

Lenovo 1U Switched & Monitored 3-Phase PDUs

Product Guide

The 1U Switched and Monitored 3-Phase Power Distribution Units (PDUs) make it quick and simple to deploy, protect, and manage your high-availability rack environment. These space efficient and power dense PDUs were co-designed by Vertiv and Lenovo and come in the following 1U designs available to meet the requirements of your most power-demanding systems:

- 18x Combination outlets C13/C19 with 80A 3-phase Delta input - for USA, Canada, Japan
- 18x Combination outlets C13/C19 with 48A 3-phase Wye input (ETL certification) - for USA, Canada
- 12x Combination outlets C13/C19 with 60A 3-phase Delta input - for USA, Canada
- 12x Combination outlets C13/C19 with 32A 3-phase Wye input 1U - for all markets except Japan
- 18x Combination outlets C13/C19 with 48A 3-phase Wye input (CE certification) - for all markets except USA, Canada, Japan

The outlets (receptacles) on the PDUs give administrators the ability to remotely turn on, turn off, or reboot power at each outlet to power cycle unresponsive IT equipment. Outlet level monitoring gives a comprehensive view of outlet power usage via remote network access. They provide on and off functionality to allow for power sequencing and to help prevent unintended overloading. The following figure shows the PDU with 18 rear-facing outlets.



Figure 1. Lenovo 1U Switched & Monitored 3-Phase PDU - 18-outlet model (attached line cord removed to show outlets)

Did you know?

With ever growing power densities in today's rack environments, it is all too easy to add load in the wrong place and trigger an overload event. The Switched and Monitored PDU offerings can minimize this impact, providing the ability to quickly recover with resettable circuit breakers for each designated bank of outlets (receptacles), referred to as circuits or load groups. Breakers are color coded to the outlets in a particular circuit to aid in configuration, installation, and maintenance. Furthermore, these PDUs also offer individual outlet remote monitoring and switching (on/off), which allows for remote power sequencing and further helping to prevent unintended PDU overloading.

Introduction to PDUs

A power distribution unit (PDU) is a highly reliable, multiple outlet power strip designed to consolidate line cords within the rack and distribute conditioned power from an uninterruptible power supply (UPS) or utility power to servers and other IT equipment. The PDU efficiently distributes power within the rack and provides fault-tolerant power redundancy for high availability requirements.

There are three types of PDUs available from Lenovo: basic, monitored, and switched & monitored. The PDUs covered in this document are of the switched & monitored type.

- **Basic PDUs:** The simplest and most cost-effective power distribution. Available with various outlet configurations and line cord options to support different systems and load requirements.
- **Monitored PDUs:** provides the same benefits as a Basic PDU, but adds additional advanced PDU power monitoring down to the load group. This enables businesses to have a cross-platform rack-level power and thermal view for trending analysis to improve power management
- **Switched & monitored PDUs:** These are advanced power management solutions, providing power monitoring at the outlet level, with increased accuracy at low amperages, for more precise views of power consumption down to the individual server level instead of at the consolidated load group. These PDUs also offer management via a web-based interface which includes individual outlet switching (on/off). Outlet switching allows for remote power sequencing and helps prevent unintended PDU overloading.

The following figure shows the PDU with 12 rear-facing outlets.



Figure 2. Lenovo 1U Switched & Monitored 3-Phase PDU - 12-outlets model (attached line cord removed to show outlets)

Part number information

The following table provides the ordering part numbers and feature codes for the PDUs.

Table 1. Part number information

Part number	Feature	Description	Market availability
4PU7A77467	BLC4	1U 18 C19/C13 Switched and Monitored 80A 3P Delta PDU	USA, Canada, Japan
4PU7A81117	BNDV	1U 18 C19/C13 switched and monitored 48A 3P WYE PDU - ETL	USA, Canada
4PU7A77469	BLC6	1U 12 C19/C13 switched and monitored 60A 3P Delta PDU	USA, Canada
4PU7A77468	BLC5	1U 12 C19/C13 switched and monitored 32A 3P WYE PDU	All markets except Japan
4PU7A81118	BNDW	1U 18 C19/C13 switched and monitored 48A 3P WYE PDU - CE	All markets except USA, Canada, Japan
4M27A13686	BNDX	Environmental Sensor - Temperature & Humidity	All markets

The PDUs include the following items:

