



## **Cisco Nexus 9372PX and 9372PX-E NX-OS-Mode Switches Hardware Installation Guide**

**First Published:** September 30, 2014

**Last Modified:** November 17, 2015

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## Audience

This publication is for hardware installers and network administrators who install, configure, and maintain Cisco Nexus switches.

## Documentation Conventions

Command descriptions use the following conventions:

Convention	Description
<b>bold</b>	Bold text indicates the commands and keywords that you enter literally as shown.
<i>Italic</i>	Italic text indicates arguments for which the user supplies the values.
[x]	Square brackets enclose an optional element (keyword or argument).
[x   y]	Square brackets enclosing keywords or arguments separated by a vertical bar indicate an optional choice.
{x   y}	Braces enclosing keywords or arguments separated by a vertical bar indicate a required choice.

Convention	Description
[x {y   z}]	Nested set of square brackets or braces indicate optional or required choices within optional or required elements. Braces and a vertical bar within square brackets indicate a required choice within an optional element.
<i>variable</i>	Indicates a variable for which you supply values, in context where italics cannot be used.
string	A nonquoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks.

Examples use the following conventions:

Convention	Description
<code>screen font</code>	Terminal sessions and information the switch displays are in screen font.
<b><code>boldface screen font</code></b>	Information you must enter is in boldface screen font.
<i><code>italic screen font</code></i>	Arguments for which you supply values are in italic screen font.
<>	Nonprinting characters, such as passwords, are in angle brackets.
[ ]	Default responses to system prompts are in square brackets.
!, #	An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line.

## Related Documentation for Cisco Nexus 9000 Series NX-OS Software

The entire Cisco NX-OS 9000 Series documentation set is available at the following URL:

[http://www.cisco.com/en/US/products/ps13386/tsd\\_products\\_support\\_series\\_home.html](http://www.cisco.com/en/US/products/ps13386/tsd_products_support_series_home.html)

### Release Notes

The release notes are available at the following URL:

[http://www.cisco.com/en/US/products/ps13386/prod\\_release\\_notes\\_list.html](http://www.cisco.com/en/US/products/ps13386/prod_release_notes_list.html)

### Configuration Guides

These guides are available at the following URL:

[http://www.cisco.com/en/US/products/ps13386/products\\_installation\\_and\\_configuration\\_guides\\_list.html](http://www.cisco.com/en/US/products/ps13386/products_installation_and_configuration_guides_list.html)



The documents in this category include:

- *Cisco Nexus 2000 Series NX-OS Fabric Extender Software Configuration Guide for Cisco Nexus 9000 Series Switches*
- *Cisco Nexus 9000 Series NX-OS Fundamentals Configuration Guide*
- *Cisco Nexus 9000 Series NX-OS High Availability and Redundancy Guide*
- *Cisco Nexus 9000 Series NX-OS Interfaces Configuration Guide*
- *Cisco Nexus 9000 Series NX-OS Layer 2 Switching Configuration Guide*
- *Cisco Nexus 9000 Series NX-OS Multicast Routing Configuration Guide*
- *Cisco Nexus 9000 Series NX-OS Quality of Service Configuration Guide*
- *Cisco Nexus 9000 Series NX-OS Security Configuration Guide*
- *Cisco Nexus 9000 Series NX-OS System Management Configuration Guide*
- *Cisco Nexus 9000 Series NX-OS Unicast Routing Configuration Guide*
- *Cisco Nexus 9000 Series NX-OS Verified Scalability Guide*
- *Cisco Nexus 9000 Series NX-OS VXLAN Configuration Guide*

#### **Other Software Documents**

- *Cisco Nexus 7000 Series and 9000 Series NX-OS MIB Quick Reference*
- *Cisco Nexus 9000 Series NX-OS Programmability Guide*
- *Cisco Nexus 9000 Series NX-OS Software Upgrade and Downgrade Guide*
- *Cisco Nexus 9000 Series NX-OS System Messages Reference*
- *Cisco Nexus 9000 Series NX-OS Troubleshooting Guide*
- *Cisco NX-OS Licensing Guide*
- *Cisco NX-OS XML Interface User Guide*

#### **Hardware Documents**

- *Cisco Nexus 3000 Series Hardware Installation Guide*
- *Cisco Nexus 93120TX NX-OS-Mode Switch Hardware Installation Guide*
- *Cisco Nexus 93128TX NX-OS-Mode Switch Hardware Installation Guide*
- *Cisco Nexus 9332PQ NX-OS-Mode Switch Hardware Installation Guide*
- *Cisco Nexus 9372PX NX-OS-Mode Switch Hardware Installation Guide*
- *Cisco Nexus 9372TX NX-OS-Mode Switch Hardware Installation Guide*
- *Cisco Nexus 9396PX NX-OS-Mode Switch Hardware Installation Guide*
- *Cisco Nexus 9396TX NX-OS-Mode Switch Hardware Installation Guide*
- *Cisco Nexus 9504 NX-OS-Mode Switch Hardware Installation Guide*

- *Cisco Nexus 9508 NX-OS-Mode Switch Hardware Installation Guide*
- *Cisco Nexus 9516 NX-OS-Mode Switch Hardware Installation Guide*
- *Regulatory, Compliance, and Safety Information for the Cisco Nexus 3000 and 9000 Series*

## Documentation Feedback

To provide technical feedback on this document, or to report an error or omission, please send your comments to [nexus9k-docfeedback@cisco.com](mailto:nexus9k-docfeedback@cisco.com). We appreciate your feedback.

## 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*, at: <http://www.cisco.com/c/en/us/td/docs/general/whatsnew/whatsnew.html>.

Subscribe to *What's New in Cisco Product Documentation*, which lists all new and revised Cisco technical documentation as an RSS feed and delivers content directly to your desktop using a reader application. The RSS feeds are a free service.



## Overview

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## Overview

The Cisco Nexus 9372PX and 9372PX-E switches (N9K-C9372PX and N9K-C9372PX-E) are 1 rack unit (RU) switches that support 48 1- and 10-Gigabit SFP+ downlink ports, six 40-Gigabit QSFP+ uplink ports, one 100/1000 network management ports, one RS-232 console port for setting the initial switch configuration, and two USB ports for saving or loading switch configurations. The chassis for these switches include the following user-replaceable components:

- Fan modules (four) with the following airflow choices:
  - Port-side exhaust fan module with blue coloring (NXA-FAN-30CFM-F)
  - Port-side intake fan module with burgundy coloring (NXA-FAN-30CFM-B)
- Power supply modules (two—one for operations and one for redundancy [1+1]) with the following choices:
  - 1200-W HVAC/HVDC dual-direction airflow power supply with white coloring (N9K-PUV-1200W)
  - 650-W port-side intake AC power supply with burgundy coloring (N9K-PAC-650W)
  - 650-W port-side exhaust AC power supply with blue coloring (N9K-PAC-650W-B)
  - 930-W port-side intake DC power supply with green coloring (UCSC-PSU-930WDC)
  - 930-W port-side exhaust DC power supply with gray coloring (UCS-PSU-6332-DC)



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**Note**

You can use the power supply types interchangeably so long as they have the same direction of airflow as the fan modules. If you are using the 1200-W HVAC/HVDC power supply, the power supply automatically uses the same airflow direction as used by the other modules in the switch.

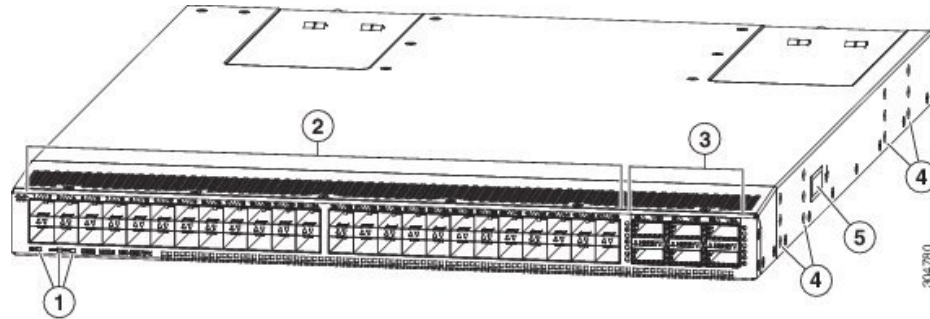
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This switch supports connections to the following Fabric Extenders (FEXs):

- Cisco Nexus 2348UPQ
- Cisco Nexus 2348TQ
- Cisco Nexus 2332TQ
- Cisco Nexus 2248TP-E
- Cisco Nexus 2248TP
- Cisco Nexus 2248PQ
- Cisco Nexus 2232TM-E
- Cisco Nexus 2232TM FEX
- Cisco Nexus 2232PP
- Cisco Nexus 2224TP
- B22DELL-P
- B22F
- B22HP FEX
- B22IBM-P

The following figure shows the switch features on the port side of the chassis.

