Cisco MDS 9148V-K9 Switch Hardware Installation Guide

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Preface

This preface describes the audience, organization of, and conventions used in the Cisco MDS 9000 Series Configuration Guides. It also provides information on how to obtain related documentation, and contains the following chapters:

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Audience

To use this installation guide, you need to be familiar with electronic circuitry and wiring practices, and preferably be an electronic or electromechanical technician.

Document Conventions

This document uses the following conventions:

Note   Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the manual.

Caution   Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

Warnings use the following conventions:

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. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device. Statement 1071.

Related Documentation

The documentation set for the Cisco MDS 9000 Series Switches includes the following documents.

Release Notes

http://www.cisco.com/c/en/us/support/storage-networking/mds-9000-nx-os-san-os-software/products-release-notes-list.html

Regulatory Compliance and Safety Information

http://www.cisco.com/c/en/us/td/docs/switches/datacenter/mds9000/hw/regulatory/compliance/RCSI.html

Compatibility Information

http://www.cisco.com/c/en/us/support/storage-networking/mds-9000-nx-os-san-os-software/products-device-support-tables-list.html

Installation and Upgrade

http://www.cisco.com/c/en/us/support/storage-networking/mds-9000-nx-os-san-os-software/products-installation-guides-list.html

Configuration

http://www.cisco.com/c/en/us/support/storage-networking/mds-9000-nx-os-san-os-software/products-installation-and-configuration-guides-list.html

CLI

http://www.cisco.com/c/en/us/support/storage-networking/mds-9000-nx-os-san-os-software/products-command-reference-list.html

Troubleshooting and Reference

http://www.cisco.com/c/en/us/support/storage-networking/mds-9000-nx-os-san-os-software/tsd-products-support-troubleshoot-and-alerts.html

To find a document online, use the Cisco MDS NX-OS Documentation Locator at:

http://www.cisco.com/c/en/us/td/docs/storage/san_switches/mds9000/roadmaps/doclocater.html

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, using the Cisco Bug Search Tool (BST), submitting a service request, and gathering additional information, see What's New in Cisco Product Documentation.

To receive new and revised Cisco technical content directly to your desktop, you can subscribe to the What's New in Cisco Product Documentation RSS feed. RSS feeds are a free service.

CHAPTER 2

Overview of Cisco MDS 9148V-K9 Switch

The Cisco MDS 9148V-K9 switch has 48 x 8/16/32/64-Gbps multispeed ports and is a powerful and compact 1-rack unit (1 RU) SAN fabric switch. This switch has the following major features:

- Provides consistent 64-Gbps quality performance for every Fibre Channel port on the switch.

- Provides availability and reliability similar to the previous generations of the Cisco MDS9000 Series switches. Additionally, port channel link members can be distributed across the two 24-port port groups providing increased hardware level high availability.

- Supports twenty four 64-Gbps Fibre Channel ports in the base variant, which can be expanded in increments of 8 ports up to 48 ports. This allows four licence options of 24, 32, 40, and 48 ports.

- Supports enterprise class features, such as Auto Zone, Smart Zoning, Slow Drain Detection and Isolation, Virtual SAN (VSAN) and Inter-VSAN routing (IVR).

- Provides intelligent diagnostics tools such as Inter-Switch Link (ISL) diagnostics, HBA diagnostics with leading HBA vendors, collection of remote transceiver error statistics, protocol decoding, network analysis tools, and integrated Cisco Call Home.

- Supports Virtual Machine Identifier (VMID) that provides visibility into virtual machines that are accessing the storage devices in the fabric.

- Supports HTTP based Cisco NX-API for RPC style on-switch command execution by remote scripts.

- Provides secured hardware that protects the switch from malicious attacks by securing access to critical components such as the bootloader, system image loader, and Joint Test Action Group (JTAG) interface.

This chapter contains the following topics:

Chassis Components

This section describes the different components of the chassis.

Front View

The following figure shows the front view of the switch:

Figure 1: Front View of the Switch
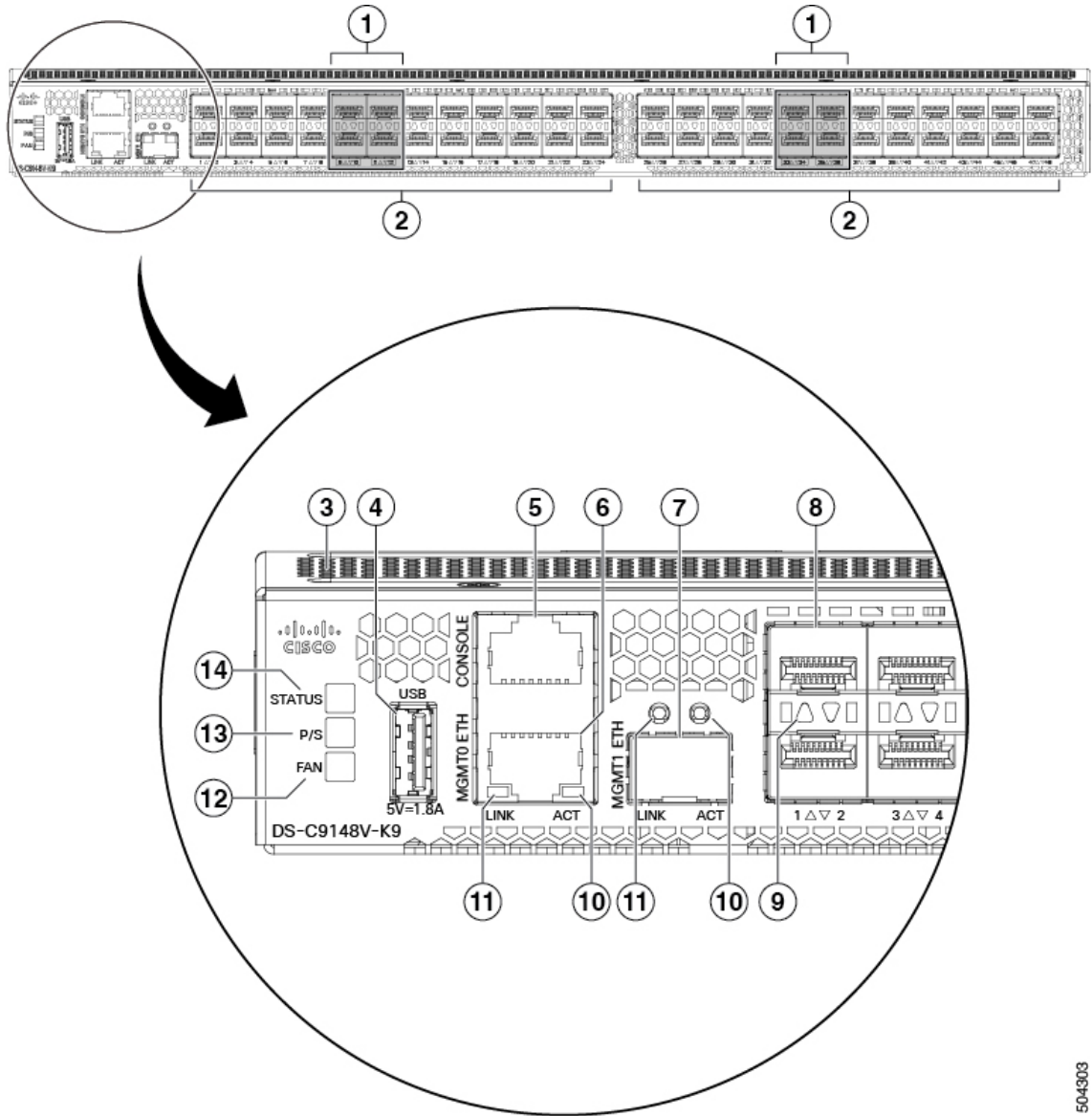
Fibre Channel encryption ports (9-12) and (33-36)		Fixed FC ports (48 x 8/16/32/64 Gbps, pluggable SFP or SFP+ compatible)
Fibre Channel port groups. A port group consists of 24 ports.		FC port status LEDs (48)
Airflow grill	0	Management port packet activity LEDs (2)
Slot0 USB3 port	1	Management port link status LEDs (2)

RS232 serial console port (fixed RJ45 connector)	2	Fan status LED	
mgmt0 Ethernet out of band management port (10/100/1000Base-T, fixed RJ45 connector)	3	Power status LED	
mgmt1 Ethernet out of band analytics port Note: The MGMT1 ETH port is not yet supported.	4	System status LED	

Rear View

The following figure shows the rear view of the switch:

Figure 2: Rear View of the Switch
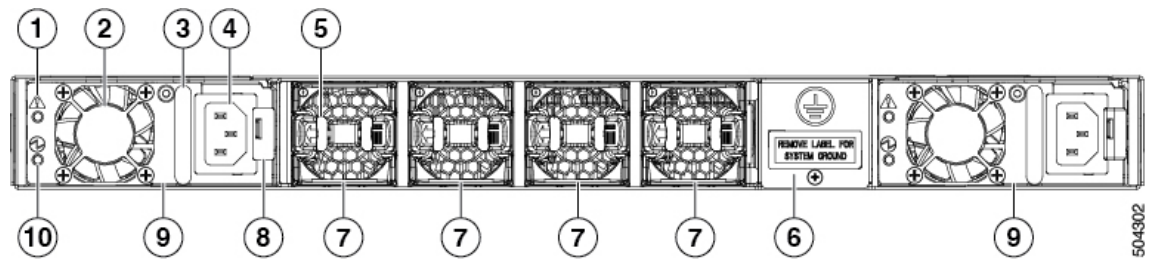
Power supply failure status LED (1 per PSU)	Ground pad
Power supply unit fan (1 per PSU)	Chassis fan modules (4)
Power supply unit handle (1 per PSU)	Power supply unit latch release (1 per PSU)
Unswitched power socket (IEC C14, 1 per PSU)	Power supply units (2)
Chassis fan module release latches (2 per fan module)	Power supply status LED (1 per PSU)

Figure 3: Rear Panel Slot Numbering of Cisco MDS 9148T
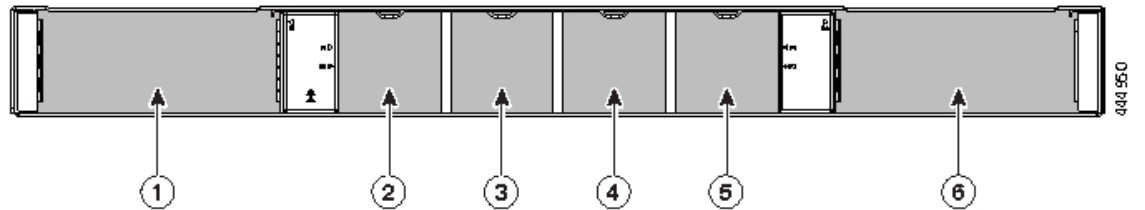
Power supply unit slot 1	Chassis fan module slot 3
Chassis fan module slot 1	Chassis fan module slot 4
Chassis fan module slot 2	Power supply unit slot 2

LEDs

The switch has LEDs on both the front and back of the switch to indicate the status of different system components during bootup tests and online operation. The following tables describe the location of each LED and the meaning of its color:

Table 1: Chassis Activity LEDs for the Switch

Indicator	Function	Color	Status	State
PWR: Power LED (front panel of the chassis)	Chassis Power/Health	Off	Off	Either of the following conditions exists: • The system is not receiving sufficient power from the PSUs. • The operating system is not running.
		Green	Solid On	Both PSUs are installed and operational.
		Red	Solid On	Either of the following conditions exists: • A PSU has failed. • A PSU has been removed.

Indicator	Function	Color	Status	State
STATUS: Status LED (front panel of the chassis)	System Status	Green	Solid On	All diagnostics have passed, Cisco NX-OS is running and the system is operational.
		Orange	Solid On	Any of the following conditions exists: • The system is running bootup diagnostics. • The system is booting. • A minor temperature threshold is exceeded.
		Red	Blinking	Mismatched airflow direction in one of the following modules: • Fan modules—The switch will shut down in 10-15 seconds. • PSUs—The switch will shut down after 10 minutes. • Fan modules and PSUs—The switch will shut down after 10 minutes.
			Solid On	One of the following conditions exists: • A diagnostic test failed or another fault occurred during bootup. • A major temperature threshold is exceeded.
FAN: Fan status (front panel of the chassis)	Fan Health	Green	Solid on	All chassis fan modules are operational.
		Red	Solid on	A chassis fan module has failed.
⊘ PSU Voltage Status LED (faceplate of each PSU)	Voltage Status	Green	Off	No input to the PSU.
			Solid on	PSU output is OK.
			Blinking	PSU output is not OK, but input is OK.