- Power distribution unit with attached power cord

- Mounting rails for supported rack cabinets - horizontal and vertical (side pocket) mounting
- Rack mounting hardware kit including M6 cage nuts and supporting screws/nuts

The Environmental Sensor includes the following:

- Vertiv GT3HD Sensor unit
- Probe with a 3 foot (0.9m) attached cable that connects to the sensor unit
- Probe with a 6-foot (1.8m) attached cable that connects to the sensor unit
- 10-foot (3m) cable to connect the sensor unit to the PDU (RJ12 connectors)

Note: An Environmental Sensor is not included with the PDU and will need to be ordered separately

Features

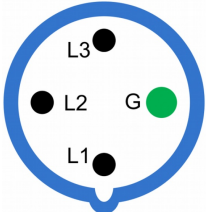
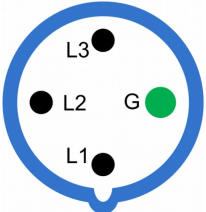
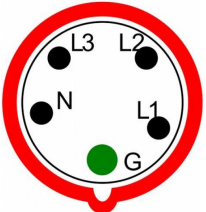
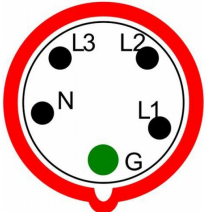
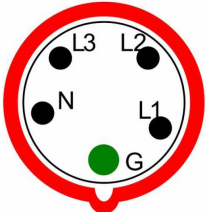
The PDUs have the following features

- 1U form factor allows for high-current deployments in a compact PDU. Can be installed vertically in the side pocket of a rack cabinet or horizontally at the rear of a rack space (1U rack unit)
- Combination C13/C19 outlets (receptacles) accommodate ever-changing rack power requirements with the flexibility to connect C14 or C20 plugs in the same outlet.
- Fully monitored and managed PDU including Residual Current Metering Type B
- Interchangeable Monitoring Device (IMD) is hot-swappable and includes ports for serial communication, environmental monitoring, and dual Gigabit Ethernet ports to simplify management of multiple PDUs with fault-tolerant daisy chaining or IP aggregation capabilities. One of these ports can be used to connect the IMD to an existing network or both ports can be used at the same time to connect one IMD to another in a daisy-chain configuration.
- Easily identify circuits with color-coded P-Lock tabs, streamlining circuit and phase balancing with alternating outlets.
- The use of P-Lock tabs on the outlets reduce the chance of accidental removal of a power cord from the PDU (P-Lock compatible cord sets required for locking feature)
- Comprehensive power management and flexible configuration
- Supported protocols: DHCP, HTTP, HTTPS, IPv4, IPv6, LDAP, NTP, RADIUS, RSTP, SSH, SMTP, SNMP (v1/v2c/v3), Syslog, TACACS+
- Detailed data-logging for statistical analysis and diagnostics
- Easy-to-use interface to display input and output status
- Event notification through SNMP trap or email alerts
- Reliable power distribution with local and remote power monitoring options offer quick access to critical power usage information to evaluate energy usage trends and maximize uptime.
- Remote monitoring of connected devices and sensors
- Easily accessible breakers
- Remotely reboot outlets to power cycle unresponsive IT equipment or increase runtime of critical equipment upon power failure with outlet-level control
- Monitor power consumption at the outlet-level for a detailed view of power distributed to specific equipment
- Local and remote input monitoring with accuracy of +/- 1% (ANSI C12.1 and IEC 62053-21 Standards)
- Detailed data logging for statistical analysis and diagnostics
- Management using SNMP v1, SNMP v2c, and SNMP v3

Specifications

The following table compares the technical and environmental specifications of the PDUs.

