

Emerson Network Power® MPH2™ Rack PDU

User Manual

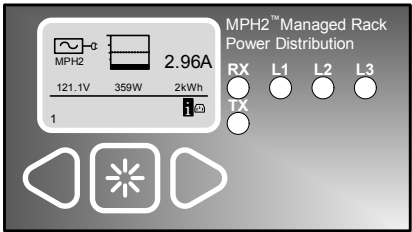


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IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

This safety sheet contains important safety instructions. Read all safety, installation and operating instructions before installing the Emerson Network Power MPH2 rack power distribution unit (PDU). Adhere to all warnings on the unit and in this safety sheet. Follow all operating and user instructions.

- The MPH2 rack PDU is designed for information technology equipment. The MPH2 rack PDU is not intended for use with life support or other designated critical devices. If uncertain about its intended application, consult your local dealer or Emerson representative.
- Maximum load must not exceed the rating shown on the MPH2 rack PDU nameplate.
- The rated line voltage must not exceed 240VAC for connection to AC power distribution systems with an isolated or high-impedance ground.
- Operate the MPH2 rack PDU in an indoor environment only in an ambient temperature range of 32°F to 140°F (0°C to 60°C) for 24A or less input models and 32°F to 122°F (0°C to 50°C) for 40A and 48A input models.
- Install the MPH2 rack PDU in a clean environment, free of conductive contaminants, moisture, flammable liquids, gases and corrosive substances.
- The MPH2 rack PDU must be installed in a restricted-access location. A restricted-access location is an area where access is possible only through the use of a tool or lock and key or other means of security, and is controlled by the authority responsible for the location.
- The MPH2 rack PDU has no user-serviceable parts. Under no circumstances attempt to gain internal access due to the risk of electric shock or burn.
- Refer any unexpected behavior or unusual fault conditions to your local dealer, Emerson representative or Emerson Network Power Applications Engineering.
- Emerson recommends powering only devices with safety agency approval from the MPH2 rack PDU.
- For permanently connected MPH2 rack PDU's (hard-wired versions), a readily accessible disconnect device must be incorporated external to the equipment.
- For MPH2 rack PDU's with integral plugs, the socket/ outlet must be installed near the equipment and must be easily accessible.



WARNING

Opening or removing end caps from an MPH2 rack PDU may expose personnel to lethal voltages within the rack PDU. Observe all cautions and warnings. Failure to do so may result in serious injury or death. MPH2 rack PDU units contain no user-serviceable parts. For service or technical support, contact Emerson Network Power Applications Engineering or your local Emerson representative. Do not attempt to service this product yourself.



CAUTION

Connecting an MPH2 rack PDU to a power supply with an incorrect rating in voltage or amperes may damage the connected equipment and your MPH2 rack PDU. For questions about the power supply connections, contact Emerson Network Power Applications Engineering or your local Emerson representative.



CAUTION

Ensure that the ratings of the electric circuit of each connected device meets the specified rating at each branch and outlet.



NOTE

For power management purposes, record the outlet where each piece of equipment is connected. Outlets on the MPH2 rack PDU have a numeric designation. The MPH2 rack PDU identifies the outlets with numbers and are grouped by branch with a letter referring to the proper circuit breaker.



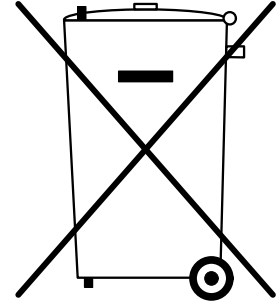
CAUTION

All configuration steps must be completed before attempting to start equipment connected to the MPH2 rack PDU.

EUROPEAN UNION

Notice to European Union Customers: Disposal of Old Appliances

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 specialized collection and disposal centers. If this unit must be dismantled, this must be done by a specialized center for collection and disposal of electric and electronics appliances or other dangerous substances. This product has been supplied from an environmentally aware manufacturer that complies with the Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC. The “crossed-out wheelie bin” symbol at right 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).

For information regarding the scrapping of this equipment, go to <http://www.eu.emersonnetworkpower.com>

(“Products session” or “Contact us” session) or call Emerson’s worldwide technical support at:

- 00 80011554499 (toll free number)
- +39 0298250222 (toll number based in Italy)

ROHS Compliance

The MPH2 rack PDU modules comply with the Restriction of Hazardous Substances directive (ROHS), prohibiting use of six hazardous materials manufacturing of electronics, including lead-free solder.

FCC Compliance

This unit complies with the limits for a Class A device pursuant to Part 15 of the FCC Rules. Operation is subject to the following two conditions:

This device may not cause harmful interference, and

This device must accept any interference received, including interference that may cause undesired operation.






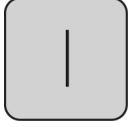
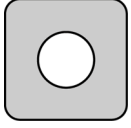

NOTE

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 that the user must correct, including the expense of all corrective modifications.

SAFETY SYMBOLS

The following symbols may appear within the documentation or on the product.

Symbol	Meaning
	High Temperature Alerts the user where the enclosure temperature may exceed 158°F (70°C) while operating under high-ambient temperature and at maximally rated load.
	Instructions Signifies the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.
	Dangerous Voltage Warns about the presence of uninsulated dangerous voltage within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.
	Power On Indicates the principal On/Off switch is in the On position.
	Power Off Indicates the principal On/Off switch is in the Off position.
	Protective Grounding Terminal Indicates a terminal that must be connected to earth ground before any other connections to the equipment may be made.

1.0 INTRODUCTION

The Emerson Network Power® MPH2™ is the most intelligent, high-availability line of managed rack PDU's. It offers remote monitoring and control capabilities as well as environmental sensors with multiple power input selections and output configurations.

Metering Levels

Four types of MPH2 are available that offer metering of all electrical information including input, branch and outlet levels, as well as integration with environmental sensors. The available information varies by type of MPH2.

Mounting

Rack PDU's are available for mounting in vertical configuration in standard or network enclosures.

Power cords on MPH2 models that mount vertically in a zero-U configuration may be switched from one end to the other to accommodate top or bottom cable entry into the rack.

Locking Outlets - IEC Type Only

Locking outlets are available on models with IEC outlets. The locking feature requires optional power cords to be installed on devices powered by the MPH2.

The outlets require no modification to function properly with non-locking power cords.

Overcurrent Protection

All MPH2 rack PDU units with input current rating of 30A and higher feature 100% rated hydraulic-magnetic breakers. For all UL-listed models, the maximum cord and plug-connected loading is limited to 80% continuous loading, as required by UL in accordance with the National Electric Code.

Low-profile circuit breakers are used on all MPH2 rack PDU's with two or three branch circuits. Standard-profile circuit breakers are used on MPH2 rack PDU's that have six branch circuits or have a 240VAC rating. Each type of circuit breaker is a flush-mount, rocker style (see **Figure 29**).

Integrated Monitoring and Management

The factory-installed Emerson RPC2™ communications module permits managing the MPH2 rack PDU over a secure Web page and SNMP-based network management system. The RPC2 permits interconnecting up to four rack PDU's for monitoring and management.



NOTE

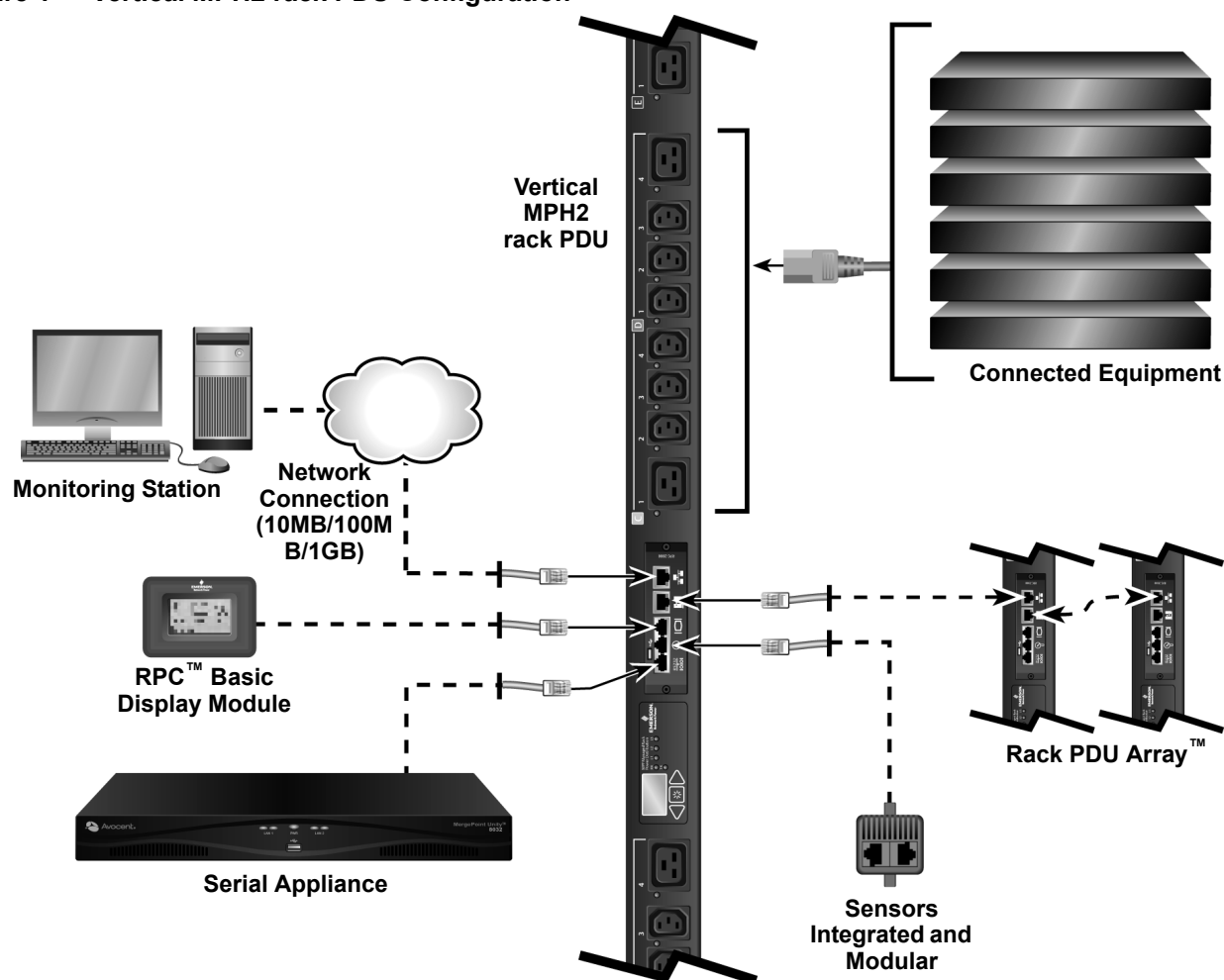
Refer to the RPC2 communications module user manual, SL-20841, for detailed instructions on installing and using the RPC2 module. The document is available at Emerson's Web site: <http://www.emersonnetworkpower.com>

A rack PDU can be monitored locally through its onboard LCD, through a Web interface or through an optional display module, either the RPC BDM (Part# RPCBDM-1000). The display module connects directly to the RPC2 communications module. It can be handheld, mounted in or on the rack or mounted on a wall near the rack PDU it is monitoring.

Multiple MPH2 rack PDU's can be managed with these software applications:

- Avocent® Rack Power Manager software
- Avocent DSView™ management software
- Emerson's Trellis™ Real-Time Infrastructure Optimization platform software
- Liebert® Nform®, which adds group-based outlet management
- Liebert SiteScan®

Figure 1 Vertical MPH2 rack PDU Configuration



1.1 General Characteristics

- Input ampacities include 16A or 32A for European Union versions and 16A to 48A for North American versions.
- Single-phase and three-phase.
- Input voltages include 100-120VAC, 120/208VAC, 200-240/415VAC.
- Outlets types include NEMA 5-20, IEC 320 C13 and IEC 320 C19
- Input connection supports a highly flexible fixed power cord or hard-wired connection to user accessible terminal block.