Indicator	Function	Color	Status	State
⚠ PSU Operation Status LED (faceplate of each PSU)	Operation Status	Amber	Off	PSU is operating normally.
			Solid on	One of the following conditions exists in the PSU: Over voltage Over current Over temperature Fan failure.
			Blinking	PSU has a fault, but is still operational.
Unlabeled LED (faceplate of each fan module)	Fan Operation Status	Green	Solid on	The chassis fan module is operating normally.
		Amber	Solid on	The chassis fan in the fan module has failed.

The following table describes the Ethernet port LEDs for the switch.

LED Position	Status	State
Left	Off	There is no link.
	Solid Green	Indicates a physical link.
Right	Solid Amber	There is no link traffic.
	Blinking Amber	Indicates link traffic.
	Off	There is no link.

The following table describes the Fibre Channel port LEDs for the switch.

Status	State
Solid Green	The link is up.
Regular Blinking Green	The link is up and the port beacon is active.
Intermittent Blinking Green	The link is up and traffic is flowing through the port.
Solid Orange	The link is disabled by the software.
Blinking Orange	A fault condition exists.
Off	No link.

Fan Modules

The fan modules have a fixed handle for insertion and removal from the chassis. The switch requires a minimum of two operating fan modules to prevent automatic shutdown. It supports up to four fan modules. This provides redundancy for uninterrupted operation in the event of fan module failure. The switch fan modules are hot-swappable to also allow swapping out of a fan module during operation for uninterrupted operation. During a fan module replacement, the internal airflow through the chassis is changed. If the internal airflow is disrupted for too long, the preset temperature thresholds will be exceeded and the system will automatically shut down to prevent permanent damage.

Figure 4: Fan Module
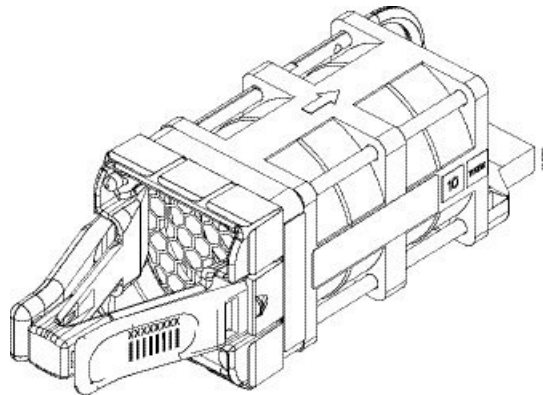
To facilitate different data center cooling configurations of hot or cold aisles and racks, there are two models of fan modules. The first type has airflow with port-side intake and exhaust at the rear of the chassis. The second type has airflow in the opposite direction, that is, rear-chassis intake and port-side exhaust. The airflow direction is denoted on each fan module as follows:

  • Red—Port-side intake airflow

  • Blue—Port-side exhaust airflow

For more information on installing and removing fan modules, see Installing and Removing Fan Modules.

Power Supplies

The switch PSUs have an unswitched power socket, a PSU status LED and a handle for insertion and removal of the PSU from the chassis. The switch requires a minimum of one operating PSU. It supports up to two PSUs. This provides redundancy for uninterrupted operation in the event of PSU or grid failure. The PSUs are hot-swappable to allow swapping out of a PSU during operation for uninterrupted operation. During a PSU replacement, the internal airflow through the chassis is changed. If the internal airflow is disrupted for too long, the preset temperature thresholds will be exceeded and the system will automatically shut down to prevent permanent damage.

Figure 5: 500-W Power Supply
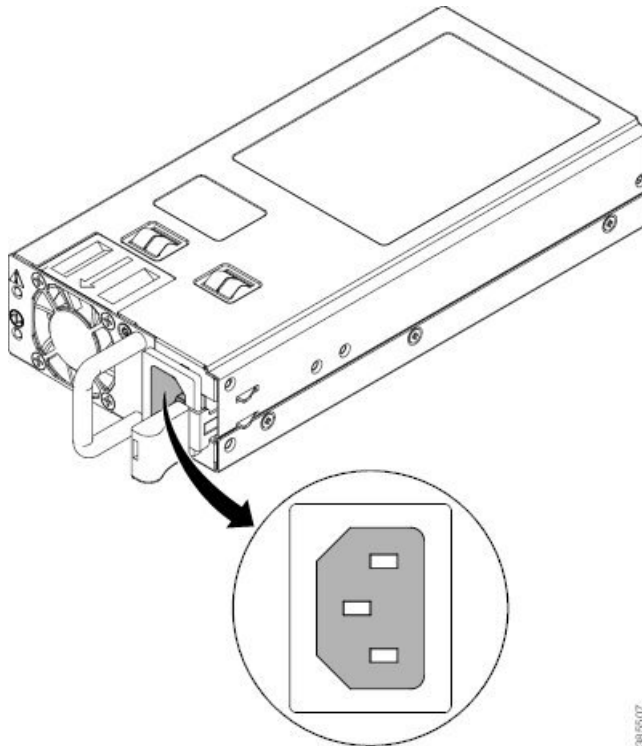
To facilitate different data center cooling configurations of hot or cold aisles and racks, there are two models of PSUs. The first type has airflow with port-side intake and exhaust at the rear of the chassis. The second type has airflow in the opposite direction, that is, rear-chassis intake and port-side exhaust. The airflow direction is denoted on each PSU as follows:

- Red—Port-side intake airflow

- Blue—Port-side exhaust airflow

The switch supports PSUs of only one airflow type at a time. Both PSUs have to be either port-side exhaust, or port-side intake PSUs.

Note The direction of PSU airflow must match the direction of the fan module airflow.

For more information on installing and removing PSUs, see Installing and Removing Power Supply Units.

1200-W Power Supply

The Cisco MDS 9148V-K9 switch supports two hot swappable AC/ HVAC/ HVDC Bidirectional airflow power supply units (PSUs). Each unit has a power receptacle and a status LED on the faceplate, and a handle for inserting and removing the unit from the chassis. The Cisco MDS 9148V-K9 switch requires a minimum of 1 PSU for normal operation and 2 PSUs for normal operation with PSU redundancy. In the event of a PSU or AC supply (in grid redundant mode) failure, the system will continue to run. PSUs are hot swappable and can be individually replaced without shutting down the system. Procedures for installing and removing PSUs are detailed in the Installing and Removing Power Supply Units section.

Figure 6: 1200-W Power Supply
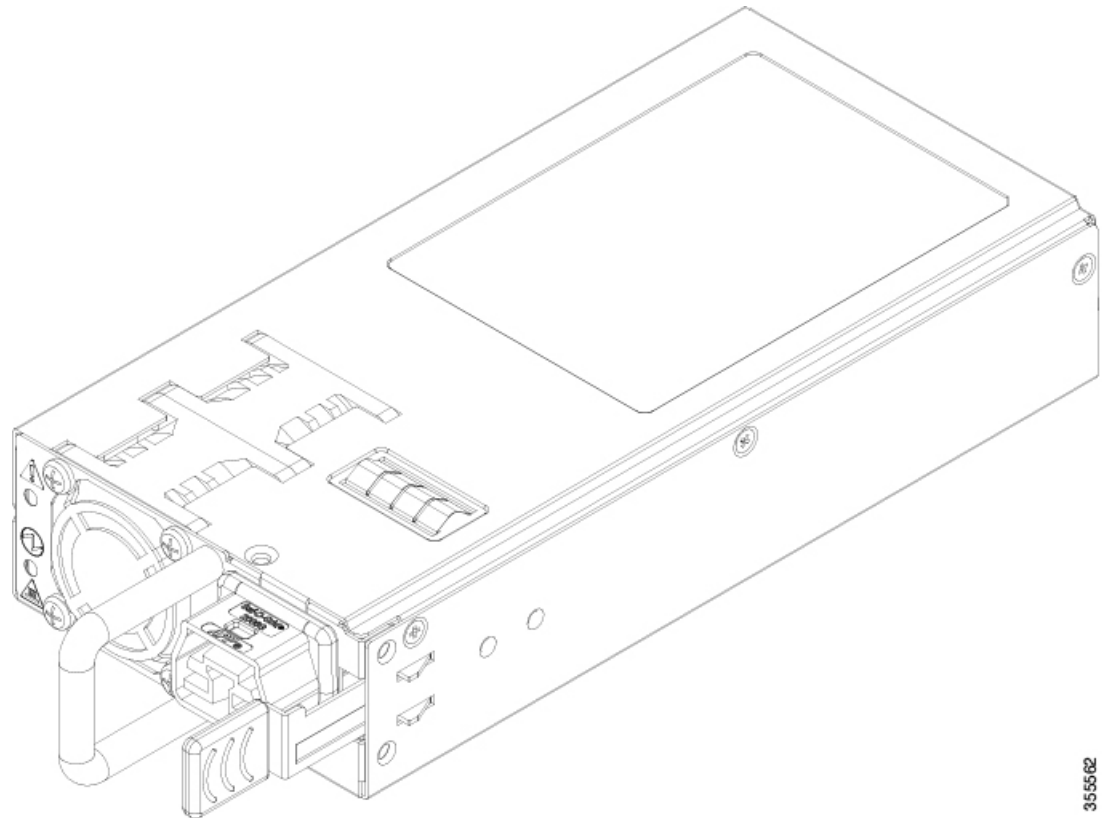
The PSUs support bidirectional airflow (DS-CAC-1200W), port-side exhaust airflow and port-side intake airflow, of fan modules. The PSUs automatically configure themselves to work in port-side exhaust airflow mode if the switch has Blue system fan modules installed. Similarly, the PSU automatically configures itself to work in port-side intake airflow mode if the switch has Red fan modules installed. For more information on the direction of airflow in fan modules, see Fan Modules, on page 11.

Cabinet and Rack Installation

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Cabinet and Rack Requirements

This section provides the Cisco MDS 9000 Series switches requirements for the following types of cabinets and racks in an external ambient air temperature range of 0 to 40°C. If you are selecting an enclosed cabinet, we recommend that you choose one of these thermally validated types:

• Standard perforated cabinets

• Solid-walled cabinets with a roof fan tray (bottom-to-top cooling)

General Requirements for Cabinets and Racks

A cabinet or rack must belong to one of the following types:

• Standard 19-in. four-post EIA cabinet or rack, with mounting posts that conform to English universal hole spacing per section 1 of ANSI/EIA-310-D-1992. See Requirements Specific to Perforated Cabinets and Requirements Specific to Solid-Walled Cabinets.

• Standard two-post telco rack, with mounting posts that conform to English universal hole spacing per section 1 of ANSI/EIA-310-D-1992.

The cabinet or rack must also meet the following requirements:

• The minimum vertical rack space per chassis should be 1 RU, equal to 1.75 in. (4.4 cm).

• The width between the inside edges of the mounting posts must be at least 17.75 in. (45.1 cm). This is the distance between the two front posts of the four-post EIA racks.

• The minimum rack-load ratings per RU are listed in the following table:

Rack Type	
EIA (4 post)	7.5 lb (3.4 kg)
Telco (2 post)	15 lb (6.8 kg)

For four-post EIA cabinets (perforated or solid-walled):

- The distance between the front door and front mounting posts should be a minimum of 3 in. (7.6 cm) to allow for the bend radius of FC port fibre-optic patch cables.

- The distance between the outside face of the front mounting post and the outside face of the back mounting post should be 26 to 32 in. (66 to 81 cm) to allow for installation with the Cisco rack mounting kit.

- The distance between the rear of the chassis and the perforated rear door of the cabinet (required for airflow in the cabinet, if used) should be a minimum of 3.0 in. (7.6 cm).

- No clearance is required between the chassis and the sides of the rack or cabinet (no side airflow).

- The amount of clearance required for interface cables is 3 in. (7.6 cm) minimum and module handles is 1 in. (25 mm) minimum.

Requirements Specific to Perforated Cabinets

In addition to the requirements listed in the General Requirements for Cabinets and Racks section, perforated cabinets with front-to-back airflow must meet the following requirements:

- The front and rear doors must have at least a 60 percent open area perforation pattern, with at least 15 sq. in. (96.7 sq cm) of open area per rack unit of door height.