**Figure 1: Chassis Features on the Port Side of the Chassis**

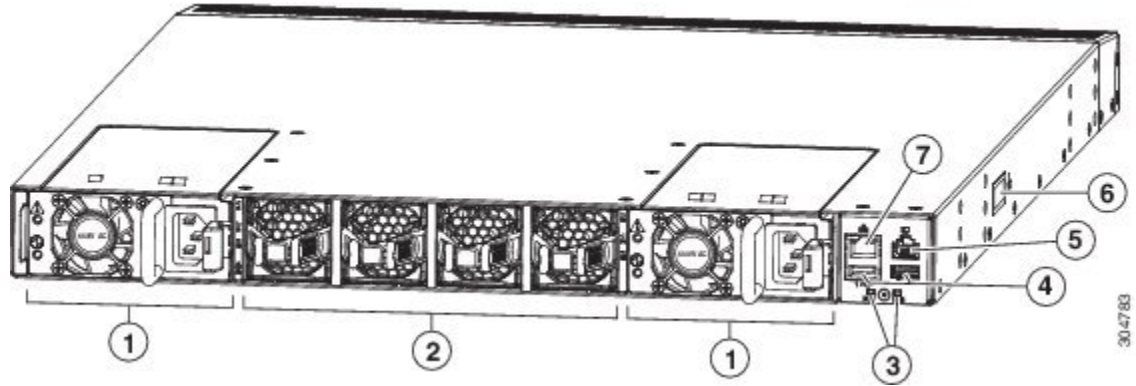


1	Beacon (BCN), Status (STS), and Environment (ENV) LEDs	4	Screw holes for mounting brackets
2	1- and 10-Gigabit SFP+ interface ports (48)	5	Grounding pad
3	QSFP+ 40-Gigabit interface ports (6)		

To determine which transceivers, adapters, and cables are supported by this switch, see the [Cisco Transceiver Modules Compatibility Information](#) document.

The following figure shows the switch features on the power supply side of the chassis.

**Figure 2: Chassis Features on the Power Supply Side of the Chassis**



1	Power supply modules (1 or 2) (AC power supplies shown) with slots numbered 1 (left) and 2 (right)	5	Console port (1)
2	Fan modules (4) with slots numbered from 1 (left) and 4 (right)	6	Grounding pad
3	Beacon (BCN) and Status (STS) LEDs	7	Management port (1)
4	USB ports (2)		

You can use the 1- and 10-Gigabit ports to connect this switch to up to 48 devices or to Nexus 2000 Series FEXs, which can be connected to additional servers (for the number of FEXs that can be supported, see the release notes for the NX-OS software that you are using). You can connect any of the supported FEXs to the downlink ports.

For installation information on the Cisco Nexus 2000 Series FEXs, see the *Cisco Nexus 2000 Series Hardware Installation Guide*. For information on a B22 FEX, see the Getting Started Guide for that FEX model.

Depending on whether you plan to position the ports in a hot or cold aisle, you can order the fan and power supply modules with port-side intake or port-side exhaust airflow. For port-side intake airflow, the fan and AC power supply modules have burgundy coloring (DC power supply modules have green coloring). For port-side exhaust airflow, the fan and AC power supplies have blue coloring (DC power supply modules have gray coloring). You can also order the 1200-W HVAC/HVDC power supply which has dual-direction airflow with white coloring. Dual-direction airflow modules automatically use the airflow direction of the other modules installed in the switch.

The fan and power supply modules are field replaceable and you can replace one fan module or one power supply module during operations so long as the other modules are installed and operating. If you have only one power supply installed, you can install the replacement power supply in the open slot before removing the original power supply.

**Note**

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All of the fan and power supply modules must have the same direction of airflow. Otherwise, the switch can overheat and shut down. If you are installing a dual-direction power supply, that module will automatically use the same airflow direction as the other modules in the switch.

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**Caution**

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If the switch has port-side intake airflow (burgundy coloring for fan modules), you must locate the ports in the cold aisle. If the switch has port-side exhaust airflow (blue coloring for fan modules), you must locate the ports in the hot aisle. If you locate the air intake in a hot aisle, the switch can overheat and shut down.

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## Preparing the Site

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- [Temperature Requirements, page 5](#)
- [Humidity Requirements, page 5](#)
- [Altitude Requirements, page 6](#)
- [Dust and Particulate Requirements, page 6](#)
- [Minimizing Electromagnetic and Radio Frequency Interference, page 6](#)
- [Shock and Vibration Requirements, page 7](#)
- [Grounding Requirements, page 7](#)
- [Planning for Power Requirements, page 7](#)
- [Airflow Requirements, page 8](#)
- [Rack and Cabinet Requirements, page 9](#)
- [Clearance Requirements, page 10](#)

### Temperature Requirements

The switch requires an operating temperature of 32 to 104° F (0 to 40° C). If the switch is not operating, the temperature must be between –40 to 158° F (–40 to 70° C).

### Humidity Requirements

High humidity can cause moisture to enter the switch. Moisture can cause corrosion of internal components and degradation of properties such as electrical resistance, thermal conductivity, physical strength, and size. The switch is rated to operate at 8 to 80 percent relative humidity, with a humidity gradation of 10 percent per hour. For nonoperating conditions, the switch can withstand from 5 to 95 percent relative humidity. Buildings in which the climate is controlled by air-conditioning in the warmer months and by heat during the colder months usually maintain an acceptable level of humidity for the switch equipment. However, if the switch is located in an unusually humid location, you should use a dehumidifier to maintain the humidity within an acceptable range.

## Altitude Requirements

If you operate a switch at a high altitude (low pressure), the efficiency of forced and convection cooling is reduced and can result in electrical problems that are related to arcing and corona effects. This condition can also cause sealed components with internal pressure, such as electrolytic capacitors, to fail or to perform at a reduced efficiency. This switch is rated to operate at altitudes from –500 to 13,123 feet (–152 to 4,000 meters). You can store the switch at altitudes of –1,000 to 30,000 feet (–305 to 9,144 meters).

## Dust and Particulate Requirements

Exhaust fans cool power supplies and system fans cool switches by drawing in air and exhausting air out through various openings in the chassis. However, fans also ingest dust and other particles, causing contaminant buildup in the switch and increased internal chassis temperature. A clean operating environment can greatly reduce the negative effects of dust and other particles, which act as insulators and interfere with the mechanical components in the switch.

In addition to regular cleaning, follow these precautions to avoid contamination of your switch:

- Do not permit smoking near the switch.
- Do not permit food or drink near the switch.

## Minimizing Electromagnetic and Radio Frequency Interference

Electromagnetic interference (EMI) and radio frequency interference (RFI) from the switch can adversely affect other devices such as radio and television (TV) receivers operating near the switch. Radio frequencies that emanate from the switch can also interfere with cordless and low-power telephones. Conversely, RFI from high-power telephones can cause spurious characters to appear on the switch monitor.

RFI is defined as any EMI with a frequency above 10 kHz. This type of interference can travel from the switch to other devices through the power cable and power source or through the air as transmitted radio waves. The Federal Communications Commission (FCC) publishes specific regulations to limit the amount of EMI and RFI that can be emitted by computing equipment. Each switch meets these FCC regulations.

To reduce the possibility of EMI and RFI, follow these guidelines:

- Cover all open expansion slots with a blank filler plate.
- Always use shielded cables with metal connector shells for attaching peripherals to the switch.

When wires are run for any significant distance in an electromagnetic field, interference can occur between the field and the signals on the wires with the following implications:

- Bad wiring can result in radio interference emanating from the plant wiring.
- Strong EMI, especially when it is caused by lightning or radio transmitters, can destroy the signal drivers and receivers in the chassis and even create an electrical hazard by conducting power surges through lines into equipment.



**Note**

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To predict and prevent strong EMI, you might need to consult experts in radio frequency interference (RFI).