1.2 Model Types

There are four types of MPH2 rack PDU.

- **Type R**—Outlet Metered, Outlet Switched: Supports metering of the overall input, individual branches and individual outlets; also supports individual On/Off control of each outlet.
- **Type M**—Outlet Metered: Supports metering of the overall input, individual branches and individual outlets.
- **Type C**—Rack PDU Metered, Outlet Switched: Supports metering of the overall input and of individual branches and supports individual On/Off control of each outlet.
- **Type B**—Rack PDU Metered: Provides basic power distribution and supports metering of the overall input and of the individual branches.

1.3 Appearance and Components

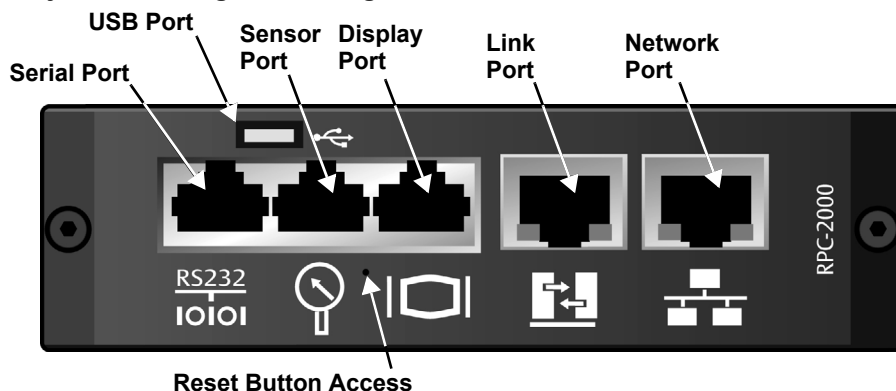
1.3.1 Controls and Indicators—RPC2™

The MPH2 rack PDU is monitored and managed by the factory-installed RPC2 communications module. This manual presents information about the MPH2's functions and features. For details on operating the MPH2 through the RPC2 communications module, refer to the RPC2 user manual, SL-20841. The document is available at Emerson's Web site: <http://www.emersonnetworkpower.com>

The RPC2 is installed near the middle of the MPH2 rack PDU. The central location eases connections whichever orientation is required for power cabling.

The RPC2's Web-based interface provides system operating measurements, as well as readings from optional SN temperature or temperature/humidity sensors. The RPC2 provides basic information about the MPH2 rack PDU, such as firmware version, unit rating, model number and serial number.

Figure 2 MPH2 major monitoring and management features



1.3.2 Controls and Indicators—LED's

The MPH2 rack PDU also has LED's that indicate outlet and branch status and system information. The LED's flash, pulse or change colors to indicate an event or alarm condition (for details on how LED's respond to events and alarms, refer to **5.0 - Troubleshooting**).



NOTE

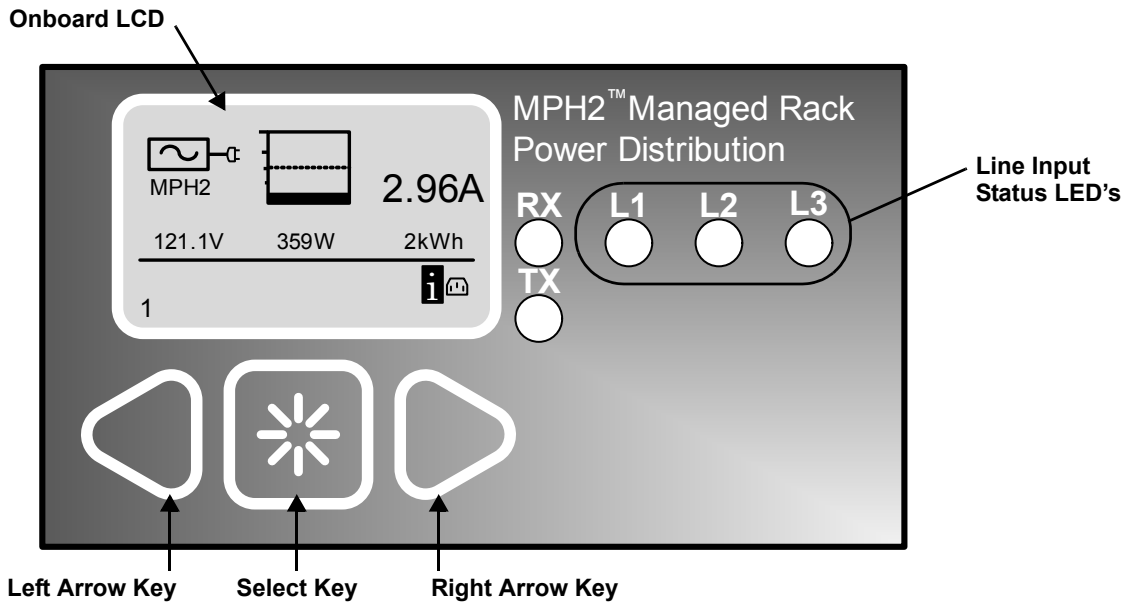
*Units with a "B" as the fourth character in the model name (MPHBxxxx) do not have LED's at their outlets. The branch and outlet LED behavior in **5.0 - Troubleshooting** and elsewhere in this document does not apply to these units.*

Outlets on units with an "M" as the fourth character in the model name (MPHMxxxx) cannot be turned Off. LED's at outlets on these models are always either on continuously or flashing when input power is present.

1.3.3 Controls and Indicators—Onboard LCD

Emerson's MPH2 has an integrated, onboard LCD that can be used to view information about the rack PDU. The information available depends on the type of MPH2. For additional information about the onboard LCD, refer to **3.1.1 - Getting Information Through the Onboard LCD**.

Figure 3 MPH2 LCD and LED's



1.3.4 Power Components

The component location and type depend on the model of the MPH2 rack PDU. For example, units with a “B” as the fourth character in the model name do not have LED’s at their outlets; see Figures 4, 5, 6 and 7.

Figure 4 Branch and outlet identification—Units with no monitoring

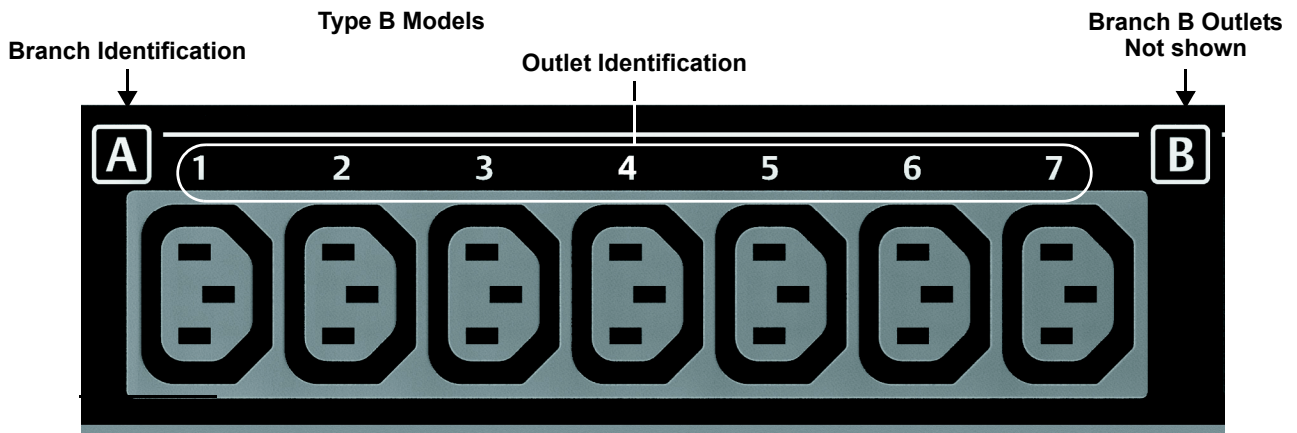
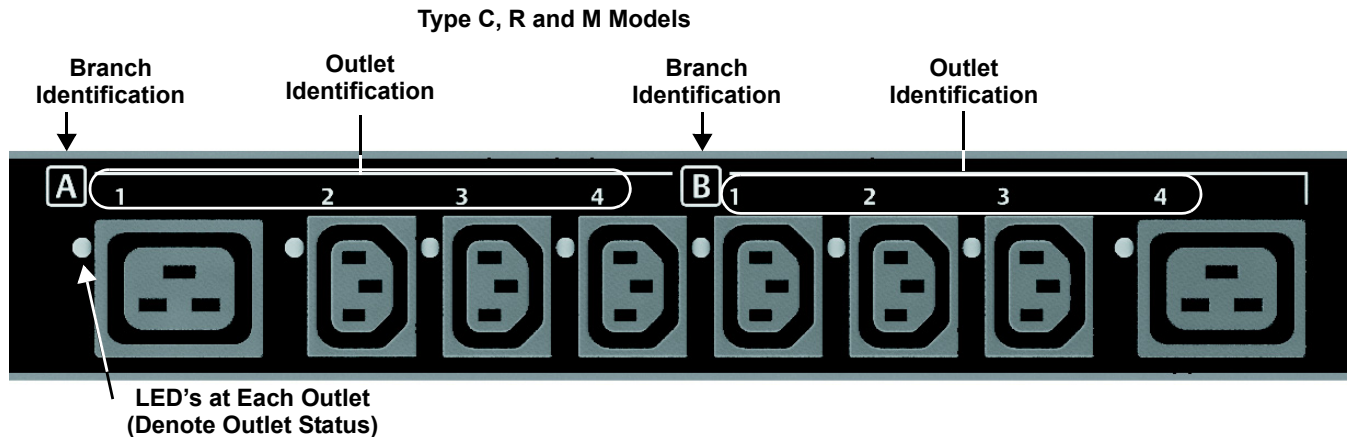


Figure 5 Branch and outlet identification—Units with individually monitored and managed outlets



Branch Overcurrent Protection

Models having more than 16A input current rating are equipped with branch overcurrent protection. This protects each outlet group against overload and short circuit. The branch circuit breaker is a UL 489-listed breaker with a flush-mount, rocker-style actuator. The circuit breaker interrupts the fault current flowing in the line-to-line, line-to-neutral and line-to-PE conductors of the branch circuits. The branch circuit breaker ratings apply over the full rated operating temperature and frequency.

The flush-mount breakers guard against accidental trips that could interrupt power to the connected load. Manually tripping a breaker requires a small, flat blade, such as a screw driver (see **Figure 29**).

Low-profile circuit breakers are used on all MPH2 rack PDU's with two or three branch circuits less than 240V rating in a line-neutral configuration. Standard-profile circuit breakers are used on MPH2 rack PDU's with six branch circuits or have a 240VAC rating. Each type of circuit breaker is a rocker style (see **Figure 29**).

