



The **Power over Ethernet** Pioneers

# **Power over Ethernet Midspans**

**PD-6548**

**48-Port Model**

**IEEE 802.3af-compliant**

**User Guide**





## Notice

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Note that the Midspan is designed for indoor use only!

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## Acknowledgements

- All other products or trademarks are property of their respective owners.
- The product described by this manual is a licensed product of PowerDsine.
- Covered under U.S patent 6,473,608 and equivalent worldwide
- Additional patents pending

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## Model Numbers Definition

PD-6548/AC/M

Where: **M** if present, indicates that the Midspan includes the Web Management (EMS) feature (refer to Section 4).

## Verifying Kit Contents

Unpack the kit and verify that the following items are included:

- The Power over Ethernet Midspan
- Communication cable (for console connection to RS232)
- User Guide
- Power cord
- Brackets & plates installation kit

Before proceeding, record the unit's serial number below for future reference. The serial number can be found on the label at the rear of the Power over Ethernet Midspan.

Serial Number

## Electrical Compatibility Approvals

The PD-6548 complies with the following standards:

- FCC Part 15, Class B, with FTP cabling; Class A with UTP cabling
- EN 55022 (CISPR 22), Class B with FTP cabling; Class A with UTP cabling
- EN 55024 (CISPR 24)
- Canadian ICES-003, Class B
- VCCI

## Safety Standard Approvals

The PD-6548 meets the following safety standards:

- UL/cUL per EN60950
- GS mark per EN60950

## CE Marking

The CE marking on this product indicates that this product is in compliance with 89/336/EEC (EMC Directive) and 73/23/EEC (Low Voltage Directive).

# Abbreviations

**PD** – Powered Device

**SELV** - Safety Extra Low Voltage

**DTE** – Data Terminal Equipment

**EMS** - Element Management System

**UTP** – Unshielded Twisted Pair

**FTP** – Foiled Twisted Pair

**DHCP** – Dynamic Host Configuration Protocol

**SNMP** – Simple Network Management Protocol

**GUI** – Graphic User Interface

# 1 Safety Information

## 1.1 General Guidelines

Read the following safety information before carrying out any installation, removal or any maintenance procedure on the Power over Ethernet Midspan. Warnings contain instructions that must be followed for personal and product safety. Follow all instructions carefully.

### **WARNINGS**

- Read the Installation Instructions in Section 3 before connecting the Power over Ethernet Midspan to its power source.
- A grounded power cord must be utilized with the Midspan as defined in paragraph 1.2.
- This product relies on the building installation for short-circuit (overcurrent) protection. Ensure that a fuse or circuit breaker no larger than 15 A for 120 VAC, (U.S.) 10 A for 230 VAC (international) is utilized.
- Do not perform any work on the unit or connect/disconnect cables during periods of lightning activity.
- A voltage mismatch can damage the equipment and may pose a fire hazard. If the voltage indicated on the label is different from the power outlet voltage, do not connect the Power over Ethernet Midspan to this outlet.
- For shelf-mounted equipment, be certain that the surface is stable and strong enough to support the equipment. Do not stack more than two of the Power over Ethernet Midspans on a single shelf.
- Ultimate disposal of this product should be handled according to all local laws and regulations.
- The Power over Ethernet Midspan "Data" and "Data + Power" ports are shielded RJ-45 data sockets. They cannot be used as Plain Old Telephone Service (POTS) telephone sockets. Only RJ-45 data connectors may be connected to these sockets.

## 1.2 Power Cord

In the event that the power cord is replaced, the replacement must meet local requirements.

- For reliable connection to an AC MAINS SUPPLY, equipment provides an appliance IEC60320 inlet for connection of a detachable power supply cord.
- The power socket outlet must be located near the Midspan and be easily accessible. *The only way to remove power from the unit is by disconnecting the power cord from the outlet*
- This unit operates under SELV (Safety Extra Low Voltage) conditions according to EN60950/IEC 950. The conditions are only maintained if the equipment to which it is connected, also operates under SELV conditions.