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The wiring is unlikely to emit radio interference if you use twisted-pair cable with a good distribution of grounding conductors. If you exceed the recommended distances, use a high-quality twisted-pair cable with one ground conductor for each data signal when applicable.

**Caution**

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If the wires exceed the recommended distances, or if wires pass between buildings, give special consideration to the effect of a lightning strike in your vicinity. The electromagnetic pulse caused by lightning or other high-energy phenomena can easily couple enough energy into unshielded conductors to destroy electronic switches. You might want to consult experts in electrical surge suppression and shielding if you had similar problems in the past.

---

## Shock and Vibration Requirements

The switch has been shock- and vibration-tested for operating ranges, handling, and earthquake standards.

## Grounding Requirements

The switch is sensitive to variations in voltage supplied by the power sources. Overvoltage, undervoltage, and transients (or spikes) can erase data from the memory or cause components to fail. To protect against these types of problems, ensure that there is an earth-ground connection for the switch. You can connect the grounding pad on the switch either directly to the earth-ground connection or to a fully bonded and grounded rack.

You must provide the grounding cable to make this connection, but you can connect the grounding wire to the switch using a grounding lug that ships with the switch. Size the grounding wire to meet local and national installation requirements. Depending on the power supply and system, a 12-AWG to 6-AWG copper conductor is required for U.S. installations (for those installations, we recommend that you use commercially available 6-AWG wire). The length of the grounding wire depends on the proximity of the switch to proper grounding facilities.

**Note**

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You automatically ground the power supplies when you connect them to power sources. You must also connect the chassis to the facility earth ground.

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## Planning for Power Requirements

The switch includes two power supplies (1-to-1 redundancy with current sharing) in one of the following combinations (all power supplies must have the same airflow direction as the fan modules):

- Two 1200-W HVAC/HVDC power supplies

- Two 650-W AC power supplies
- Two 930-W DC power supplies
- Any combination of the above power supplies

**Note**

For  $n+1$  redundancy, you must provide power to both power supplies. For  $n+n$  redundancy, you must provide power to both power supplies and each power supply must be connected to a different power source.

The power supplies are rated to output up to 650 W (AC power supplies), up to 1200 W (HVAC/HVDC power supplies), or up to 930 W (DC power supplies), but the switch requires less than those amounts of power from the power supply. To operate the switch you must provision enough power from the power source to cover the requirements of both the switch and a power supply. Typically, this switch and a power supply require about 210 W of power input from the power source, but you must provision as much as 537 W power input from the power source to cover peak demand.

To minimize the possibility of circuit failure, make sure that each power-source circuit used by the switch is dedicated to the switch.

**Note**

For the AC power cables that you can use with this switch, see [Power Cord Specifications](#), on page 45. For DC power cables, the recommended wire gauge is 8 AWG and the minimum wire gauge is 10 AWG.

## Airflow Requirements

The switch is designed to be positioned with its ports in either the front or the rear of the rack depending on your cabling and maintenance requirements. Depending on which side of the switch faces the cold aisle, you must have fan and power supply modules that move the coolant air from the cold aisle to the hot aisle in one of the following ways:

- Port-side exhaust airflow—Coolant air enters the chassis through the fan and power supply modules in the cold aisle and exhausts through the port end of the chassis in the hot aisle.
- Port-side intake airflow—Coolant air enters the chassis through the port end in the cold aisle and exhausts through the fan and power supply modules in the hot aisle.
- Dual-direction airflow—airflow direction is determined by the airflow direction of the installed fan modules.

You can identify the airflow direction of each fan and power supply module by its coloring as follows:

- Blue coloring indicates port-side exhaust airflow.
- Burgundy coloring indicates port-side intake airflow.
- Gray coloring on DC power supplies indicates port-side exhaust airflow.
- Green coloring on DC power supplies indicates port-side intake airflow.
- White coloring on HVAC/HVDC power supplies indicates dual-direction airflow.

**Note**

To prevent the switch from overheating and shutting down, you must position the air intake for the switch in a cold aisle, and all of the fan and power supply modules must have the same direction of airflow (even if their coloring is different).

## Rack and Cabinet Requirements

You can install the following types of racks or cabinets for your switch:

- Standard perforated cabinets
- Solid-walled cabinets with a roof fan tray (bottom-to-top cooling)
- Standard open four-post Telco racks

To correctly install the switch in a cabinet that is located in a hot-aisle/cold-aisle environment, you should fit the cabinet with baffles to prevent exhaust air from recirculating into the chassis air intake.

Work with your cabinet vendors to determine which of their cabinets meet the following requirements or see the Cisco Technical Assistance Center (TAC) for recommendations:

- Use a standard 19-inch (48.3-cm), four-post Electronic Industries Alliance (EIA) cabinet or rack with mounting rails that conform to English universal hole spacing per section 1 of the ANSI/EIA-310-D-1992 standard.
- The depth of a four-post rack must be 24 to 32 inches (61.0 to 81.3 cm) between the front and rear mounting brackets.
- Required clearances between the chassis and the edges of its rack or the interior of its cabinet are as follows:
  - 4.5 inches (11.4 cm) between the front of the chassis and the interior of the cabinet (required for cabling).
  - 3.0 inches (7.6 cm) between the rear of the chassis and the interior of the cabinet (required for airflow in the cabinet if used).
  - No clearance is required between the chassis and the sides of the rack or cabinet (no side airflow).

Additionally, you must have power receptacles located within reach of the power cords used with the switch. For the power cord specifications, see the [Power Cord Specifications](#).

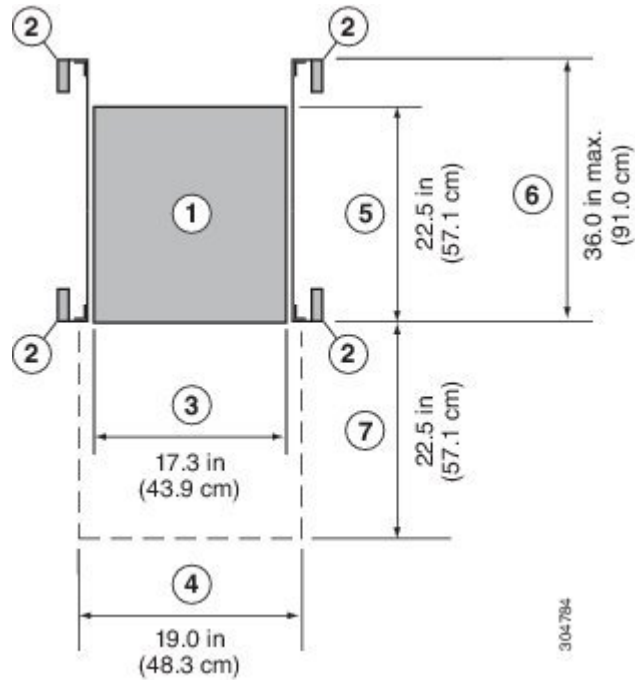
**Warning****Statement 1048—Rack Stabilization**

Stability hazard. The rack stabilizing mechanism must be in place, or the rack must be bolted to the floor before you slide the unit out for servicing. Failure to stabilize the rack can cause the rack to tip over.

# Clearance Requirements

You must provide the chassis with adequate clearance between the chassis and any other rack, device, or structure so that you can properly install the chassis, route cables, provide airflow, and maintain the switch. For the clearances required for an installation of this chassis in a four-post rack, see the following figure.

**Figure 3: Clearances Required for a Four-Post Rack Installation**



1	Chassis	5	Depth of the chassis
2	Vertical rack-mount posts and rails	6	Maximum extension of the bottom-support rails
3	Chassis width	7	Depth of the front clearance area (this equals the depth of the chassis)
4	Width of the front clearance area (this equals the width of the chassis with two rack-mount brackets attached to it)		



**Note**

Both the front and rear of the chassis must be open to both aisles for airflow.



## Installing the Switch Chassis

- [Safety, page 11](#)
- [Installation Options with Racks and Cabinets, page 12](#)
- [Airflow Considerations, page 12](#)
- [Installation Guidelines, page 12](#)
- [Unpacking and Installing the Switch, page 13](#)
- [Installing the Switch, page 14](#)
- [Grounding the Chassis, page 19](#)
- [Starting the Switch, page 21](#)

### Safety

Before you install, operate, or service the switch, see the *Regulatory, Compliance, and Safety Information for the Cisco Nexus 3000 and 9000 Series* for important Safety Information.



