



# Cisco 6260 Power Entry Module FRU Installation and Replacement Notes

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**Product Number: 6260-1-PEM-DC=**

This document provides the features and procedures for installing and removing the power entry module (PEM) in the Cisco 6260 chassis. The PEM is a field-replaceable unit (FRU).



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**Only trained and qualified personnel should be allowed to install, replace, or service this equipment.**

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# Introduction

The Cisco 6260 needs only one active PEM to operate; if two PEMs are installed, the second PEM serves as a hot backup to the first PEM.

The PEMs reside at the bottom of the chassis, and they are installed and accessed from the front. Each PEM is held in place by the overhanging lip of the fan tray above it. You must remove the fan tray before you can remove the PEM.

In a system with two PEMs, you can remove and replace each individual PEM while the system continues to operate. However, a system with a single PEM must be powered down before you remove the PEM.

**Note**

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To completely turn off a Cisco 6260 that has two PEMs, you must flip the circuit breakers on *both* PEMs to 0 (off).

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## PEM Overview

The Cisco 6260 system is equipped with two  $-48/-60\text{V}$  PEMs, which distribute DC power within the chassis. Each PEM should be connected to a single DC power source. For full power redundancy, two PEMs must be installed in the chassis, and the two PEMs must be connected to two separate DC power sources.

**Note**

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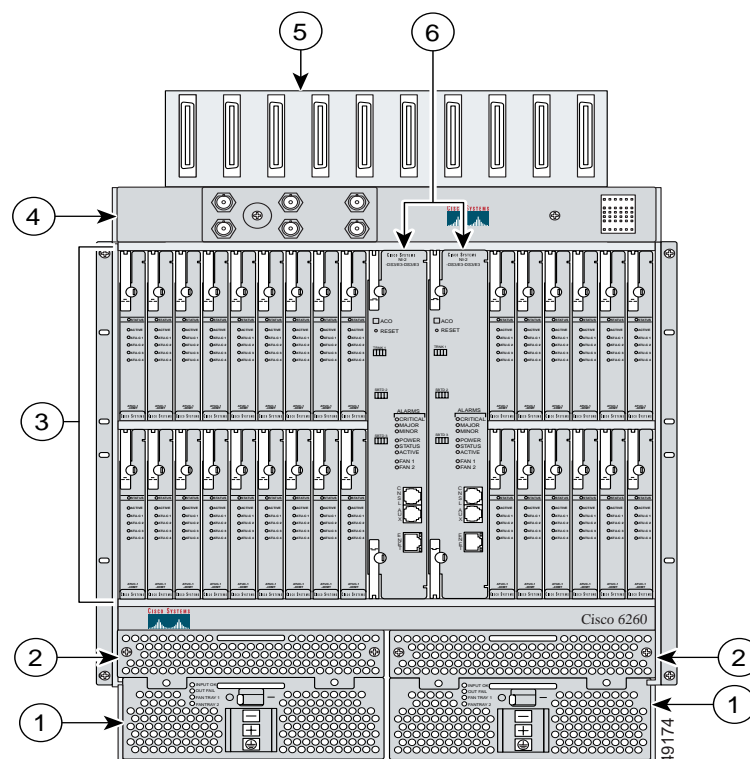
The Cisco 6260 can be ordered with only one PEM installed, and one blank faceplate installed in the place of a second PEM.

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DC power ( $-48\text{V}$ ) enters the chassis through the terminal blocks on the front of each PEM.

Figure 1 shows the location of the PEM in the Cisco 6260 chassis.

**Figure 1** PEM Location in the Cisco 6260 Chassis



The following fixtures are present on the front of the PEM:

- Four LEDs showing the status of the PEM and fan trays, as described in Table 1.

**Table 1** PEM LEDs

LED	Color	Meaning
Input OK	Green	–48V power is available to the chassis.
Out fail	Red	The PEM is not distributing power to the chassis.
Fan Tray 1	Green	The fans in this tray are operating normally.
	Red	One or more fans in this tray have failed. Replace the fan tray.
Fan Tray 2	Green	The fans in this tray are operating normally.
	Red	One or more fans in this tray have failed. Replace the fan tray.

- Two-position circuit breaker—the positions are Off (0) and On (1).
- Extraction handle
- DC power terminal blocks

Figure 2 shows a close-up of the PEM faceplate.