### **U.S.A. and Canada**

- The cord must be UL-approved or CSA certified.
- The minimum specification for the flexible cord is:  
No. 18 AWG  
Type SV or SJ  
Three-conductor.
- The cord set must have a rated current capacity of at least 10 A.
- The attachment plug must be an earth-grounding type with a NEMA 5-15P (15 A, 125 V) or NEMA 6-15P (15 A, 250 V) configuration.

### **Denmark**

- The supply plug must comply with section 107-2-D1, standard DK2-1a or DK2-5a.

### **Switzerland**

- The supply plug must comply with SEV/ASE 1011.

### **France and Peru**

- This unit cannot be powered from IT supplies. If your supplies are of the IT type, this unit must be powered by 230 V (2P+T), via an isolation transformer with a 1:1 ratio and with the secondary connection point labeled Neutral, connected directly to ground

### **U.K**

- The Power over Ethernet Midspan is covered by General Approval, NS/G/12345/J/100003, for indirect connection to a public telecommunications system

## 2 About the Power over Ethernet Midspan

PowerDsine's Midspans family, injects DC power over data-carrying Ethernet cabling. The PD-6548 Midspan, supports 48 ports in a 10/100BaseTx Ethernet network, over TIA/EIA-568 Category 5/5e/6 cabling. DC operating power, for data terminal units, is fed over the unused pairs of the cabling (7/8 and 4/5).

The Midspan powers devices that are Power over Ethernet enabled, or are equipped to receive power over Ethernet. These devices are called Powered Devices (PDs). Devices that are not equipped to receive power over Ethernet, may require an external power adapter in order to be powered. Contact PowerDsine for such an adapter.

The Power over Ethernet Midspan main features are as follows:

- Remote power feeding over standard Ethernet ports
- Eliminates the need for AC outlets, local UPS & AC/DC adapters near PDs
- Universal range power input (100-240 VAC, 50/60 Hz)
- Power management
- Remote Web manager (optional)
- Overload and short-circuit protection per channel
- Port status indications
- Standard 19-inch rack mountable

### 2.1 Power Management

When establishing a network, the total power required by PDs may exceed the total power available from the Midspan. The built-in Power Management feature does not allow the total power output to exceed the maximum power available (refer to the Technical Specifications). When the total power available is close to the maximum value, attempts to connect an additional PD to a free port cause the corresponding port LED to blink green at an 0.5 sec. rate, indicating an out-of-power budget, thus, this port will not deliver power. The power distribution method is based on "First Come, First Served" logic.

Sometimes, connected operating PDs significantly increase or suddenly raise their power requirements. If the required power exceeds the available power, the Power over Ethernet Midspan starts to turn off ports in accordance with their priority (the first turned off port is the lower priority port) until the total power is once again under the maximum limit. Default priority is established by port number: the higher the port number is, the lower priority it gets.

## 2.2 10/100BASE-TX Ports Definition

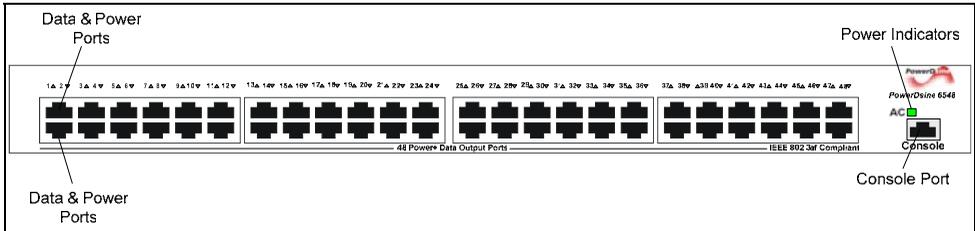
### 2.2.1 Data Input Ports

The Midspan has 48 10/100Base-TX data input ports, configured in a non-crossover manner (straight-wired). These ports located on the PoE's rear panel of front box, are designed to carry Ethernet data only (Tx/Rx) over the standard 2-wire pairs (pins 1/2 and 3/6) and are typically connected to existing Ethernet switch.