#### Warning

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#### Statement 1071—Warning Definition

##### IMPORTANT SAFETY INSTRUCTIONS

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.

##### SAVE THESE INSTRUCTIONS

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#### Statement 1017—Restricted Area

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 1030—Equipment Installation

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

# Installation Options with Racks and Cabinets

You can install the switch in the following types of racks using the rack-mount kit shipped with the switch:

- Open EIA rack
- Perforated EIA cabinet

The rack or cabinet that you use must meet the requirements listed in [General Requirements for Cabinets and Racks](#), on page 41

The rack-mount kit enables you to install the switch into racks of varying depths. You can use the rack-mount kit parts to position the switch with easy access to either the port connections end of the chassis or the end of the chassis with the fan and power supply modules. For instructions on how to install the rack-mount kit, see the [Installing the Switch](#), on page 14.

## Airflow Considerations

The switch comes with fan and power supply modules that have either port-side intake or port-side exhaust airflow for cooling the switch. If you are positioning the port end of the switch in a cold aisle, make sure that the switch has port-side intake fan modules with burgundy coloring. If you are positioning the fan and power supply modules in a cold aisle, make sure that the switch has port-side exhaust fan modules with blue colorings.

## Installation Guidelines

When installing the switch, follow these guidelines:

- Record equipment and installation information in the forms presented in [Chassis and Module Information](#) as you install and configure the switch.
- Ensure that there is adequate space around the switch to allow for servicing the switch and for adequate airflow (see [Clearance Requirements](#), on page 10).
- 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. If there is blue coloring on the fan modules, the switch is configured for port-side exhaust airflow and you must position the module side of the switch in a cold aisle. If there is burgundy coloring on the fan modules, the switch is configured for port-side intake airflow and you must position the port of the switch in a cold aisle.
- Ensure that the chassis can be adequately grounded. If the switch is not mounted in a grounded rack, we recommend connecting both the system ground on the chassis directly to an earth ground.
- Ensure that the site power meets the power requirements listed in [System Specifications](#). If available, you can use an uninterruptible power supply (UPS) to protect against power failures.



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**Caution**

Avoid UPS types that use ferroresonant technology. These UPS types can become unstable with the switch, which can have substantial current draw fluctuations because of fluctuating data traffic patterns.

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- Ensure that circuits are sized according to local and national codes. Typically, this often requires one or both of the following:
  - AC power supplies typically require at least a 15-A or 20-A AC circuit.
  - DC power supplies require the following:
    - DC input voltage range of –48 to –60 VDC nominal (self-ranging, –40 to –72 VDC)
    - DC line input current (steady state) of 23 A peak at –48 VDC

**Caution**

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

## Unpacking and Installing the Switch

Before you install the switch, be sure to unpack and inspect the switch for damage or missing components. If anything is missing or damaged, contact your customer service representative immediately.

**Tip**

Keep the shipping container in case the chassis requires shipping at a later time.

### Before You Begin

Before you unpack the switch and before you handle any switch components, be sure that you are wearing a grounded electrostatic discharge (ESD) strap. To ground the strap, attach it directly to an earth ground or to a grounded rack or grounded chassis (there must be a metal-to-metal connection to the earth ground).

### Step 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:

- Accessory kit, which includes the following:
  - Rack Mount kit
    - Front-mount angled brackets (2)
    - Rear-mount slider brackets (2)
    - Slider rails (2)
    - M4 x 7 mm mounting screws (16)
  - Ground lug kit
  - Console cable
  - EAC Compliance document
  - DCNM DVD

- Step 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
- Step 3** Check to be sure that each of the power supply and the fan tray modules have the expected direction of airflow as follows:
- Port-side intake airflow modules
    - Red (fan modules and AC power supplies)
    - Green (DC power supplies)
  - Port-side exhaust airflow modules
    - Blue (fan modules and AC power supplies)
    - Gray (DC power supplies)
  - If the power supplies have white coloring, look at the fan modules to determine the airflow direction.
- 

## Installing the Switch

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



---

**Note** You must supply the eight 10-32 or 12-24 screws required to mount the slider rails and switch to the rack.

---

### Before You Begin

- You have inspected the switch shipment to ensure that you have everything ordered.
- Make sure that the switch rack-mount kit includes the following parts:
  - Front rack-mount brackets (2)
  - Rear rack-mount brackets (2)
  - Slider rails (2)
  - M4 x 0.7 x 8-mm Phillips countersink screws (12)



- The rack is installed and secured to its location

**Step 1**

Install two front-mount brackets to the switch as follows:

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

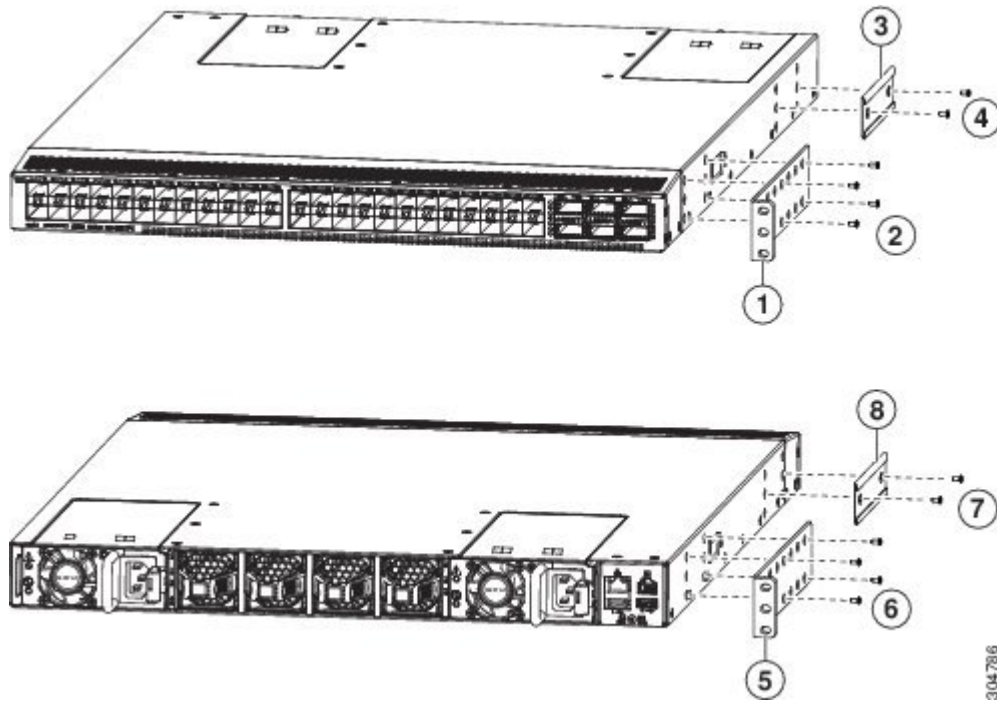
- If the switch has port-side intake modules (fan modules with burgundy coloring), position the switch so that its ports will be in the cold aisle.
- If the switch has port-side exhaust modules (fan modules with blue coloring), position the switch so that its fan and power supply modules will be in the cold aisle.

**Note** If the power supply modules have white coloring, look at the fan modules to determine the airflow direction for the switch.

b) Position a front-mount bracket so that four of its screw holes are aligned to the screw holes on the side of the chassis.

**Note** You can align any four of the holes in the front rack-mount bracket to four of the six screw holes on the side of the chassis (see the following figure). The holes that you use depend on the requirements of your rack and the amount of clearance required for interface cables (3 inches [7.6 mm] minimum) and module handles (1 inch [2.5 mm] minimum).

**Figure 4: Two Ways to Attach Rack-Mount Brackets and Guides on the Switch**



1	Front rack-mount bracket aligned to the module end of the chassis	5	Front rack-mount bracket aligned to the port connections end of the chassis
---	---	---	---

2	Four M4 screws used to attach the bracket to the chassis	6	Four M4 screws used to attach the bracket to the chassis
3	Rear rack-mount guide aligned to the port connection end of the chassis	7	Rear rack-mount guide aligned to the mobile end of the chassis
4	Two M4 screws used to attach the bracket to the chassis	8	Two M4 screws used to attach the bracket to the chassis

- c) Secure the front-mount bracket to the chassis using four M4 screws and tighten each screw to 12 in-lb (1.36 N·m) of torque.
- d) Repeat Step 1 for the other front rack-mount bracket on the other side of the switch and be sure to position that bracket the same distance from the front of the switch.