Table 2. Specifications

	1U 18 C19/C13 Switched and Monitored 80A 3P Delta PDU	1U 12 C19/C13 switched and monitored 60A 3P Delta PDU	1U 18 C19/C13 switched and monitored 48A 3P WYE PDU - ETL	1U 12 C19/C13 switched and monitored 32A 3P WYE PDU	1U 18 C19/C13 switched and monitored 48A 3P WYE PDU - CE
Part Number	4PU7A77467	4PU7A77469	4PU7A81117	4PU7A77468	4PU7A81118
Feature Code	BLC4	BLC6	BNDV	BLC5	BNDW
Market availability	USA, Canada, Japan	USA, Canada, Japan	USA, Canada (ETL)	All markets (CE)	All markets (CE)
Input power					
Number of phases	3 Phase Delta	3 Phase Delta	3 Phase Wye	3 Phase Wye	3 Phase Wye
Line cord	Attached, 6/4 Type W cable	Attached, 8/4 Type W cable	Attached, 6/5 Type W Cable	9/5 (6mm ² H07RN-F)	Attached, 6/5 Type W Cable
Line cord length	3 meters (10 feet)	3 meters (10 feet)	3 meters (10 feet)	3 meters (10 feet)	3 meters (10 feet)
Line cord connector	IEC60309 3P+E, 100A	IEC60309 3P+E, 60A	IEC60309 3P+N+E, 60A, 230V	IEC60309 3P+N+E, 32A, 400V	IEC60309 3P+N+E, 63A, 400V
Plug design					
Input voltage	200-240 VAC	200-240 VAC	200-240 VAC 346-415 VAC	200-240 VAC 346-415 VAC	200-240 VAC 346-415 VAC
Input current	80A	60A	48A	32A	48A
VA per Input (Load Capacity)	23.0kW (208V)	17.2kW (208V)	26.5kW (230V)	22.0kW (230V)	33.1kW (230V)
Output power					
Outlet type	Combination C13/C19	Combination C13/C19	Combination C13/C19	Combination C13/C19	Combination C13/C19
Number of outlets	18 outlets (6 front, 12 rear)	12 outlets (all rear)	18 outlets (6 front, 12 rear)	12 outlets (all rear)	18 outlets (6 front, 12 rear)
Output voltage rating at 50/60Hz	200-240 VAC	200-240 VAC	200-240 VAC	200-240 VAC	200-240 VAC

	1U 18 C19/C13 Switched and Monitored 80A 3P Delta PDU	1U 12 C19/C13 switched and monitored 60A 3P Delta PDU	1U 18 C19/C13 switched and monitored 48A 3P WYE PDU - ETL	1U 12 C19/C13 switched and monitored 32A 3P WYE PDU	1U 18 C19/C13 switched and monitored 48A 3P WYE PDU - CE
Output current rating	16A with with C20 cord, 10A with C14 cord	16A with with C20 cord, 10A with C14 cord	16A with with C20 cord, 10A with C14 cord	16A with with C20 cord, 10A with C14 cord	16A with with C20 cord, 10A with C14 cord
Circuit breakers	18A Double Pole Magnetic Breakers (10kAIC Rated)	18A Double Pole Magnetic Breakers (10kAIC Rated)	18A Single Pole Magnetic Breakers (10kAIC Rated)	18A Single Pole Magnetic Breakers (10kAIC Rated)	18A Single Pole Magnetic Breakers (10kAIC Rated)
Number of circuits (load groups)	9 circuits	6 circuits	9 circuits	6 circuits	9 circuits
Number of outlets per circuit	2	2	2	2	2
Capacity per circuit (Amps)	16A per circuit	16A per circuit	16A per circuit	16A per circuit	16A per circuit
Capacity per phase (Amps)	37A per phase	22.1A per phase	48A per phase	32A per phase (CE), 24A per phase (ETL)	48A per phase
Mechanical and environmental					
Physical dimensions (HxWxD)	44 x 448 x 483 mm (1.7 x 17.5 x 19 inches)	44 x 448 x 356 mm (1.7 x 17.5 x 14 inches)	44 x 448 x 483 mm (1.7 x 17.5 x 19 inches)	44 x 448 x 356 mm (1.7 x 17.5 x 14 inches)	44 x 448 x 483 mm (1.7 x 17.5 x 19 inches)
Weight	15.9 kg (35.1 lb)	12 kg (26.5 lb)	14.5 kg (32.0 lb)	14.1 kg (31.1 lb)	14.5 kg (32.0 lb)
Operating temperature	10 to 60 °C (50 to 140 °F)	10 to 60 °C (50 to 140 °F)	10 to 60 °C (50 to 140 °F)	10 to 60 °C (50 to 140 °F)	10 to 60 °C (50 to 140 °F)
Operating humidity, non-condensing	5% - 95%	5% - 95%	5% - 95%	5% - 95%	5% - 95%

Connections

The front and rear of the PDUs is shown in the following figure.

