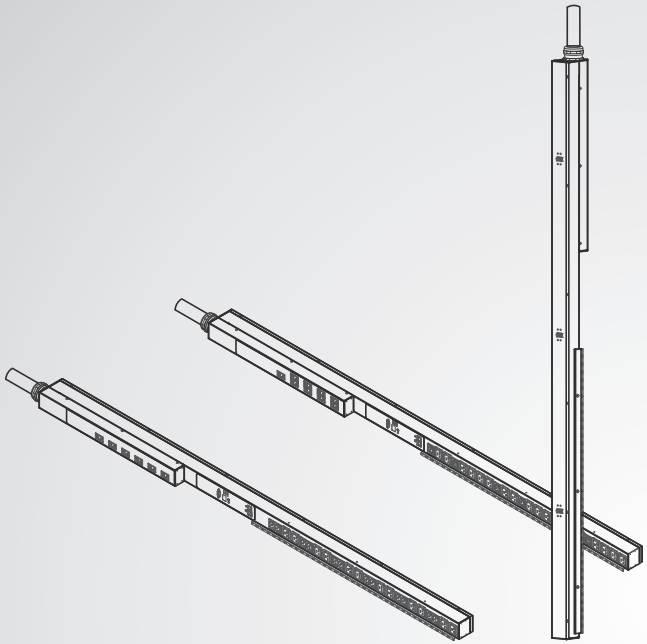

The power behind competitiveness

Delta Infrasuite Power Management

Power Distribution Unit

User Manual

www.deltapowersolutions.com

Smarter. Greener. Together.

Save This Manual

This manual contains important instructions and warnings that you should follow during the installation, operation, storage and maintenance of this product. Failure to heed these instructions and warnings will void the warranty.

NOTE:
This manual is applicable to the following models: PDUE428, PDUE428 II and PDUE928.

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Chapter 1 : Important Safety Instructions

1.1 Safety Precautions

To reduce the risk of personal injury from electric shock, you must observe the following safety precautions when placing, installing, operating, or performing maintenance on the Delta PDU.

- The product is designed for indoor use only in a controlled environment away from excess moisture, temperature extremes, conductive contaminants, dust or direct sunlight.
- Do not connect the PDU to an ungrounded outlet or extension cords or adapters that eliminate the connection to ground.
- Do not use the PDU in the presence of flammable substances.
- The power requirement for each piece of equipment connected to the PDU must not exceed the individual outlet's load rating.
- The total power requirement for equipment connected to the PDU must not exceed the maximum load rating for the PDU.
- Do not drill into or attempt to open any part of the PDU housing. There are no user serviceable parts inside.
- Do not modify the PDU, including the input plugs and power cables.
- Do not use the PDU if any part of it becomes damaged.
- Do not mount the PDU to an insecure or unstable surface.
- Never install electrical equipment during a thunderstorm.

1.2 Precautions for Rack Mounting

- **Elevated Operating Ambient :** If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (Tma) 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 :** Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on over-current protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
- **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 (such as use of power strips).

1.3 Precautions for Connecting to a Power Source

- Only a certified electrician can connect the PDU with a power source.
- Do not remove the cover. There are no internal components that the user can service.
- A certified electrician must install a circuit breaker when connecting the PDU to a power source. This protects the PDU against over current.
- A certified electrician must determine the type of circuit breaker required depending on the input voltage.
- Before connecting the power supply, make sure you verify the earth connection.
- The use of a detachable input power cord is prohibited.
- The plug on the power supply cord is intended to serve as the disconnect device, the socket outlet shall be installed near the equipment and shall be easily accessible.
- The short-circuit protection device is considered to be provided external to the equipment, a circuit breaker with adequate breaking (rupturing) capacity to interrupt the maximum fault current is provided between the equipment and the

building installation. See below external protective devices for detail.

The external short-circuit/ over-current protective devices (circuit breakers):

- Model PDUE428: 60A
- Model PDUE428 II: 60A
- Model PDUE928: 60A

1.4 Maintenance with Input Power

Delta strongly recommends that you do not perform maintenance on the PDU if it is receiving input power. However, if critical maintenance is required on the PDU connected to input power, please reduce your risk of electric shock by strictly following the precautions below.

To reduce your risk of personal injury by electric shock, you must:

- Be a certified electrician trained in live electrical installation.
- Always work with another qualified person.
- Know how to disconnect electricity to the PDU and data center in case of emergency.
- Wear the right protective equipment.
- Use double-insulated tools.
- Strictly follow local and site regulations.