**Step 2**

Install the two rear rack-mount brackets on the chassis as follows:

- a) Align the two screw holes on a rear rack-mount bracket to the middle two screw holes in the remaining six screw holes on a side of the chassis. If you are aligning the guide to holes that are near the port connections end of the chassis, see Callout 3 in the previous figure. Otherwise, see Callout 7 in the previous figure.
- b) Attach the guide to the chassis using two M4 screws (see Callout 4 or 8 in the previous figure). Tighten the screws to 12 in-lb (1.36 N·m) of torque.
- c) Repeat Step 2 for the other rear rack-mount bracket on the other side of the switch.

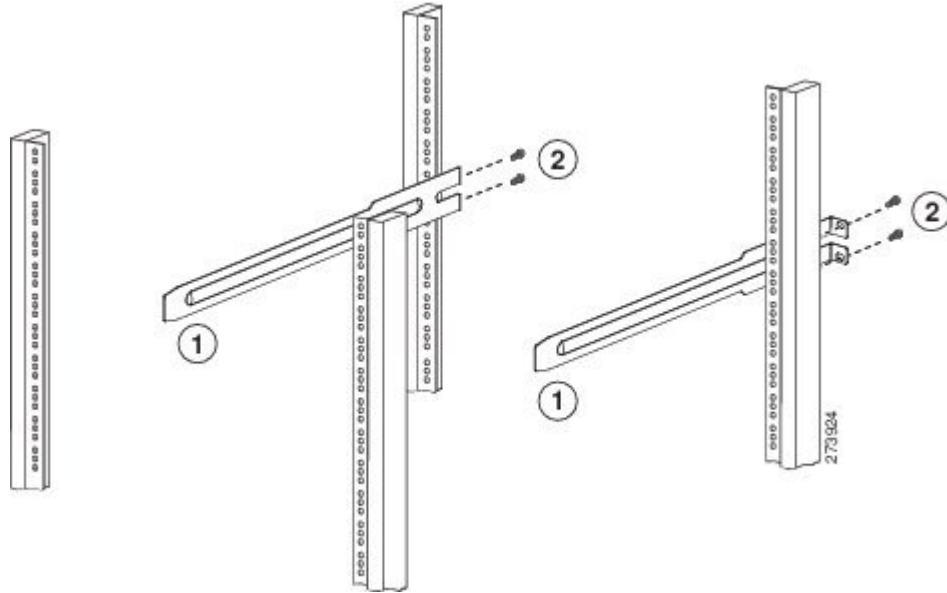
**Step 3**

Install the slider rails on 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 front mount brackets attached to the easiest accessed end of the chassis, and the other two posts will have the slider rails.

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

**Figure 5: Installing the Slider Rails**



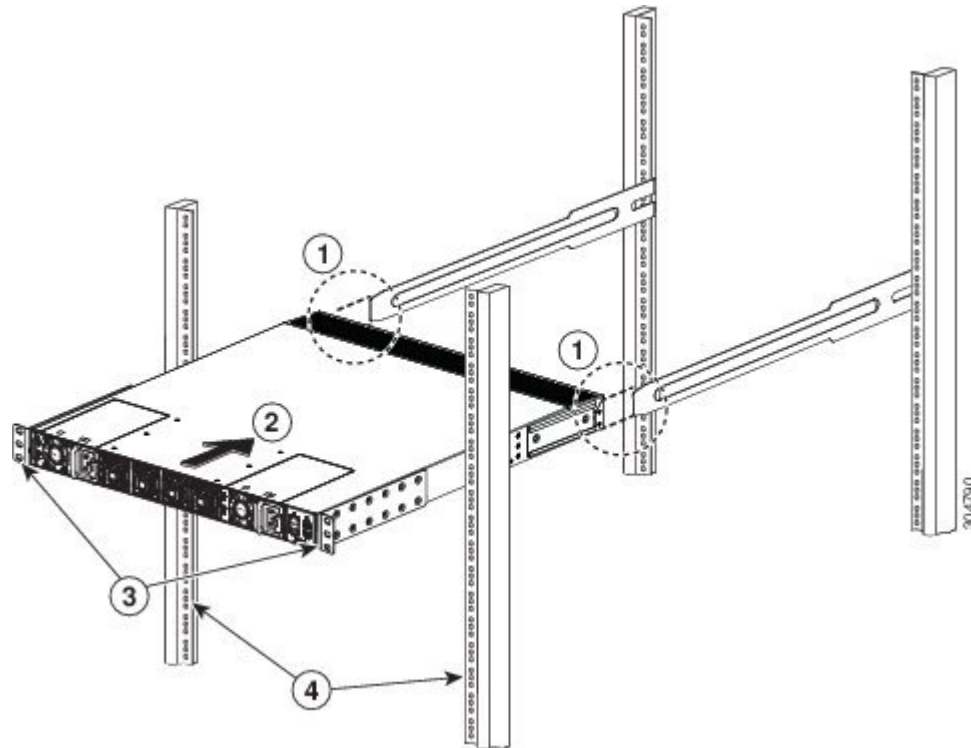
1	Slider rail with screw holes aligned to screw holes in rack	2	Two customer-supplied 12-24 or 10-32 screws used to attach each slider rail to the rack
---	---	---	---

- c) Repeat Step 3 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, tape measure, or carefully count the screw holes in the vertical mounting rails.

**Step 4** Insert the switch into the rack and attach it as follows:

- a) Holding the switch with both hands, position the two rear rack-mount brackets on the switch between the rack or cabinet posts that do not have slider rails attached to them (see the following figure).

**Figure 6: Sliding the Chassis into the Rack**

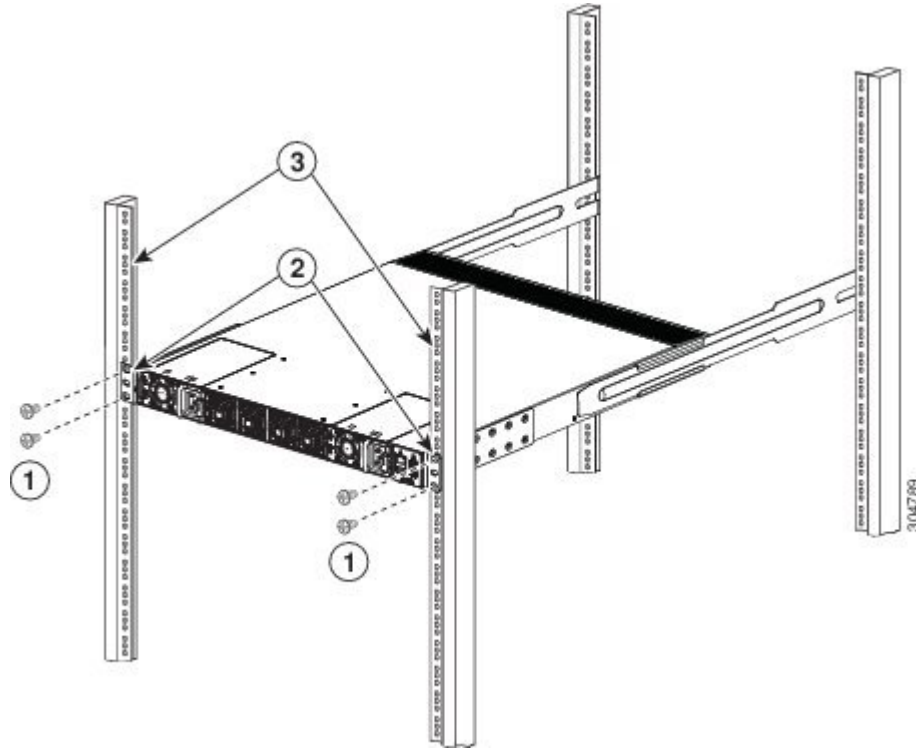


1	Align the two rear rack-mount bracket guides with the slider rails installed in the rack.	3	Front-mount brackets.
2	Slide the rack-mount guides onto the slider rails until the front rack-mount brackets come in contact with the front rack-mount rails.	4	Mounting rails on rack or cabinet posts.

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

- c) Holding the chassis level, insert two screws (12-24 or 10-32, depending on the rack type) in each of the two front rack-mount brackets (using a total of four screws) and into the cage nuts or threaded holes in the vertical rack-mounting rails (see the following figure).