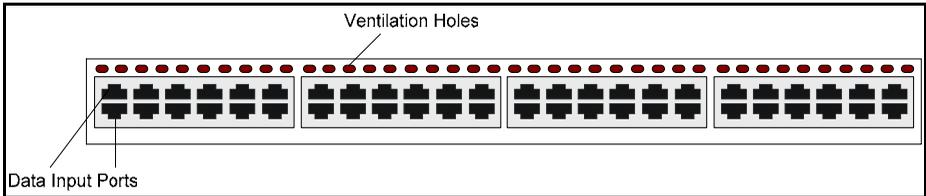
### 2.2.2 Data & Power Output Ports

The Midspan has 48 Data & Power output ports, located on the front panel (Figure 2-1). These ports are configured in a non-crossover manner (straight-wired) and are designed to carry Ethernet data over the standard 2-wire pairs (pins 1/2 and 3/6) and DC power over the spare pairs (pins 4/5 and 7/8). Each output port corresponds to an opposite input port located on the rear panel.

The Midspan is not a repeater. As such, the maximum distance from the Ethernet switch to PDs should not exceed 100 meters (328 ft). In accordance with the IEEE 802.3 standard, the Power over Ethernet Midspan is guaranteed to work up to this distance.



**Figure 2-1: Power over Ethernet Midspan, Front View**



**Figure 2-2: Power over Ethernet Midspan, Rear View**

## 2.3 Indicators

A set of indicators provide the status of the Power over Ethernet Midspan and its ports. Refer to Table 2-1 and Table 2-2 for status information during operation.

### 2.3.1 *Primary Power Indicators*

A Primary Power LED (labeled “AC”) is located on the front panel; the LED provides Power over Ethernet Midspan power status.

When the indicator illuminates in green, it means that the Midspan receives AC power. The “AC” indicator lits in orange to indicate Built In test failure. Refer to Table 2-1: for additional information.

### 2.3.2 *Port Indicators*

One uni-color indicator (green) per port provides port status:

- Green indicates that the PD (Powered Device) is identified as "Power over Ethernet Enabled", is active and receives power.
- Blinking green indicates that the power is not delivered to a specific port.

Refer to Table 2-1 and Table 2-2 for additional information.

<b>Note</b>	Due to the standard detection process performed on each PoE port, power is not supplied to an Ethernet device that is not PoE-enabled. In this way, PDs (non PoE -enabled) are not affected by connection to Midspan’s output port.
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**Table 2-1: Power Status Indications**

Indicator	Color	Symptom	Remarks
AC	Off	Internal power supply unit is unplugged or faulty	Internal power supply voltage is too low.
	Green	Indicates AC power input active	Internal power supply voltage is within tolerance.
	Orange	Internal problem alarm	Built in Test (BIT) failed.

**Table 2-2: Port Status Indications**

Port LED Color	Port Load Conditions	Port Voltage
Off	Non-active load or unplugged port.	Power to the port is disconnected. No DC voltage present on spare pairs.
Green	Active load is plugged in and complies with normal load conditions.	Continuous nominal DC voltage is present on the spare pairs.
Green blinks at a 1 sec. rate	Overload or short circuit.	Power to the port is disconnected. No DC voltage is present on the spare pairs.
Green blinks at a 0.5 sec. rate	Valid load. Total aggregated power exceeds pre-defined power budget (400w by default).	Power to the port is not connected or, if previously connected –disconnected at the moment. No DC voltage is present on the spare pairs.

## 2.4 Connectors

The Midspan's front panel includes a Console port (RJ-45 connector) that supports two communication types:

1. Standard DTE Ethernet connector only at the web manageable version of the midspan. This connector is a standard 10/100BaseTX port that is used for remote management of the device (see Table 2-3).