1.5 Electromagnetic Interference

This is a Class A product. In a domestic environment, the product may cause radio interference in which case the user may be required to take adequate measures.

Chapter 2 : PDU Overview

2.1 Product Introduction

The Power Distribution Unit (PDU) distributes power to equipment mounted in racks and enclosures used in data centers, and IT and telecom installations. The PDU installs vertically without tools in the rear of a rack and without requiring a unit space. Input to the PDU can be either single phase or three phase America/ Taiwan or International voltages.

The PDU consists of receptacles distributed vertically, an attached line cord with plug, a display module and a built-in InsightPower SNMP IPv6 communication device. Connecting by cord to the AC mains or a UPS output, the PDU requires a user supplied facility receptacle and circuit breaker for input connection and protection.

The output of the PDU supplies single phase, cord connected AC devices via receptacles on the PDU. The output receptacles are divided into 6 or 9 groups. Each receptacle group is protected by a circuit breaker. The built-in InsightPower SNMP IPv6 communication device provides communication interfaces with SNMP compatible network management systems, which lets you remotely monitor the PDU via an Ethernet network.

2.2 Package Contents

The PDU package contains the following items:

No.	Item	Q'ty
1	Power Distribution Unit (PDU)	1 PC
2	User Manual	1 PC
3	RS-232 Cable (1.8m)	1 PC
4	RJ45 to DB9 Cable	1 PC
5	Cable Tie	30 PCS (PDUE428/ 928)
		54 PCS (PDUE428 II)
6	Wire Mount	54 PCS (PDUE428 II)
7	Mounting Bracket	3 PCS (PDUE428/ 928)
		4 PCS (PDUE428 II)
8	Software & User's Manual CD*1	1 PC

NOTE:

*1: The provided ***Software & User's Manual CD*** does not include the contents of this printed user manual. However, the CD includes the contents of the built-in SNMP IPv6 communication device's user manual. For more information, please refer to the provided CD's ***5.5 InsightPower SNMP IPv6 Communication Interfaces***.

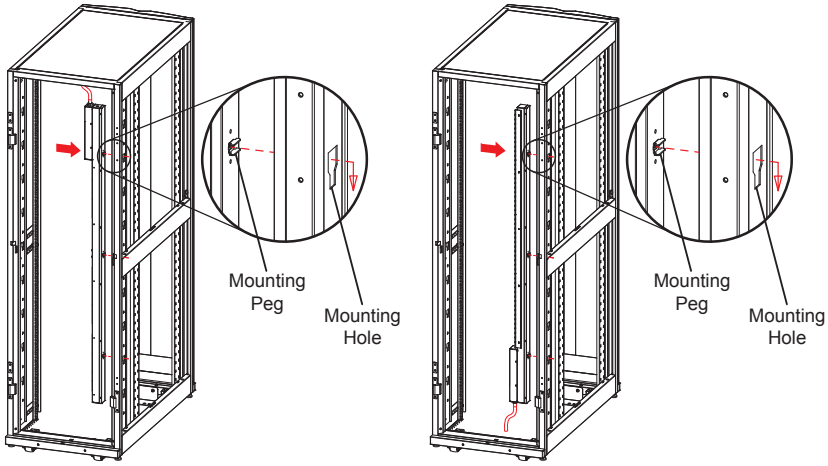
Chapter 3 : PDU Installation

You can install the PDU into a rack using the PDU's attached toolless mounting pegs or using the mounting brackets (provided). Once in the rack you can plug power cords into the PDU's sockets and secure them to the PDU's retention slots using the cable ties (provided).

3.1 Toolless Mounting (Delta Standard Rack Cabinet)

You can mount the PDU without tools into a Delta standard rack cabinet. The PDU installs vertically at the rear of the rack in the cable channel directly behind the rear vertical mounting rails.

1. Locate the mounting holes in the channel in the rear panel of the rack.
2. Hold the PDU vertically and align its toolless mounting pegs to the mounting holes. Note that either end can face top or bottom. See ***Figure 1***.



(Figure 1)

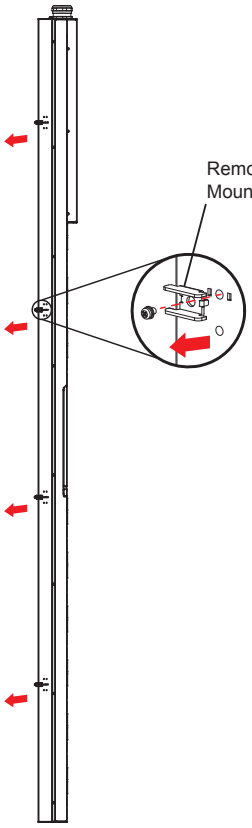
3. Slide the mounting pegs into the mounting holes.
4. Push the PDU downward until it snaps into place.

