PANDUIT®
infrastructure for a connected world

Panduit EL2P PDU
Installation Manual Rev 02

Contents

Before You Begin

Overview

This document provides installation instructions to qualified personnel for installing a Panduit Rack Power Distribution Unit (PDU) into a datacenter rack or cabinet. Please read all instructions before operating the equipment and save this manual for future reference.

Important Safety Information

See the complete regulatory compliance notices in *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products* on the Panduit website (http://www.panduit.com/). In addition, follow the safety precautions that are specific to this device.

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

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

IMPORTANT SAFETY INSTRUCTIONS-----SAVE THESE INSTRUCTIONS

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

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

HIGH LEAKAGE CURRENT. To reduce the risk of electric shock due to high leakage currents, ensure that there is a reliable grounded (earthed) connection before connecting power distribution products to AC power. If a large number of products will be connected to a single PDU, it may be necessary to conduct an evaluation of the installation to verify the total amount of leakage current. The total combined leakage current should not exceed 5 percent of the input current for the PDU and associated load.

Connect only to a circuit providing branch circuit overcurrent protection of appropriate current rating.

Connect the input power cord to a grounded (earthed) electrical outlet that is located

near the equipment and is easily accessible.

Be sure all circuit breakers are in the off position before connecting input power.

Be sure that the devices connected to the Panduit PDU are adjusted for, or otherwise capable of, operation from the same line voltage supplying the PDU. Failure to verify the voltage can lead to severe equipment damage.

Do not overload the PDU. The total input current rating of all equipment connected to each output cannot exceed the total output rating marked on the PDU.

Use only the hardware provided to install the PDU.

To reduce the risk of fire or electric shock, install this PDU in a temperature and humidity controlled, indoor environment, free of conductive contaminants. Do not operate near water or excessive humidity (90% maximum noncondensing).

Ambient temperature must not exceed 0°C to 60°C (32°F to 140°F).

The internal components can become extremely hot during operation. Allow sufficient time for the PDU to cool before handling.

Do not use a two-wire power cord in any product configuration.

TO ISOLATE THIS EQUIPMENT, DISCONNECT THE POWER CORD.

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

IT IS ESSENTIAL THAT THIS EQUIPMENT IS CONNECTED TO AN ELECTRICAL SUPPLY.

For permanently connected PDUs, the installation must be performed by a licensed electrician, must be connected to an AC power source that is current limited by a properly rated circuit breaker or fuse meeting national and local electrical codes, and must be connected to a protective earth ground.

Required Tools

The following tools may be required for installation:

- #2 Phillips screwdriver
- T10 Torx screwdriver
- USB Drive (firmware upgrade)

Section 1 – Introduction

Classification Overview

The Panduit Monitored, Switched, Monitored per Outlet, and Monitored & Switched per Outlet PDUs (Power Distribution Units) are intelligent PDUs designed to distribute power to IT equipment installed into a rack. These PDUs are single-phase (1Ph) or three-phase (3Ph) models with electrical metering and switching capabilities.

Each PDU provides power distribution to IT loads through C13, C19, or Combination outlets. The quantity and location of outlets vary by model. The PDUs allow you to connect and manage these outlets from a single power connection. The PDUs can be managed from a Web interface, a Command Line Interface (CLI) or Redfish API and viewed from the local display.

Panduit PDUs are designed for use with all Panduit cabinets and are compatible with most third-party data center racks and cabinets. The PDU models vary in form factor with several mounting configurations available.

Panduit Monitored PDU: Provides aggregate power monitoring to quickly identify potential power issues and reclaim available or under-utilized power capacity.

Panduit Switched PDU: Provides aggregate power monitoring and outlet level switching capabilities for individual outlets or a group of outlets. This PDU enables power sequencing, rebooting equipment or restrict unauthorized use of individual outlets.

Panduit Monitored per Outlet PDU: Provides outlet-level power monitoring to quickly identify potential power issues and reclaim available or under-utilized power capacity at the outlet level.

Panduit Monitored & Switched per Outlet PDU: Provides outlet-level power monitoring and outlet-level switching capabilities for individual outlets or a group of outlets. Power monitoring at the individual outlet level provides actionable management data on the power consumption of each connected IT device, enabling the redeployment or decommissioning of individual servers to reclaim available or under- utilized power capacity.