For connecting the port to a switch output, use a straight-through ethernet cable. for connecting the port directly to a PC port, use a crossed-over ethernet cable.

**Table 2-3: Console Ethernet Connector**

Pin #	Label	Description
1	TX+	Plus signal, transmit from midspan
2	TX-	Minus signal, transmit from midspan
3	RX+	Plus signal, received to midspan
4	spare	
5	spare	
6	RX-	Minus signal, received to midspan
7	spare	
8	spare	

2. Proprietary RS232 connector for console purposes: The user may connect a terminal and perform software loading via the connector, using the console cable included in the supplied kit.

The console port is set to 38,400-baud, 8 data bits, no parity and 1 stop bit. The RJ-45 connector of the cable should be connected to the Midspan's console terminal and the D-type 9 pin should be connected to the PC. Pin connections for the D-type connector are as follows:

**Table 2-4: Console Cable D-type Connector**

Pin #	Label	Description
1	spare	
2	RD	DTE receive data
3	TD	DTE transmit data
4	spare	
5	GND	DTE GND
6	spare	
7	spare	
8	spare	

Each input port is configured as shown in Figure 2-3, as data “Pass-Through” ports for all data pins (pins 1, 2, 3 and 6). Be certain to use Category 5 or higher cabling.

**Table 2-5: Rear Panel RJ45 Input Plug (Per Channel)**

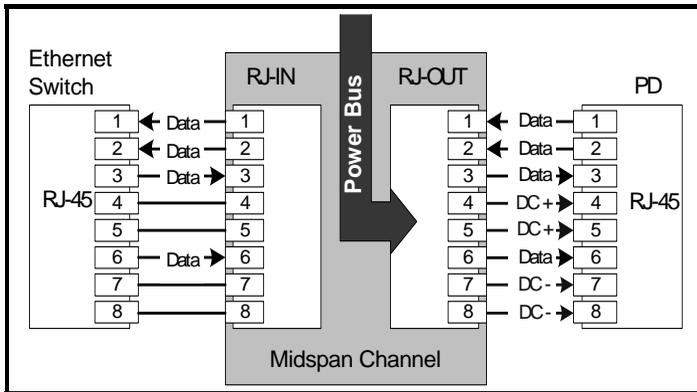
Pin #	Label	Description
1	P_RX+	Plus signal, Receive from DTE to PD
2	P_RX-	Minus signal, Receive from DTE to PD
3	P_TX+	Plus signal, Transmit from DTE to PD
4	spare	
5	spare	
6	P_TX-	Minus signal, Transmit from DTE to PD
7	spare	
8	spare	

**Table 2-6: Front Panel RJ45 Output Plug (per channel)**

Pin #	Label	Description
1	P_RX+	Plus signal, Receive from DTE to PD
2	P_RX-	Minus signal, Receive from DTE to PD
3	P_TX+	Plus signal, Transmit from DTE to PD
4	Vdc (+)	Feeding power (+)
5	Vdc (+)	Feeding power (+)
6	P_TX-	Minus signal, Transmit from DTE to PD
7	Vdc (-)	Feeding power (-)
8	Vdc (-)	Feeding power (-)

Each output port is configured as shown in Figure 2-3, as data pass-through ports for all data pins (pins 1, 2, 3 and 6) and DC power addition on the spare pins (pins 4, 5, 7 and 8). Be certain to use Category 5 or higher cabling.

Figure 2-3 illustrates the Midspan functionality that adds DC power to the spare pins.