3.2 Bracket Mounting (For Other Rack Cabinets)

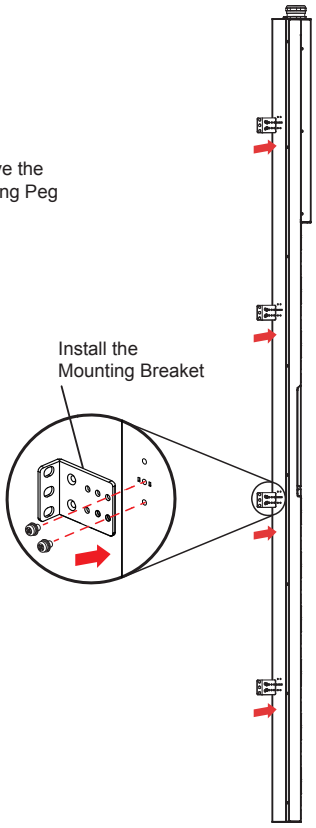
You can also use the mounting brackets (provided) to mount the PDU into any other standard rack cabinet.

1. Choose a mounting position for the PDU.
2. Please remove the PDU's toolless mounting pegs. See ***Figure 2***.
3. Attach the mounting brackets to the PDU using the M4*8mm screws that came with the mounting brackets. See ***Figure 3***.

NOTE : Use only the screws and nuts supplied with the rack or the mounting brackets.



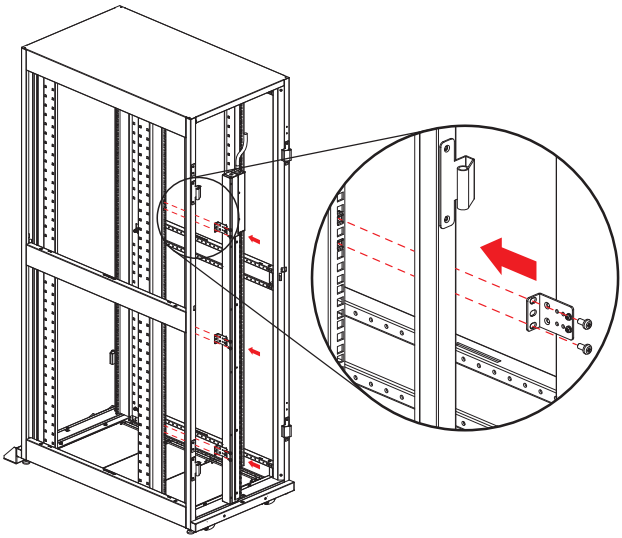
(Figure 2)



(Figure 3)

4 Choose a location in the rack for the PDU.

5 Install the PDU on a mounting rail in your rack using the M6*12mm screws and M6 cage nuts. See ***Figure 4***.



(Figure 4)

Chapter 4 : PDU Connection

4.1 Plug in the PDU

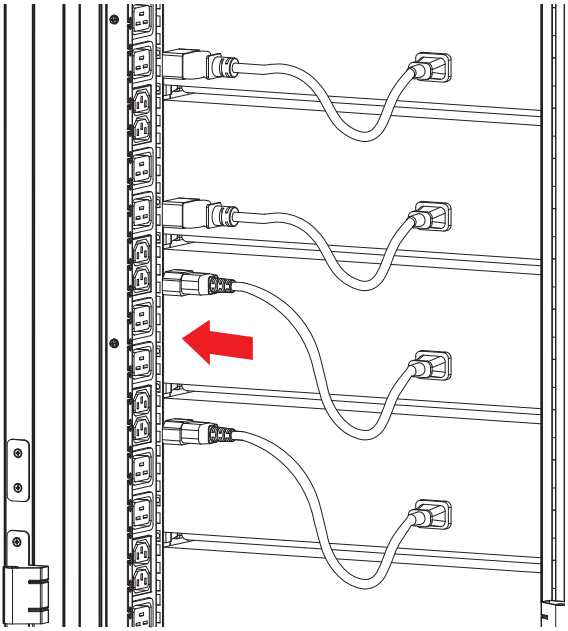
Plug the PDU input power cord into a grounded outlet. Make sure the grounded outlet does not share a circuit with a heavy electrical load such as an air conditioner or refrigerator.

