The following “crossed-out wheelie bin” symbol is placed on this product to encourage you to recycle wherever possible.



Please be environmentally responsible and recycle this product through your recycling facility at its end of life. Do not dispose of this product as unsorted municipal waste. Follow local municipal waste ordinances for proper disposal provisions to reduce the environmental impact of waste electrical and electronic equipment (WEEE).

C.2 RoHS compliance

The Liebert® MPX™ rack PDUs comply with the Restriction of Hazardous Substances Directive (RoHS), prohibiting the use of six hazardous materials used in the manufacturing of electronics, including lead-free solder.

C.3 FCC compliance

This equipment has been tested and found to comply with the limits for a Subpart B Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

C.4 Modification disclaimer

Be aware that this product must be assembled and operated as stated in this document. Modifying the Liebert MPX rack PDU or any module may void the user’s authority to operate the equipment.



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