Figure 2 PEM Faceplate

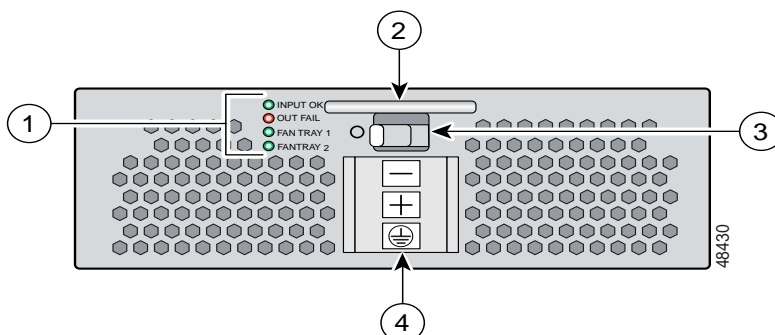


Table 2 lists the specifications for the PEM.

Table 2 PEM Specifications

Specification	PEM
Dimensions	Height: 2.45 in. (6.22 cm) Depth: 10.86 in. (30.48cm) Width: 7.96 in. (20.22 cm)
Weight	5.85 lb (2.65 kg)
Power consumption	50.159W
Minimum software and network management requirement	Cisco IOS—Release 12.0(5)DA CDM <sup>1</sup> —Release 3.0

1. CDM = Cisco DSL Manager

## Installation Prerequisites

This section describes a list of parts and tools that are needed to install and remove the PEM.

### Part and Tool Requirements

To install or remove the PEM, you need the following parts and tools:

- PEM.
- Necessary equipment for ESD protection—Required whenever you handle Cisco DSLAM equipment, which includes the chassis, modules, and cards.
- No. 1 Phillips-head or flat-head screwdriver.
- 6 AWG to 10 AWG (6 AWG preferred) multistrand copper wire for power and grounding connections (optional for DC power). The grounding wire must be no smaller than 10 AWG, and it must be equal to or larger in size than the power leads. The actual wire diameter and length depend on your system location and the installation environment.

- Wire stripping tool. Use a tool that does not nick the internal wire.
- Metric measuring tape or ruler.
- Marking pen.

## General Safety Precautions and Maintenance Guidelines

This section describes the following areas:

- General Safety Precautions, page 5
- General Maintenance Guidelines, page 8
- Preventing Electrostatic Discharge Damage, page 9
- Hot Swapping Modules, page 9

### General Safety Precautions

Before working on the equipment, be aware of standard safety guidelines and the hazards involved in working with electrical circuitry to prevent accidents. Adhere to the following cautions and warnings and those throughout the guide for safe and hazard-free installation.



**Note**

To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information for the Cisco 6260 System* document that accompanied this product.



**Caution**

Before you start the installation procedures, read the entire document for important information and safety warnings.



**Caution**

Proper ESD protection is required whenever you handle Cisco digital subscriber line access multiplexer (DSLAM) equipment. Installation and maintenance personnel should be properly grounded using ground straps to eliminate the risk of ESD damage to the equipment. Modules are subject to ESD damage whenever they are removed from the chassis.



**Caution**

If fuses are already installed in the fuse and alarm panel, remove them. You can replace the fuses after the system is installed. Do not power up the system while you install and connect the system.



**Caution**

If the power connections are improperly connected and power is applied while the cards are installed, the cards and chassis could be damaged.



Caution

It is important that the chassis cooling fans run continuously while the system is powered.



Caution

Any card that is only partially connected to the Cisco 6260 chassis can disrupt system operation.



Warning

This warning symbol means *danger*. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents.



Warning

Only trained and qualified personnel should be allowed to install, replace, or service this equipment.



Warning

*Never* attempt to lift the chassis with the handles on the power supplies or the switching modules. These handles are not designed to support the weight of the chassis. Using them to lift or support the chassis can result in severe damage to the equipment and serious bodily injury.



Warning

Before opening the chassis, disconnect the telephone-network cables to avoid contact with telephone-network voltages.



Warning

Use copper conductors only.



Warning

A readily accessible two-poled disconnect device must be incorporated in the fixed wiring.