**Figure 7: Attaching the Switch to the Rack**



1	Fasten the chassis to the front of the rack with two 12-24 or 10-32 screws on each side.	3	Mounting rails on rack or cabinet posts.
2	Front-mount bracket.		

- 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).

## Grounding the Chassis

The switch is grounded when you connect the chassis and the power supplies to the earth ground in both of the following ways:

- You connect the chassis (at its grounding pad) to the data center ground. If the rack is fully-bonded and grounded, you can ground the switch by connecting it to the data center ground indirectly through the rack. Otherwise, you must connect the chassis directly to the data center ground.




---

**Note** The chassis ground connection is active even when the power supply modules have not been grounded or connected to the switch.

---

- You connect each power supply to the data center ground.
  - AC power supplies are automatically grounded when you connect the power supply to an AC power source (see [Powering Up the Switch](#)).
  - DC power supplies are grounded when you connect the ground cable to the power source ground terminal while also connecting the positive and negative wires to their power source terminals (see [Powering Up the Switch](#)).




---

**Warning** **Statement 1024**—Ground Conductor

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.

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**Warning** **Statement 1046**—Installing or Replacing the Unit

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

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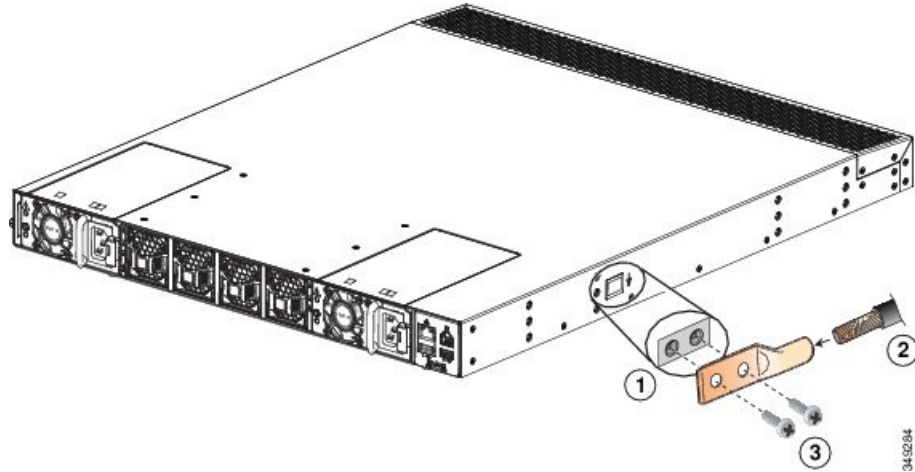
**Before You Begin**

Before you can ground the chassis, you must have a connection to the earth ground for the data center building. If you installed the switch chassis into a bonded rack (see the rack manufacturer's instructions for more information) that now has a connection to the data center earth ground, you can ground the chassis by connecting its grounding pad to the rack. Otherwise, you must connect the chassis grounding pad directly to the data center ground.

- 
- Step 1** Use a wire-stripping tool to remove approximately 0.75 inch (19 mm) 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 (see Callout 2 in the following figure). Verify that the ground wire is securely attached to the grounding lug by attempting to pull the wire out of the crimped lug.

**Figure 8: Grounding the Chassis**



1	Chassis grounding pad	3	Two M4 screws used to secure the grounding lug to the chassis
2	Grounding cable, with 0.75 in. (19 mm) of insulation stripped from one end, inserted into the grounding lug and crimped in place		

- Step 3** Secure the grounding lug to the chassis grounding pad with two M4 screws (see Callouts 1 and 3 in the previous figure), and tighten the screws to 11 to 15 in-lb (1.24 to 1.69 N·m) of torque.
- 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 for the rack.

## Starting the Switch

You start the switch by connecting it to its dedicated power source. If you need  $n+1$  redundancy, you must connect each of the power supplies to one or two power sources. If you need  $n+n$  redundancy, you must connect each power supply in a switch to a different power source.

### Before You Begin

- The switch must be installed and secured to a rack or cabinet.

- The rack must be close enough to the dedicated power source so that you can connect the switch to the power source by using a designated power cables.
- You have a designated power cable for each power supply that you are connecting to the dedicated power source.




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**Note** Depending on the outlet receptacle on your AC power distribution unit, you might need an optional jumper power cord to connect the switch to your outlet receptacle.

---

- The switch is not connected to the network (this includes any management or interface connections).
- The fan and power supply modules are fully secured in their chassis slots.

All of the fan slots must be filled with fan modules. The power supply slots must have at least one power supply. If there is an open power supply slot, it must have a blank filler plate installed to preserve the designed airflow.

- Ensure that the switch is adequately grounded (see [Grounding the Chassis, on page 19](#)).

---

**Step 1** For each AC power supply, do the following:

- Using the recommended AC power cable for your country or region, connect one end to the AC power supply.
- Connect the other end to the AC power source.

**Step 2** For each DC power supply, do the following:

- Turn off the circuit breaker for the power source to avoid an electrical shock hazard.
- Verify that the power cable wires from the power source are connected to a connector block.  
If the positive, negative, and grounding wires from the power source are not connected to the connector block, see [Wiring a 48 V DC Electrical Connector Block, on page 37](#).
- Insert the connector block into the receptacle on the power supply. Make sure that the connector block clicks when fully inserted in the receptacle and does not pull out.
- If there is a safety cover for the terminals, place it over the terminals to avoid an electrical shock hazard.
- Turn on the power at the circuit breaker for the DC power source.

**Step 3** For each HVAC/HVDC power supply, connect it to a power source as follows:

- Using the recommended high voltage power cable for your country or region, connect the Anderson Power Saf-D-Grid connector on the power cable to the power receptacle on the power supply. Make sure that the connector clicks when fully pushed into the receptacle.
- Connect the other end of the power cable to a power source.
  - When connecting to an HVAC power source, insert the C14 or LS-25 plug in a receptacle for the HVAC power source.
  - When connecting to an HVDC power source, do the following:
    - Verify that the power is turned off at a circuit breaker for the power source terminals.
    - Remove the nuts from each of the terminal posts for the power supply.
    - Place the power cable negative-wire terminal ring on the negative terminal for the power source and secure them with a terminal nut.



- 4 Place the power cable positive-wire terminal ring on the positive terminal for the power source and secure them with a terminal nut.
- 5 Place the power cable ground-wire terminal ring on the ground terminal for the power source and secure them with a terminal nut.
- 6 Turn on the power at the power source circuit breaker.

**Step 4**

Verify that the power supply  LED is on and green.

**Step 5**

Listen for the fans; they should begin operating when the power supply is powered.

**Step 6**

After the switch boots, verify that the following LEDs are lit:

- On the fan modules, the Status (STA or STS) LED is green.  
If a fan module Status LED is not green, try reinstalling the fan module as described in [Replacing a Fan Module, on page 31](#).
- After initialization, the switch chassis Status (labeled as STA or STS) LED is green.
- The Link LEDs for the Ethernet connectors are lit if connected to interface cables.

**Step 7**

Verify that the system software has booted and the switch has initialized without error messages.

**Step 8**

Complete the worksheets provided in [Site Preparation and Maintenance Records](#) for future reference.

**Note**

A setup utility automatically launches the first time that you access the switch and guides you through the basic configuration. For instructions on how to configure the switch and check module connectivity, see the appropriate Cisco Nexus 93xxx configuration guide.

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## Connecting the Switch to the Network

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- [Connecting to the Network, page 25](#)
- [Preparing for Network Connections, page 25](#)
- [Connecting to a Console, page 26](#)
- [Connecting the Management Interface, page 27](#)
- [Connecting Interface Ports to Other Devices, page 27](#)

### Connecting to the Network

You need to connect the following ports when connecting the switch to the network:

- Console port—A direct local management connection used to initially configure the switch
- Management ports—An online management connection
- Uplink and downlink ports—Connections to hosts and servers



#### Caution

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When running power and data cables in overhead or subfloor cable trays, we strongly recommend that you locate power cables and other potential noise sources as far away as practical from network cabling that terminates on Cisco equipment. In situations where long parallel cable runs cannot be separated by at least 3.3 feet (1 meter), we recommend that you shield any potential noise sources by housing them in a grounded metallic conduit.