- We recommend that the roof be perforated with at least 20 percent open area.

- We recommend an open or perforated cabinet floor to enhance cooling but it is not required.

Reference Perforated Cabinet

A perforated cabinet that conforms to the above requirements is available from Rittal Corporation:

```
Rittal Corporation
One Rittal Place
Springfield, OH 45504
Phone: (800) 477-4000
Cabinet P/N: Rittal 9969427
Cabinet description: PS-DK/OEM Cabinet Assembly, 1998 x 600 x 1000 (H x W x D)
(42U)
```

Requirements Specific to Solid-Walled Cabinets

In addition to the requirements listed in the General Requirements for Cabinets and Racks section, solid-walled cabinets must meet the following requirements:

- A roof-mounted fan tray and an air-cooling scheme in which the fan tray pulls air in at the bottom of the cabinet and sends it out from the top, with a minimum airflow of 849.5 m^3/h exiting the cabinet roof through the fan tray, to be available.

- Nonperforated (solid and sealed) front and back doors and side panels to be present so that air travels predictably from bottom to top.

- The overall cabinet depth to be 36 to 42 in. (91.4 to 106.7 cm) to allow the doors to close and to facilitate adequate airflow.

- A minimum of 150 sq. in. (968 sq. cm) of open area to be available at the floor air intake of the cabinet.

- The lowest piece of equipment to be installed at a minimum of 1 RU (1.75 in. or 4.4 cm) above the floor openings to prevent blockage of the floor intake.

Installing the Cisco MDS 9148V-K9 Switch

This chapter describes how to install a Cisco MDS 9148V-K9 switch and its components.

Before you install, operate, or service the system, see the Regulatory Compliance and Safety Information for the Cisco MDS 9000 Family document for important safety information.

⚠️
Warning **This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security.** Statement 1017

⚠️
Warning **Only trained and qualified personnel should be allowed to install, replace, or service this equipment.** Statement 1030

Preinstallation

Cisco MDS 9000 Series Telco and EIA Shelf Bracket

The optional Telco and EIA Shelf Bracket Kit (part number DS-SHELF=) can temporarily or permanently support the switch during installation. After the front rack-mount brackets are securely attached to the rack-mounting rails, the shelf bracket can be removed.

The Telco and EIA Shelf Bracket kit supports the following configurations:

- A two-post Telco rack
- A four-post EIA rack

✎

Note　Telco and EIA Shelf Bracket optional kit is not provided with the switch; to order the kit, contact your switch supplier.

This section describes the procedure for installing a switch in a rack or cabinet using the optional Telco and EIA Shelf Bracket Kit.

Shelf-Installation Guidelines

⚠

Caution　• If the rack is on wheels, ensure that the brakes are engaged or the rack is otherwise stabilized.

• If you are installing this kit in an EIA rack, attach the shelf to all four rack-mounting posts; the EIA posts may not be thick enough to prevent flexing of shelf brackets if only two posts are used.

Before Installing the Shelf Brackets

Before installing the shelf brackets, inspect the contents of your kit. The following table lists the contents of the shelf bracket kit:

Quantity	Part Description
2	Slider brackets
2	Shelf brackets
1	Crossbar
2	10-32 x 3/8-in. Phillips pan-head screws
16	12-24 x 3/4-in. Phillips screws
16	10-24 x 3/4-in. Phillips screws

Required Equipment

You need the following equipment for this installation:

• Number 2 Phillips screwdriver

• Tape measure and level (to ensure that shelf brackets are at level with each other)

Installing the Shelf Bracket Kit into a Four-Post EIA Rack

The following figure shows the installation of the shelf bracket kit into a four-post EIA rack:

Figure 7: Installing the Shelf Bracket Kit into an EIA Rack
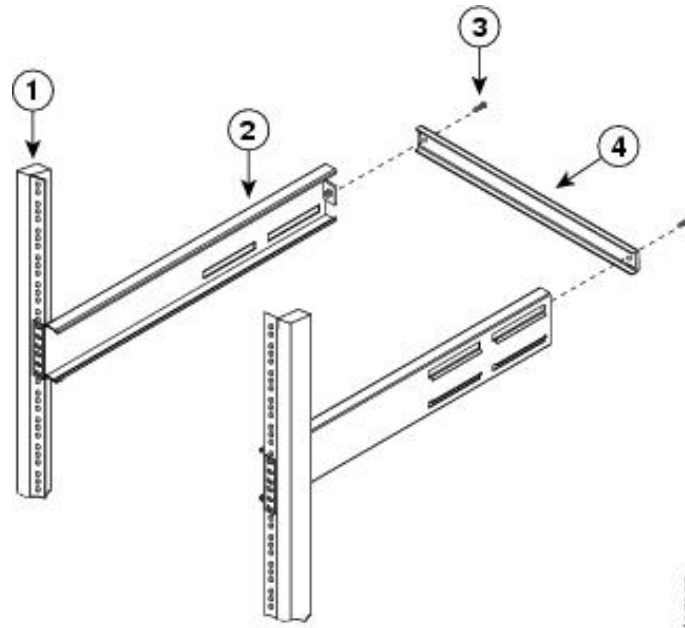
1	Rack-mounting post	4	Crossbar
2	Shelf bracket	5	10-32 screws
3	Slider post		

To install the shelf brackets in an EIA rack, follow these steps:

Step 1 Position a shelf bracket inside the rack-mounting posts, as shown in Installing the Shelf Bracket Kit into an EIA Rack. Align the screw holes at the front of the shelf bracket with the holes in the front rack-mounting post. Then, attach the shelf bracket to the front rack-mounting post using a minimum of four 12-24 or 10-24 screws.

Note The bottom hole of the shelf bracket should align with the bottom hole (the hole immediately above the 1/2 in. spacing) of a rack unit on the rack-mounting post.

Step 2 Repeat Step 1 with the other shelf brackets.

Step 3 Verify that the shelf brackets are at the same height (using the level or tape measure, as desired).

Step 4 Attach the crossbar to the shelf brackets, as shown in Installing the Shelf Bracket Kit into an EIA Rack, using the 10-32 screws.

Step 5 Insert the slider posts into the shelf brackets, as shown in Installing the Shelf Bracket Kit into an EIA Rack. Attach them to the rear rack-mounting posts, using a minimum of four 12-24 or 10-24 screws.

Preinstallation Guidelines

Airflow Considerations

The switch comes with fan modules and power supply units that have either port-side intake or port-side exhaust airflow for cooling the switch. If you are orienting the switch with the FC ports facing a cold aisle, make sure that the switch has a port-side intake fan and power supply modules with red colorings. If you are orienting the switch with the fan and power supply modules facing a cold aisle, make sure that the switch has port-side exhaust fan and power supply units with blue colorings. All fan modules and power-supply modules must have the same direction of airflow.

Connection Guidelines for AC-Powered Systems

To connect to the switch AC power supply units to the site power source, follow these guidelines:

- For power redundancy, each power supply should be connected to a separate power feed (at a minimum, separate branch circuits).

- Circuits should be sized according to local and national codes.

- The AC power receptacles that are used to power the chassis must be the grounding type. The grounding conductors that connect to the receptacles should connect to protective earth ground in the service equipment.

Installation Guidelines

Follow these guidelines when installing the switch:

- Each new switch requires a license. See the Cisco MDS 9000 Family NX-OS Licensing Guide for instructions on installing a license.

- Plan your site configuration and prepare the site before installing the switch.

- Ensure that there is adequate space around the switch to allow for servicing the switch and for adequate airflow. The airflow requirements are listed the Technical Specifications section.

- Ensure that you are positioning the switch in a rack so that it takes in cold air from the cold aisle and exhausts air to the hot aisle. For more information, see the Airflow Considerations section.

- Ensure that the air-conditioning meets the heat dissipation requirements listed in the Technical Specifications section.

- Ensure that the cabinet or rack meets the requirements listed in the Cabinet and Rack Installation section.

- Ensure that the chassis is adequately grounded. If the switch is not mounted in a grounded rack, we recommend that you connect both the system ground on the chassis and the site power ground to an earth ground.

- Ensure that the site power meets the power requirements listed in the Technical Specifications section. If available, you can use an uninterruptible power supply (UPS) to protect against power failures.

⚠️

Caution   Avoid UPS types that use ferro-resonant technology. These UPS types can become unstable with systems such as the Cisco MDS 9000 Series, triggered by substantial current draw fluctuations due to fluctuating data traffic patterns.

- Ensure that electrical circuits are sized according to local and national codes.

  If you are using a 200 or 240 VAC power source in North America, the circuit must be protected by a two-pole circuit breaker.

⚠️

Caution   To prevent loss of input power, ensure that the total maximum loads on the circuits supplying power to the switch are within the electrical current ratings for circuit for wiring and breakers.

Unpacking and Inspecting the Switch

⚠️

Caution   When handling switch components, wear an ESD strap and handle modules using only the carrier edges.

🔎

Tip   Retain the shipping container in case the chassis has to be shipped in the future.

✏️

Note   The switch is thoroughly inspected before shipment. If any damage occurs during transportation, or if any item is missing, contact your customer representative immediately. If you purchased Cisco support through a Cisco reseller, contact the reseller directly. If you purchased support directly from Cisco, contact Cisco Technical Support.

To inspect the shipment, follow these steps:

1. Compare the shipment to the equipment list provided by your customer service representative and verify that you have received all items, including the following:

   - Grounding lug kit

   - Rack-mount kit

   - ESD wrist strap

   - Cables and connectors

   - Optional items, if any, ordered

2. Check for damage and report any discrepancies or damage, to your customer service representative. Have the following information ready:

   - Invoice number of shipper (see packing slip)

• Model and serial number of the damaged unit

• Description of damage

• Effect of damage on the installation

3. Check if all the power supplies and the fan trays have the expected direction of airflow. Port-side intake airflow modules have a red coloring, and port-side exhaust airflow modules have blue coloring. For more information, see thePower Supplies and Fan Modules sections.

Installing the Switch

This section describes how to use the rack mount kit to install the switch into a cabinet or rack that meets the requirements described in the Cabinet and Rack Requirements section.

Installing the Switch in a 4-Post Rack

To install the switch, you must attach the front and rear mounting guides to the switch, install the slider rails on the rear of the rack, slide the switch into the slider rails, and secure the switch to the front of the rack. Typically, the front of the rack is the side that is easiest to access for maintenance.

Before you begin

• Inspect the switch shipment to ensure that you have everything you ordered.

• Make sure that the switch rack-mount kit includes the following parts:

  • Rack-mount brackets (2)

  • Rack-mount guides (2)

  • Slider rails (2)

  • M4 x 0.7 x 8-mm Phillips countersink screws (12)

• The rack is installed and secured to its location.

• Determine how you want to set up your switch:

  1. Determine which end of the chassis is to be located in the cold aisle as follows:

     a. If the switch has port-side intake modules (fan modules and power supply units with red coloring), position the switch so that its ports are in the cold aisle.

     b. If the switch has port-side exhaust modules (fan modules and power supply units with blue coloring), position the switch so that its fan modules and power supply units are in the cold aisle.

  2. Determine which way the chassis should slide in and out of the rack—port-side entry first or rear-side entry first. You might consider whether the front or back of the rack provides better clearance for maneuvering the chassis in and out during installation and servicing. The end that needs to enter the rack first requires the guides and the other end the brackets.

Step 1   Install two rack-mount brackets to the switch as follows:

    a. Position a rack-mount bracket so that three of its screw holes are aligned to the screw holes on the side of the chassis. You can align any three of the holes in the rack-mount bracket to three of the screw holes on the side of the chassis. The holes that you use depend on the requirements of your rack and the amount of clearance. For more information on clearance, see the General Requirements for Cabinets and Racks.

    b. You can install the rack-mount bracket either at the front or rear of the chassis. The choice is determined by which end of the chassis will be inserted into the rack first. If the rear end of the chassis is to be inserted first, then mount the brackets on the front of the chassis, and vice versa.