Warning

Do not reach into a vacant slot or chassis while you install or remove a card, a module, or a fan. Exposed circuitry could constitute an energy hazard.



Warning

Blank faceplates and cover panels serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place.

-  **Warning** Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.
-  **Warning** When installing the unit, the ground connection must always be made first and disconnected last.
-  **Warning** This equipment needs to be grounded. Use a green and yellow 12 to 14 AWG ground wire to connect the host to earth ground during normal use.
-  **Warning** Read the installation instructions before you connect the system to its power source.
-  **Warning** Do not work on the system or connect or disconnect cables during periods of lightning activity.
-  **Warning** Use caution when installing or modifying telephone lines.
-  **Warning** Hold the PEM by the sheet-metal carrier (top and front) only. Internal components may be hot.
-  **Warning** Before working on a system that has an on/off switch, turn OFF the power and unplug the power cord.
-  **Warning** The power supply circuitry for the equipment can constitute an energy hazard. Before you install or replace the equipment, remove all jewelry (including rings, necklaces, and watches). Metal objects can come into contact with exposed power supply wiring or circuitry inside the DSLAM equipment. This could cause the metal objects to heat up and cause serious burns or weld the metal object to the equipment.
-  **Warning** Before working on a chassis or working near power supplies, unplug the power cord on AC units; disconnect the power at the circuit breaker on DC units.
-  **Warning** Ultimate disposal of this product should be handled according to all national laws and regulations.



Warning

Connect the unit only to a DC power source that complies with the Safety Extra-Low Voltage (SELV) requirements in IEC 60950 based safety standards.



Warning

This equipment is to be installed and maintained by service personnel only as defined by AS/NZS 3260 Clause 1.2.14.3 Service Personnel.



Warning

This product requires short-circuit (overcurrent) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations.



Warning

The telecommunications lines must be disconnected 1) before unplugging the main power connector or 2) while the housing is open.



Warning

Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.



Warning

Do not use a telephone to report a gas leak in the vicinity of the leak.



Warning

Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electric shock from lightning.



Warning

Do not use this product near water; for example, near a bath tub, wash bowl, kitchen sink or laundry tub, in a wet basement, or near a swimming pool.



Warning

Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.



Warning

During line card installation, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself.

## General Maintenance Guidelines

This section covers the following topics:

- Installation and Replacement Suggestions, page 9
- Hot Swapping Modules, page 9



## Installation and Replacement Suggestions

The following examples list recommended installation and replacement practices for the Cisco 6260 system modules.



Caution

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Any module that is only partially connected to the Cisco 6260 backplane can disrupt system operation.

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- Do not force the module into its slot. This action can damage the pins on the backplane if they are not aligned properly with the module.
- Ensure that the module is straight and not at an angle when you install the module in the slot. Installing the module at an angle can damage the module. Use the guide rails to install the module correctly.

## Hot Swapping Modules

The PEM is a FRU and is hot swappable. However, when a PEM is installed in a single-PEM configuration, it is not hot swappable and will interrupt the service for the entire system when it is removed.

If two PEMs are installed (to provide backup power redundancy), then a single PEM at a time becomes hot swappable. In other words, if two PEMs are installed, then a single PEM can be removed without interrupting service to the entire system.



Caution

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The PEM must be installed and removed by a trained technician only.

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## Preventing Electrostatic Discharge Damage

Proper ESD protection is required whenever you handle Cisco equipment. ESD damage, which can occur when electronic cards or components are improperly handled, results in complete or intermittent failures. Use an antistatic strap during handling.

Follow these guidelines to prevent ESD damage:

- Always use an ESD wrist or ankle strap and ensure that it makes good skin contact.
- Connect the equipment end of the strap to the ESD jack on the front left side of the chassis.
- When you install a component, use available ejector levers or captive installation screws to properly seat the bus connectors in the backplane or midplane. These devices prevent accidental removal, provide proper grounding for the system, and help to ensure that bus connectors are properly seated.
- When you remove a component, use available ejector levers or captive installation screws to release the bus connectors from the backplane or midplane.

- Avoid contact between the printed circuit boards and clothing. The wrist strap protects components from ESD voltages on the body only; ESD voltages on clothing can still cause damage.