Features

The Panduit Monitored, Switched, Monitored per Outlet, and Monitored & Switched PDUs provide the following features:

- **Auto Rotating Screen via an internal accelerometer** – simplifies installation for overhead or underfloor power
- **Touch Screen Display** – reduces button presses for routine interaction
- **Lower profile on vertical PDUs** – enhances serviceability area in the back of the rack.
- **Multiple mounting options on vertical PDUs** – optimally spaced threaded inserts on back mounting face enables the PDU to be oriented for either top fed or underfloor power.
- **Higher operating temperature** – all Panduit PDUs are rated for 60˚C operating temperature.
- **4-in-1 combination outlets** - the ultimate in connection flexibility allowing a single outlet to be used as a C13/C15 or a C13/C15/C19/C21, making sure connection types are available when needed most. Combination outlets also accept the Panduit dual locking power cords to eliminate accidental disconnects.
- **Color-coded outlets to circuit breakers** – used to easily differentiate load segments and aid in balancing of the phases.
- **Supports Dual locking (V-Lock & W-Lock) cords, sold separately, without the need for an external adapter** –locks on both ends of the power cord, PDU and IT Equipment side, virtually eliminating accidental disconnects.
- **Hot Swappable Network Management Module** – allows power distribution during module replacement eliminating downtime.
- **Dual 1Gb Ethernet** – eliminates the need to manually set the network switch to run at a slower rate and increases the amount of PDUs that can be daisy chained together.
- **Daisy Chain** – able to network up to 64 of the same PDUs on one IP address.
- **Enhanced Sensor Support** – supports up to six physical sensors (with optional hub) and eight measurements per PDU with a total of 32 measurements in a maximum daisy chain configuration.
- **Highly Visible Touch display** – improves visibility while providing local access to view configuration settings. Automatically enters power save mode to conserve energy and protect the display from premature failure.

Form Factors

Details of the form factors that are covered within this document.

Form Factor	Details
0U (Vertical)	Vertical PDUs available install vertically in the 0U space in the back of the rack or cabinet.

Load Segment and Phase Distinction

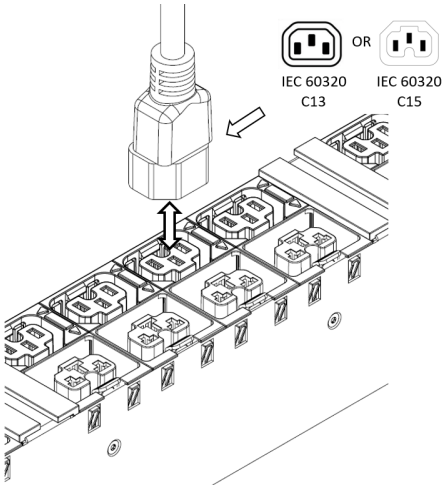
Panduit EL2P PDUs have colored outlets (aqua, light gray, and white) to help distinguish between the different load segments and phases. For single phase PDUs with no breakers the outlets are all black.

Three Phase PDU Example

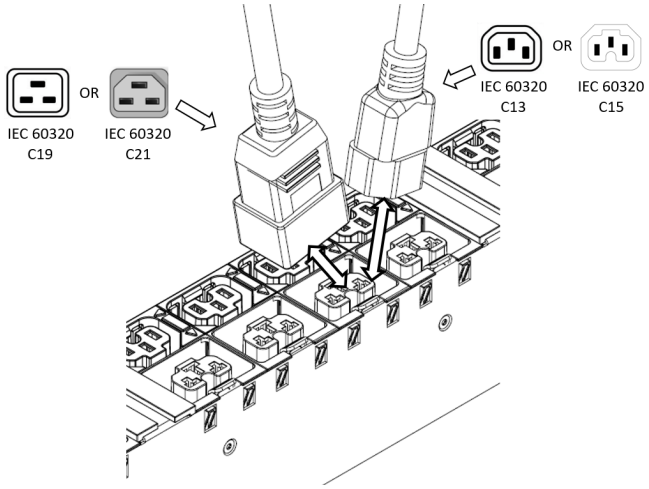
Power Cord Retention

4-in-1 combination outlets

Provides the ultimate in flexibility by allowing a customer to use an outlet as either a C13/C15 outlet (Image C) or a C13/C15/C19/C21 outlet (Image D) without any modifications or additional adapter. Merely plug in the corresponding power cord to the applicable outlet.