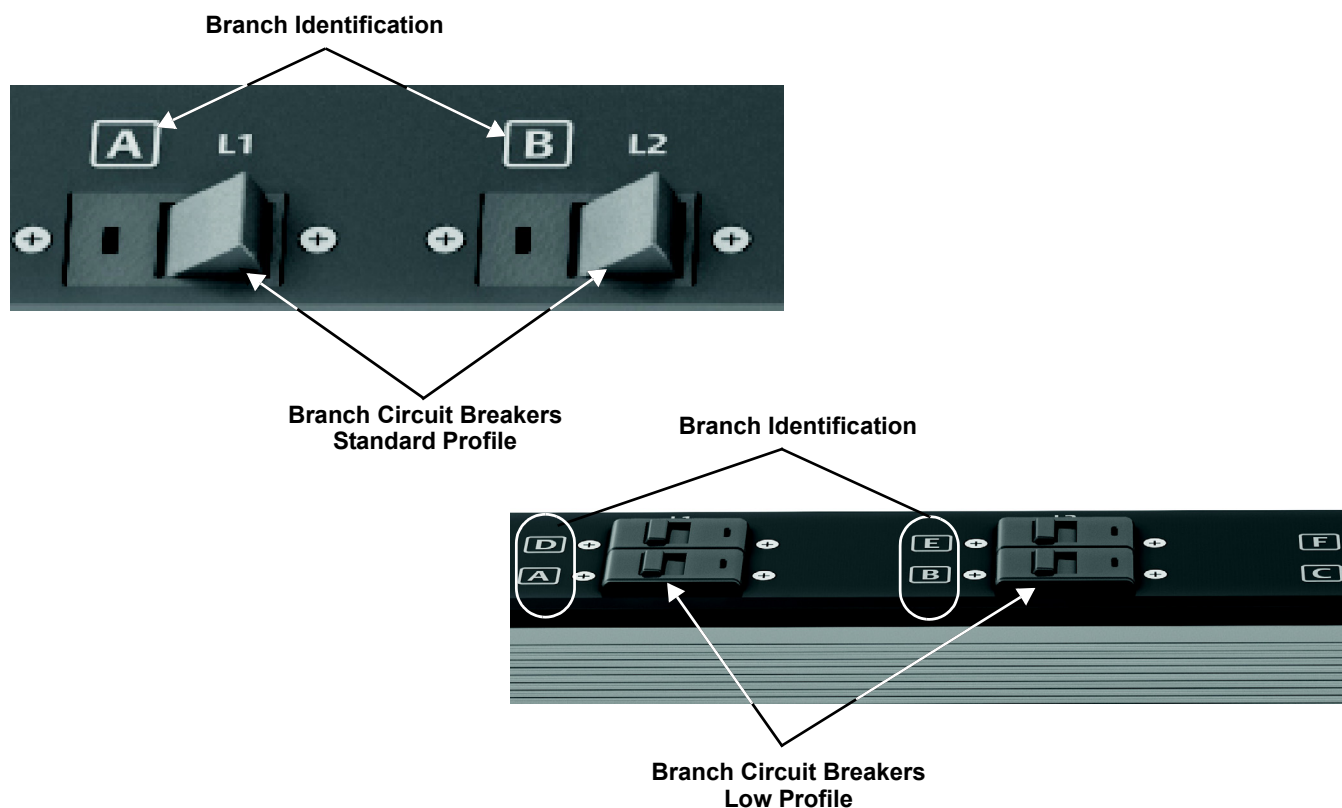
The branch circuit breaker labeling (A, B, C and so on) shows which outlets are protected by each specific breaker. Outlets on Branch A are protected by the circuit breaker labeled A. Three-phase PDU's may also have labeling showing the phase associated with each circuit breaker.



NOTE

The branch circuit breaker is not designed to be used as a disconnect device for the connected load.

Figure 6 Circuit breaker branch identification



1.3.5 Hard-Wired Connection Features

Emerson's MPH2 rack PDU may be equipped with either a factory-installed input power cord or hard-wired connections. The hard-wired connection will be at one end of the unit. A terminal block in the hard-wired connection compartment is coded to aid in making the connections. A collar secures the input wire, keeping the strain off the terminal block connections. See **Figure 7**.

2.0 INSTALLATION

An MPH2 rack PDU can be installed in an Emerson rack on the frame members using field-supplied hardware. The unit can be installed on the face or the side of frame members. The unit can be mounted so that the power cord exits either the top or bottom of the rack.

**NOTE**

Follow all local and national electrical codes, standards and recommended practices.

Disconnect Required for Hard-Wired MPH2 Units

A readily accessible input power disconnect device must be installed near the MPH2 rack PDU.

Input Power Location for MPH2 Units with Factory-Installed Power Cords

The input power socket or outlet must be installed near the MPH2 and must be easily accessible.

2.1 Attaching Input Power Cords—Hard-Wired Models Only

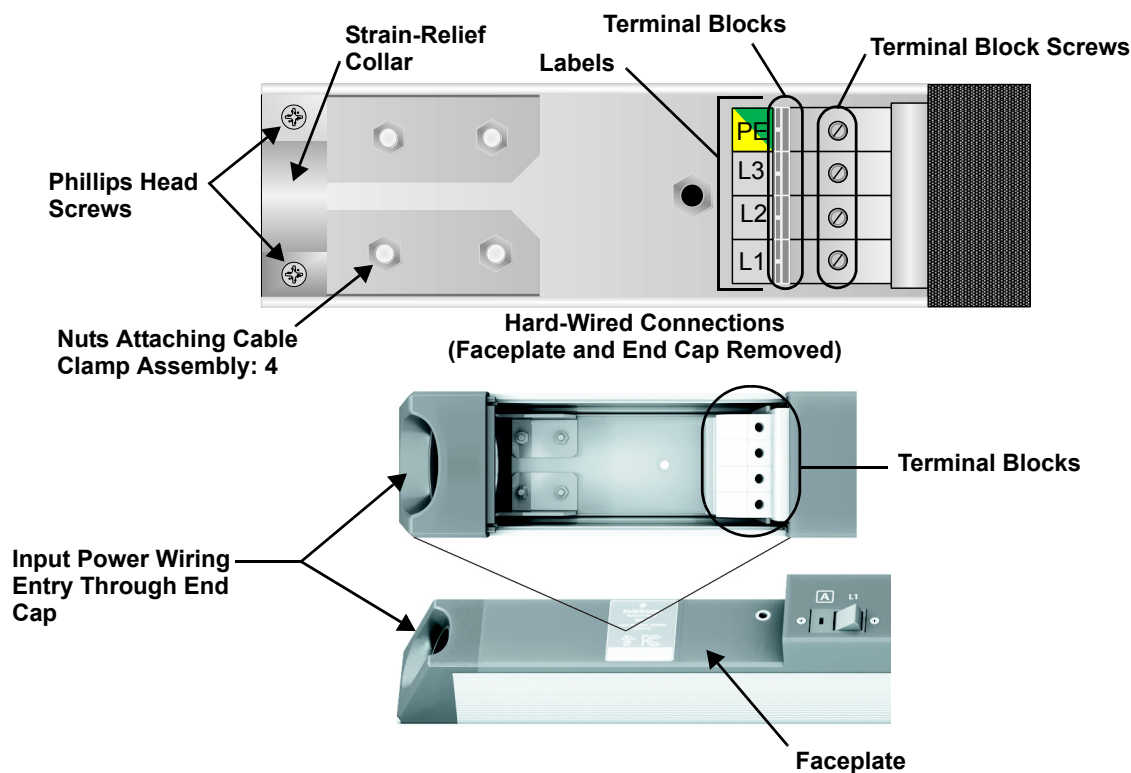
MPH2's with integral power cords need no assembly before installation. Units with hard-wired input power require attachment of input power cords. See **Table 1** for wire sizing.

Hard-wired models may be wired with or without conduit.

2.1.1 Attaching Input Power Cords Without Conduit

1. Remove the end cap. It is held in place with two T10 Torx screws.
2. Slide the terminal block cover off.
3. Loosen the strain-relief collar. It is held in place with two Phillips head PH1 screws.
4. Strip the insulation from the individual wires as required to fit into the terminal block.
Recommended stripping length for MPH2 units rated less than 32A is 9mm; for MPH2's rated or higher, 11mm.
5. Slip the power cord through the hole in the end cap and through the strain-relief collar.
6. Loosen the terminal block screws.
7. Insert the wires into the terminal block according to the labeling inside the MPH2; tighten each terminal block screw after inserting a wire. Refer to **Table 2** for tightening torque.
8. Tighten the strain-relief collar around the input power cord. The cord's outer insulation covering should extend through the bracket.
9. Replace the terminal block cover by either sliding it on or snapping it into place.
10. Reattach the end cap to the MPH2 with the two screws removed in **Step 1**.

Figure 7 Hard-wired connections



2.1.2 Attaching Input Power Cords With Conduit

1. Remove the end cap. It is held in place with two T10 Torx screws.
2. Slide the terminal block cover off.
3. Remove the cable clamp assembly. It is held in place with four nuts (see **Figure 7**).
4. Strip the insulation from the individual wires as required to fit into the terminal block.
Recommended stripping length for MPH2 units rated less than 32A is 9mm; for MPH2's rated or higher, 11mm.
5. Slip the stripped wires through the seal-tight conduit connector, through the metal end plate and into the terminal block connection box.
6. Loosen the terminal block screws.
7. Insert the wires into the terminal block according to the labeling inside the MPH2; tighten each terminal block screw after inserting a wire. Refer to **Table 2** for tightening torque.
8. Install the cover plate spacer, by either sliding it on or snapping it into place and sliding it firmly against the main body of the MPH2.
9. Install the cover plate, by either sliding it on or snapping it into place and pressing it against the cover plate spacer.
10. Attach the metal end plate to the MPH2 with four screws provided in the kit.
11. Slide the conduit into the seal-tight conduit connector.
12. Tighten the seal-tight conduit connector until it grips the conduit and crimps it securely.

Figure 8 Disassembling the MPH2 for installing an input power cable in conduit

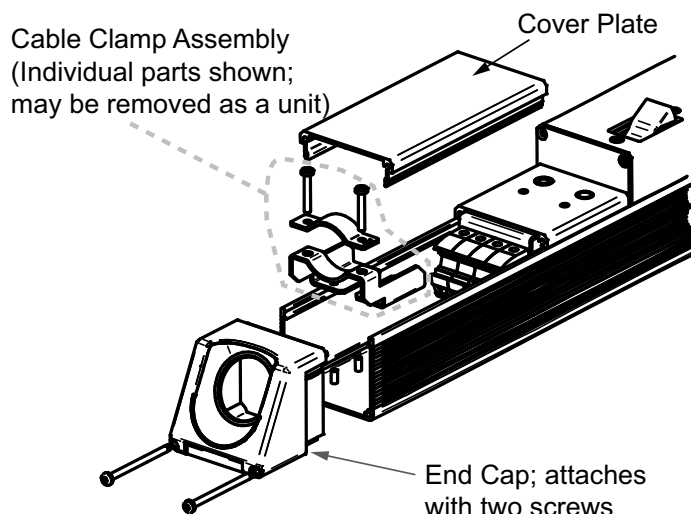


Figure 9 Disassembling the MPH2 for installing an input power cable in conduit

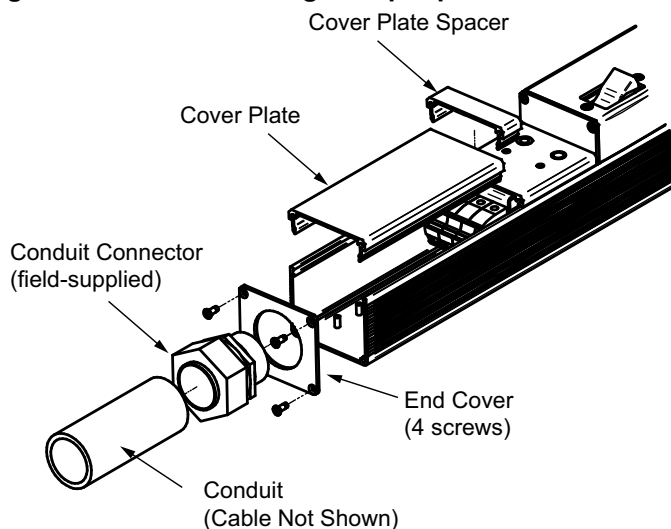


Table 1 Hard-wired models—Connection terminal ratings

	MPH2 Rating	
	≤32A	>32A
Conductor Cross-Section Solid, Minimum	0.2mm ²	0.5mm ²
Conductor Cross-Section Solid, Maximum	6mm ²	16mm ²
Conductor Cross-Section Stranded, Minimum	0.2mm ²	0.5mm ²
Conductor Cross-Section Stranded, Maximum	4mm ²	10mm ²
Conductor Cross-Section, AWG/kcmil, Minimum	24	20
Conductor Cross-Section, AWG/kcmil, Maximum	10	6
Conductor Cross-Section Stranded, With Ferrule Without Plastic Sleeve, Minimum	0.25mm ²	0.5mm ²
Conductor Cross-Section Stranded, With Ferrule Without Plastic Sleeve, Maximum	4mm ²	10mm ²
Conductor Cross-Section Stranded, With Ferrule With Plastic Sleeve, Minimum	0.25mm ²	0.5mm ²
Conductor Cross-Section Stranded, With Ferrule With Plastic Sleeve, Maximum	4mm ²	10mm ²