**Tips**

Use the ESD grounding jack on the fan module for all maintenance except when you are removing the fan module. Use the ESD grounding jack on the PEM when you are removing the fan module.

## Removing and Installing the PEM

The following sections describe how to remove or install a PEM.



**Caution**

Proper ESD protection is required whenever you handle Cisco DSLAM equipment. Installation and maintenance personnel should be properly grounded using ground straps to eliminate the risk of ESD damage to the equipment. Modules are subject to ESD damage whenever they are removed from the chassis.



**Caution**

To maintain agency compliance requirements and meet EMI emission standards, if only one PEM is installed in the Cisco 6260 chassis, a blank faceplate must be installed in place of a second PEM.

## Removing the PEM

Complete the following steps to remove the PEM from the Cisco 6260 chassis:

- Step 1** Connect a grounding strap to the ESD grounding jack that is located on the Cisco 6260 chassis.
- Step 2** Turn the circuit breaker on the PEM to the OFF (0) position.
- Step 3** Remove the fuses from the fuse and alarm panel.
- Step 4** Disconnect the wires coming from the fuse and alarm panel to the PEM.
- Step 5** Disconnect the grounding wire from the PEM.
- Step 6** If a fan tray is present directly above the PEM you are wishing to remove, use the following steps to remove the fan tray first:
  - a. Use a Phillips-head screwdriver to remove the bezel that partially covers the fan trays.
  - b. Use a Phillips-head screwdriver to loosen the screws that hold the fan tray in place.
  - c. Grasp the fan tray by the handle and pull it away from the chassis. If the fans are running, you will hear them slow down as the tray disengages from its power connector. Wait for the fans to stop before completely removing the tray.

- Step 7** Use a flat-head or Phillips-head screwdriver to unscrew the two screws and prepare to disconnect the PEM from the Cisco 6260 chassis.
- Step 8** Hold the extraction handle on the front of the module and carefully slide the module out of the slot. See the “Installing the PEM” section on page 11 for PEM installation procedures.
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## Installing the PEM

Complete the following steps to install or replace the PEM in the Cisco 6260 chassis:



**Note** Connect each Cisco 6260 PEM to a separate fuse. Do not power the components in the rack by chaining them together.

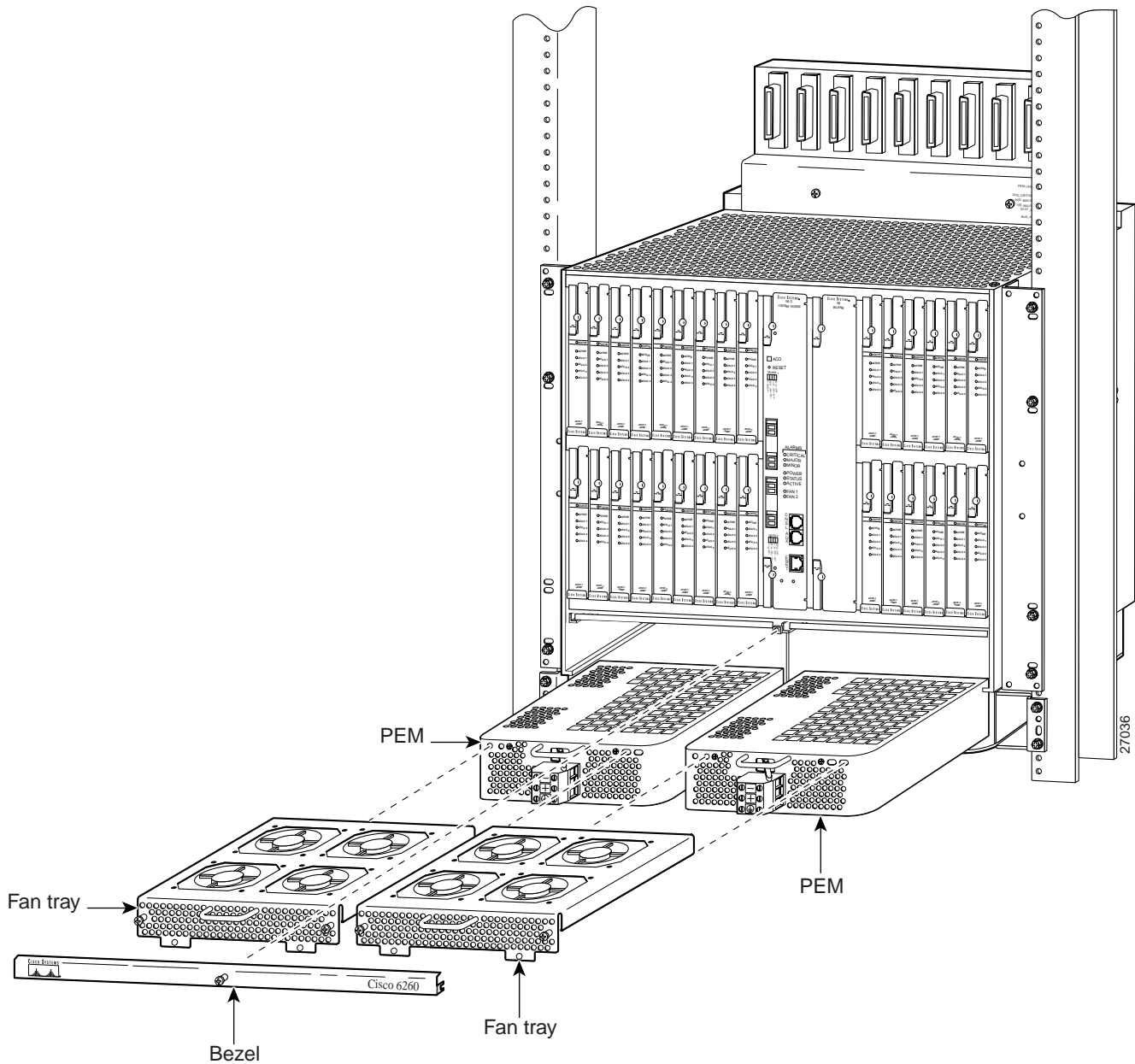
Refer to the *Cisco 6260 Hardware Installation Guide* for the calculation tables that are necessary to determine the minimum fuse rating for each component that is wired to the fuse and alarm panel. Refer to the power rating label on the back of the Cisco 6260 to determine the maximum fuse rating.