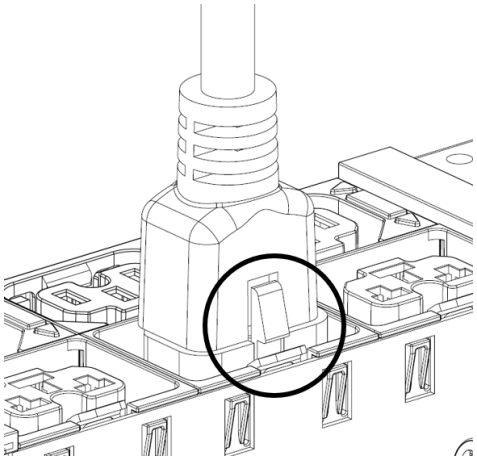
(C)



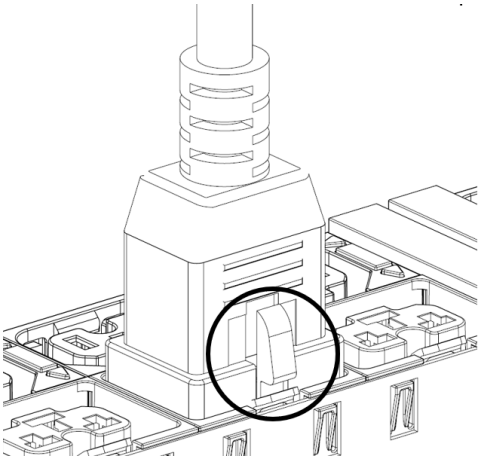
(D)

Locking Power Cord

Optional locking power cords, adhering to the W-Lock/V-Lock standard, can be used on each IEC C13 (Image A) and C19 (Image B) outlet on the PDUs. Several lengths are available to support any configuration. The image below shows the locking power cord engaged with the outlets.



(A)



(B)

Section 2 – Installing the PDU

Vertical PDUs

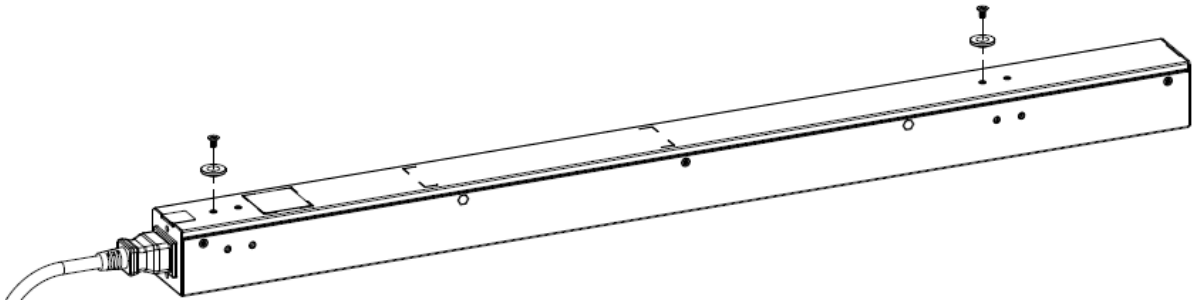
Panduit Vertical PDUs include the following form factors: 0U Full and 0U Full Wide models. This section covers the recommended installation methods.

Install Mounting Hardware

Each vertical PDU has multiple button mounting hole (threaded inserts) locations on back of the PDU. When installing the mounting buttons, use either mounting holes as a set.

Mounting button installation – outlets facing the center of the rack

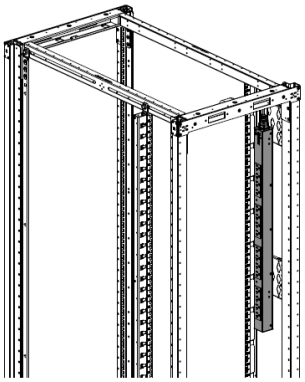
1. To save on labor, buttons are pre-installed at the factory in the most common location for the industry. However, they can be moved to accommodate as needed.