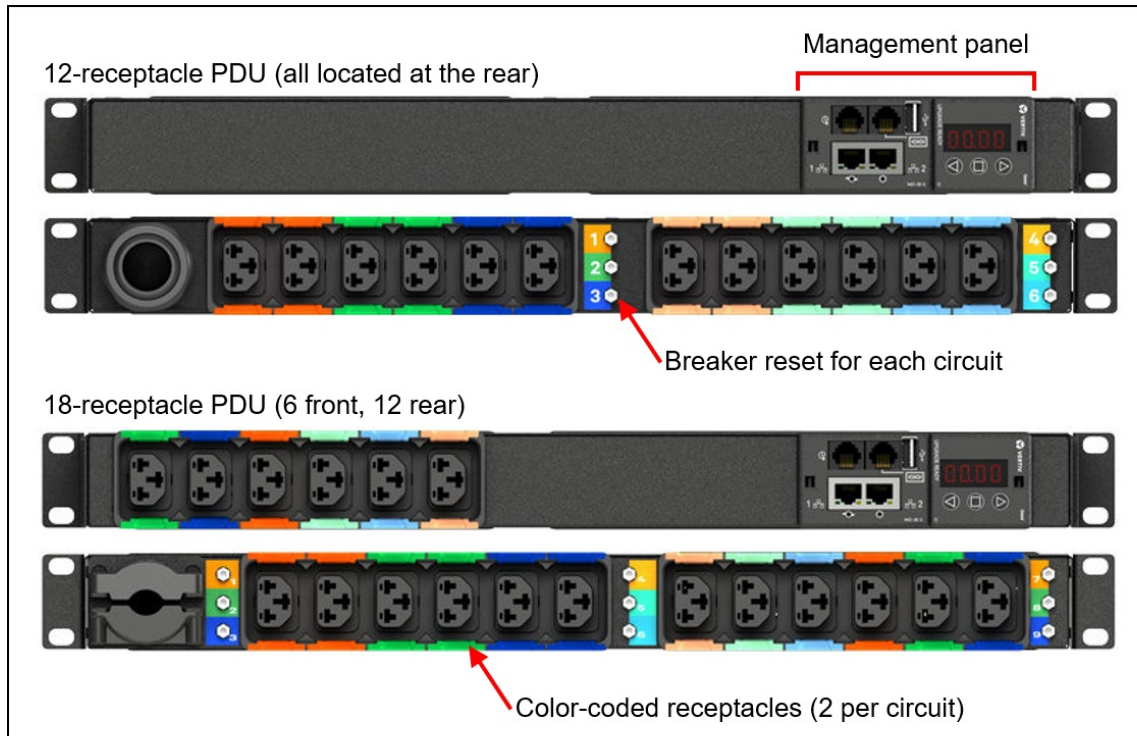


Figure 3. Front and rear views of the PDUs

For PDUs with 9 circuits (18 outlets), the circuits are the following outlet pairs and are indicated on the PDUs using colors. Note that the two outlets in a circuit are not always adjacent to each other.

1. Outlets 1 and 2
2. Outlets 3 and 4
3. Outlets 5 and 6
4. Outlets 7 and 13
5. Outlets 8 and 14
6. Outlets 9 and 15
7. Outlets 10 and 16
8. Outlets 11 and 17
9. Outlets 12 and 18

For PDUs with 6 circuits (12 outlets), the circuits are the following outlet pairs. The two outlets in each circuit are adjacent to each other in these PDUs.

1. Outlets 1 and 2
2. Outlets 3 and 4
3. Outlets 5 and 6
4. Outlets 7 and 8
5. Outlets 9 and 10
6. Outlets 11 and 12

Circuit breaker ratings

The PDUs described in this product guide contain magnetic and hydraulic circuit breakers. The rating of the breakers can vary from their nominal rating based on the orientation of the PDU and consequently, the orientation of the circuit breakers within the PDU.

In particular, when a PDU is installed vertically in the side pocket of a rack, its rating can increase or decrease 10% from the nominal rating, depending on the orientation of the PDU in the side pocket. The following diagrams illustrate the rating for each breaker and the corresponding outlets protected by the breaker.

Note that if the PDU is installed horizontally in 1U slot of the rack, all of the breakers in the PDU are rated at their nominal rating of 18A.