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- Step 1** Connect a grounding strap to the ESD grounding jack that is located on the Cisco 6260 chassis.
- Step 2** Verify that the circuit breaker on the PEM is turned to the OFF (0) position, and that the PEM is disconnected from the fuse and alarm panel.
- Step 3** Verify that the fan tray above the PEM you wish to install is removed.
- Step 4** Horizontally align the module edge with the module guides at the right and left of the slot in the Cisco 6260.

Figure 3 shows the PEM installation.

Figure 3 PEM Installation



- Step 5** Hold the extraction handle on the front of the module and gently apply pressure while carefully pushing the module into the slot.



**Note** Forcefully inserting the PEM in the slot could cause damage to the EMI gasket located on the top of the faceplate.

- Step 6** Insert the fan tray into the compartment above the PEM. Make sure that the pins in the lower lip of the fan tray's front panel engage with the holes in the PEM below.

- Step 7** Press the fan tray firmly into its slot to ensure that the power connectors mate.
- Step 8** Use a flat-head or Phillips-head screwdriver to attach the two screws to the Cisco 6260 chassis.
- Step 9** Replace the bezel that covers the air filters.
- Step 10** Use a Phillips-head screwdriver to tighten the screws on the bezel and on the fan tray.

**Warning**

**When you are installing the unit, the ground connection must always be made first and disconnected last.**

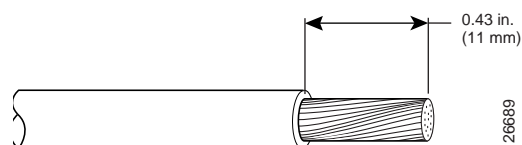
- Step 11** Prepare the wire for the Cisco 6260 power and grounding connections, as necessary.
- Measure enough wire (6 to 10 AWG multistrand copper wire) to connect each of the PEM power connections to the fuse and alarm panel, as well as enough to connect the grounding receptacle on the PEM terminal block to the grounding connection at the DC power source.