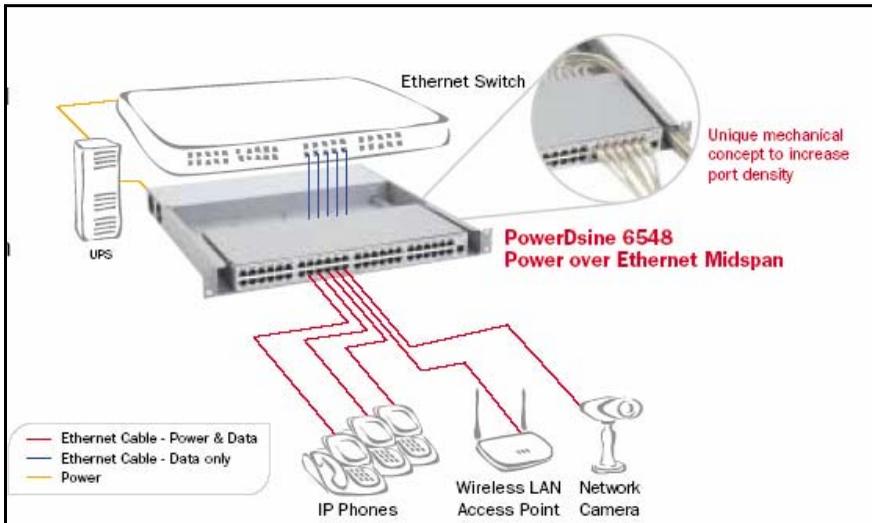


**Figure 2-3: Connecting to the Midspan**

## 3 Installing the Power over Ethernet Midspan

### 3.1 Background

The Midspan is connected (see Figure 3-1) in series to an Ethernet switch/hub. The data outputs from the switch are connected to Midspan's input ports. The Midspan delivers power over spare twisted pairs (pins 7/8 and pins 4/5) of the Category 5 cabling, without degrading the quality of data communications of the output ports. The installation requires the Midspan to be rack mounted, as described in the next Paragraph.



**Figure 3-1: Typical Installation**

Installation process should be conducted by a qualified technician in the following way:

Rack Mounting Brackets

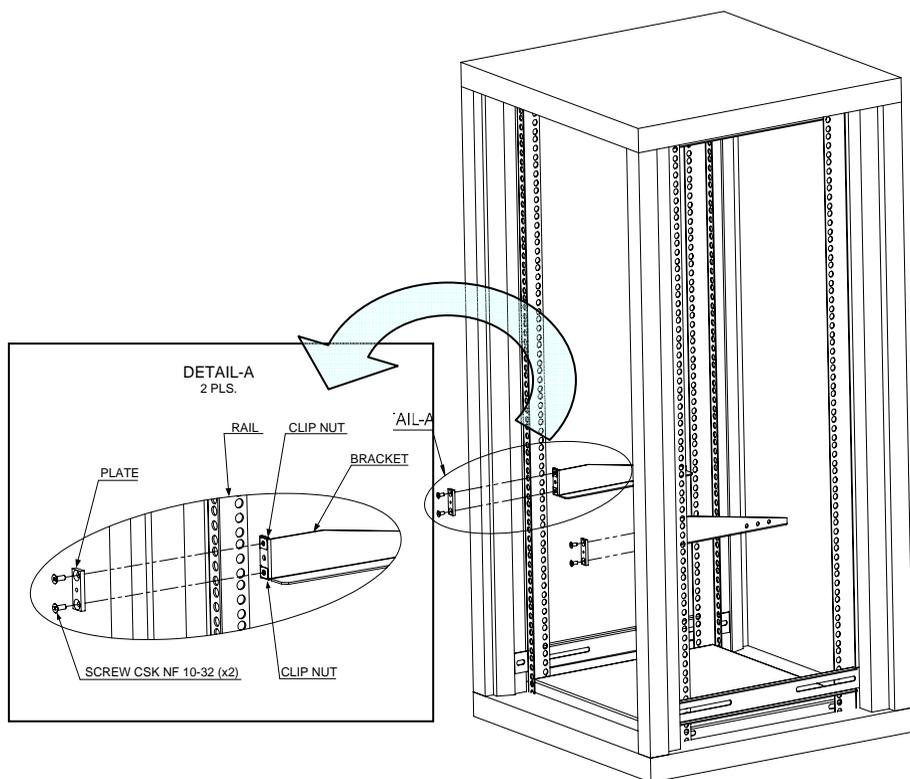
Routing the Input Ports Cables

Assembling Midspan to Rack

## 3.2 Rack Mounting Brackets

The Midspan is supplied with mounting brackets, plates and screws utilized for assembling the Midspan in an 19-in rack.