4.2 Attaching Cords

- **For PDUE428/ PDUE928 :**

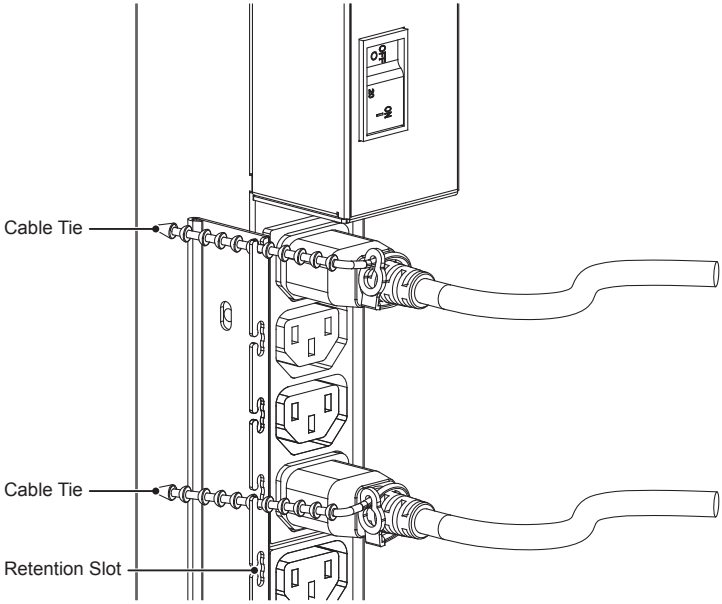
  1 Attach the cable ties (provided) next to the plug of each power cord.

  2 Plug the power cords into the PDU's sockets. See ***Figure 5***.



(Figure 5)

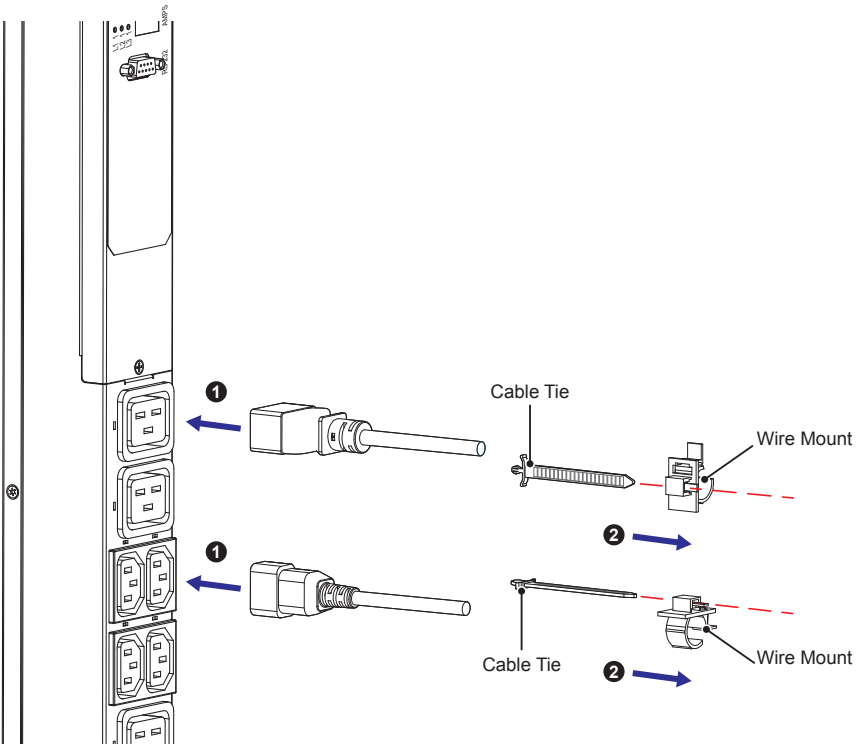
3 Pull and fasten the cable ties (provided) into the PDU's retention slots. See ***Figure 6***.



(Figure 6)