Table 2 Terminal tightening torque

Tightening Torque	MPH2 Rating	
	≤32A	>32A
Minimum	0.6 Nm	1.5Nm
Maximum	0.8Nm	1.8Nm

2.2 Tool-less Mounting

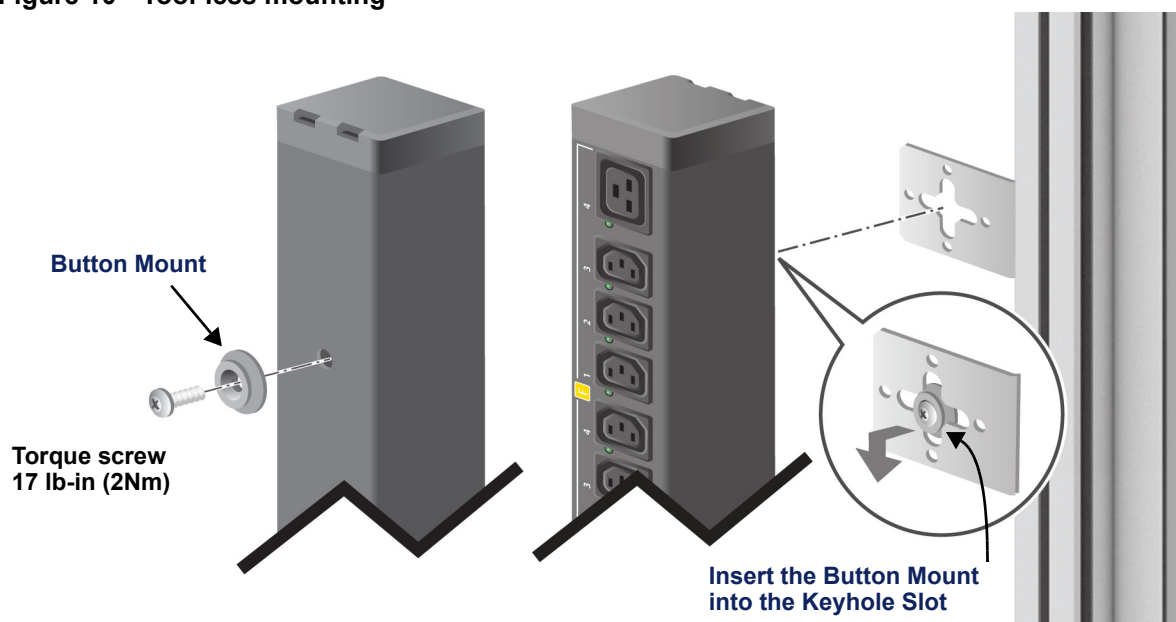
For tool-less mounting, attach the mounts to the rear of the MPH2 rack PDU, then hang it in the rack as shown in **Figure 10**. Torque the screw attaching the mounting button 17 lb-in (2Nm).



NOTE

Brackets are not supplied. A range of brackets for Emerson and other manufacturers' racks are available as accessories.

Figure 10 Tool-less mounting



2.3 Installing an MPH2 in an Emerson® Rack

2.3.1 Mounting Hardware and Tools Required

Factory-Supplied

- Two brackets
- Mounting buttons

Field-Supplied

- Spring nuts (supplied with Emerson rack)
- Phillips #2 screwdriver

Determine where in the Emerson rack the PDU will be installed and follow the instructions below. Installation requires attaching two brackets to the PDU, inserting four spring nuts into the rack and using the brackets to attach the PDU to the rack.

To install a PDU in a rack:

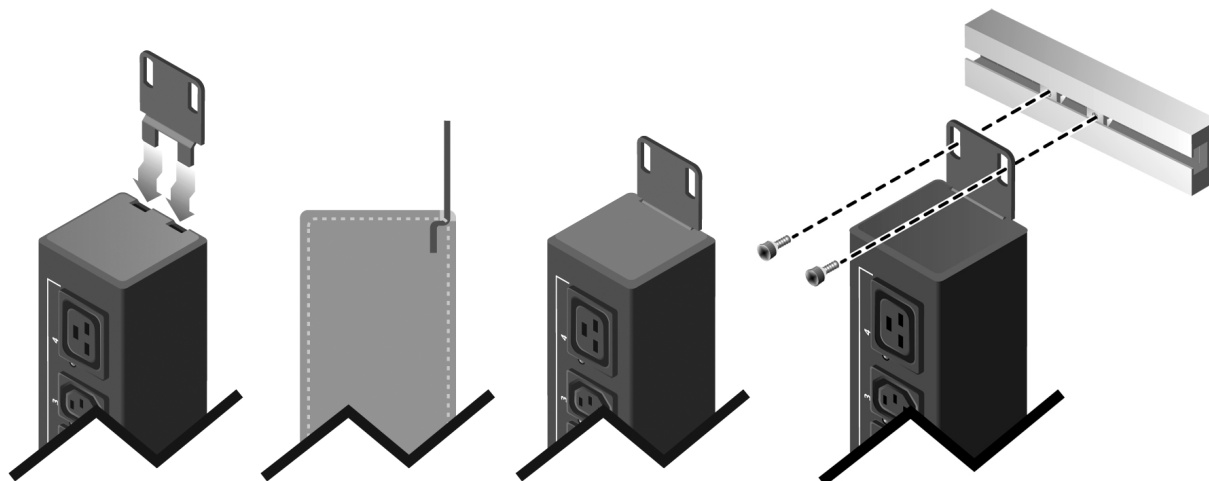
1. Attach a bracket to each end of the PDU.
2. If mounting on horizontal frame members, attach the brackets in-line.

- or -

If mounting on a vertical frame member, attach the brackets at a right angle to the PDU.

3. Insert two spring nuts into the appropriate T-slot on the frame member. Position the spring nuts to accommodate screws inserted through slots in the brackets. To move the spring nuts, press down on each with a small, pointed object and slide each into position.
4. Hold the PDU in place and attach the top of the unit to the rack with tool-less fasteners.
5. Tighten the screws, applying 46 lb-in (5.2Nm).
6. Repeat **Steps 3** through **5** for the lower bracket on the lower end of the PDU.

Figure 11 Installing in an Emerson rack



2.3.2 Safety Earth Ground Connection

Ensure that the safety earth connection is made before any equipment is connected to Emerson's MPH2 rack PDU. Units with factory-attached input power cords have an internal grounding conductor. The ground wire establishes the same ground reference between the MPH2 rack PDU and the rack. The ground-wire and hardware are available as an option from Emerson.



NOTE

The grounding strap may be used with MPH2 rack PDU's that have integral input power cords and units that have hard-wired input power cords. The strap supplements the internal grounding conductor of the integral power supply cord.

The grounding strap may be particularly useful when the rack is on a raised floor.


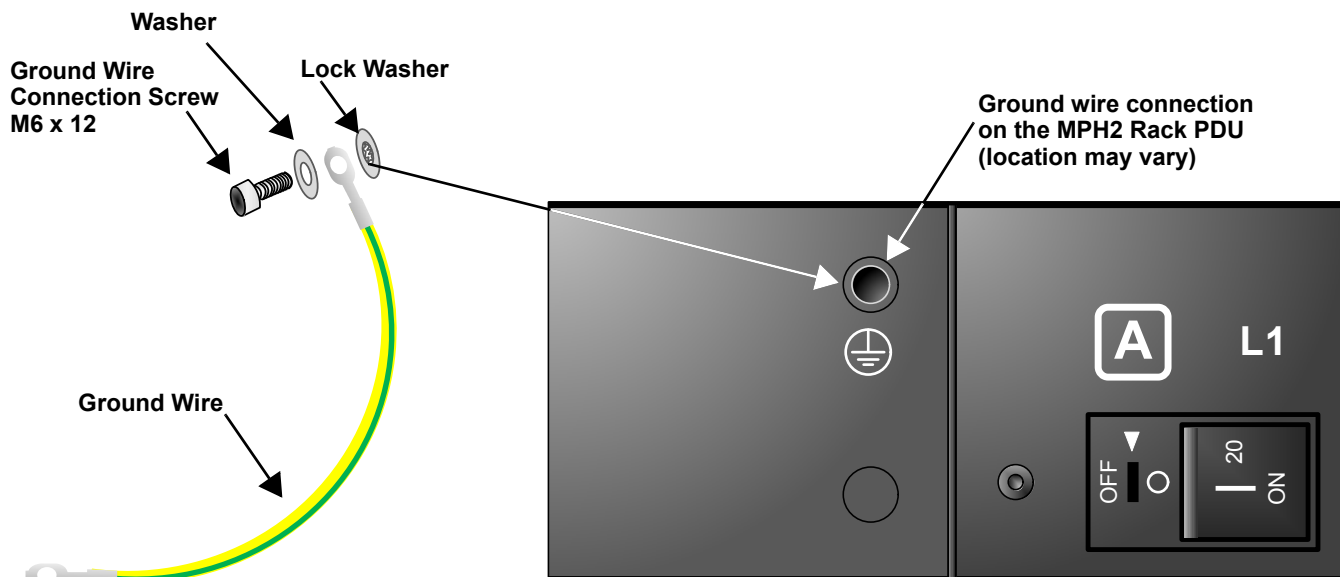
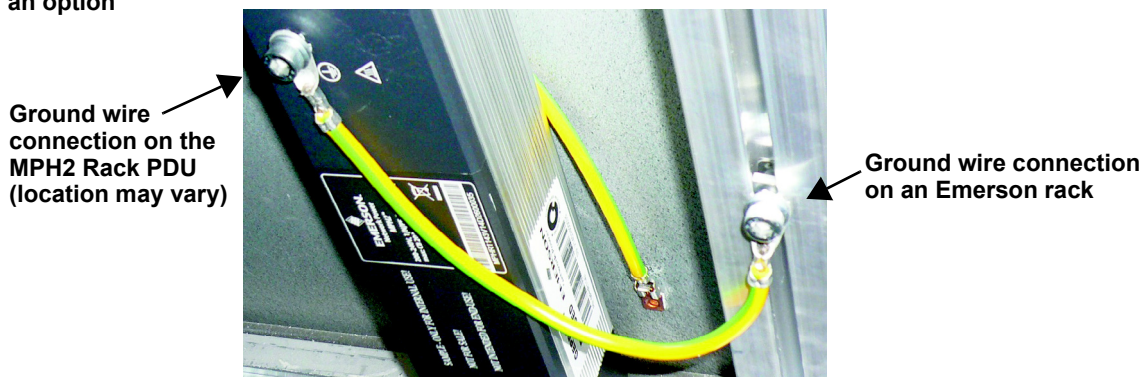
1. Insert a spring nut into the rack frame near the grounding point on the MPH2 (see **Figure 10** for inserting the spring nut).
2. Attach a ground wire to the rack with a screw, washer and lock washer. The screw is secured to the rack's frame with a spring nut. The ground wire and hardware are available as an option from Emerson.
3. Use a second field-supplied screw, washer and lock washer to secure the ground wire to the MPH2. The connection point is marked with an earth-ground symbol  (see **Figure 12**).