Figure 8: Installing Rack-Mount Brackets on the Front Side of the Chassis
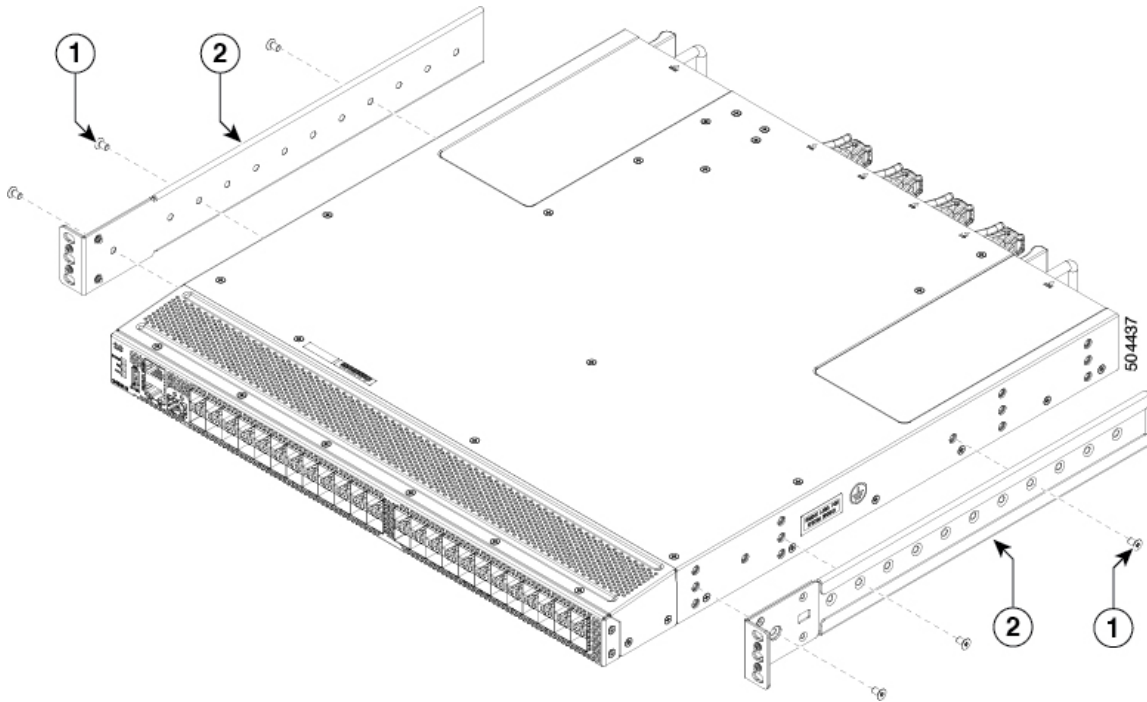
1.	M4 screws	2.	Rack-mount

    c. Secure the rack-mount bracket to the chassis using the three M4 screws and tighten each screw to 12 in-lb (1.36 N·m) of torque.

    d. Repeat Step 1 for the other rack-mount bracket on the other side of the switch, and be sure to position it in the same distance from the front of the switch.

Step 2   If you are installing the chassis into an ungrounded rack, you must attach a customer-supplied grounding wire to the chassis. However, if you are installing the chassis into a grounded rack, you can skip this step.

Step 3   Install the slider rails into the rack or cabinet, as follows:

    a. Determine which two posts of the rack or cabinet you should use for the slider rails. Of the four vertical posts in the rack or cabinet, two will be used for the rack-mount brackets, and the other two posts will have the slider rails.

b. Position a slider rail at the desired level side of the rack and use two 12-24 screws or two 10-32 screws, depending on the rack thread type, to attach the slider rail to the rack. Tighten the 12-24 screws to 30 in-lb (3.39 N·m) of torque, or tighten the 10-32 screws to 20 in-lb (2.26 N·m) of torque.

c. Repeat Step 2 to attach the other slider rail to the other side of the rack.

To make sure that the slider rails are at the same level, you should use a level tool or tape measure, or carefully count the screw holes in the vertical mounting posts.

Step 4 Insert the switch into the rack and attach it as follows:
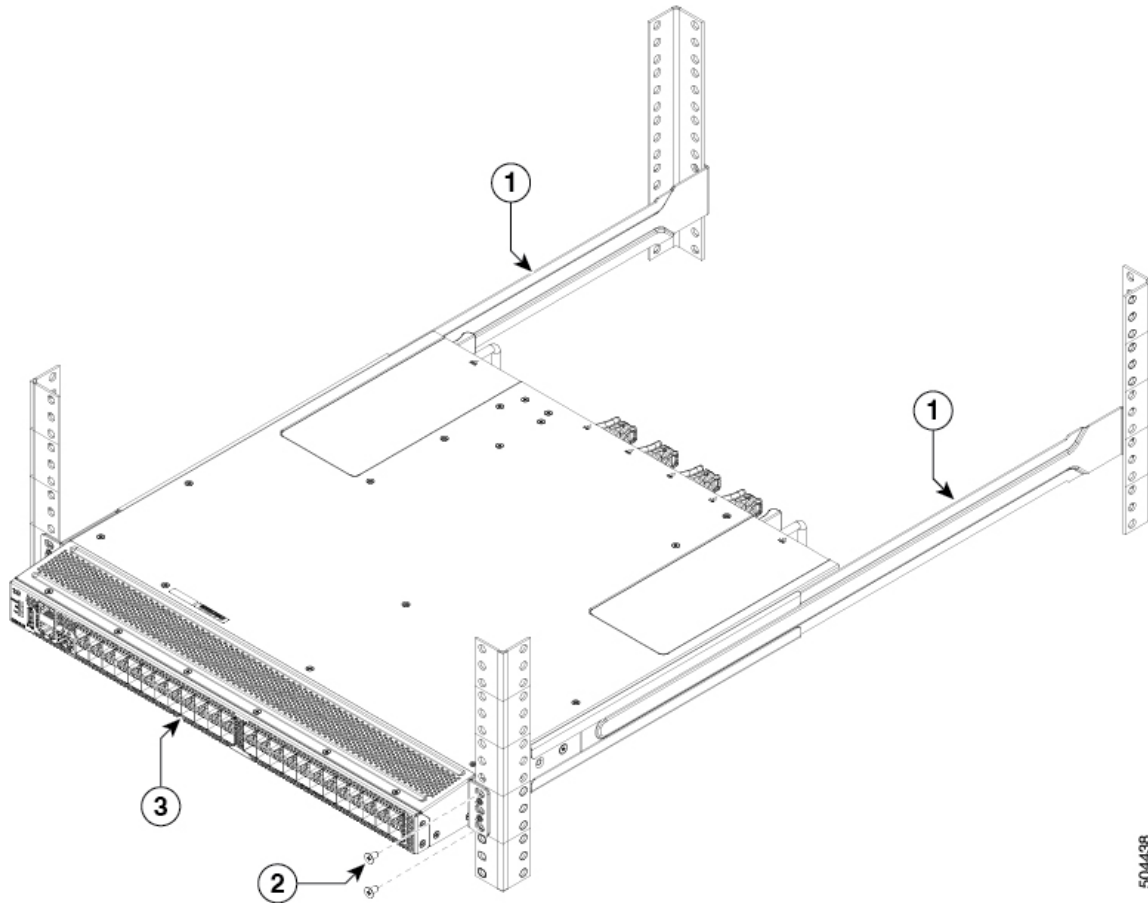
1.	Slider rails	3.	Chassis
2.	rack-mount screws		

a. Holding the switch with both hands, position the two rack-mount guides on the switch between the rack or cabinet posts that do not have slider rails attached to them.

b. Align the two rack-mount guides on either side of the switch with the slider rails installed in the rack. Slide the guides onto the slider rails, and then gently slide the switch all the way into the rack until the brackets come in contact with two rack or cabinet posts.

> **Note** If you attached a grounding cable to the chassis, you will need to flex one of the rack-mount posts slightly to allow the grounding lug to go behind the post.

    c. Holding the chassis level, insert two screws (12-24 or 10-32, depending on the rack type) into each of the two brackets (using a total of four screws), and into the cage nuts or threaded holes in the rack or cabinet posts.

    d. Tighten the 10-32 screws to 20 in-lb (2.26 N·m), or tighten the 12-24 screws to 30 in-lb (3.39 N·m).

Step 5 If you have attached a grounding wire to the chassis grounding pad, connect the other end of the wire to the facility ground.

Installing the Switch into a 2-Post Rack

Before you begin

- Determine how you want to set up your switch:
  - Determine which end of the chassis is to be located in the cold aisle as follows:
    1. If the switch has port-side intake modules (fan modules and power supply units with red coloring), position the switch so that its ports are in the cold aisle.
    2. If the switch has port-side exhaust modules (fan modules and power supply units with blue coloring), position the switch so that its fan modules and power supply units are in the cold aisle.
  - Determine which way the chassis should slide in and out of the rack—port side entry first or rear-side entry first. You might consider whether the front or back of the rack provides better clearance for maneuvering the chassis in and out during installation and servicing. The end that needs to enter the rack first requires the guides and the other end the brackets.

Step 1 Install two rack–mount brackets onto the switch as follows:

    a. Position a rack-mount bracket so that four of its screw holes are aligned to the screw holes on the side of the chassis. You can align any four of the holes in the rack-mount bracket to four of the six screw holes on the side of the chassis. The holes that you use depend on the requirements of your rack and the amount of clearance. For more information on clearance, see the General Requirements for Cabinets and Racks.

    b. You can install the rack-mount bracket either at the front or rear of the chassis. The choice is determined by which end of the chassis will be inserted into the rack first. If the rear end of the chassis is to be inserted first, then mount the brackets on the front of the chassis, and vice versa.

Figure 9: Installing Rack-Mount Brackets on the Front Side of the Chassis
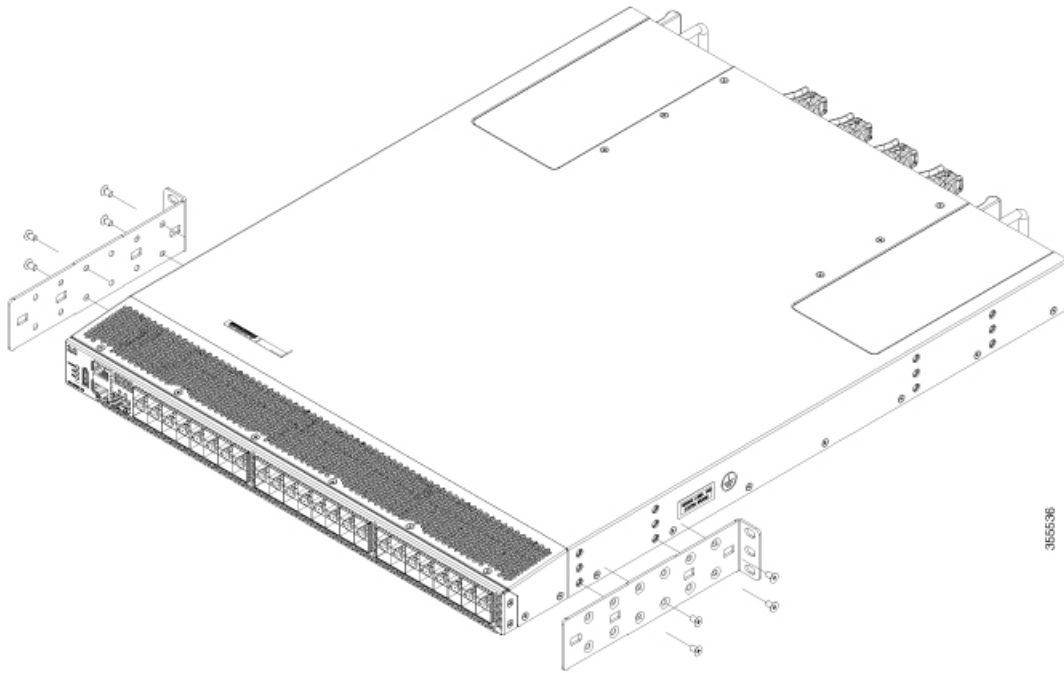
Step 2   If you are installing the chassis into an ungrounded rack, you must attach a customer-supplied grounding wire to the chassis. However, if you are installing the chassis into a grounded rack, you can skip this step.

Step 3   Install the switch onto the 2-post rack:

   a.   Holding the switch with both hands, position the back of the switch between the two posts of the rack. Then gently move the switch until the rack-mount brackets come in contact with two rack posts.

   b.   Holding the chassis level, insert three screws (12-24 or 10-32, depending on the rack type) into each of the two rack-mount brackets (using a total of six screws) and into the cage nuts or threaded holes in the rack or cabinet posts.