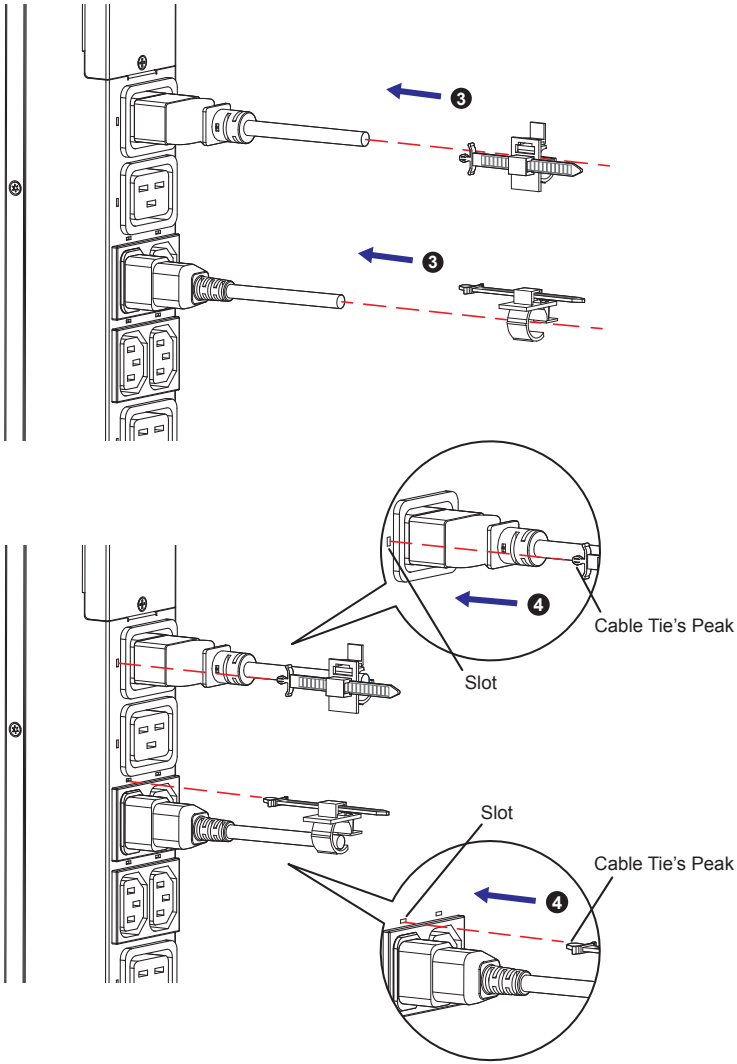
- **For PDUE428 II :**

  1 Firmly insert the power cables into the PDU's sockets (❶) and insert the cable ties into the wire mounts (❷). Please refer to ***Figure 7***.



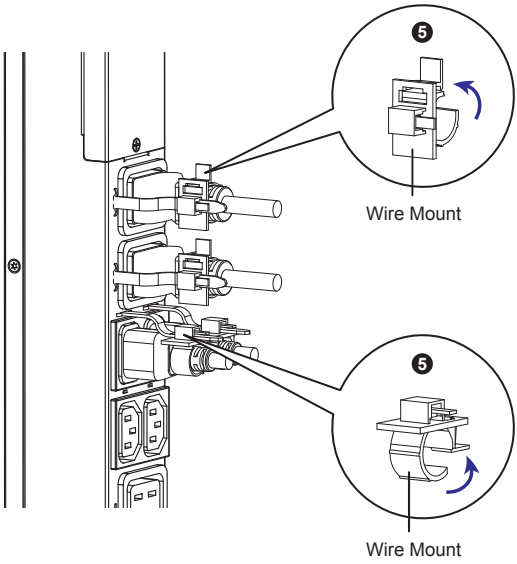
(Figure 7)

2 Firmly insert the wire mounts into the power cables (❸) and insert each cable tie's peak into the according slot (❹). Please refer to ***Figure 8***.



(Figure 8)

3 Clip each wire mount firmly (❺). Please refer to ***Figure 9***.



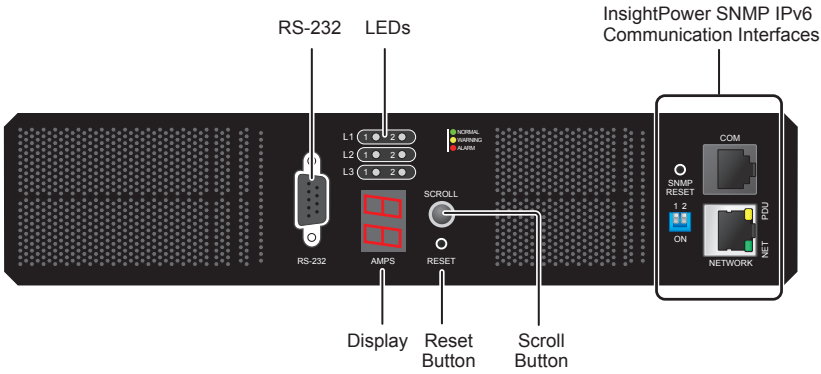
(Figure 9)