**Warning**

**Before connecting or disconnecting ground or power wires to the chassis, ensure that power is removed from the DC circuit. To ensure that all power is OFF, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position. Use a voltmeter to test for 0 (zero) voltage at the power terminals on the chassis.**

- Cut the ends of the power and ground wires so that the ends are straight, not slanted.
- Measure 0.43 inch (11 mm) up from the end of each power and ground wire and place a mark at that point. These are the wire ends that will be connected to the Cisco 6260.
- Use the wire stripping tool to remove 0.43 inch (11 mm) of the covering from both ends of each wire. Trim the end of the covering so that it is straight, as shown in Figure 4, not slanted.

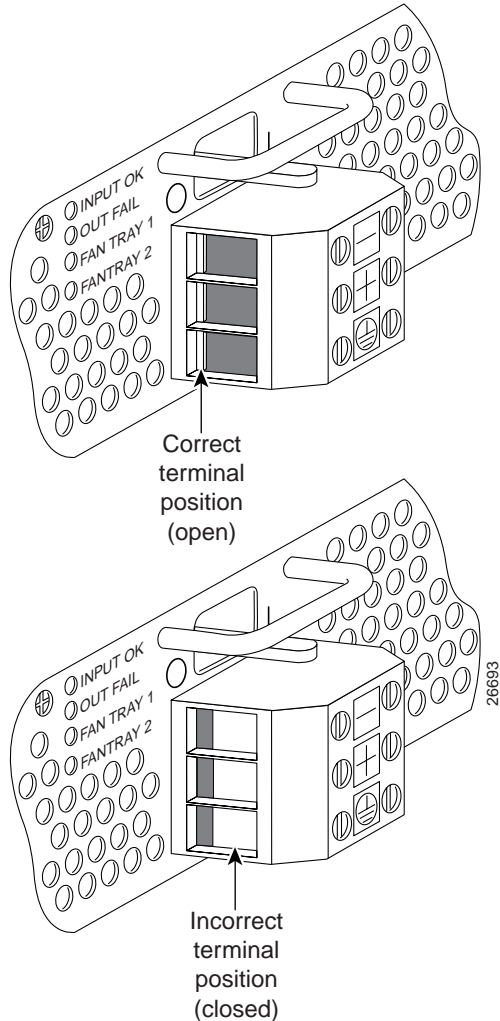
**Figure 4** Strip and Square Off Power and Ground Wires

**Warning**

**Remove the covering from exactly the specified length of each power wire. If you strip too much of the covering, exposed wire protruding from the terminal block will create an electrical hazard. If you strip too little of the covering, the wire may not make a good contact with the terminal, or it may not be held securely in place in the terminal block.**

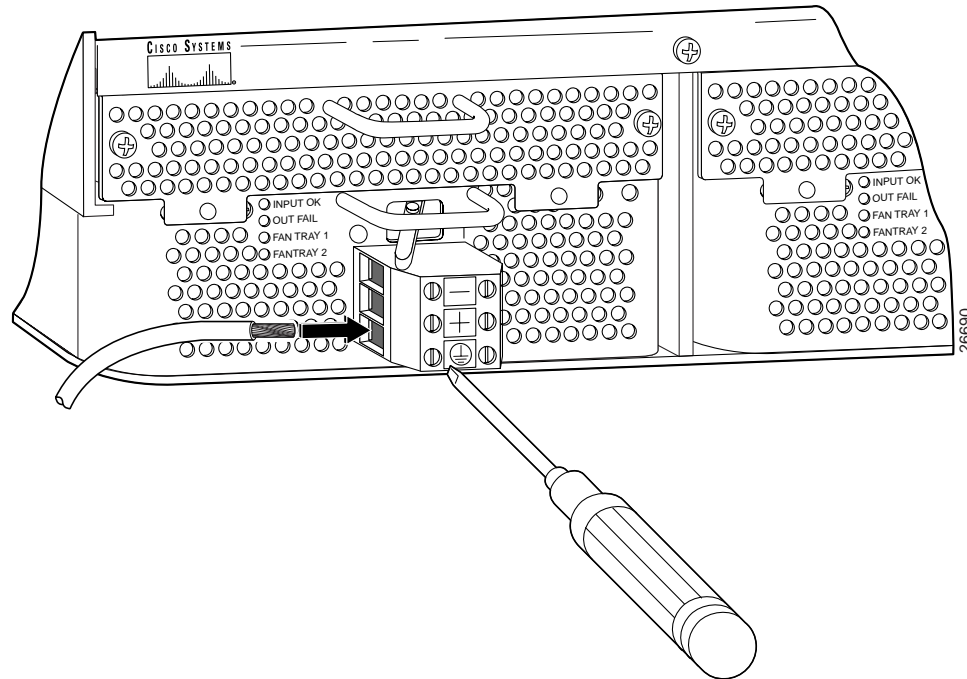
- Step 12** Use a flat-head screwdriver to turn all three screws on the terminal block counterclockwise to open the terminal connectors, + (positive), – (negative), and ground. This step ensures that the correct opening is presented for the wires. See Figure 5.