Figure 10: Installing the Switch onto the 2-Post Rack From the Front Side of the Chassis
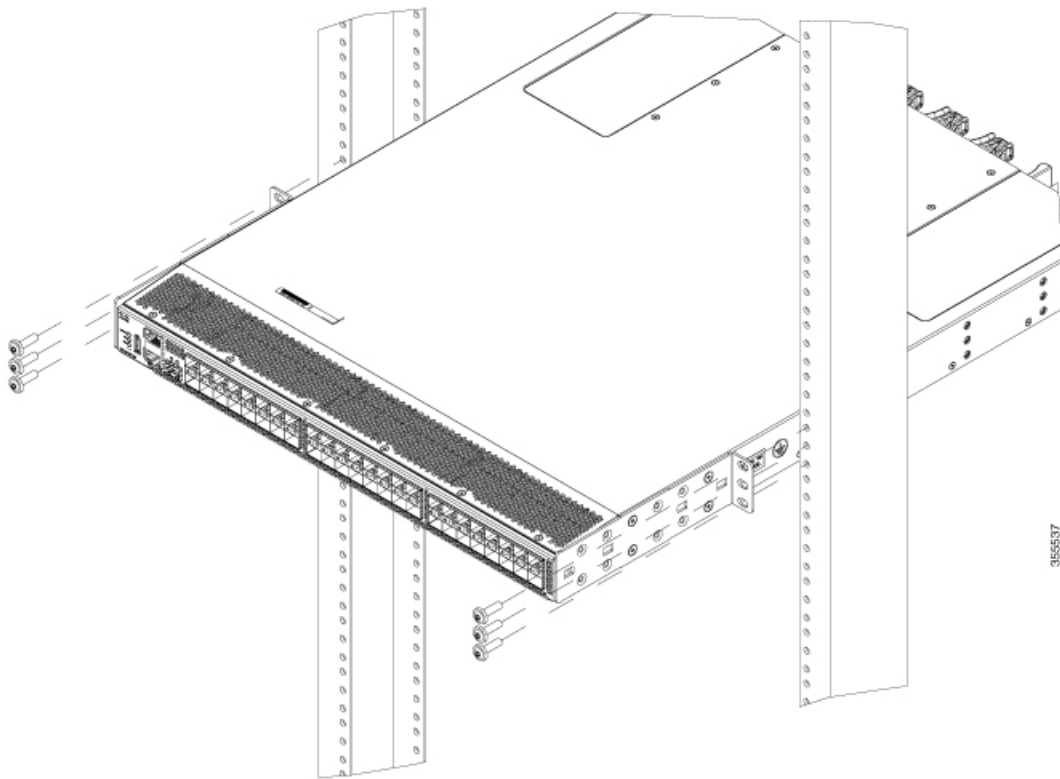
Figure 11: Installing the Switch onto the 2-Post Rack From the Rear Side of the Chassis
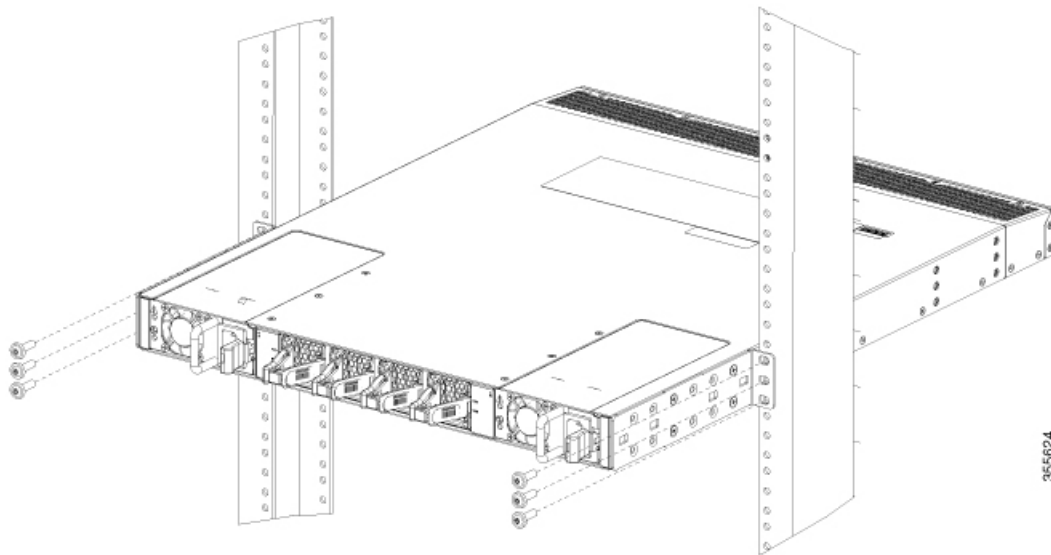
   c. Tighten the 10-32 screws to 20 in-lb (2.26 N.m) or tighten the 12-24 screws to 30 in-lb (3.39 N.m).

Step 4   If you have attached a grounding wire to the chassis grounding pad, connect the other end of the wire to the facility ground.

Grounding the Switch

The switch chassis is automatically grounded when you install the switch properly in a grounded rack with metal-to-metal connections between the switch and rack.

Alternatively, you can ground the chassis (this is required if the rack is not grounded) by attaching a customer-supplied grounding cable to the chassis grounding pad and the facility ground. We recommend using 6-AWG wire.

Warning   This equipment must be grounded. 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. **Statement 1024**

Warning   When installing or replacing the unit, the ground connection must always be made first and disconnected last. **Statement 1046**

Step 1   Use a wire-stripping tool to remove approximately 0.75 in. (1.9 cm) of the covering from the end of the grounding wire.

Step 2   Insert the stripped end of the grounding wire into the open end of the grounding lug, and use a crimping tool to crimp the lug to the wire. Verify that the ground wire is securely attached to the grounding lug by attempting to pull the wire out of the crimped lug.

Step 3   Remove the label covering the grounding pad on the chassis. Secure the grounding lug to the chassis grounding pad with two M4 screws, and tighten each screw to 11.5 to 15 in-lb (1.3 to 1.7 N·m) of torque.

Figure 12: Grounding the Switch
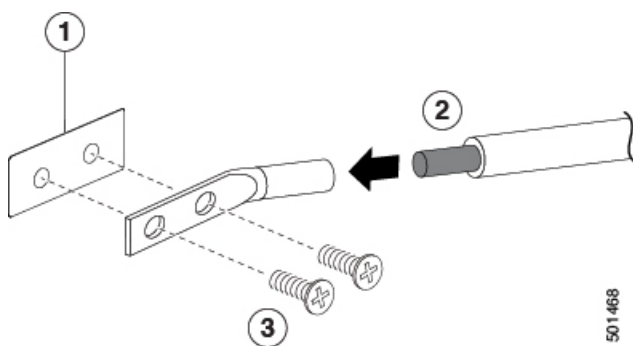
Chassis grounding pad	Two M4 screws are used to secure the grounding lug to the chassis

Grounding cable, with 0.75 in. (19 mm) of insulation that is stripped from one end, which is inserted into the grounding lug and crimped in place.	

Step 4   Prepare the other end of the grounding wire and connect it to an appropriate grounding point in your site to ensure an adequate earth ground for the switch. If the rack is fully bonded and grounded, connect the grounding wire, as explained in the documentation provided by the vendor from whom you bought the rack.

Installing and Removing Components

Warning   **Hazardous voltage or energy is present on the backplane when the system is operating. Use caution when servicing.** Statement 1034

Caution   During this procedure, wear grounding wrist straps to avoid ESD damage to the switch.

Installing the ESD Grounding Strap

This section illustrates how to prepare yourself before removing the chassis from the sealed antistatic bag.

The figures show how to cuff the ESD strap around the wrist and the ground cord that connects the cuff to the ground. ESD wrist straps are the primary means of controlling static charge on personnel.

Note These images are for only representation purposes. The chassis' actual appearance and size may vary.

Figure 13: Wearing the ESD Strap

Earth ground
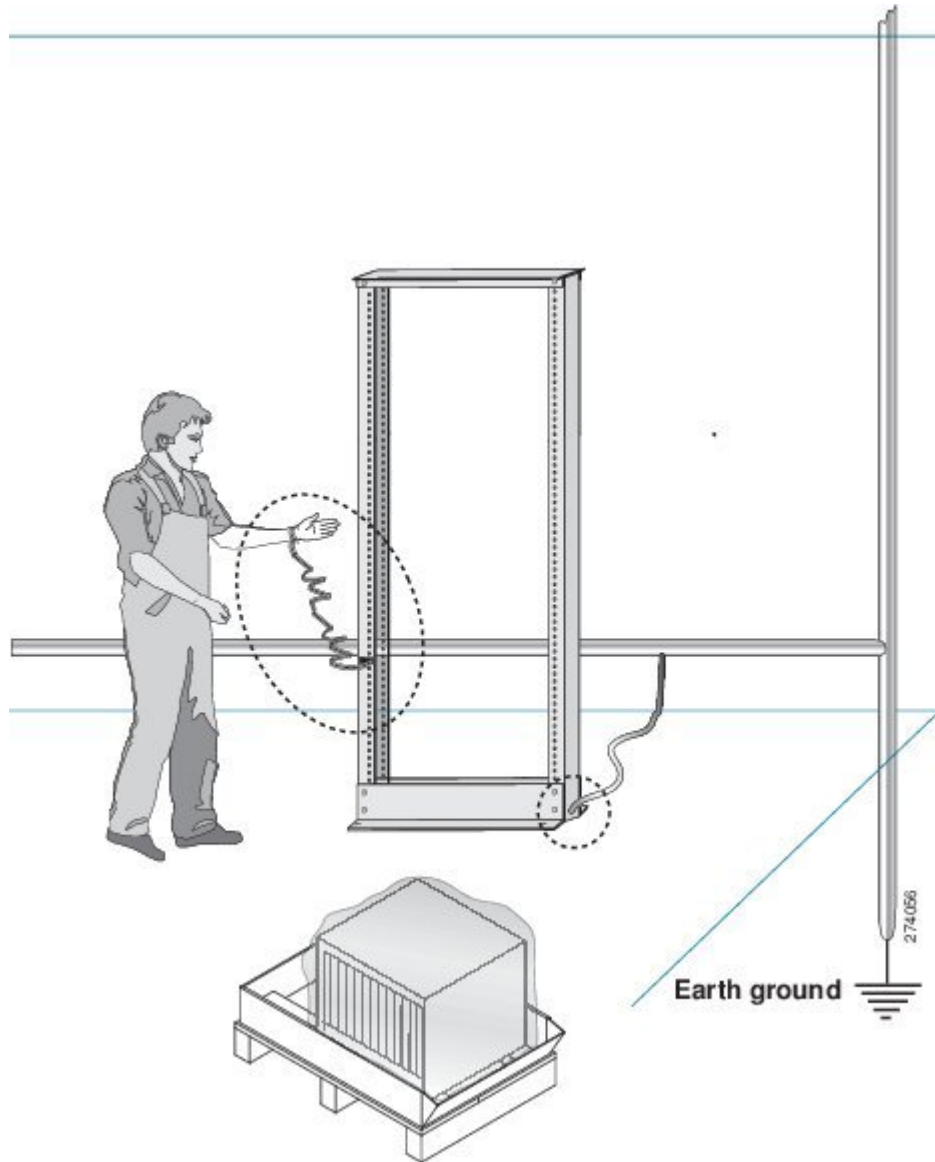
Figure 14: Handling the Chassis
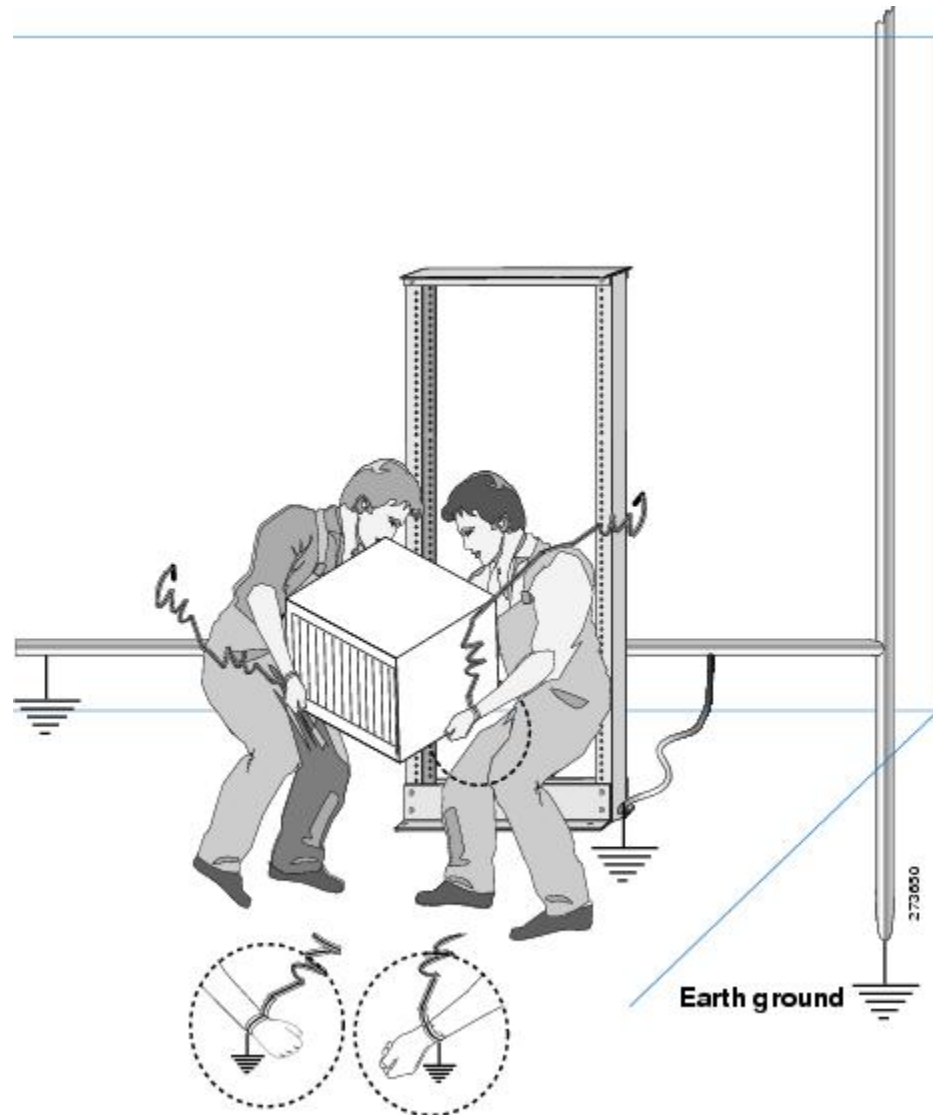
Installing and Removing Power Supply Units