Chapter 5 : Front Panel Operation

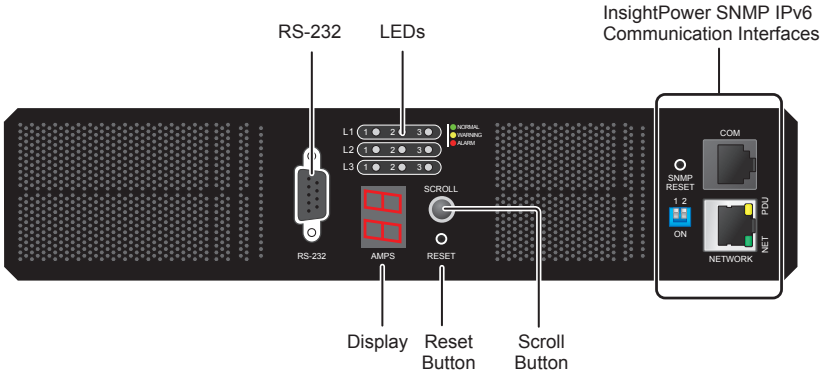
The PDU's front panel has an RS-232 port, alarm LEDs, which indicate current overload and voltage-out-of-range conditions, a two-digit LED display that shows the current in each circuit breaker, a scroll button to scroll through values, a reset button and a built-in InsightPower SNMP IPv6 communication device. The following describes the front panel of each PDU model.

5.1 Front Panel Descriptions

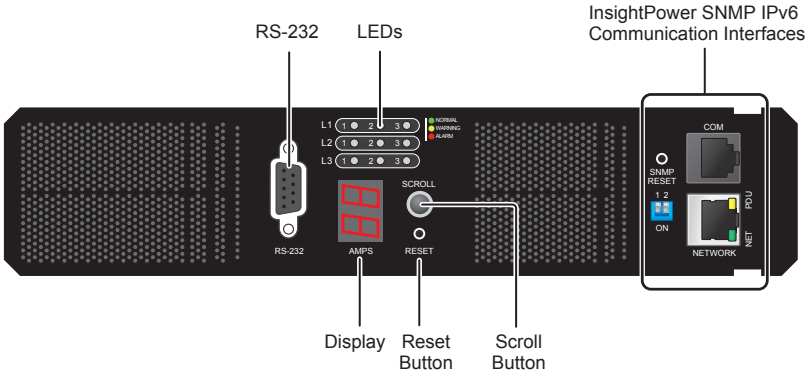
Model : PDUE928



Model : PDUE428



Model : PDUE428 II



5.2 LEDs

Model : PDUE428/ PDUE428 II		Model : PDUE928	
LED	**Color**	**LED**	**Color**
L1-1~ L1-3	Green/ Yellow/ Red (Tricolor LED)	L1-1~ L1-2	Green/ Yellow/ Red (Tricolor LED)
L2-1~ L2-3	Green/ Yellow/ Red (Tricolor LED)	L2-1~ L2-2	Green/ Yellow/ Red (Tricolor LED)
L3-1~ L3-3	Green/ Yellow/ Red (Tricolor LED)	L3-1~ L3-2	Green/ Yellow/ Red (Tricolor LED)
Green LED: Normal Yellow LED: Warning (minor alarm) Red LED: Alarm (major alarm)		Green LED: Normal Yellow LED: Warning (minor alarm) Red LED: Alarm (major alarm)	

5.3 Scroll Button

The scroll button lets you scroll through the display for each circuit or invert the display.

5.4 Display

A. View the Display for Each Circuit

1. Push the scroll button once (less than 3 seconds) to switch the seven-segment display from one circuit to the other.
2. The circuits are displayed in the following order as you push the scroll button.

   Model PDUE428: L1-1, L1-2, L1-3, L2-1, L2-2, L2-3, L3-1, L3-2 and L3-3.

   Model PDUE428 II: L1-1, L1-2, L1-3, L2-1, L2-2, L2-3, L3-1, L3-2 and L3-3.

   Model PDUE928: L1-1, L1-2, L2-1, L2-2, L3-1 and L3-2.

B. If you mount the PDU in a rack with the circuit breakers at the top, press and hold the scroll button for over 3 seconds to invert the seven-segment display 180 degrees.