2. Install the PDU by inserting the mounting buttons into the keyhole slots on the PDU mounting bracket in the rack.
    a. Secure using the #2 Phillips screwdriver to a recommended torque of 3.0Nm

Vertical (0U) PDU– Single Installation

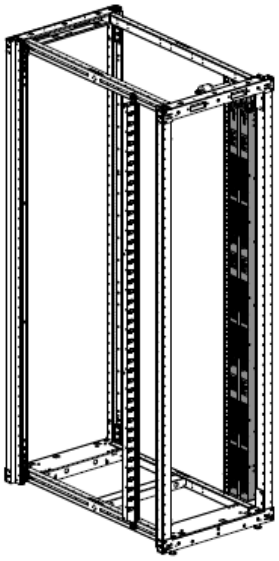
A single vertical unit can be installed with the outlets facing the center (A). The picture below illustrates this.



(A)

Vertical (0U) PDU– Two or More Installation

For two full-height (in a 42U/45U/48U rack), vertical units to be mounted on one side of the rack, all units must be installed with the outlets facing towards the center of the rack.



(A)

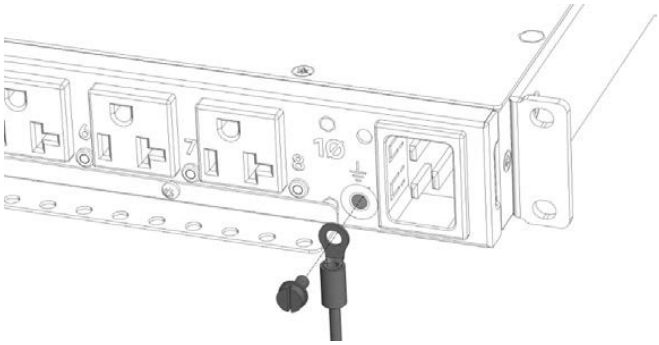
NOTE:

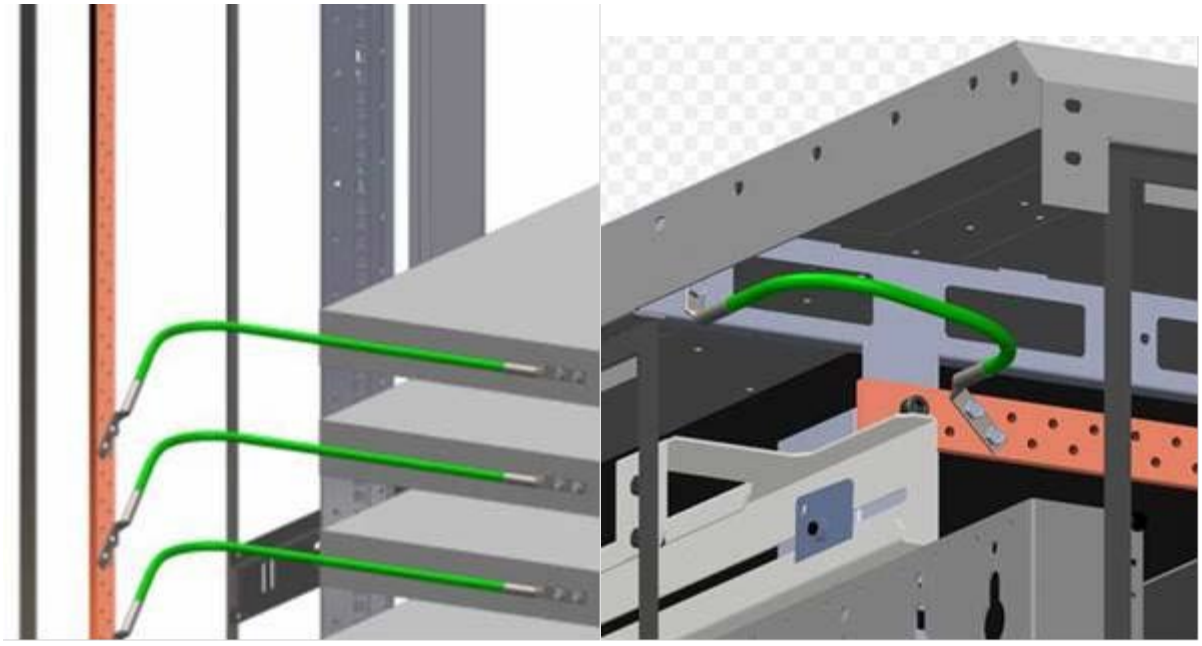
(A) Two full-height PDUs with outlets facing towards the center of the rack;