Figure 12 Earth-ground connection



Ground wire and hardware are available as an option from Emerson.

COMPLETED GROUND WIRE CONNECTION



2.3.3 Recommended Electrical Backup Protection

A field-provided external circuit breaker must be installed upstream of the MPH2 rack PDU. The circuit breaker must be sized according to the input rating of the PDU. The circuit breaker rating must meet the values in **Table 3**.

The external circuit breaker serves as the primary input power disconnect for the MPH2.

Table 3 Upstream circuit breaker rating

Maximum Input Current Per Pole	Rated Current of Upstream CB
16A	20A (North America) 16A (EU, WW)
24A	30A (NA)
32A	32A (EU, WW)
40A	50A (NA)
48A	60A (NA)
63A	63A (EU, WW)

2.4 Connecting Rack Equipment



NOTE

Circuit breakers on Emerson's MPH2 rack PDU are opened at the factory. The open circuit breakers help protect against damage to the connected load from high inrush current when input power is connected.

The circuit breakers must be closed before the unit will supply power to the connected load. Do not close the breakers until after all rack equipment is connected to the MPH2 rack PDU.

Once the MPH2 rack PDU has been installed in the rack, the unit is ready for connection of equipment that will be powered by the unit or used for monitoring.

Verify that the equipment to be connected meet these requirements:

- Input power requirements of each device match the MPH2 output
- Equipment will not overload the MPH2 rack PDU
- Input power cords match the MPH2 outlets
- Equipment is ready for input power (properly installed and prepared)

To connect devices to an MPH2 rack PDU:

1. Verify that all devices to be connected are shut down and unplugged from input power sources.
2. If the MPH2 rack PDU will be monitored over a network, connect an Ethernet cable to the network port on the factory-installed RPC2.
3. Route the devices' power cables to the MPH2 rack PDU, following proper procedures and good practices, such as segregating power cables from control cables and keeping cable bends to recommended angles.
4. Verify that the branch circuit breakers on the MPH2 rack PDU are open.
5. Connect the devices' input power cables to the MPH2 rack PDU.



NOTE

All C13 and C19 outlets on MPH2 rack PDU's are locking outlets. Locking requires use of special power cords, which may be factory-installed on the equipment or is available from Emerson.

If non-locking power cords are used, the power cords should be secured through other methods to prevent unintended power interruption.

6. Record where each piece of rack equipment is connected, using the branch and outlet numbers on the MPH2 rack PDU.
7. Post the connection information on or near the rack and at any remote monitoring location.
8. Connect input power to the MPH2 rack PDU. On Types R, C and M models, all LED's will begin pulsing.
9. Verify that input power is present and the line status LED's are illuminated.
10. Close the branch circuit breakers. The receptacle LED's will glow green.
11. Turn on the connected devices one at a time and verify that each is operating properly.
12. Ensure that the specified values found on the MPH2 rack mount PDU's serial tag are not exceeded.
13. Monitor and control the MPH2 rack PDU as detailed in the RPC2 user manual, SL-20841, available at www.emersonnetworkpower.com

2.5 Installing Optional Items

The following items may be added to an MPH2 rack PDU system but are not required.

- RPC Basic Display Module
- Liebert® SN temperature/humidity sensors

2.5.1 RPC Basic Display Module

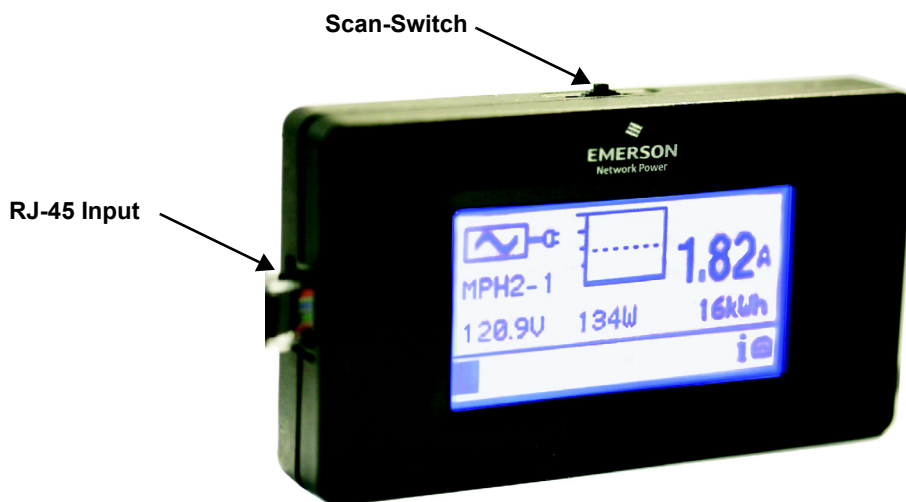
The RPC Basic Display Module (BDM) provides local display of parametric data, including electrical status, temperature and humidity for all connected MPH2 rack PDU's. Display information is accessed via a navigation switch on the BDM. The RPC BDM is connected by cable to the MPH2 rack PDU, allowing the user to install the display to suit the local reading requirements. A 6.5ft. (2m) cable and general mounting provisions are provided. A single display can be used for up to four rack PDU's connected in a Rack PDU Array™.

The RPC BDM can be mounted in the rack with either the included hardware or with a cable tie through the slot on the back of the module. Either method permits moving the BDM to a different place in the same rack or to another rack.

Included Hardware

- RPC BDM, 1
- Spring Nut M5, 1
- Spacer Sleeve, 1
- Mounting Button, 1
- M5 Screw, 1
- Cable Clip, 1

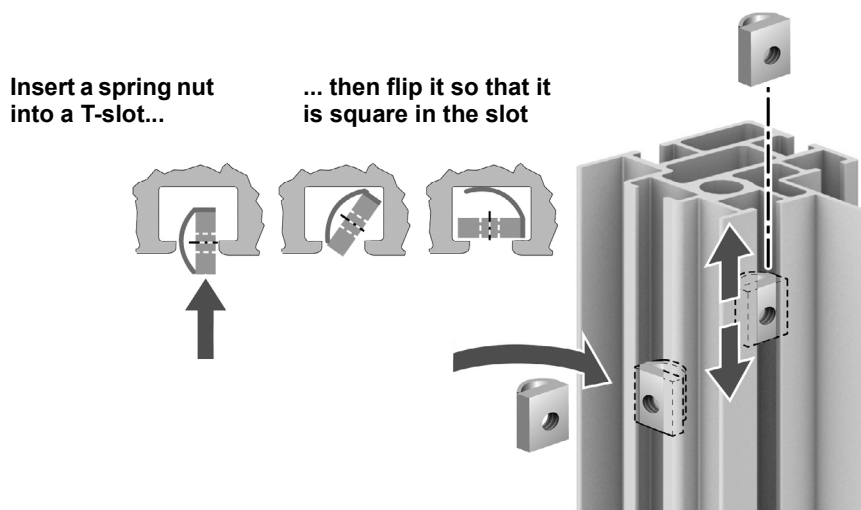
Figure 13 RPC BDM



To install an RPC BDM in a rack:

1. Determine the mounting location.
2. Insert a spring nut into a T-slot on the frame member where the RPC BDM will be installed.

Figure 14 Inserting the spring nut into a T-slot



3. Insert the MPH2 rack PDU screw into the spacer sleeve.
4. Insert the MPH2 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.
6. Connect the RPC BDM to the RPC2 with an Ethernet cable.
7. Be certain to connect the cable to the correct port on the RPC2.

2.5.2 Temperature/Humidity Sensor

Optional Liebert® SN temperature/humidity sensors are available to assist in monitoring conditions in the rack. Liebert SN sensors are designed for installation in Emerson racks without tools, but each may be placed in any area to monitor temperature and humidity levels. Each connects to the RPC2 communications module, which makes readings available to other monitoring methods.

To install a sensor in a rack:

1. Insert the sensor bracket base into one end of the sensor support.
2. Snap the sensor into the other end of the sensor support.
3. Choose where in the rack to install the sensor assembly.



NOTE

Emerson recommends placing the sensor in the area of the rack that is likely to be warmest. That location helps determine extreme conditions that can cause equipment damage.

4. Hold the sensor bracket on a T-slot on the Emerson rack frame where the sensor will be placed.
5. Insert the included quarter-turn fastener through the rectangular hole in the sensor bracket base and into the T-slot.
6. Turn the fastener clockwise 90 degrees, a quarter of a turn.
7. Route the sensor cable to the RPC2 communications module and insert it into the card's external sensor port.



NOTE

For more information, see the RPC2 user manual, SL-20841, available at Emerson's Web site, <http://www.emersonnetworkpower.com>

3.0 OPERATION

Emerson's MPH2 rack PDU may be monitored and managed by the factory-installed RPC2 communications module. This manual presents information about the MPH2's functions and features. Refer to the RPC2 user manual, SL-20841, for details on using the RPC2 communications module to monitor and manage the MPH2. The document shipped with the MPH2 rack PDU and is available at Liebert's Web site, <http://www.emersonnetworkpower.com>

The MPH2's onboard LCD and the Web-based interface display system operating measurements, as well as readings from optional Liebert SN temperature or temperature/humidity sensors. The RPC2 communications module and onboard LCD also display basic information about the MPH2 rack PDU, such as firmware version, unit rating, model number and serial number.

LED's on the MPH2 and an audible alarm also assist in monitoring performance with alerts about events and alarm conditions. The keys under the onboard LCD are used to navigate to various information and to silence alarms.

3.1 Controls and Indicators

The MPH2 rack PDU also has LED's that indicate outlet and branch status and system information. LED's flash, pulse or change colors to indicate an event or alarm condition (for details on how LED's respond to events and alarms, refer to **5.0 - Troubleshooting**).



NOTE

*Units with a "B" as the fourth character in the model name (MPHBxxxx) do not have LED's at their outlets. The branch and outlet LED behavior in **5.0 - Troubleshooting** and elsewhere in this document does not apply to these units.*

Outlets on units with an "M" as the fourth character in the model name (MPHMxxxx) cannot be turned Off. LED's at outlets on these models are always either on continuously or flashing when input power is present.

3.1.1 Getting Information Through the Onboard LCD

The MPH2's main screen is displayed when the rack PDU is first powered up; see **Figure 3**. The onboard LCD returns to the main screen from any other view after 5 minutes of inactivity (no keys being pressed).

The Left and Right arrow keys below the onboard LCD move the cursor across the bottom of the screen. When the cursor is over the desired symbol, press the Select key to display information about that portion of the MPH2. The keys permit moving one level at a time through the levels of the MPH2 menus.

Example: Use the arrow keys to move the cursor over branch names (A or B) or outlet names (numbers 1 - 8). Press the Select key and the screen displays information about the selected branch or outlet. The screen retains the view if no key is pressed for 5 minutes. After 5 minutes of inactivity, the onboard LCD returns to the main screen.