This section provides instructions for installing and removing the power supply units in the switch.

Installing Power Supply Units

You can replace one power supply unit (PSU) while the other one provides power to the switch.

Before you begin

- To implement n+n redundancy, each PSU must be connected to a separate power feed. Otherwise, only one power feed is required.

• There must be an earth ground connection to the chassis to which you are installing the replacement module. Typically, the chassis is grounded by its metal-to-metal connection with a grounded rack. If you need to ground the chassis, see Grounding the Switch.

Step 1 Holding the PSU with one hand underneath it and the other hand holding the handle, turn the PSU so that its release latch is on the right side, and align the back end (the end with the electrical connections) to the open power supply slot. Carefully slide the PSU all the way into the slot until it clicks into place.

Note If the PSU does not fit into the slot opening, turn the unit over and try again.

Step 2 Test the installation by trying to pull the PSU out of the slot without using the release latch.

If the PSU does not move out of place, it is secured in the slot. If the PSU moves, carefully press it all the way into the slot until it clicks in place.

Step 3 Attach the power cable to the power socket on the front of the PSU.

Step 4 Make sure that the other end of the power cable is attached to the appropriate power feed for the PSU. If the power feed has a switch, slide it to the On position.

Note Depending on the outlet socket on your power distribution unit, you might need the optional jumper cable to connect the switch to the outlet socket.

Step 5 Verify that the PSU is operational by making sure that the PSU LEDs are both green. For information on what the PSU LEDs indicate, see the LEDs section.

Removing Power Supply Units

You can remove one faulty PSU, and the other one will provide enough power to operate the switch.

Step 1 Holding the plug for the power cable, pull the plug out from the power socket on the PSU, and wait until both the PSU LEDs are off.

Step 2 Grasp the PSU handle while pressing the release latch towards the handle.

Step 3 Place your other hand under the PSU to support it while you slide it out of the chassis.

Caution Do not touch the electrical connectors on the back side of the unit and prevent anything else from coming into contact with and damaging the connectors.

Installing and Removing Fan Modules

This section provides instructions for installing and removing the fan modules for the switch.

You can replace one of the four fan modules even when the switch is operating so long as you perform the replacement within one minute of removing the old fan module. If you cannot perform the replacement within one minute, leave the original fan module in the chassis to maintain the designed airflow until you have the replacement fan module on hand and can perform the replacement.

⚠️

Caution   If you are replacing a module during operation, be sure that the replacement fan module has the correct direction of airflow, which means that it has the same airflow direction as the other modules in the chassis. Also, be sure that the airflow direction takes in air from a cold aisle and sends it out to a hot aisle. Otherwise, the switch can overheat and shut down.

As well as, be sure that the airflow direction takes in air from a cold aisle and sends it out to a hot aisle. Otherwise, the switch can overheat and shut down.

If you are changing the airflow direction of all the modules in the chassis, you must shut down the switch before replacing all the fan and power supply modules with modules using the other airflow direction. During operation, all the modules must have the same direction of airflow.

Installing a Fan Module

To install a new fan module, follow these steps:

Before you begin

- You must have a new fan module on hand and ready to install within one minute of removing the original fan module if the switch is operating.

- The new fan module must have the same airflow direction as the other fan and power supply modules installed in the switch. All of these modules must have either red coloring (port-side intake airflow) or blue coloring (port-side exhaust airflow).

- Remove any blank plate or existing fan module from the fan slot.

Step 1   Holding the fan module by its handle, align the back of the fan module (the side with the electrical connectors) to the open fan slot in the chassis.

Step 2   Slide the fan module into the fan module bay until it clicks into place.

Step 3   Verify that the Status LED turns on and becomes green. For more information on what the LEDs indicate, see the LEDs.

Removing a Fan Module

The fan module is designed to be removed and replaced while the system is operating without presenting an electrical hazard or damaging the system.

⚠️

Caution   The Cisco MDS 9000 Series Switches have internal temperature sensors that can shut down the system if the temperature within the chassis exceed certain safety thresholds. To accurately monitor the system temperature, the temperature sensors require sufficient airflow through the chassis. In the event that a fan module is removed from the chassis and the airflow is reduced, the system will bypass the temperature sensor information and shut down after five minutes to prevent undetected overheating. However, the switches will shut down sooner if the major temperature threshold is exceeded.

⚡

Warning   **While removing the fan module, keep your hands and fingers away from the spinning fan blades. Let the fan blades completely stop before you remove the fan module.** Statement 258

To remove an existing fan module, follow these steps:

Step 1   On the fan module that you are removing, press the two sides of the fan module handle next to where it connects to the fan module and pull on the handles enough to unseat it from its connectors.

Step 2   Holding the handle, pull the module out of the chassis.

> **Caution**   Do not touch the electrical connectors on the back side of the module and prevent anything else from coming into contact with and damaging the connectors.

C H A P T E R 5

Connecting the Cisco MDS 9148V-K9 Switch

The Cisco MDS 9148V-K9 switch provides the following types of ports:

- Console port—An RS-232 port that you can use for a local management connection.

- MGMT 10/100/1000 Ethernet port—Two Ethernet ports that you can use to access and manage the switch by IP address, such as through the CLI or Fabric Manager. One of the Ethernet ports can also be used to export analytic data.

- Fibre Channel ports—Fibre Channel ports that you can use to connect to the SAN, or for in-band management.

- USB port—USB port for USB disk that you can use for configuration file backups, and capturing logs to file.

This chapter describes how to connect the various components of the Cisco MDS 9148V-K9 switch.

Preparing for Network Connections

When preparing your site for network connections to the switch, consider the following for each type of interface:

- Cabling required for each interface type

- Distance limitations for each signal type

- Additional interface equipment needed

Before installing the component, have all the additional external equipment and cables available.

Connecting the Console Port

This section describes how to connect the RS-232 console port to a PC. The console port allows you to perform the following functions:

- Configure the switch from the CLI.

- Monitor network statistics and errors.

- Configure SNMP agent parameters.

- Download software updates to the switch or distribute software images residing in flash memory to attached devices.

- Perform initial switch configuration

- Perform password recovery

Connecting the Console Port to a PC

You can connect the console port to a PC serial port for local administrative access to the switch.

> **Note** The PC must support VT100 terminal emulation. The terminal emulation software—frequently a PC application, such as HyperTerminal Plus—makes the communication between the switch and your PC possible during setup and configuration.

To connect the console port to a PC, follow these steps:

Step 1 Configure the baud rate and character format of the PC terminal emulation program to match the following management port default characteristics:

- 9600 baud

- 8 data bits

- 1 stop bit

- No parity

Step 2 Attach the adapter required for your PC to its communication port. It must present an RJ-45 socket towards the switch.

- For a DB-9 serial port, attach the supplied RJ-45-to-DB-9 female adapter.

- For a DB-25 serial port, attach the supplied RJ-45-to-DB-25 female adapter.

- For a USB port, attach a customer-supplied USB-to-serial dongle.

Step 3 Connect one end of the supplied console cable (a rollover RJ-45-to-RJ-45 cable) to the console port. Connect the other end to the female RJ-45 adapter attached to the PC communication port.

Connecting a Modem to a Console Port

⚠️

Caution   Do not connect the console port to a modem while the switch is booting. Connect the console port to a modem either before powering the switch on or after the switch has completed the boot process.

To connect the console port to a modem before the switch is powered on, follow these steps:

Step 1   Connect the supplied console cable (a rollover RJ-45-to-RJ-45 cable) to the console port.

Step 2   Connect the other end of the console cable to the supplied RJ-45-to-DB-25 adapter.

Step 3   Connect the RJ-45-to-DB-25 adapter to the DB-25 port on the modem.

Step 4   Power on the switch. The switch boots automatically, and the following default console port characteristics are applied to the modem connection:

- 9600 baud

- 8 data bits

- 1 stop bit

- No parity

- Default initialization string (ATE0Q1&D2&C1S0=1\015) if previously configured

Note   For instructions on how to change these settings, see the Cisco Fabric Manager Fundamentals Configuration Guide.

To connect the console port to a modem after the switch is powered on, follow these steps:

Step 1   Ensure that the system has completed booting and the system image is running.

Step 2   Connect the supplied console cable (a rollover RJ-45-to-RJ-45 cable) to the console port.

Step 3   Connect the other end of the console cable to the supplied RJ-45-to-DB-25 adapter.

Step 4   Connect the RJ-45-to-DB-25 adapter to the DB-25 port on the modem.

Step 5   Initialize and configure the modem as specified in the Cisco Fabric Manager Fundamentals Configuration Guide and the Cisco NX-OS Fundamentals Configuration Guide.

Connecting the Management Ports

The autosensing 10/100/1000 Mbps Ethernet management ports are located on the left side of the front panel (labeled MGMT ETH0 and MGMT ETH1), below the console port. MGMT ETH0 is the default Ethernet management port (interface mgmt0). This port is used for out-of-band management and data streaming to remote receivers.

Note   MGMT ETH1 is disabled and reserved for future use.

Use a modular, RJ-45, straight-through UTP cable to connect the management ports to an external hub or switch. To connect to a router, use a crossover cable.

Connecting to a Fibre Channel Port

The Fibre Channel ports in this switch are compatible with FC LC-type fiber-optic SFP+ transceivers and cables (see the Removing and Installing Cables into SFP Transceivers section). You can use these ports to connect to the SAN or for in-band management. For information about configuring the switch for in-band management, see the Cisco Fabric Manager Fundamentals Configuration Guide or the Cisco NX-OS Fundamentals Configuration Guide.

Each transceiver must match the transceiver at the other end of the cable, and the cable must not exceed the stipulated cable length for reliable communications. SFP+ transceivers can be ordered either separately or with this switch.