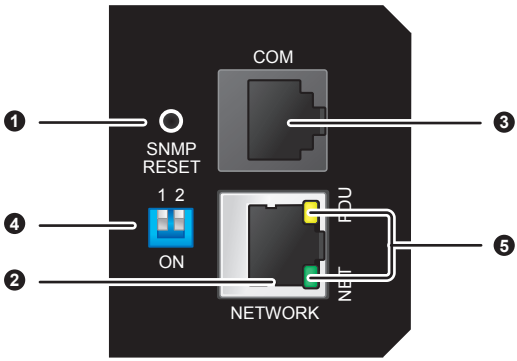
5.5 Start-up or Reset

During the start-up process or after a reset, all LED indicators and the seven-segment display illuminate for a minimum of 2 seconds to verify operation. In the case of tricolor LEDs, the color switches every second during the verification process.

5.6 RS-232 Port

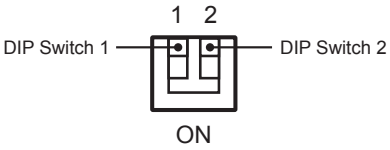
RS-232 port is a communication port for communicating with outside device such as PC or notebook.

5.7 InsightPower SNMP IPv6 Communication Interfaces

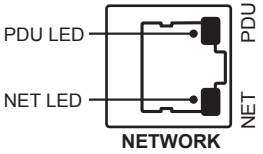


No.	Item	Description
❶	SNMP Reset Button	Resets the SNMP IPv6 only. This does not affect the operation of the PDU.
❷	Network Port	Connects to the network.
❸	Console (COM) Port	1. Connects to a workstation with the provided RJ45 to DB9 cable. 2. Connects to an EnviroProbe (optional).

No.	Item	Description
❹	DIP Switches	Set up operation modes.



DIP Switch 1	DIP Switch 2	Operation Mode	Description
OFF	OFF	Normal Mode	The SNMP IPv6 works with the PDU. It provides the PDU's status information and parameters through a network system.
OFF	ON	Pass Through Mode	The SNMP IPv6 stops polling the PDU but transfers the communication data between the console port and the PDU.
ON	OFF	Sensor Mode (with EnviroProbe)	The SNMP IPv6 works with the PDU and an optional EnviroProbe. It provides not only the PDU's status information and parameter readings, but also the EnviroProbe's status information and its environmental parameters such as temperature and humidity.

<table>
<tr><th>No.</th><th>Item</th><th>Description</th></tr>
<tr><td>❹</td><td>DIP Switches</td><td>
<table>
<tr><th>DIP Switch 1</th><th>DIP Switch 2</th><th>Operation Mode</th><th>Description</th></tr>
<tr><td>ON</td><td>ON</td><td>Configuration Mode</td><td>In this mode, the user can login through the console port and configure the SNMP IPv6's settings.
Please refer to the provided Software & User's Manual CD
→ InsightPower SNMP IPv6 for PDU
→ SNMP IPv6 for PDU
→ UM_EN_353413900708.pdf
→ 4.4 Configuring through COM Port.</td></tr>
</table>
</td></tr>
<tr><td>❺</td><td>LED Indicators</td><td>


1. When the SNMP IPv6 is initializing or upgrading firmware, the two LED indicators flash simultaneously to show its status. Refer to the following:
• Rapid simultaneous flashing (every 50ms): Initialization or firmware upgrade in progress.
• Slow simultaneous flashing (every 500ms): Initialization failure.
</td></tr>
</table>

No.	Item	Description
❺	LED Indicators	**WARNING**: Do NOT disconnect the PDU's input power during initialization or firmware upgrade! This could result in data loss or damage to the SNMP IPv6. 2. NET LED (Green): shows the network connection status. • **ON:** Network connection is established and the IPv4 address is usable. • **OFF:** Not connected to a network. • **Flashes slowly (every 500ms):** Faulty IP address. 3. PDU LED (Yellow): shows the linking status between the SNMP IPv6 and the PDU. • **Flashes rapidly (every 50ms):** The PDU is linked. • **Flashes slowly (every 500ms):** The PDU is not linked.

NOTE :

1. For EnviroProbe information, please refer to the ***Installation Guide*** included in the package of the EnviroProbe.
2. For more information on SNMP IPv6's configurations and troubleshooting, please refer to the provided.

   Software & User's Manual CD

   → ***InsightPower SNMP IPv6 for PDU***

   → ***SNMP IPv6 for PDU_UM_EN_353413900708.pdf***

   → ***Chapter 4: System Configurations,***
   Chapter 5: InsightPower SNMP IPv6 for PDU Web,
   Chapter 6: SNMP Device Firmware Upgrade and
   Chapter 7: Troubleshooting.

   Please note that the screenshots shown in the provided CD's ***Chapter 5: InsightPower SNMP IPv6 for PDU Web*** are for reference only. Actual displays depend on actual situations.