**Figure 5** Positioning the Power and Ground Terminals to Accept Wires



- Step 13** Insert the end of the grounding wire into the grounding receptacle, which is the bottom receptacle in the terminal block on the PEM (see Figure 6). The stripped part of the wire must be fully inserted into the terminal block, so that no bare wire is exposed.
- Step 14** Ensure that no wire strands are left outside the connector.
- Step 15** Use the screwdriver to tighten the ground screw in the terminal block to a torque of 1.5 to 1.8 newton meters (13.28 to 15.93 inch-pounds). (Tighten in a clockwise direction.) Pull on the wire to ensure that it is held firmly in place.
- Step 16** Make sure that the other end of the grounding wire is connected to ground at the DC power source.
- Step 17** If you are connecting two power sources to the Cisco 6260 system, repeat Step 11 through Step 15 for the second PEM.

**Figure 6** Insert Grounding Wire into Grounding Receptacle.

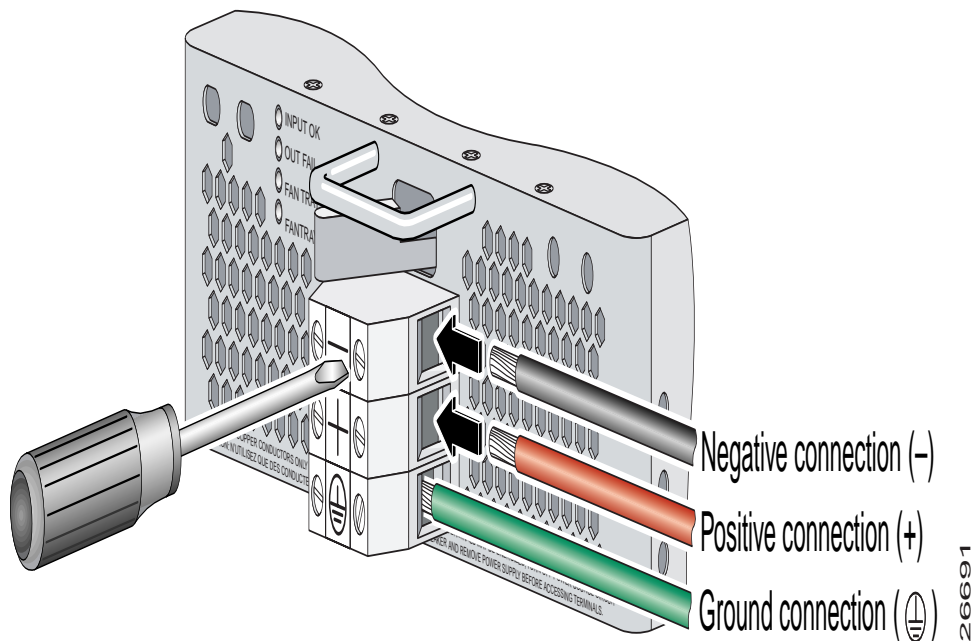


**Warning**

Only a DC power source that is isolated from the AC main power source with reinforced insulation, and that complies with the other safety extra-low voltage (SELV) requirements in UL1950, CSA 950 3rd Edition, EN 60950, and IEC950, can be connected to a Cisco 6260 system. This requirement ensures that in a catastrophic power source fault condition, hazardous voltages are not present on power terminals and connectors.

- Step 18** After connecting the battery return wire to the external power source, insert the other end into the receptacle labeled + (positive) on the terminal block on the first PEM. The stripped part of the wire must be fully inserted, so that no bare wire is exposed. Use the screwdriver to tighten the terminal screw to a torque of 1.5 to 1.8 newton meters (13.28 to 15.93 inch-pounds). (Tighten the screws clockwise.)