Warning   **Class 1 laser product**. Statement 1008

Warning   **Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments.** Statement 1051

Note   Wear an ESD wrist strap connected to the chassis when handling transceivers. Keep optical connectors covered when not in use, and do not touch connector ends. The fiber-optic connectors must be free of dust, oil, and other contaminants.

Removing and Installing Cables into SFP Transceivers

Caution   To prevent damage to the fiber-optic cables, do not place more tension on them than the rated limit and do not bend to a radius of less than one inch (2.5 cm) if there is no tension in the cable, or two inches (5 cm) if there is tension in the cable.

## Installing a Cable into an SFP Transceiver

Caution   To prevent possible damage to the cable or transceiver, install the transceiver in the port before installing the cable in the transceiver.

To install a cable into a transceiver, follow these steps:

Step 1 Attach an ESD-preventive wrist strap and follow its instructions for use.

Step 2 Remove the dust cover from the connector on the cable.

Step 3 Remove the dust plug from the cable end of the transceiver.

Step 4 Align the cable connector with the transceiver and insert the connector into the transceiver until it clicks into place.

Figure 15: Connecting an LC-Type Cable to a Fibre Channel Port
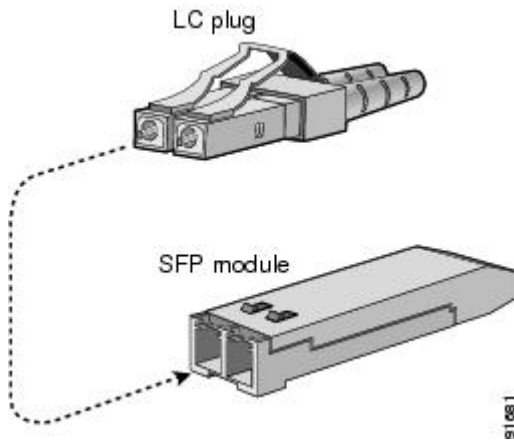
Caution The LC connector has keys to allow insertion only one way into the transceiver. If the cable does not install easily, ensure that it is correctly oriented before continuing.

For instructions on verifying connectivity, see the Cisco Fabric Manager Fundamentals Configuration Guide and the Cisco NX-OS Fundamentals Configuration Guide.

Removing a Cable from an SFP Transceiver

Caution
- When pulling a cable from a transceiver, grip the body of the connector. Do not pull on the jacket sleeve because this can compromise the fiber optic termination in the connector.

- If the cable does not remove easily, ensure that any latch present on the cable has been released before continuing.

To remove the cable, follow these steps:

Step 1 Attach an ESD-preventive wrist strap and follow its instructions for use.

Step 2 Press the release latch on the cable, grasp the connector near the connection point, and gently pull the connector from the transceiver.

Step 3 Insert a dust plug into the cable-end of the transceiver.

Step 4   Install a dust cover over the end of the cable.

Removing and Installing SFP Transceivers

⚠️

Warning   Removing and installing an SFP transceiver can shorten its useful life. Do not remove and insert SFP transceivers more often than is absolutely necessary. We recommend that you disconnect the cables before installing or removing SFP transceivers to prevent damage to the cable or transceiver.

✎

Note   Use only Cisco transceivers in this switch. Each Cisco transceiver is encoded with model information that enables the switch to verify that the transceiver meets the requirements for the switch.

This switch supports transceivers with the following types of latching devices:

- Mylar tab latch
- Bale-clasp latch

Installing an SFP Transceiver

To install an SFP+ transceiver, follow these steps:

Step 1   Attach an ESD-preventive wrist strap and follow its instructions for use.

Step 2   Remove the dust plug from the FC port.

Step 3   Insert the transceiver into the port.

Caution   The transceiver can only be inserted one way into the FC port. If the transceiver does not install easily, ensure that it is correctly oriented and the tab or clasp are in the correct position before continuing.

Step 4   Insert or leave the dust plug in the cable-end of the transceiver if a cable is not being installed in the transceiver.

Removing an SFP Transceiver

To remove an SFP+ transceiver, follow these steps:

Step 1   Attach an ESD-preventive wrist strap and follow its instructions for use.

Step 2   Remove attached fibre-optic cables, if any. For more information, see the Removing a Cable from an SFP Transceiver section.

Step 3   Remove the transceiver from the port:

- If the transceiver has a Mylar tab latch, gently pull the tab straight out (do not twist), and then pull the transceiver out of the port.

• If the transceiver has a bale-clasp latch, open the clasp by pressing it downwards, and then pull the transceiver out of the port.

Step 4   Insert a dust cover into the cable-end of the transceiver and place the transceiver on an antistatic mat or into a static shielding bag.

Step 5   Protect the FC port by inserting a clean dust plug if another transceiver is not being installed.

Maintaining SFP Transceivers and Fiber-Optic Cables

SFP transceivers and fiber optic cables must be kept clean and dust free to maintain high signal accuracy and prevent damage to the connectors. Attenuation (loss of light) is increased by contamination. Therefore, attenuation should be kept below 0.35 dB.

Follow these maintenance guidelines:

• SFP transceivers are static sensitive. To prevent ESD damage, wear an ESD-preventive wrist strap that is connected to the chassis while handling transceivers.

• Do not remove and reinsert a transceiver more often than necessary. Repeated removals and insertions can shorten its useful life.

• Keep all optical connections covered when not in use. If they become dusty, clean them before using in order to prevent dust from scratching the fiber-optic cable ends.

• Do not touch the ends of connectors. This prevents fingerprints and other contamination of the connectors.

• Inspect cables before installation for dust and damage. If damage is suspected, clean the ends and check for excessive light loss with a light meter.

Powering Up the Switch

This section provides instructions for powering up the switch and verifying component installation.

Caution   During this procedure, wear grounding wrist straps to avoid ESD damage to the switch.

Note   Do not connect the MGMT ETH0 port to the LAN until the initial switch configuration has been performed through the console connection. For instructions on connecting this port, see the Connecting the Management Ports section.

Note   This switch is designed to boot up in less than 30 minutes. This is dependent on all associated devices, already running and fully operational.

To power up the switch and verify hardware operation, follow these steps:

Step 1   Verify that sufficient PSUs and fan modules are installed.

Step 2   Plug the power cables into the power supplies and arrange the cables so that they cannot be accidentally pulled out.

> **Note**   Depending on the outlet socket on your power distribution unit, you may need the optional jumper power cord to connect the switch to the outlet socket.

Step 3   Connect the other end of the power cables to the site power outlets that have the required power specification.

Step 4   Ensure that the switch is adequately grounded, as described in the Grounding the Switch section.

Step 5   Connect a terminal device to the serial console port. For more information, see the Connecting the Console Port section.

Step 6   If using Power On Automatic Provisioning (POAP), insert the USB stick with the required files into the USB port.

Step 7   Turn the site power outlet switches to On. The switch boots automatically.

Step 8   Listen for the fans; they should begin operating as soon as the switch is powered on.

> **Note**   Do not operate the switch without a functioning fan module, except briefly during the fan module replacement procedure. Cisco MDS 9000 Series Switches can operate for only a few minutes without any functioning fan modules before they begin to overheat.

Step 9   Verify that the LED behavior is as follows when the switch has finished booting:

- Fan status LED is green.

- Both LEDs on each PSU are green.

- The switch status LED is green. If this LED is orange or red, it indicates that one or more environmental monitors is reporting a problem.

- The Ethernet port link LEDs should not be On unless the cable is connected.

> **Note**   The LEDs for the Fibre Channel ports remain orange until the ports are enabled, and the LED for the management port remains Off until the port is connected.

Step 10   If a component is not operating properly, try removing and reinstalling it. If it still does not operate correctly, contact your customer service representative for a replacement.

> **Note**   If you purchased Cisco support through a Cisco reseller, contact the reseller directly. If you purchased support directly from Cisco, contact Cisco Technical Support.

Step 11   Verify that the system software has booted and the switch has initialized without error messages. If any problems occur, see the Cisco MDS 9000 Series System Messages Guide. If you cannot resolve an issue, contact your customer service representative.

Step 12   If not using POAP, manually complete the initial configuration of the switch via the automatically launched setup script through the console connection.

Step 13   Complete the worksheets provided in Site Planning and Maintenance Records for future reference.

> **Note**   A setup utility is automatically launched the first time you boot the switch and guides you through the basic configuration. For instructions about how to configure the switch and check module connectivity, see the Cisco Fabric Manager Fundamentals Configuration Guide.

Technical Specifications

Switch Specifications

The following table lists the environmental specifications for the switch:

Table 2: Environmental Specifications

Description	Specification
Temperature, ambient operating	32 to 104°F (0 to 40°C)
Temperature, ambient nonoperating and storage	-40 to 158°F (-40 to 70°C)
Humidity (RH), ambient (noncondensing) operating	10 to 90%
Humidity (RH), ambient (noncondensing) nonoperating and storage	10 to 95%
Altitude, operating	-197 to 6500 ft (-60 to 2000 m)

The following table lists the physical specifications for the switch:

Table 3: Physical Specifications

Description	Specification
Dimensions (HxWxD)	1.72 x 17.3 x 18 in. (4.37 x 43.94 x 45.72 cm) excluding PSU and fan module handles
Rack Space	Chassis requires 1 RU (1.75 in. or 4.45 cm)
Weight	21.8 lb (9.9 kg) unpopulated
Fan Dimensions (WxH)	1.575 x 1.575 in. (4.0 x 4.0 cm)

Description	Specification
Fan Slots Opening Dimensions (WxH)	1.614 x 1.602 in. (4.09 x 4.06 cm)
Power Supply	500-W • 500-W AC, port-side exhaust variant (up to 2 per switch) • 500-W AC, port-side intake variant (up to 2 per switch) • AC input—100 to 240 V AC (10% range) • Frequency—50 to 60 Hz (nominal) • 80 PLUS Platinum certified 1200-W • 1200W AC/ HVAC/ HVDC Bidirectional airflow (2 per switch) • Part Number: DS-CAC-1200W • AC input: 90V to 305V • DC input: 192V to 400V • Frequency – 50 to 60 Hz (nominal) • 80 PLUS Platinum certified
Airflow	• Back to front (toward ports) using port-side exhaust fans • Front to back (into ports) using port-side intake fans • 50 CFM (0.02 m^3/s) through system fan assembly at 25°C • 100 CFM (0.04 m^3/s) maximum We recommend that you maintain a minimum air space of 2.5 in. (6.4 cm) between walls and chassis air vents and a minimum horizontal separation of 6 in. (15.2 cm) between two chassis to prevent overheating. To prevent the switch from overheating and shutting down, you must position the air intake for the switch in a cold aisle.

Power Supply Requirement Specifications

The following table provides a sample calculation of power for the switch AC power supply:

Table 4: Power Dissipation for AC Power Supply

Power Mode	PSU	Traffic Rate	Temperature	Voltage	Optics Speed	Optics Number	Fan Trays	Power at 110 V/60 Hz (Watts)	Power at 220 V/50 Hz (Watts)
Typical	2	50%	25°C	Nominal	32G-SW	24	4	211	205
						48	4	247	240
					64G-SW	24	4	235	228
						48	4	295	286
Max	2	100%	25°C		32G-SW	24	4	213	207
					32G-SW	48	4	248	241
					64G-SW	24	4	236	229
					64G-SW	48	4	301	292
			40°C		32G-SW	48	4	286	278
					64G-SW	48	4	323	314

Table 5: Power Supply Fuse Information

PID	Fuse Type	Fuse Rating (Amp)	I2t (Amps^2 seconds)	Fuse Melting Time
DS-CAC-500W-I	Time-lag	15	534	4 min@15 A 2 min@30 A
DS-CAC-500W-E			660	30 min@22.5 A 0.15 s@50 A

Component Power Requirements and Heat Dissipation

Consider heat dissipation when sizing the air-conditioning requirements for an installation. The power and heat associated with switch varies based on the following considerations:

- The environment (temperature) outside the chassis

- Internal chassis temperature

- Any hardware component failure in the chassis

- Average switching traffic levels

The following table lists the power requirements and heat dissipation for the components of the switch:

Table 6: Power Requirements (maximum) and Heat Dissipation for the Switch

Module Type/Product Number	Power Required (Watts)	Heat Dissipation (BTU/hr)	Input Current	
			110 VAC (Amps)	**220 VAC (Amps)**
Cisco MDS 9148V-K9 64-Gbps 48-port Switch	314 (Max)	986	2.94	1.42

Cable and Port Specifications

This appendix includes information about the cables and connectors used with the Cisco MDS 9148T Multilayer Fabric Switch.