Chapter 6 : Other Information

6.1 Normal Conditions

1. AMPS – The dual seven-segment display shows the current of the load group selected by the user. The value is displayed without a decimal point, for example, 1 Amp is displayed using only the right hand digit. For current value less than 1 (I < 1), the value is displayed as “0”.
2. LEDs – Under normal conditions, when there are no alarms, all LEDs glow green. The LED corresponding to the load group flashes at a 1Hz rate (0.5 second on and 0.5 second off).
3. If no alarms are present, the display begins to automatically scroll through the load groups after 5 minutes of inactivity. Inactivity is defined as no user input, such as pushing the scroll button, for 5 minutes. When automatically scrolling each load group, current will be displayed for 3 seconds before switching to the next group. When pushing the scroll button during automatic scrolling, the automatic function terminates until the 5-minute inactive criteria is met again.

6.2 Alarm Conditions

1. If a minor alarm condition exists, the LED corresponding to the load group with the alarm condition glows yellow.
2. If a major alarm condition exists, the LED corresponding to the load group with the alarm condition glows red.
3. When an alarm condition occurs, the display automatically changes to show the circuit with the alarm condition regardless of the present display setting. The automatic scrolling function is disabled when an alarm condition exists.
4. If an alarm condition is displayed and the user scrolls to display another circuit that does not have an alarm condition, the circuit without an alarm is displayed for 10 seconds. The display then switches back to the circuit with the alarm condition. If an alarm condition is displayed and the user scrolls to another circuit with an alarm condition, the display remains on the last circuit selected with an alarm until the alarm condition clears or the user scrolls to a different circuit.
5. If multiple circuits have concurrent alarm conditions, the last circuit to activate an alarm will be displayed.

6. If a circuit with an active alarm is selected for display, the LED (yellow or red) flashes at a 1 Hz rate (0.5 second on and 0.5 second off).
7. Minor alarm (Yellow LED) conditions include:
    a. Caution prior to overload
    b. Over or under voltage caution
8. Major alarm (Red LED) conditions include:
    a. Overload warning
    b. Over or under voltage warning
    c. Breaker tripped

6.3 PDU Data

The following PDU data is available via communication interfaces:

- Current in each circuit breaker (measured)
- Voltage on the load side of each circuit breaker
- Alarm condition present
- Unit information, such as model name, serial number, etc.

Appendix 1 : Specifications

Model	PDUE428	PDUE428 II	PDUE928
Electrical			
Input Connecter	IEC309-63A-5W		IEC309-63A-4W
Output Connectors	IEC320-C13 × 6 pcs IEC320-C19 × 18 pcs	ICE320-C13 × 36 pcs IEC320-C19 × 18 pcs	IEC320-C13 × 12 pcs IEC320-C19 × 12 pcs
Input Rated Current	48A		55.4A
Nominal Input Voltage	380/400V		208V
Input Frequency	50/60 Hz		
Output Voltage	200 ~ 240 Vac (1 Phase)		
Physical			
Dimensions (W × H × D)	58 × 1750 × 60/ 100 mm	56 × 2325 × 60/ 100 mm	58× 1750× 60/ 100 mm
Unit Weight	13.4 kg	15.1 kg	12.8 kg

Enviromental	
Temperature	Operating: 0 ~ 45ºC Storage: -20 ~ 65ºC
Altitude	Operating: 0 ~ 6,600 feet (0 ~ 2000 meters) Non-operating: 0 ~ 49,000 feet (0 ~ 15,000 meters)
Humidity	Operating: 5 ~ 95% relative humidity (non-condensing) Non-operating: 5 ~ 95% relative humidity (non-condensing)

NOTE:

1. Refer to the rating label for the safety rating.
2. All specifications are subject to change without prior notice.

Appendix 2 : Warranty

Seller warrants this product, if used in accordance with all applicable instructions, to be free from original defects in material and workmanship within the warranty period. If the product has any failure problem within the warranty period, Seller will repair or replace the product at its sole discretion according to the failure situation.

This warranty does not apply to normal wear or to damage resulting from improper installation, operation, usage, maintenance or irresistible force (i.e. war, fire, natural disaster, etc.), and this warranty also expressly excludes all incidental and consequential damages.

Maintenance service for a fee is provided for any damage out of the warranty period. If any maintenance is required, please directly contact the supplier or Seller.

WARNING!

The individual user should take care to determine prior to use whether the environment and the load characteristic are suitable, adequate or safe for the installation and the usage of this product. The User Manual must be carefully followed. Seller makes no representation or warranty as to the suitability or fitness of this product for any specific application.

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