1. Install two clip nuts on each bracket.
2. Tighten two brackets to both sides of the rack's rails using the supplied plates and 10-32" screws as shown below.

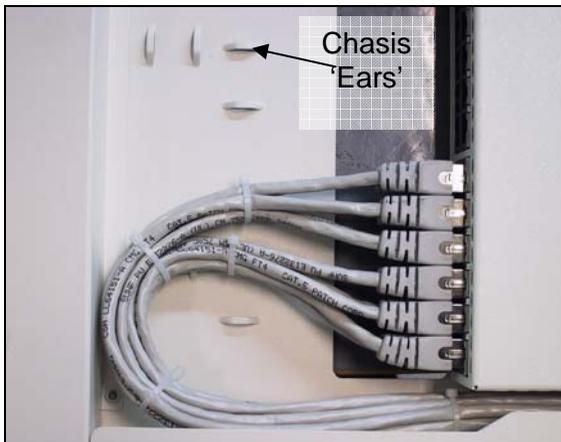


### 3.3 Routing the Input Ports Cables

The ports on the front panel of the Midspan are configured as "Pass Through" ports for all 48 conductors of the RJ-45 connectors. Use Category 5 jumpers cables with a diameter that is less than 0.25 inch in making connections.

\*Using an appropriate bench, connect all the cables to the Midspan as follows:

1. Connect cables to the Data input ports as shown below:



2. Start connecting the cables in groups of six as shown above. For proper wiring, each group should be tied using plastic straps. The cables should be routed via the side path to the Midspan's front side. Every two groups should be tied together to chassis 'ears' as shown above.
3. Repeat the above mentioned procedure for the rest of the cables, thus 24 cables are routed via left/right side path.

\*Midspan cables connection may also be performed by firstly assembling the midspan to the rack by the brackets. In such a case take all necessary precautions to prevent the Midspan from falling down to the floor!