Figure 15 MPH2 onboard LCD and control keys

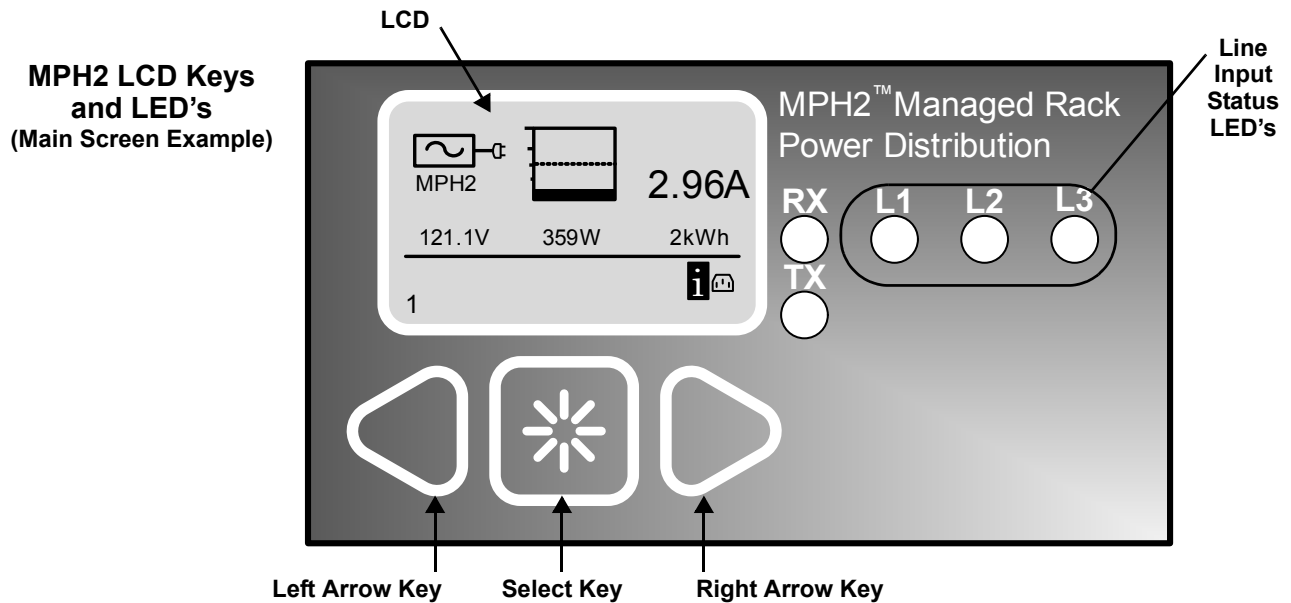
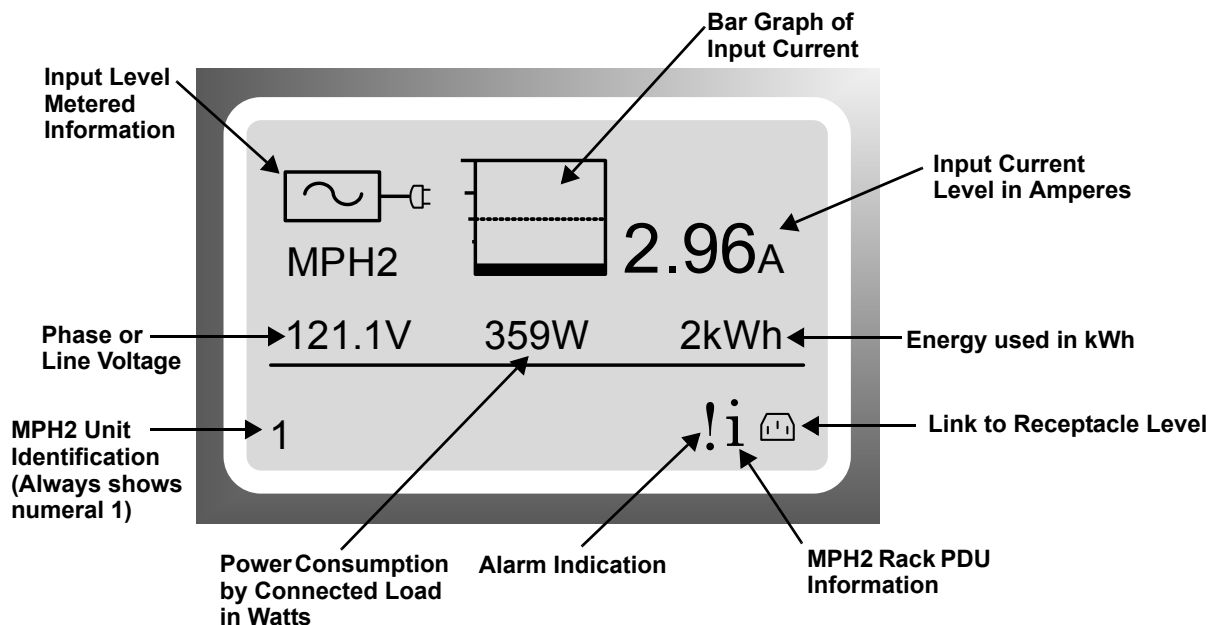


Figure 16 MPH2 onboard LCD layout



3.1.2 Adjusting the Onboard LCD's Contrast

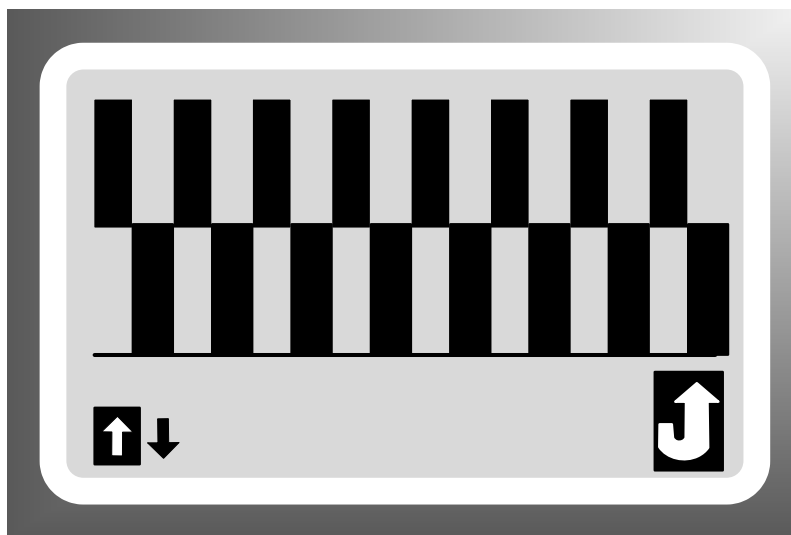
The onboard LCD is factory-set to be easily viewed in lighting conditions found in most work places. The contrast can be changed. To change the contrast:

1. Press any key to activate the LCD.
2. Press either the Right or Left arrow key to highlight the contrast icon, a circle half dark and half white.
3. Press the Select key.
4. Use the Right or Left arrow key to highlight the Up or Down contrast icon (each is an arrow). Use the pattern to determine when the contrast is acceptable.
5. Press Select until the screen's contrast is satisfactory

**NOTE**


The same steps apply to the RPC BDM.

Figure 17 Adjust LCD contrast



3.1.3 Adjusting the Onboard LCD's Orientation

The onboard LCD may be flipped for viewing ease. To flip the screen:

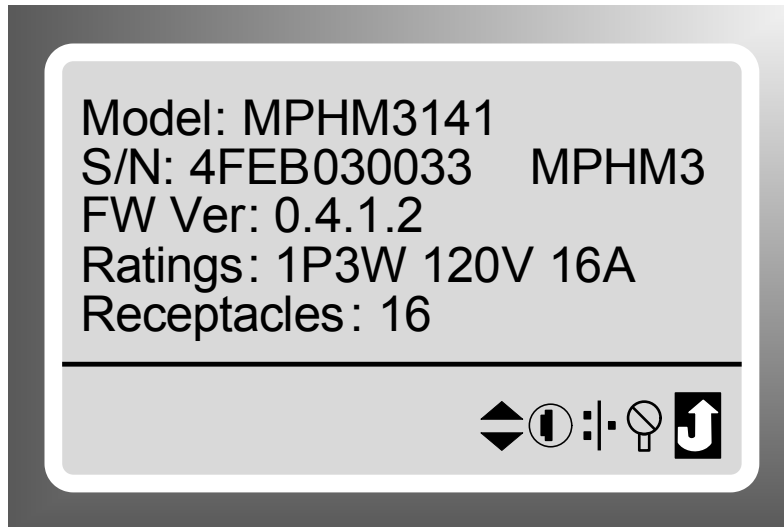
1. Press any key to activate the LCD.
2. Press either the Right or Left arrow key to highlight the information icon (i).
3. Press the Select key.
4. Use the Right or Left arrow key to highlight the orientation icon .
5. Press Select to flip the screen's orientation.



NOTE

The same steps apply to the RPC BDM.

Figure 18 Flip LCD

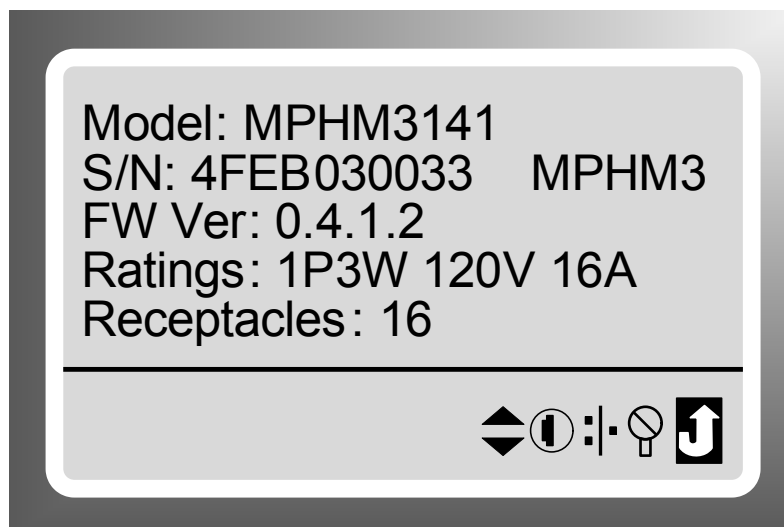


3.1.4 Obtain MPH2 System Information


1. Use the Left or Right arrow key to move the cursor to the information icon (the letter *i*) in the lower right corner.
2. Press the Select key.

The onboard LCD shows information about the MPH2: model number, serial number, firmware version, power rating and number of outlets. See **Figure 19**. After 5 minutes of no activity (no key pressed), the onboard LCD returns to the main screen.

Figure 19 MPH2 rack PDU information screen

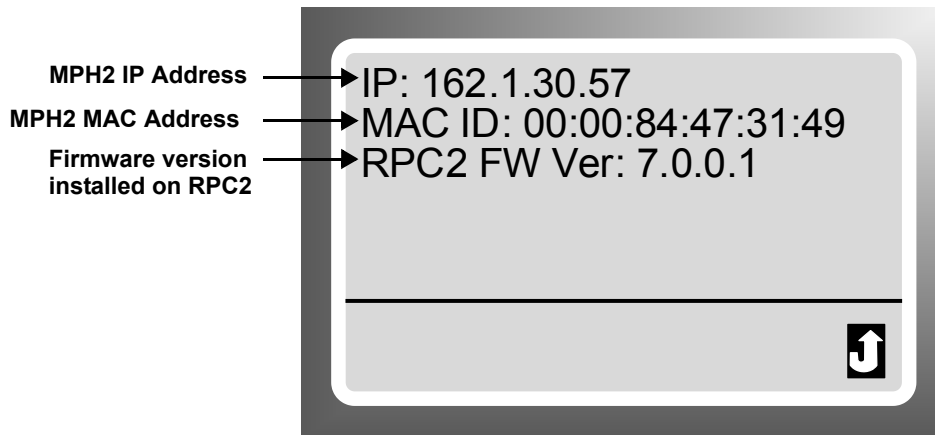


3.1.5 Determine IP or MAC Address

1. Use the Left or Right arrow key to move the cursor to the information icon (the letter *i*) in the lower right corner.
2. Press the Select key.
3. Use an arrow key to scroll to the Network icon .
4. Press the Select key.

The onboard LCD will display the MPH2 rack PDU's IP address and MAC address as shown in **Figure 20**.