---

### Preparing for Network Connections

When preparing your site for network connections to your switch, consider the following for each type of interface and gather all the required equipment before connecting the ports:

- Cabling required for each interface type
- Distance limitations for each signal type

- Additional interface equipment required

## Connecting to a Console

You can connect the switch to a console to perform the following functions:

- Configuring the switch using the CLI
- Monitoring network statistics and errors
- Configuring SNMP agent parameters
- Downloading software updates



---

**Note**

We recommend that you use this port to create a local management connection to set the IP address and other initial configuration settings before connecting the switch to the network for the first time.

---

The console port on the switch is an RS-232 port with an RJ-45 interface. This is an asynchronous (async) serial port; any device connected to this port must be capable of asynchronous transmission.



---

**Caution**

The console port can be used to connect to a modem. If you do not connect it to a modem, connect it either before powering the switch on or after the switch has completed the boot process.

---

### Before You Begin

Before you connect the switch to a console, ensure that you have the following:

- Computer terminal that supports VT100 terminal emulation. The terminal emulation software (such as HyperTerminal or Procomm Plus) makes communication between the switch and a computer possible during setup and configuration.

---

**Step 1**

Configure the terminal emulator program to match each of the following default port characteristics:

- 9600 baud
- 8 data bits
- 1 stop bit
- No parity

**Step 2**

Connect the DB-9 connector on the other end of the cable to the computer serial port.

---

### What to Do Next

You are ready to configure the switch.

## Connecting the Management Interface

To create a management connection to the switch, you must connect a management port on the switch to an external hub, switch, or router.

### Before You Begin

To prevent an IP address conflict, you must complete the initial configuration and establish an IP address for the switch.

---

**Step 1** Connect the appropriate modular cable to one of the two management ports on the switch.

- To connect the management port to an Ethernet switch port or hub, insert the RJ-45 connector for a modular, straight-through UTP cable into the management port.
- To connect to a router, insert the connector on a crossover cable into the management port.

**Step 2** Connect the other end of the cable to the device.

---

## Connecting Interface Ports to Other Devices

After you perform the initial configuration for the switch and create a management connection, you are ready to connect the interface ports on the switch to other devices. Depending on the types of interface ports on the switch, you will need to use interface cables with QSFP+, SFP+, or SFP transceivers or RJ-45 connectors to connect the switch to other devices.

The transceivers used with many fiber-optic cables come separated from their cables. To prevent damage to the fiber-optic cables and their transceivers, we recommend that you keep these transceivers disconnected from their fiber-optic cables when installing the transceiver in the I/O module. Before removing a transceiver for a fiber-optic cable, you must remove the cable from the transceiver.

To maximize the effectiveness and life of your transceivers and optical cables, do the following:

- Wear an ESD-preventative wrist strap that is connected to an earth ground whenever handling transceivers. The switch is typically grounded during installation and provides an ESD port to which you can connect your wrist strap.
- Do not remove and insert a transceiver more often than is necessary. Repeated removals and insertions can shorten its useful life.
- Keep the transceivers and fiber-optic cables clean and dust free to maintain high signal accuracy and to prevent damage to the connectors. Attenuation (loss of light) is increased by contamination and should be kept below 0.35 dB.
- Clean these parts before installation to prevent dust from scratching the fiber-optic cable ends.
- Clean the connectors regularly; the required frequency of cleaning depends upon the environment. In addition, clean connectors if they are exposed to dust or accidentally touched. Both wet and dry cleaning techniques can be effective; refer to your site's fiber-optic connection cleaning procedures.

- Do not touch the ends of connectors. Touching the ends can leave fingerprints and cause other contamination.
- Inspect routinely for dust and damage. If you suspect damage, clean and then inspect fiber ends under a microscope to determine if damage has occurred.

**Warning****Statement 1051—Laser Radiation**

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

## Installing SFP+ and SFP Transceivers

**Note**

Excessively removing and installing an SFP or SFP+ transceiver can shorten its life. Unless it is absolutely necessary, do not remove and insert SFP or SFP+ transceivers. To prevent damage to an optical cable and transceiver, we recommend that you disconnect cables before installing or removing transceivers.

**Note**

If you cannot install the cable into the transceiver, insert or leave the dust plug in the cable end of the transceiver.

- 
- Step 1** Attach an ESD-preventive wrist strap and follow its instructions for use.
- Step 2** Remove the dust cover from the port cage.
- Step 3** Remove the dust cover from the port end of the transceiver.
- Step 4** Insert the transceiver into the port as follows:
- If the transceiver has a Mylar tab latch, position the transceiver with the tab on the bottom, and then gently insert the transceiver into the port until it clicks into place.
  - If the transceiver has a bale clasp latch, position the transceiver with the clasp on the bottom, close the clasp by pushing it up over the transceiver, and then gently insert the transceiver into the port until it clicks into place.
- Caution** If the transceiver does not install easily, ensure that it is correctly positioned and the tab or clasp are in the correct position before continuing.
-

## Installing SFP+ and SFP Optical Cables



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**Note** To prevent damage to an optical cable and transceiver, disconnect cables before installing or removing transceivers.

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**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 cover 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.

**Caution** If the cable does not install easily, ensure that it is correctly positioned before continuing.

**Note** If you cannot install the cable into the transceiver, insert or leave the dust plug in the cable end of the transceiver.

For instructions on verifying connectivity, see the appropriate Cisco Nexus 9000 Series configuration guide.

---

## Installing QSFP+ Transceivers

The QSFP+ transceiver module can have either a bail-clasp latch or a pull-tab latch.



---

**Caution** The QSFP+ transceiver module is a static-sensitive device. Always use an ESD wrist strap or similar individual grounding device when handling QSFP+ transceiver modules or coming into contact with system modules.

---

---

**Step 1** Attach an ESD wrist strap to yourself and a properly grounded point on the chassis or the rack. Follow its instructions for use.

**Step 2** Remove the QSFP+ transceiver module from its protective packaging.

**Step 3** Remove the dust cover from the port end of the transceiver.

**Step 4** Check the label on the QSFP+ transceiver module body to verify that you have the correct model for your network.

**Step 5** For optical QSFP+ transceivers, remove the optical bore dust plug and set it aside.

**Step 6** For transceivers equipped with a bail-clasp latch, do the following:

- a) Keep the bail-clasp aligned in a vertical position.
- b) Align the QSFP+ transceiver in front of the module's transceiver socket opening and carefully slide the QSFP+ transceiver into the socket until the transceiver makes contact with the socket electrical connector.

**Step 7** For QSFP+ transceivers equipped with a pull-tab, do the following:

- a) Hold the transceiver so that the identifier label is on the top.

- b) Align the QSFP+ transceiver in front of the module's transceiver socket opening and carefully slide the QSFP+ transceiver into the socket until the transceiver makes contact with the socket electrical connector.
-





## Replacing Components

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- [Replacing a Fan Module, page 31](#)
- [Replacing a Power Supply Module, page 32](#)

### Replacing a Fan Module



**Caution**

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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 fan and power supply modules in the chassis. Otherwise, the switch can overheat and shutdown.

---

### Removing a Fan Module



**Warning**

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**Statement 263—Fan Warning**

The fans might still be turning when you remove the fan assembly from the chassis. Keep fingers, screwdrivers, and other objects away from the openings in the fan assembly's housing.

---

**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.

---

## Installing a Fan Module

### Before You Begin

- A fan slot must be open and ready for the new fan module to be installed.
- 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 burgundy coloring (port-side intake airflow) or they must all have blue coloring (port-side exhaust airflow).

- 
- 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 slot until it clicks in place.
- Step 3** Verify that the Status (STS) LED turns on and becomes green.
- 

## Replacing a Power Supply Module

The switch requires only one power supply for operations but a second one can be installed for redundancy. With one power supply providing the necessary power for operations, you can replace the other power supply during operations. If the switch has only one power supply, you can install and power up the replacement power supply in the open power-supply slot before removing the original power supply.

You can replace a power supply with any other power supply that is supported by the same switch so long as it provides the same direction of airflow as the fan modules installed in the switch and you have the appropriate power source within reach of the power cable. The coloring of the latch handle on the power supply indicates the airflow direction as explained in the following table that lists the supported power supplies for this switch.