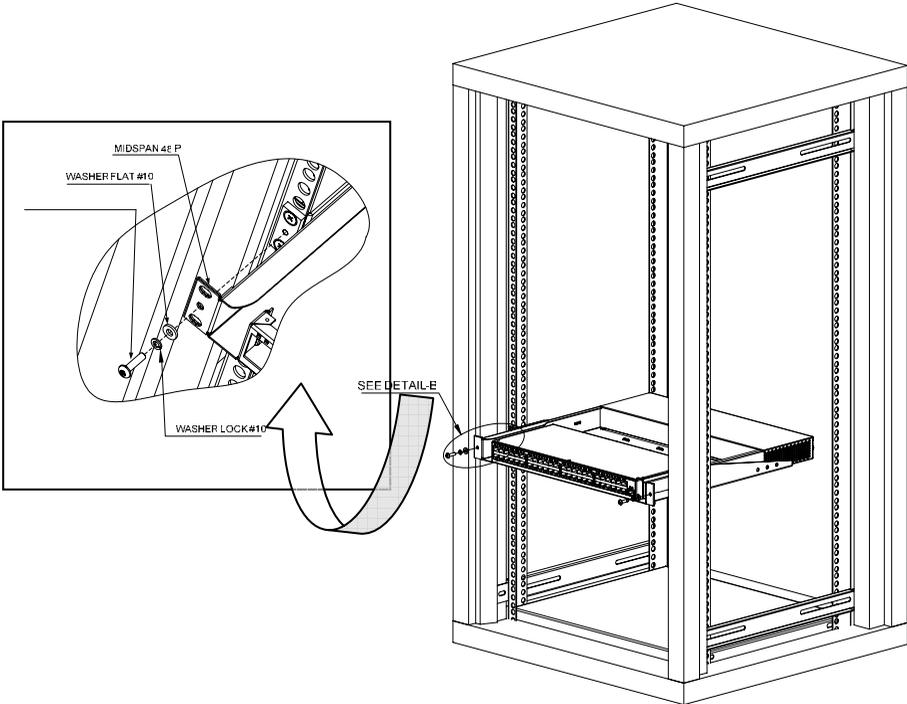


**Figure 3-2: Cable Connections**

4. Upon completion of 48 cables connections, the Midspan should be installed into the rack.

### 3.4 Assembling Midspan to Rack

Assemble the Midspan (including its cables) to the previously installed



brackets as shown below, using two 10-32” screws plus lock washer and flat washer (one on each side of the rack).

**Note:** Verify that the Midspan’s ventilation holes on both sides are not blocked and are free of dust and foreign objects!

## 3.5 Connecting Data Cables

1. Connect the previously routed cables to the switch's output ports.
2. Connect the cables from the IEEE 802.3af ready terminals (PDs) to the corresponding Data & Power ports on the Midspan's front panel.

## 3.6 Connecting Power Cables

When using AC source to power the Midspan, plug in the provided power cord at the rear AC connector.

### Notes:

- ◆ A readily accessible disconnect device shall be incorporated in the building installation wiring.
- ◆ The PD-6548 Midspan should be installed at Restricted Access Location

## 3.7 Powering up

The Power over Ethernet Midspan has no on/off switch. To apply or remove power to the Midspan, insert or remove the power cable from the AC receptacle on the rear panel of the unit.

With power applied, the Midspan powers-up and the internal fan operates; then, the device runs through its power-on self-test (POST), which takes less than 10 seconds. During the POST, all ports are disabled and the indicators illuminate in the following sequence:

1. AC indicator illuminates orange
2. Port indicators and AC power indicator illuminate green.
3. Main AC indicator remains lit green; port indicators are off.

Ports are now enabled for normal operation.

## 3.8 Troubleshooting

### 3.8.1 Preliminary Steps

If you encounter problems, verify that:

1. Power is applied to the Midspan
2. A crossover-type Ethernet cable has not been used
3. The Ethernet cable from the network is connected to the Data input port
4. The Ethernet cable to the PD is connected to the Data & Power output port

### 3.8.2 Troubleshooting Guide

This paragraph provides a symptom and resolution sequence in order to assist in the troubleshooting of minor operating problems. If the steps given do not solve your problem, do not hesitate to call your local dealer for further assistance. Refer to Table 3-1.

**Table 3-1: Troubleshooting Steps**

Symptom	Corrective Steps
<i>Midspan does not power up</i>	<ol style="list-style-type: none"> <li>1. Verify that a known-good power cord is used.</li> <li>2. Verify that the voltage at the power inlet is between 100 and 240 Vac.</li> <li>3. Remove and re-apply power to the device and check the indicators during power up sequence as described in Para. 3.7.</li> </ol>
<i>A port indicator is not lit and the corresponding PD does not operate.</i>	<ol style="list-style-type: none"> <li>1. The Midspan did not detect a PD and therefore the port is not enabled.</li> <li>2. Verify that the PD is designed for Power over Ethernet operation.</li> <li>3. Verify that you are using a standard Category 5/5e/6, straight-wired cable, with four pairs.</li> <li>4. If an external power splitter is in use, replace it with a known-good splitter.</li> <li>5. Verify that the PD is connected to the Data &amp; Power output port.</li> <li>6. Try to reconnect the same PD to a different port on the same or into another Midspan. If it works, there is probably a faulty output port or RJ-45 connection.</li> <li>7. Verify that port shutdown command was not issued via the Web management.</li> </ol>