Figure 7 Connecting Power to the Terminal Block



- Step 19** After connecting the power lead to the external –48V power source, insert the other end of the wire into the receptacle labeled – (negative) on the terminal block of the first PEM. The stripped part of the wire must be fully inserted, so that no bare wire is exposed. Use the screwdriver to tighten the terminal screw to a torque of 1.5 to 1.8 newton meters (13.28 to 15.93 inch-pounds). (Tighten the screws clockwise.)
- Step 20** If you are connecting a second power source, repeat Step 18 and Step 19 to wire it to the second PEM.



**Note** Be sure that the chassis is connected to earth ground as described in the *Cisco 6260 Hardware Installation Guide*. The Cisco 6260 requires two or three ground connections, one to the side of the chassis and one to each PEM.

- Step 21** Use a voltmeter to check the voltage at the terminal block. Connect the voltmeter positive contact to the positive (+) terminal on the Cisco 6260 terminal block. Connect the voltmeter negative contact to the negative (–) terminal on the Cisco 6260 terminal block. If the power is wired correctly, you will see a reading of +48V on the voltmeter.
- Step 22** Turn the circuit breaker on the PEM to the ON (1) position.
- Step 23** Verify that the PEM LED is green. If it is not green, refer to the *Cisco 6260 Hardware Installation Guide* for troubleshooting procedures.



## Standards and Certifications

Table 3 details the PEM standards and certifications.

**Table 3** *PEM Standards and Certifications*

Category	Description
Product Safety	<ul style="list-style-type: none"> <li>• UL 1950, 3rd Edition</li> <li>• EN60950 2nd Edition, Amendments 1, 2, 3, 4, 11</li> <li>• IEC 60950 2nd Edition, Amendments 1, 2, 3, 4</li> <li>• AS/NZS 3260</li> </ul>
EMI	<ul style="list-style-type: none"> <li>• EN 5022/CISPR22</li> <li>• AS/ANS 3458</li> <li>• ICES-003</li> <li>• VCCI</li> <li>• BSMI (CNS 13438)</li> </ul>
Immunity	<ul style="list-style-type: none"> <li>• IEC/EN61000-4-2, 3, 4, 5, and 6</li> </ul>

## Related Documentation

A complete list of all DSL product related documentation is available on the World Wide Web at [http://www.cisco.com/univercd/cc/td/doc/product/dsl\\_prod/index.htm](http://www.cisco.com/univercd/cc/td/doc/product/dsl_prod/index.htm).

## Obtaining Documentation

The following sections provide sources for obtaining documentation from Cisco Systems.

### World Wide Web

You can access the most current Cisco documentation on the World Wide Web at the following sites:

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- <http://www-china.cisco.com>
- <http://www-europe.cisco.com>

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## Technical Assistance Center

The Cisco TAC website is available to all customers who need technical assistance with a Cisco product or technology that is under warranty or covered by a maintenance contract.

### Contacting TAC by Using the Cisco TAC Website

If you have a priority level 3 (P3) or priority level 4 (P4) problem, contact TAC by going to the TAC website:

<http://www.cisco.com/tac>

P3 and P4 level problems are defined as follows:

- P3—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.
- P4—You need information or assistance on Cisco product capabilities, product installation, or basic product configuration.

In each of the above cases, use the Cisco TAC website to quickly find answers to your questions.

To register for Cisco.com, go to the following website:

<http://www.cisco.com/register/>

If you cannot resolve your technical issue by using the TAC online resources, Cisco.com registered users can open a case online by using the TAC Case Open tool at the following website:

<http://www.cisco.com/tac/caseopen>

### Contacting TAC by Telephone

If you have a priority level 1 (P1) or priority level 2 (P2) problem, contact TAC by telephone and immediately open a case. To obtain a directory of toll-free numbers for your country, go to the following website:

<http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml>

P1 and P2 level problems are defined as follows:

- P1—Your production network is down, causing a critical impact to business operations if service is not restored quickly. No workaround is available.
- P2—Your production network is severely degraded, affecting significant aspects of your business operations. No workaround is available.

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This document is to be used in conjunction with the documents listed in the “Related Documentation” section.

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