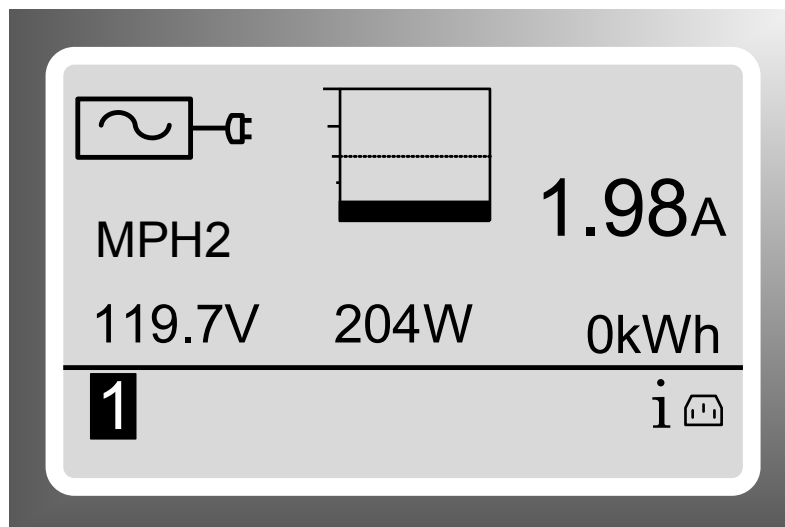
Figure 20 IP address in MPH2 Onboard LCD



3.1.6 View Input Level Information

The input level is the main screen shown by the onboard LCD. The LCD will show the input level screen if the cursor and arrow keys are not used for 5 minutes. The input screen is shown in **Figure 21**.

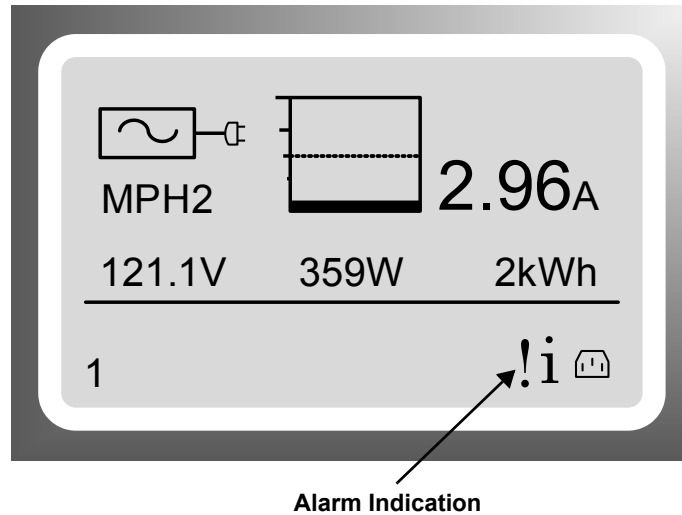
Figure 21 Input level screen



3.1.7 View Active Alarms

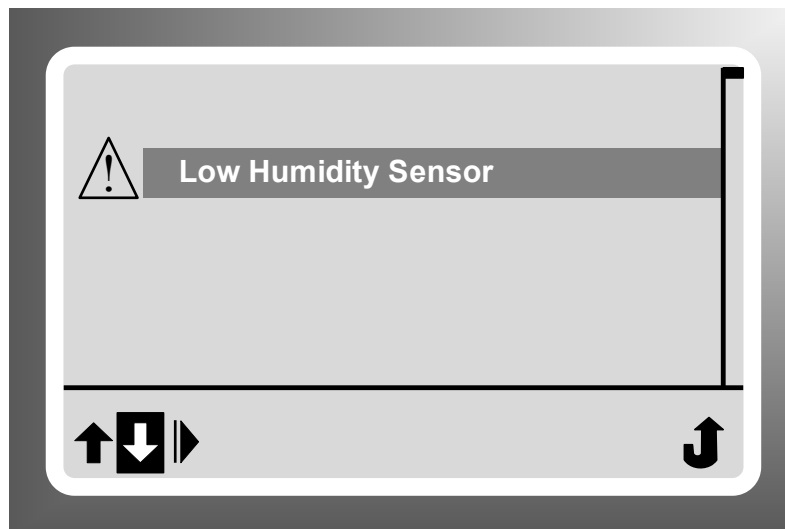
1. Use the Left or Right arrow key to move the cursor to the information icon (the letter *i* on a black box) in the lower right corner.
2. Press the Select key.
3. Use the Left or Right arrow key to scroll to the Alarm icon, a large exclamation point.

Figure 22 Alarm icon



4. Press the Select key.
The onboard LCD will display a list of active alarms on the MPH2 rack PDU as shown in **Figure 23**.
5. Moving the cursor to an alarm and pressing the select key displays information about the alarm.

Figure 23 Alarm list screen



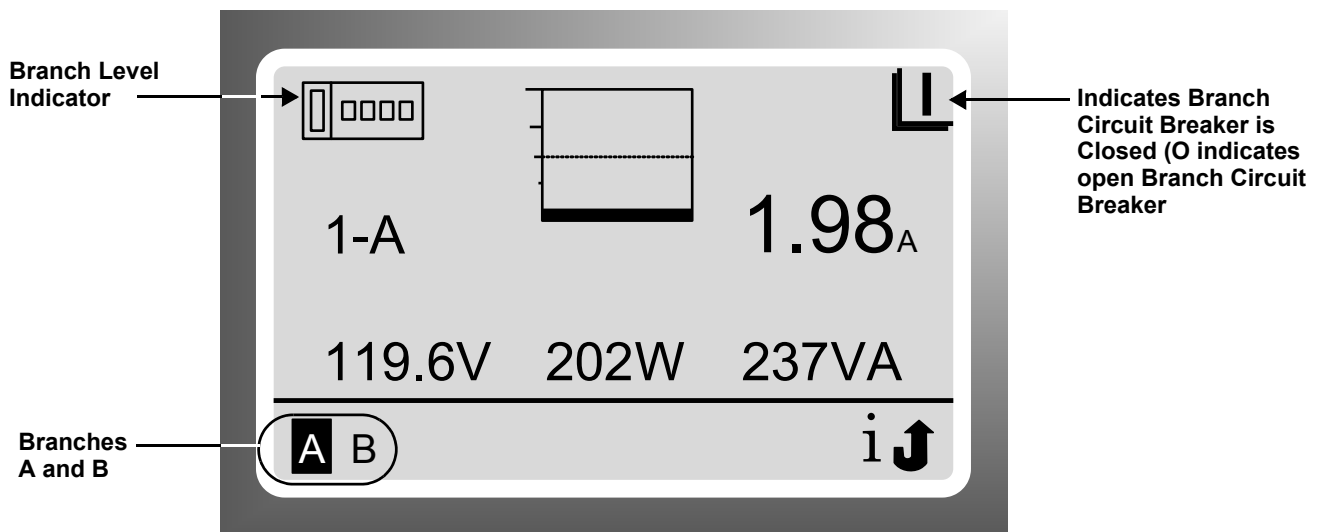
The most-recent alarms will be at the top of the list.

3.1.8 View Branch Level Information


1. Use the Left or Right arrow key to move the cursor to the information icon (the letter *i* on a black box) in the lower right corner.
2. Press the Select key.
3. Use the Left or Right arrow key to scroll to the letter of the branch to be viewed.
4. Press the Select key.

The onboard LCD will display information about the selected branch of the MPH2 rack PDU as shown in **Figure 24**.

Figure 24 Branch level information screen

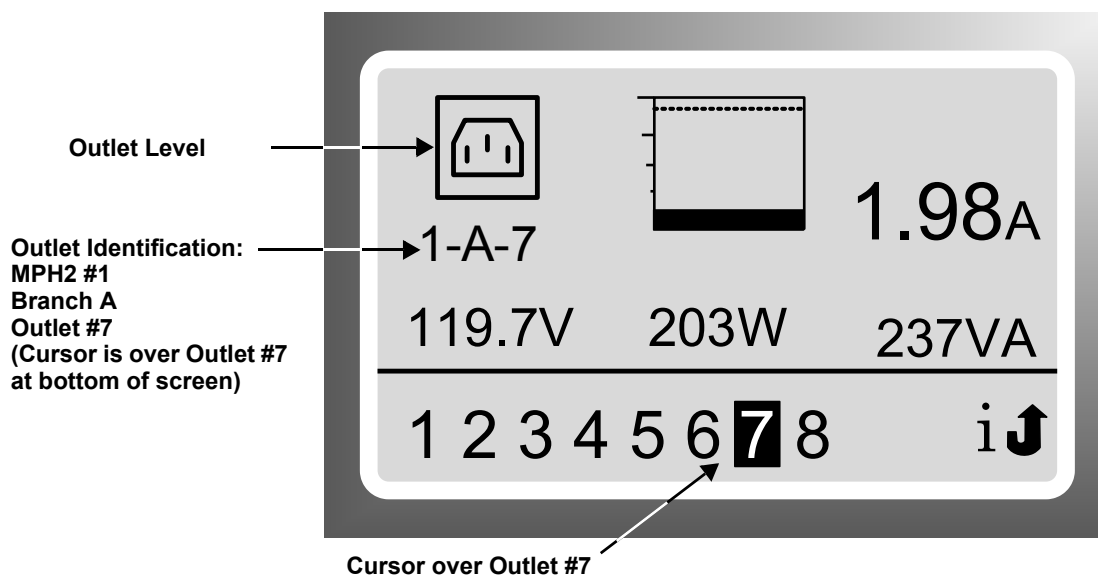


3.1.9 View Outlet Level Information

1. Use the Left or Right arrow key to move the cursor to the outlet icon  in the lower right corner of the screen.
2. Press the Select key.
3. Use the Left or Right arrow key to scroll to the number of the outlet to be viewed.
4. Press the Select key. The outlet number will begin flashing and remain flashing until a new outlet is selected.

The onboard LCD will display information about the outlet as shown in **Figure 25**.

Figure 25 Outlet level information screen

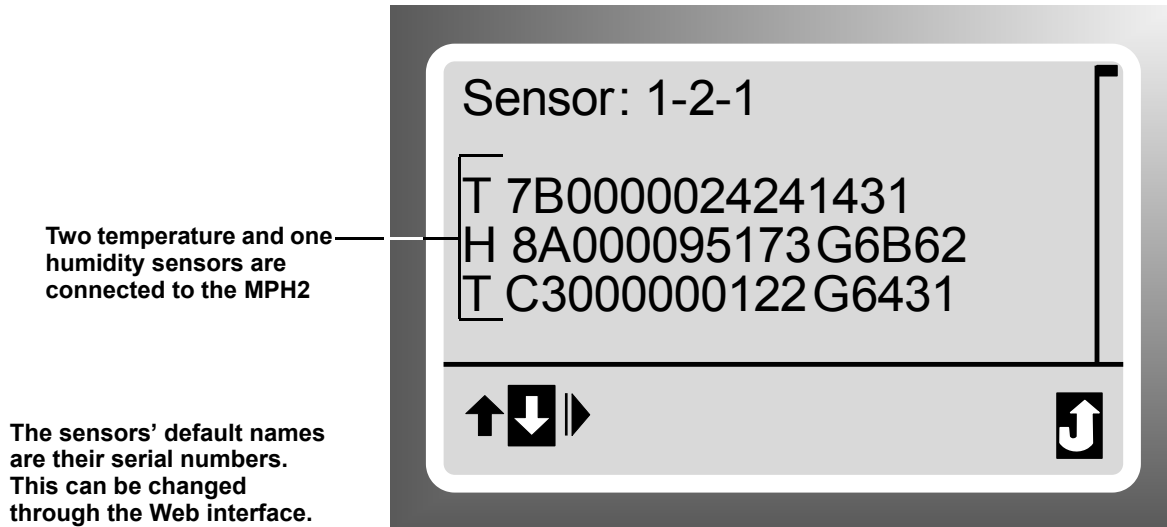


3.1.10 View Sensor List

1. Use the Left or Right arrow key to move the cursor to the outlet icon in the lower right corner of the screen.
2. Press the Select key.
The onboard LCD will display a list of the sensors as shown in **Figure 26**. The sensors will be listed in order of their identification number.