⚠️

Caution We strongly recommend that power cable runs and other potential noise sources be located as far away as practical from network cabling that terminates at Cisco equipment. In situations where long parallel cable runs exist, but cannot be separated by at least 3.3 ft. (1 m), we recommend that you shield these potential noise sources. To avoid interference, the source should be shielded by housing it in a grounded metallic conduit.

Cables and Adapters

The Accessory kit includes the following:

- RJ-45-to-RJ-45 rollover cable

- RJ-45-to-DB-9 female DTE adapter (labeled Terminal)

- RJ-45-to-DB-25 female DTE adapter (labeled Terminal)

- RJ-45-to-DB-25 male DCE adapter (labeled Modem)

✎

Note Additional cables and adapters can be ordered from your customer service representative.

✎

Note If you purchased this product through a Cisco reseller, contact the reseller directly for technical support. If you purchased this product directly from Cisco, contact Cisco Technical Support at http://www.cisco.com/c/en/us/support/index.html.

Console Port

The console port is an asynchronous RS-232 serial port with an RJ-45 connector. You can use the RJ-45-to-RJ-45 rollover cable and the RJ-45-to-DB-9 female adapter or the RJ-45-to-DB-25 female DTE adapter (depending on your computer serial port) to connect the console port to a computer running terminal emulation software.

Console Port Pinouts

The following table lists the pinouts for the console port on the switch:

Table 7: Console Port Pinouts

Pin	Signal
1[1]	RTS
2	DTR
3	TxD
4	GND
5	GND
6	RxD
7	DSR
8	CTS

1. Pin 1 is connected internally to pin 8.

Connecting the Console Port to a Computer Using the DB-25 Adapter

You can use the RJ-45-to-RJ-45 rollover cable and the RJ-45-to-DB-25 female DTE adapter (labeled Terminal) to connect the console port to a computer running terminal emulation software. The following table lists the pinouts for the console port, the RJ-45-to-RJ-45 rollover cable, and the RJ-45-to-DB-25 female DTE adapter:

Table 8: Port-Mode Signaling and Pinouts with DB-25 Adapter

Console Port	RJ-45-to-RJ-45 Rollover Cable		RJ-45-to-DB-25 Terminal Adapter	Console Device
Signal	RJ-45 Pin	RJ-45 Pin	DB-25 Pin	Signal
RTS	1	8	5	CTS
DTR	2	7	6	DSR
TxD	3	6	3	RxD

Console Port	RJ-45-to-RJ-45 Rollover Cable		RJ-45-to-DB-25 Terminal Adapter	Console Device
GND	4	5	7	GND
GND	5	4	7	GND
RxD	6	3	2	TxD
DSR	7	2	20	DTR
CTS	8	1	4	RTS

Connecting the Console Port to a Computer Using the DB-9 Adapter

You can use the RJ-45-to-RJ-45 rollover cable and RJ-45-to-DB-9 female DTE adapter (labeled Terminal) to connect the console port to a computer running terminal emulation software. The following table lists the pinouts for the console port, the RJ-45-to-RJ-45 rollover cable, and the RJ-45-to-DB-9 female DTE adapter:

Table 9: Port-Mode Signaling and Pinouts with DB-9 Adapter

Console Port	RJ-45-to-RJ-45 Rollover Cable		RJ-45-to-DB-9 Terminal Adapter	Console Device
Signal	RJ-45 Pin	RJ-45 Pin	DB-9 Pin	Signal
RTS	1	8	8	CTS
DTR	2	7	6	DSR
TxD	3	6	2	RxD
GND	4	5	5	GND
GND	5	4	5	GND
RxD	6	3	3	TxD
DSR	7	2	4	DTR
CTS	8	1	7	RTS

Out of Band Ethernet Management Port

Use a modular, RJ-45, straight-through UTP cable to connect the 10/100/1000 management Ethernet port to external hubs and switches.

Figure 16: RJ-45 Interface Cable Connector
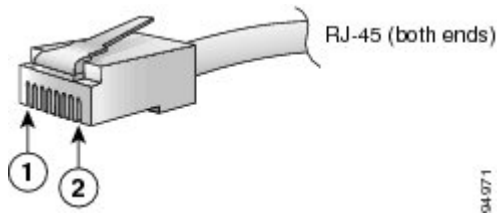
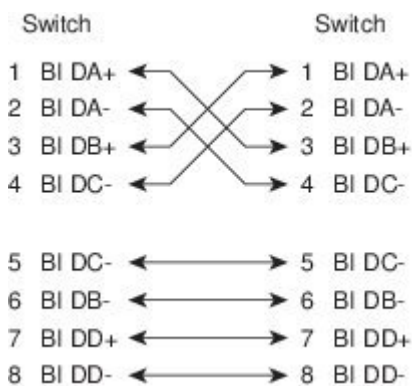| 1. Pin 1	2. Pin 8

The following table lists the connector pinouts and signal names for a 10/100/1000BASE-T management port (MDI) cable.

Table 10: 10/100/1000 BASE-T Management Port Cable Pinout

Pin	Signal
1	BI DA+
2	BI DA-
3	BI DB+
4	BI DC+
5	BI DC-
6	BI DB-
7	BI DD+
8	BI DD-

The following figure shows a schematic representation of the 10/100/1000 BASE-T cable:

Figure 17: Twisted-Pair 10/100/1000 BASE-T Cable

The following table lists the connector pinouts and signal names for a 10/100 BASE-T management port (MDI) cable:

Table 11: 10/100 BASE-T Management Port Cable Pinout

Pin	Signal
1	TD+
2	TD-
3	RD+
4	RD-
5	Not used
6	Not used
7	Not used
8	Not used

The following figure shows a schematic of the 10/100 BASE-T cable:

Figure 18: Twisted-Pair 10/100 BASE-T Cable Schematic
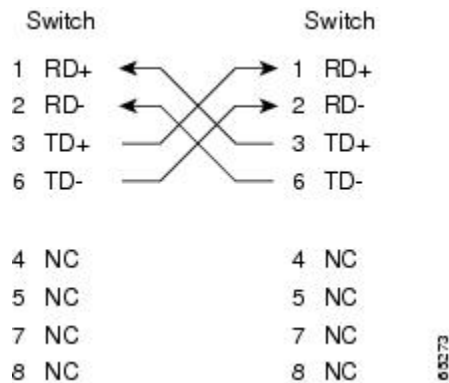
Supported Power Cords and Plugs

Each switch power supply unit requires one power cord. Cisco approved cords may be ordered with the product. Standard power cords with a country specific plug can be used with wall outlets. Jumper power cords can be used with cabinet outlets. The user may also source their own power cords for the product, as long as they meet the power cord specifications for this product.

Note   Only the standard power cords or jumper power cords ordered from Cisco are supported.
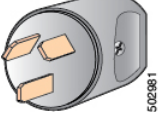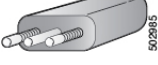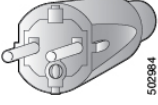
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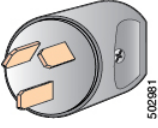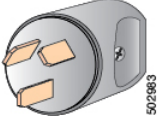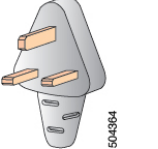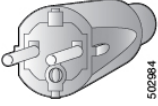
Caution If you do not order a power cord with the system, you are responsible for selecting the appropriate power cord for the product. Using a noncompatible power cord with this product may result in electrical safety hazard. Orders delivered to Argentina, Brazil, and Japan must have the appropriate power cord ordered with the system.
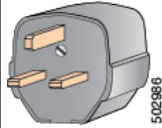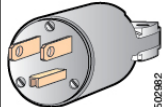
Standard Power Cords

Cisco standard power cords for the switch have an IEC C15 connector on the outlet end of the cord and a country specific plug on the inlet end of the cord.

The following table lists the supported power cords and power plugs for the switch:

Table 12: Supported Power Cords and Power Plugs

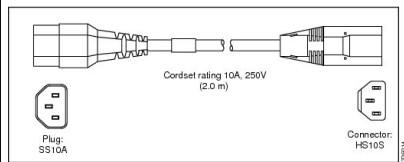| Locale	Power Cord Part Number	Source Plug Type	Length	Power Plug Reference Illustration
Argentina	CAB-9K10A-AR	IRAM 2073 plug (10 A)	8.2 ft (2.5 m)	
Australia	CAB-9K10A-AU	SAA/3 plug, AS 3112-1993 (10 A)	8.2 ft (2.5 m)	
China	CAB-9K10A-CH	GB1002 (10A)	8.2 ft (2.5 m)	
Europe	CAB-9K10A-EU	VIIG Plug, CEE (7) VII (16 A)	8.2 ft (2.5 m)	
Israel	CAB-9K10A-ISR	SI 32 Part 1.01 (16A)	14 ft (4.27 m)	
Italy	CAB-9K10A-IT	1/3G plug, CEI 23-16 (10 A)	8.2 ft (2.5 m)	
Korea	CAB-9K10A-KOR	CEE 7 Standard Sheet VII (16A)	8.2 ft (2.5 m)	

Locale	Power Cord Part Number	Source Plug Type	Length	Power Plug Reference Illustration
South Africa	CAB-9K10A-SA	EL 208, SABS 164-1 (10 A)	5.12 ft (1.82 m)	
Switzerland	CAB-9K10A-SW	12G SEV 1011 (10 A)	8.2 ft (2.5 m)	
Taiwan	CAB-9K10A-TWN	CNS 10917-2 & CNS 690 (15A)	13.12 ft (4 m)	
United Kingdom	CAB-9K10A-UK	BS89/13, BS 1363/A (13 A; replaceable fuse)	8.2 ft (2.5 m)	
North America	CAB-9K12A-NA	NEMA 5-15P plug (15 A)	8.2 ft (2.5 m)	
Brazil	CAB-250V-10A-BR	NBR 14136 (10A)	7 ft (2.13 m)	

Jumper Power Cords

Jumper power cords have an IEC C15 connector on the outlet end of the cord and an IEC C14 connector on the inlet end of the cord. This cord is compatible with IEC C13 outlet receptacles. This type of outlet receptacle is commonly used for power distribution inside cabinets.

The following table lists the supported jumper power cords and power plugs for the switch.

Table 13: Supported Jumper Power Cords

Description	Plug Type	Length	Illustration
CAB-C13-C14-2M	IEC C14 (250 VAC 10 A)	6.6 ft (2.0 m)	

Description	Plug Type	Length	Illustration
CAB-C13-C14-3M	IEC C14 (250 VAC 10 A)	9.8 ft (3.0 m)	

HVAC/HVDC Power Cord

Table 14: Power Cable Specifications for HVAC/HVDC Power Supplies

Power Type	Power Cord	Description
HVAC	CAB-HVAC-C14-2M	6.6 feet (2.0 m) cable with Saf-D-Grid and C14 connector (use for up to 240 V)

The following figure shows the power cord used with the 1.20-KW HVAC/HVDC Power Supply Unit:
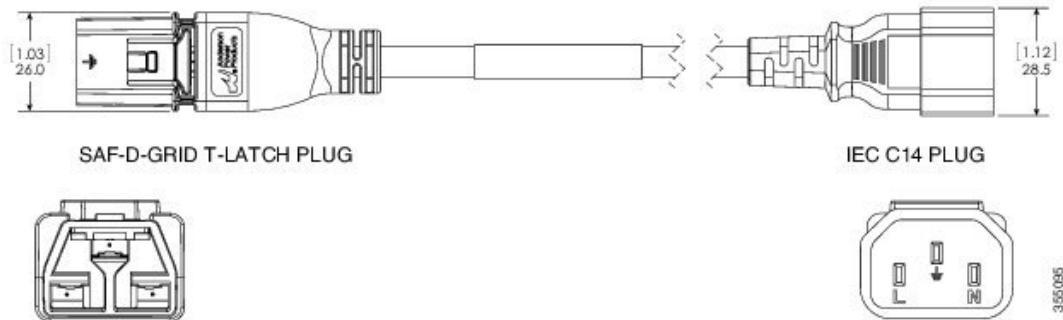
Fibre Cable Specifications

For information on the fibre cable specifications, see the Cisco MDS 9000 Family Pluggable Transceivers Data Sheet.