Kratos PDUs with 9 Circuit Breakers

This section applies to the 18-outlet PDUs with 9 circuit breakers. The circuit breaker ratings are listed in the following table.

The table shows the different ratings based on the vertical orientation of the PDU. If the PDU is installed horizontally in a 1U slot of a rack, all circuit breakers are rated for 18A, regardless of whether the PDU AC cord is on the left or right.

Table 3. Circuit breaker ratings - 18-outlet PDUs

Circuit Breaker	PDU AC Cord Towards Top	PDU AC Cord Towards Bottom
CB1	19.8A	16.2A
CB2	19.8A	16.2A
CB3	19.8A	16.2A
CB4	19.8A	16.2A
CB5	19.8A	16.2A
CB6	19.8A	16.2A
CB7	16.2A	19.8A
CB8	16.2A	19.8A
CB9	16.2A	19.8A

The following figure shows the location of the circuit breakers and their ratings.

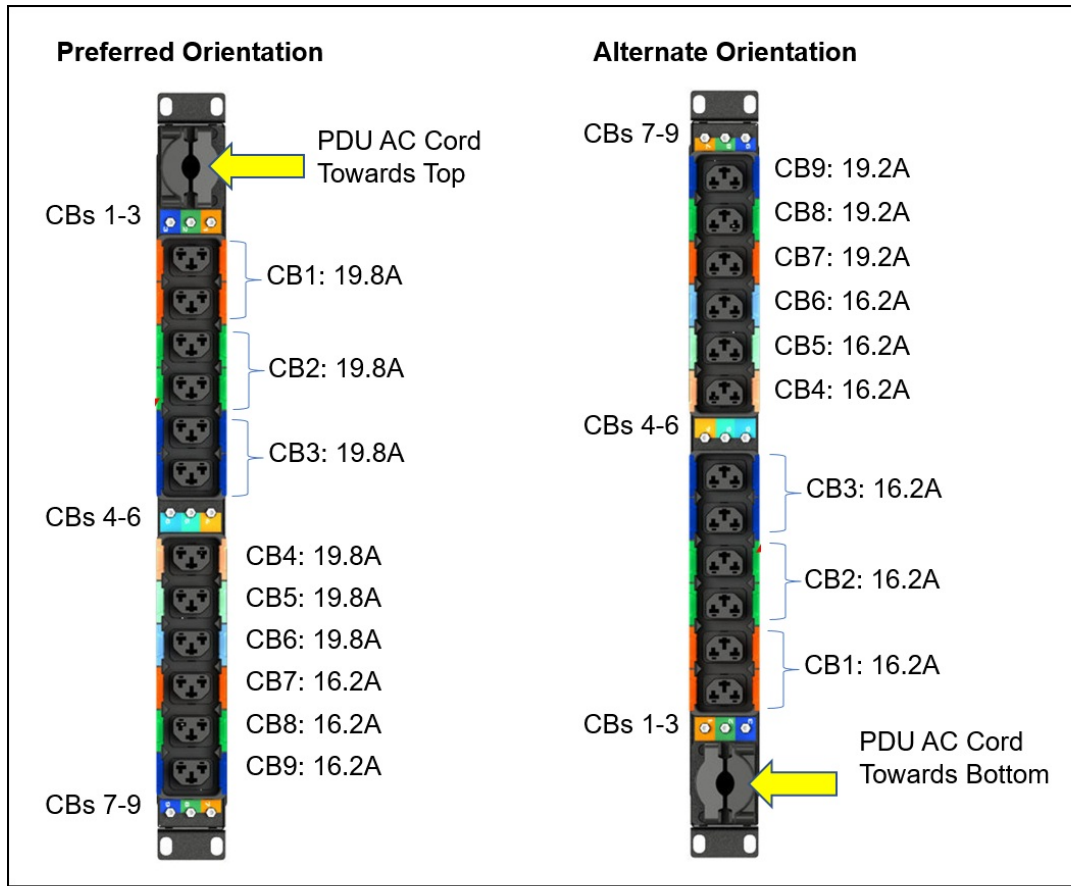


Figure 4. Circuit breaker ratings - 18-outlet PDUs

Kratos PDUs with 6 Circuit Breakers

This section applies to the 12-outlet PDUs with 6 circuit breakers. The circuit breaker ratings are listed in the following table.