**Table 3-1: Troubleshooting Steps**

Symptom	Corrective Steps
<i>AC indicator lit orange</i>	Power-on self-test failed: the Midspan detected an internal fault. In this case, contact your local dealer.
<i>Midspan repeatedly shutdown for few minutes and then starts</i>	Verify that the ventilation holes are not blocked.
<i>The end device operates, but there is no data link.</i>	<ol style="list-style-type: none"> <li>1. Verify that the port indicator on the front panel is continuously lit.</li> <li>2. If an external power splitter is in use, replace it with a known-good splitter.</li> <li>3. Verify that for this link, you are using standard UTP/FTP Category 5 straight (non-crossover) cabling, with all four pairs. Check that the link is 100 m or less.</li> <li>4. Try to re-connect the same end device into a different port on the same unit or into another Midspan – if it works, there is probably a faulty input/output port, or RJ-45 connection.</li> </ol>
Midspan port indicator is blinking at a 1 sec. rate	<p>This is a safe condition. The blinking green indication is due to:</p> <ol style="list-style-type: none"> <li>1. A device, not compliant to IEEE 802.3af, was detected.</li> <li>2. Terminals 4/5 and 7/8 are shorted together.</li> <li>3. Forced external power fed into the port.</li> </ol> <p>During these conditions, port power is disconnected.</p>
Midspan port indicator is blinking at a 0.5 sec. rate	<p>This is a safe condition. The blinking green indication is due to a power management event.</p> <p>In such event the corresponding port to the indicator, requires power that exceeds power budget capability of the Midspan. During these conditions, port power is disconnected.</p> <p>A port will operate when total power consumption of the Midspan decreases.</p> <p>try to connect the PD to another Midspan to verify that the PD is valid.</p>

## 3.9 Technical Specifications

### 3.9.1 *Physical Specifications*

**Height:** 1U 44mm, 1.75"

**Width:** standard 19" Rack mount 438mm, 17.2"

**Depth:** 460mm, 18.1"

**Weight:** 7.5 Kg, 15 lb.

#### **Temperature**

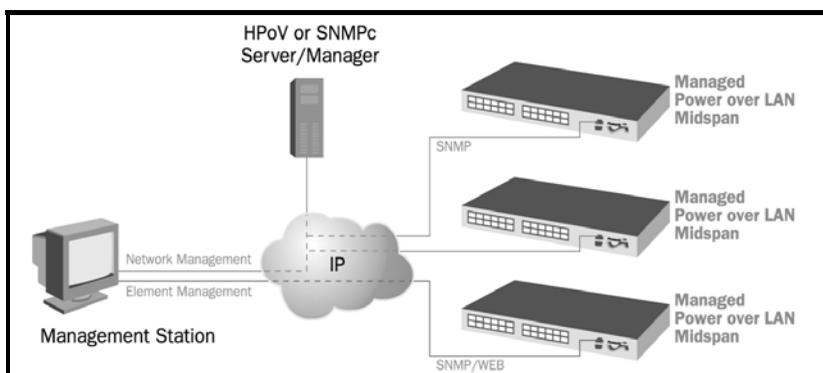
- Operating 0 to 40 °C (32 to 122 °F)

- Storage -20 to 70 °C (-4 to 158 °F)

**Humidity** 10 to 90% (non-condensing)

## 4 Remote Web Management

Remote Web Management is an optional feature, for monitoring and control of the device. For further details, refer to PowerDsine's PowerView, Power over Ethernet Web Manager User Guide. PowerView manages Midspans via an Web Manager or via a remote Network Management station, using Java applets. The system provides direct on-line power supervision, configuration, monitoring, diagnostics and control of PowerDsine products, via their SNMP agents. PowerDsine PowerView allows monitoring and controlling at Network and Element levels, as shown in Figure 4-1:



**Figure 4-1: Management Deployment**

PowerDsine PowerView provides a number of unique features for PoL Midspan management:

- Web-based application for remote management of Power over Ethernet devices
- Web management capabilities for network element management
- Configuration using graphical representations of remote device
- Real time monitoring with visual status indicators and alarms
- Real time power parameters
- Optional DHCP enabled-client
- Runs on a PC platform with Windows graphic user interface (GUI).



*Covered under U.S patent S/N 6,473,608 and equivalent worldwide*

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