Grounding the PDU

Connecting the Ground Bonding Cable

Per international regulatory requirements, the primary Safety Earth Bond connection is contained in the PDU as an integral part of the branch circuit cabling and plug. There is an external ground bonding point located on the chassis of the PDU. The ground bonding screw is provided as an attachment point for conductors. Use a ground bonding cable if the rack contains any conductors for functional grounding or bonding of ungrounded metal parts. This bonding point can also be used to bond the PDU to a known earthed reference terminal in the building. The ground bounding point can typically be found on the surface with the outlets.





Bond Power Distribution Units (PDUs) to grounding strip or grounding bus bar. See **Panduit Grounding and Bonding Jumper kits** for factory terminated options to provide a bolt-on solution.

Bonding

This product contains an external earthing screw with a star washer, which should be used for supplementary Earth bonding to the rack metalwork. Conductor sizes shall meet National or Local Electrical Codes NEC Table 250.122 or equivalent based on the country product being deployed in. The table below is provided as a reference only. All installations shall be made by qualified personnel.

Bonding	
Minimum Requirements for Bonding (Copper Conductors)	
Up to and including 15A	14 AWG
Up to and including 20A	12 AWG
Up to and including 60A	10 AWG
Up to and including 100A	8 AWG
Up to and including 200A	6 AWG

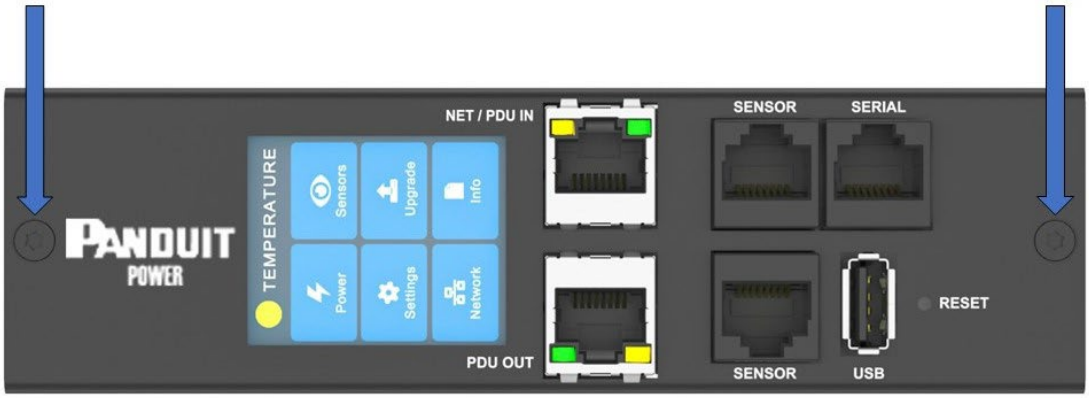
Section 3 - Rotating / Replacing Network Controller

Vertical PDUs

Panduit EL2P PDU's utilize a network control module that is both rotatable as well as replaceable. This section covers the recommended method to safely and effectively accomplish both.

Note: The EL2P network control module is equipped with an internal accelerometer designed to automatically rotate the screen. For end users who prefer a specific orientation of the physical ports, the following manual rotation method is provided.

1. Using a T10 Torx screwdriver, remove the (2) screws as shown. Note that the screws are held in the NC with retaining washers