Figure 26 Sensor list screen



3.1.11 View Sensor Information

1. Use the Left or Right arrow key to move the cursor to the outlet icon in the lower right corner of the screen.
2. Press the Select key.
3. Use the Left or Right arrow key to scroll to the sensor to be viewed.
4. Press the Select key.
The onboard LCD will display information about the sensor, similar to that shown in **Figure 27**.



Figure 27 Sensor information

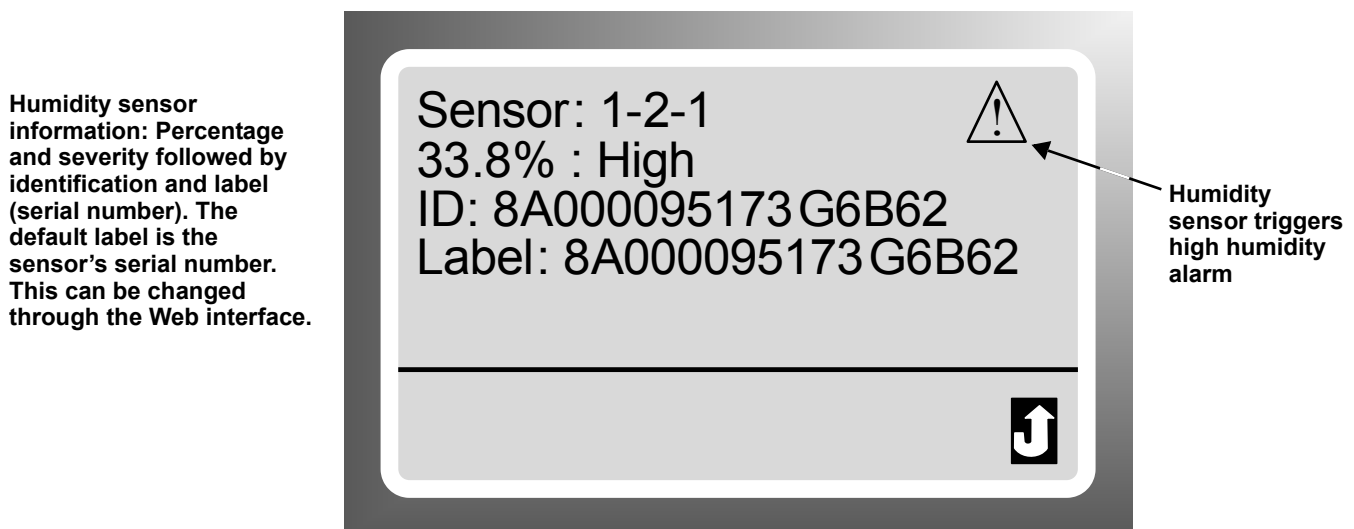
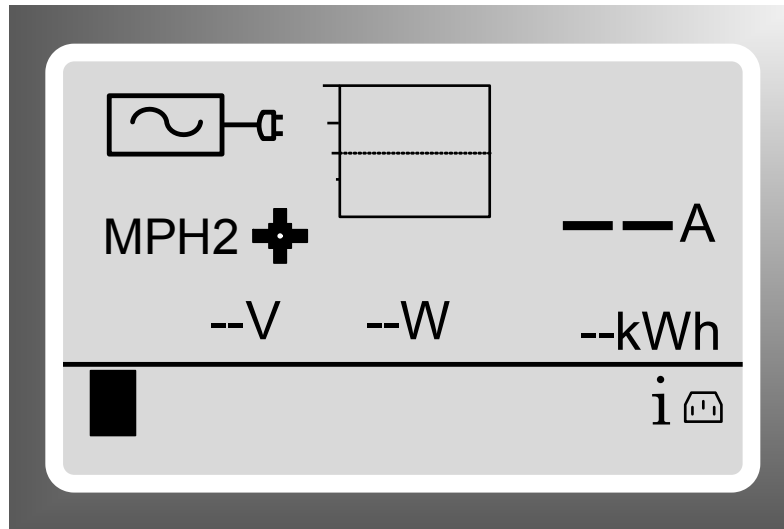


Figure 28 Configuration in progress screen

The onboard LCD will shift to the main menu during a configuration update. The keys below the LCD will be inoperable during the update.

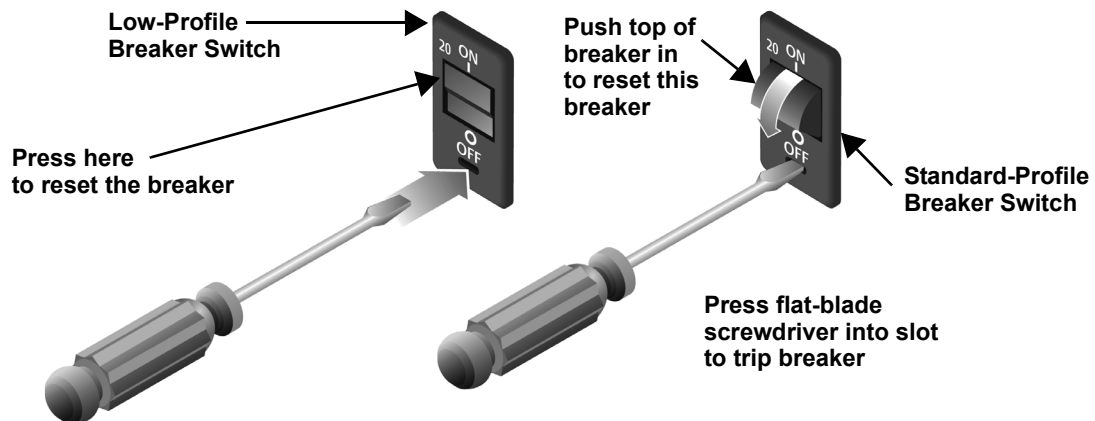


3.1.12 Opening and Closing Circuit Breakers

MPH2 rack PDU feature circuit breakers to protect either branches or individual outlets, depending on the model. Low-profile circuit breakers are used on all MPH2 rack PDU's with two or three branch circuits. Standard-profile circuit breakers are used on MPH2 rack PDU's with six branch circuits or have a 240VAC rating.

Both types of circuit breakers are flush-mount, rocker-style breakers. The circuit breakers are designed to prevent accidental trips. To manually trip a circuit breaker to the Off position, insert a flat-blade screwdriver or similar tool into the slot on the breaker as shown in **Figure 29**. To reset the breaker, press the end nearest ON until it clicks into place.

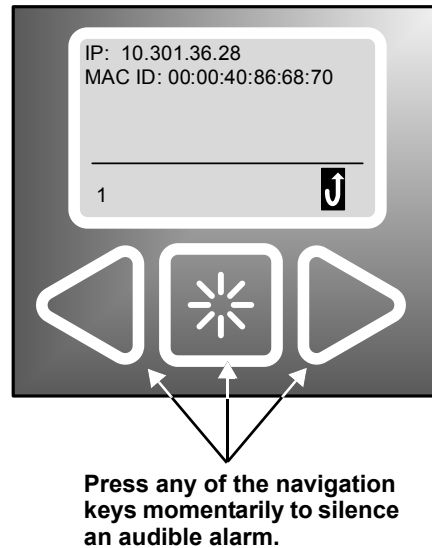
Figure 29 Turning Off or resetting a circuit breaker



3.1.13 Silence an Alarm

To silence an audible alarm, press any of the three navigation keys below the LCD.

Figure 30 Silence an alarm



5.0 - Troubleshooting tells how the LED interface signifies events and alarms.



NOTE

During a firmware upgrade, the Line Input Status LED's on the MPH2 will flash red and green, but the rack PDU will continue receiving and distributing power without interruption.

4.0 EMERSON® MPH2 RACK PDU SPECIFICATIONS

Input Power Configurations; Vary by Model and Region	
Single-Phase Input; CE-Mark	
240VAC, 16A; also UL-listed	3.7kW
230V, 32A	7.3kW
Three-Phase Input; CE-Mark	
230/400V, 16A	11kW
230/400V, 32A	22kW
Single-Phase Input; UL-Listed	
120VAC 16A	1.9kW
120VAC 24A	2.9kW
208VAC 24A	4.9kW
Three-Phase Input; UL-Listed	
120/208VAC, 24A	8.6kW
120/208VAC, 40A	14.4kW
120/208VAC 48A; 240/415VAC, 24A	17.3kW
Input Wiring Options	8 to 10 ft. (2.4 to 3m) Non-Detachable Power Supply Cord Hard-Wired Terminal Block
Outlet Options	NEMA 5-15; NEMA 5-20; IEC 320C13; IEC 320 C19
Number of Outlets, Maximum	48
Power Consumption, Maximum	7.5W
Measurement Accuracy	Voltage: $\pm 1\% + 0.1\text{VAC}$
	Current: $\pm 1.5\% + 0.01\text{A}$ from 1% to 10% of unit rating; $\pm 1\% + 0.01\text{A}$ from >10% to 125% of unit rating
Insulation	Class I, Reinforced SELV
Dielectric Electric Strength	Tested up to 4242VDC
Overcurrent Protection	UL489-Listed, CSA, TUV, CCC Overcurrent Circuit Breaker, 20A, 5000A A.I.C
Operating Temperature Range, °F (°C)	32A or Less Input Models: 32 to 140 (0 to 60) 40A and 48A Input Models: 32 to 122 (0 to 50)
Storage Temperature Range, °F (°C)	-13 to 185 (-25 to 85)
Humidity, %	10 to 90 non-condensing
Altitude, ft. (m)	6562 (2000)
Mounting	Factory-Installed Toolless Brackets Universal Mounting Bracket
Zero-U Units, Width x Depth, in. (mm)	Low-profile: 2.2 x 1.96 (56x50) Standard: 2.2 x 2.7 (56 x 70)
Zero-U Units, Length, in. (mm)	13.1 - 72.2 (333 - 1833)
Safety Standards (Vary by Model and Region)	IEC 60950-1:2005 (Second 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, CB, RoHS, REACH, WEEE

5.0 TROUBLESHOOTING

LED Indication (One or All LED's)		Audible Alarm	Condition	Status/Recommended Action
Color	State/Flash Speed			
Green	Fast	—	Receptacle Identification	Remote user is requesting outlet identification. The LED should stop flashing after 10 seconds.
Green	Steady On	—	Input Voltage Supported Receptacle Powered On	Normal Operation
Off	NA	—	Voltage Off	Check power source and input plug's receptacle wiring.
				Check receptacle power control settings.
Red	Steady On	✓	Line Undervoltage Alarm	Check power source for power quality problem. If the MPH2 uses 3-phase power, a single low- voltage phase may cause one or more undervoltage alarms. The undervoltage alarm is factory-set to -10% of the minimum input voltage range on the nameplate; it cannot be changed.
Red	Fast	✓	Line or Receptacle Overcurrent Alarm	Check for changing load conditions. Check overcurrent alarm threshold settings.
Green	Slow	—	Line or Receptacle Overcurrent Warning	Check for changing load conditions. Check overcurrent warning threshold settings.
Red	Fast	✓	Line or Receptacle Undercurrent Alarm	Check for removal of load. Check undercurrent alarm threshold settings.
Red (All Receptacle LED's)	Pulse	—	Branch Circuit Breaker Open	Check for changing load conditions; confirm circuit breaker actuator is closed. If open, correct loading condition before pressing circuit breaker actuator closed again.
Green (All Receptacle LED's)	Slow	—	Branch Overcurrent Warning	Check for changing load conditions. Check overcurrent warning threshold settings.
Red (All Receptacle LED's)	Fast	✓	Branch Overcurrent Alarm	Check for changing load conditions. Check overcurrent alarm threshold settings.

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Emerson Network Power

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