The table shows the different ratings based on the vertical orientation of the PDU. If the PDU is installed horizontally in a 1U slot of a rack, all circuit breakers are rated for 18A, regardless of whether the PDU AC cord is on the left or right.

Table 4. Circuit breaker ratings - 12-outlet PDUs

Circuit Breaker	PDU AC Cord Towards Bottom	PDU AC Cord Towards Top
CB1	19.8A	16.2A
CB2	19.8A	16.2A
CB3	19.8A	16.2A
CB4	19.8A	16.2A
CB5	19.8A	16.2A
CB6	19.8A	16.2A

The following figure shows the location of the circuit breakers and their ratings.

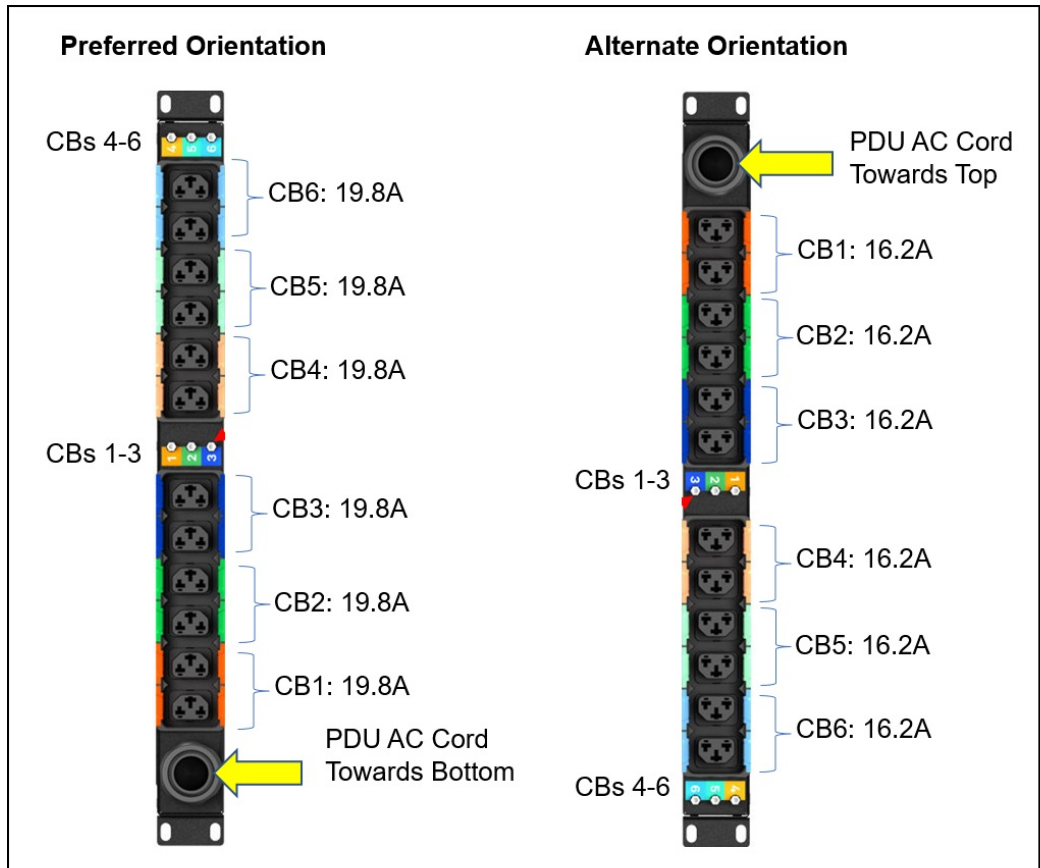


Figure 5. Circuit breaker ratings - 12-outlet PDUs

Management panel

The PDUs include a local management panel, known as the Interchangeable Monitoring Device (IMD), which provides the interface and connectors to manage the PDU. The following figure shows the components and ports of the IMD.