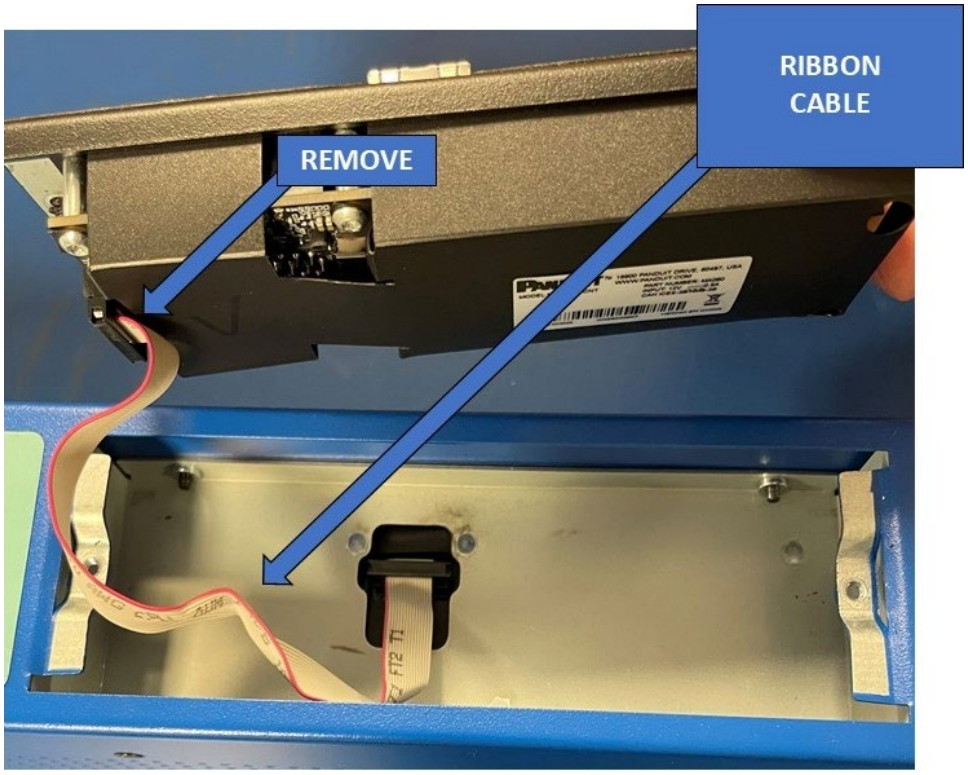


Location of (2) T-10 Screws

2. Controller may be manually rotated if desired.

3. If physically rotating the controller, **YOU MUST DISCONNECT** the ribbon cable to prevent damage. After rotating the controller, carefully reconnect the ribbon cable paying close attention to connector orientation and also making sure to avoid any crimping or pinching of the ribbon cable.

4. If replacing controller, disconnect the existing ribbon cable from the existing controller. To reinstall carefully connect the ribbon cable (see below) to the new controller, then carefully mate the new controller to the PDU chassis; making sure to not pinch or damage the ribbon cable.



Disconnect at the Controller

5. Using a T10 Torx screwdriver, torque the (2) screws with a torque range of of 2.2–3.1 lbf-in [0.25–0.35 N-M].

NOTE: Overtightening the screws may result in metal deformation.

Section 4 – Connecting the PDU

Connecting the PDU to a Power Source

Always follow local and national codes when installing the PDU. The PDU should be connected to a dedicated circuit protected by a branch circuit breaker, appropriately matched, to the PDU input plug type. Facility and room level branch circuits must follow all local and national electrical codes for the country the parts are being deployed in. All connections are to be made by qualified personnel.

NOTE: When connecting the PDU to a Power Source, make sure that you have enough length in the PDU power cord to reach the PDU power source.

1. Turn the feed circuit breaker Off.
2. Make sure that all circuit breakers on the PDU are set to On.
3. Connect each PDU to an appropriately rated branch circuit adhering to all local and national electrical codes.

   NOTE: Refer to the compliance label on the PDU for the input ratings.
4. Turn the feed circuit breaker On. Wait for the operating system to load. When complete, the Main Menu will display on the screen. Switched (MS) and Monitored & Switched per Outlet (MSPO) PDUs feature a LED corresponding to each outlet as it is powered on.

Section 5 – Configuration considerations

Dual rated PDUs

Dual rated PDUs require an additional CLI configuration step to enable the Web interface to report the correct power capacity. See CLI Commands in the User Manual for details.

Panduit, a global leader in high-quality electrical and network infrastructure and connectivity solutions, operates from Tinley Park, Ill., and across 112 worldwide locations. Since 1955, we have championed our customers' success by driving innovation through strategic R&D and breakthrough product development while providing seamless global support. Learn more at www.panduit.com.