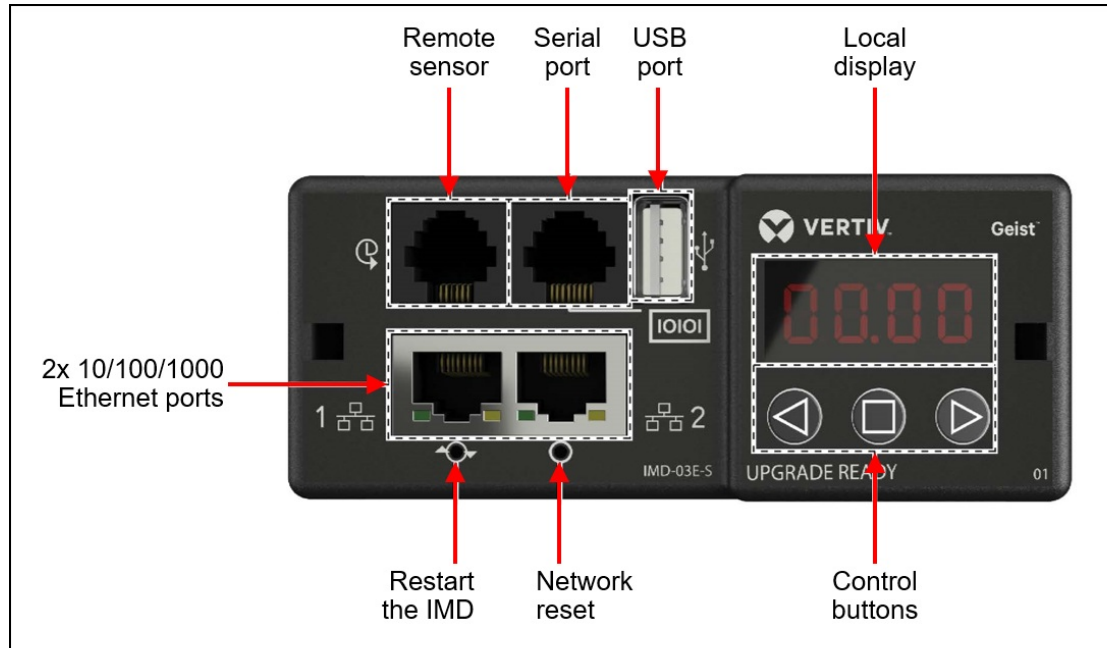


Figure 6. Local management panel (IMD)

The components of the IMD management panel are as follows:

- Dual Ethernet Ports: The dual Ethernet ports act as a two-port Ethernet switch, allowing for multiple devices to be daisy-chained.
- Hard-Reboot Button: Pressing the hard-reboot button reboots the IMD. This acts as a power-cycle for the IMD; it does not change or remove any user information.
- Network Reset Button: Holding the network-reset button for 5 seconds during normal operation will restore the default IP address and reset the user accounts.
- Local Display: The local display shows the phase, line and circuit current values (in amperes).
- Display Buttons:
 - Back button: Press to decrement to previous channel. Also used to initiate a backup function.
 - Forward button: Press to increment to next channel. Also used to initiate a restore function
 - Center button: Toggle between scrolling and static display modes. Also used to initiate a reset function.
- Remote Sensor Port: RJ-12 port for connecting an environmental sensor.
- Serial Port: RS-232 via RJ-45 port.
- USB Port: USB port used to upload firmware, backup/restore device configuration or expand logging capacity via USB storage device. Provides up to 100mA power capacity for USB-connected devices.

Tips:

- Pressing both Left and Right buttons together flips the display 180 degrees
- Pressing the Left and Center buttons together displays the IPv4 address of the IMD

Environmental Sensor

The Environmental Sensor, part number 4M27A13686, is an optional device used to report local temperature and humidity values at its installed location and make that information available to the PDU. The Environmental Sensor connects to the PDU via the Remote Sensor port of the IMD of the PDU as shown in the [Management panel](#) section. The following figure shows the Environmental Sensor.



Figure 7. Environmental Sensor

Features of the Environmental Sensor - Temperature & Humidity , 4M27A13686:

- Vertiv GT3HD sensor with two remote probes on 3ft and 6ft cables
- Provide temperature, humidity, and dew point information
- Receive alerts when a threshold is breached to ensure out-of-range conditions are addressed before resulting in downtime.
- Strategically monitor data center, server room and network closet environments to protect critical infrastructure.
- Simple installation and configuration
- Connects to PDU via RJ12 cabling
- Supports daisy-chaining of additional environmental sensors in other rack cabinets, up to 16 sensors
- Temperature measurement range: -20°C to 80°C (-4°F to 176°F) at +/- 0.5°C accuracy
- Humidity measurement range 5% to 95% at accuracy +/- 3%
- Dew point measurement range -50°C to 85°C (-58°F to 185°F)
- View real time sensor data from a secure web interface.

The probes are attached to the sensor and should be positioned to allow monitoring of key devices in the rack cabinet, as shown in the following figure. The figure also shows how multiple sensors can be daisy-chained together.

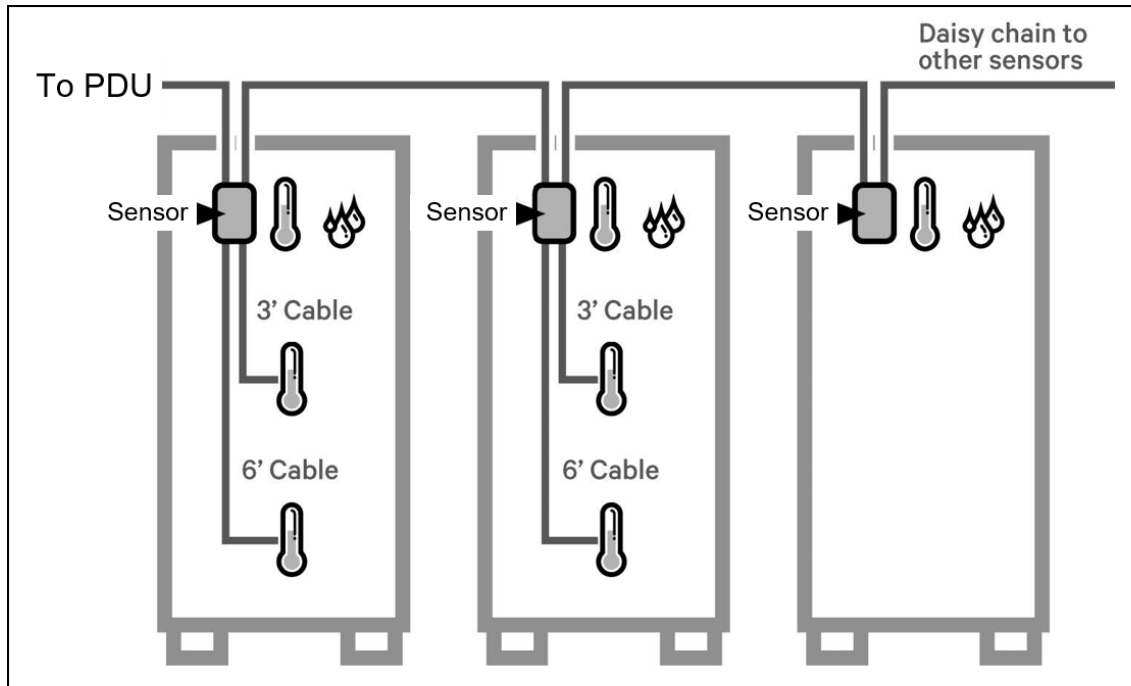


Figure 8. Connecting the sensor

Browser interface

The PDU provides a graphical user interface that you can view from a web browser. Using a web browser, you can access and monitor the PDU power outlets and output devices remotely from a computer.

The following tasks can be performed through browser interface:

- Control individual outlets (On/Off)
- Display PDU and outlet-level current, kWh, watts, output power in VA, and power factor
- Set outlet alarm thresholds
- View environmental sensor data and set traps/alarm thresholds
- Access a graphical historical view of PDU data for statistical trend analysis
- View PDU Alarms
- View Event/System Logs

Supported rack cabinets

The 1U Switched and Monitored PDUs can be installed in all 19 inch rack cabinets.

Installation can be either vertically in side pockets of the rack or horizontally in a 1U space. The PDU part numbers include the necessary rack installation hardware for either configuration.

Warranty

The PDUs are offered with a three-year limited warranty.

Agency approvals

The PDUs conform to the following standards:

- FCC Part 15 Class A Conformance
- UL 62368
- RoHS Compliant

Related publications and links

For more information, see the following documents:

- User Manuals - Quick Install Guide, Installer Guide and IMD Replacement Guide
<https://www.vertiv.com/en-us/support/avocent-support-lenovo/>
- Lenovo Rack Cabinet Reference
<https://lenovopress.com/lp1287-lenovo-rack-cabinet-reference>

Related product families

Product families related to this document are the following:

- [Power Distribution Units](#)

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