**Table 1: Supported Power Supply Modules**

Part Number	Power Characteristics	Airflow Direction (Latch Color)
N9K-PAC-650W	650 W, 16 A, AC power source	Port-side intake (burgundy latch)
N9K-PAC-650W-B	650 W, 16 A, AC power source	Port-side exhaust (blue latch)
N9K-PUV-1200W	1200 W, 16 A, HVAC/HVDC power source	Dual direction (white latch)(These modules automatically use the same airflow direction as the fan modules installed in the same switch.)
UCSC-PSU-930WDC	930 W, 16 A, DC power source	Port-side intake (green latch)

Part Number	Power Characteristics	Airflow Direction (Latch Color)
UCS-PSU-6332-DC	930 W, 16 A, DC power source	Port-side exhaust (gray latch)

To remove a power supply, refer to one of the following topics:

- [Removing an HVAC/HVDC Power Supply](#)
- [Removing an AC Power Supply, on page 33](#)
- [Removing a DC Power Supply](#)

To install a replacement power supply, refer to one of the following topics:

- [Installing an HVAC/HVDC Power Supply](#)
- [Installing an AC Power Supply](#)
- [Installing a DC Power Supply](#)

## Removing an HVAC/HVDC Power Supply

If the switch has two power supplies, you can replace one power supply while the other one provides power to the switch. If you have only one power supply in the switch, install the replacement power supply in the open slot before removing the original power supply.

To disconnect the power supply from its power cables, you must shut off the power from the power source and then either disconnect a connector for the power cables or release each of three cables from the power supply (requires a standard screw driver).

- 
- Step 1** Turn off the circuit breaker for the power source to only the power supply that you are replacing (be sure that this does not turn off power to the other power supply that is powering the switch during this replacement process). Be sure that the LEDs turn off on the power supply that you are removing.
- Step 2** Remove the power cable from the power supply by pressing the tab on the top of the Anderson Power SAF-D-Grid connector and pull the cable and connector out of the power supply.
- Step 3** Grasp the power supply handle while pressing the release latch towards the power supply handle.
- Step 4** Pull the power supply out of the bay.
- Step 5** If you cannot replace the power supply, fill the empty slot with a blank module (part number N2200-P-BLNK). Otherwise, you are ready to install a power supply in the open slot.
- 

## Removing an AC Power Supply

If you are replacing one of two power supplies in the switch chassis, you remove one power supply while the other one provides power to the switch and install the new power supply in the open slot. If you need to replace

the power supply in a chassis that has only one power supply, install the new power supply in the open power supply slot and power it up before removing the older power supply.

- 
- Step 1** Holding the plug for the power cable, pull the plug out from the power receptacle on the power supply and verify that both power supply LEDs are off.
- Note** If you need to remove an Anderson's Saf-D-Grid power cable connector from a high-voltage power supply, press the tab at the top of the connector and pull the connector out of the power supply.
- Step 2** Release the power supply from the chassis by moving the power supply release latch to the left and then pulling the power supply part way out of the chassis.
- Step 3** Place your other hand under the power supply to support it while you slide it 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.
- Step 4** If the power supply slot in the chassis is to remain empty, install a blank power supply filler panel (part number N2200-P-BLNK). Otherwise, install another power supply in the slot as explained in [Installing an AC Power Supply, on page 36](#).
- Warning** **Statement 1029—Blank Faceplates and Cover Panels**
- 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.
- 

## Removing a DC Power Supply

If the switch has two power supplies, you can replace one power supply while the other one provides power to the switch. If you have only one power supply in the switch, install the replacement power supply in the open slot before removing the original power supply.

To disconnect the power supply from its power cables, you must shut off the power from the power source and then either disconnect a connector for the power cables or release each of three cables from the power supply (requires a standard screw driver).

- 
- Step 1** Turn off the circuit breaker for the power source to only the power supply that you are replacing (be sure that this does not turn off power to the other power supply that is powering the switch during this replacement process). Be sure that the LEDs turn off on the power supply that you are removing.
- Step 2** Remove the power cable from the power supply by doing the following:
- If you need to remove an orange power cable connector from a 48-V DC power supply, do the following:
    - 1 Push the orange plastic button on the top of the connector block inward toward the power supply.
    - 2 Pull the connector block out of the power supply.
  - If you need to remove an Anderson Power Products Saf-D-Grid power cable connector from a high-voltage power supply, press on the tab at the top of the Saf-D-Grid connector and pull the connector out of the power supply.

- Step 3** Grasp the power supply handle while pressing the release latch towards the power supply handle.
- Step 4** Pull the power supply out of the bay.
- Step 5** If you cannot replace the power supply, fill the empty slot with a blank module (part number N2200-P-BLNK). Otherwise, you are ready to install a power supply in the open slot.
- 


## Installing an HVAC/HVDC Power Supply

This topic is for installing the high-voltage AC/DC (HVAC/HVDC) power supply into a switch chassis.

If the switch has two power supplies, you can replace one power supply while the other one provides power to the switch. If you have only one power supply in the switch, install the replacement power supply in the open slot, power up the replacement power supply, and then remove the original power supply.

### Before You Begin


- If you are using DC power for the replacement power supply, the circuit breaker for the DC power source must be turned off.
- The power source for the replacement power supply must be within reach of the power supply power cable.
- If you are using  $n+n$  power redundancy, there must be a separate power source for each power supply installed in the chassis. Otherwise, only one power source is required.
- There must be an earth ground connection to the chassis that you are installing the replacement module. To ground the chassis, see [Grounding the Chassis](#), on page 19.

- 
- Step 1** If the power supply slot has a blank filler panel, remove it from the slot by moving its release latch to the left and pulling the panel out of the slot.
- Step 2** Holding the replacement power supply with one hand underneath the module and the other hand holding the handle, align the back end of the power supply (the end with the electrical connections) to the open power supply slot and slide the power supply all the way into the slot until it clicks into place.
- Step 3** If the DC power cables and a grounding cable are already connected to an electrical connector block, insert the block into the power receptacle on the power supply.  
If the electrical cables have not been connected to the electrical connector block, wire them as described in [Wiring a 48 V DC Electrical Connector Block](#), on page 37.
- Step 4** Turn on the circuit breaker for the DC power source connected to the power supply.
- Step 5** Verify that the power supply  LED turns on and becomes green.
-

## Installing an AC Power Supply

### Before You Begin

- The power supply that you are installing must be capable of using the same airflow direction as the fan trays installed in the same switch
- An AC power source must be within reach of the power cable that will be used with the replacement power supply. If you are using  $n+n$  power redundancy, there must be a separate power source for each power supply installed in the chassis. Otherwise, only one power source is required.
- There must be an earth ground connection to the chassis that you are installing the replacement module. To ground the chassis, see [Grounding the Chassis](#), on page 19.

- 
- Step 1** If the power supply slot has a blank filler panel, remove it from the slot by moving its release latch to the left and pulling the panel out of the slot.
- Step 2** Holding the replacement power supply with one hand underneath the module and the other hand holding the handle, align the back end of the power supply (the end with the electrical connections) to the open power supply slot and slide the power supply all the way into the slot until it clicks into place.
- Step 3** Test the installation by trying to pull the power supply out of the slot without using the release latch. If the power supply does not move out of place, it is secured in the slot. If the power supply moves, carefully press it all the way into the slot until it clicks in place.
- Step 4** Attach the power cable to the electrical outlet on the front of the power supply.
- Step 5** Connect the other end of the power cable to an AC power source if it is not already connected to a power source.
- For no power redundancy, connect one power supply to one power source.
  - For  $n+1$  power redundancy, connect two power supplies to one or two power sources.
  - For  $n+n$  power redundancy, connect each of two power supplies to a different power source.
- Note** Depending on the outlet receptacle on your power distribution unit, you might need the optional jumper cable to connect the switch to your outlet receptacle.
- Step 6** Verify that the power supply is operational by verifying that the power supply  LED is green. For information on what the power supply LEDs indicate, see [Power Supply LEDs](#), on page 48.
- 


## Installing a DC Power Supply

This topic is for installing the 48-V DC power supply into switch chassis. If you need to install a high voltage (HVAC/HVDC) power supply, see [Installing an HVAC/HVDC Power Supply](#), on page 35.

If the switch has two power supplies, you can replace one power supply while the other one provides power to the switch. If you have only one power supply in the switch, install the replacement power supply in the open slot before removing the original power supply.

### Before You Begin

- The circuit breaker for the DC power source for the power supply must be turned off.
- The power supply that you are installing must be capable of using the same airflow direction as the fan trays installed in the same switch
- A DC power source must be within reach of the power cable that will be used with the replacement power supply. If you are using  $n+n$  power redundancy, there must be a separate power source for each power supply installed in the chassis. Otherwise, only one power source is required.
- There must be an earth ground connection to the chassis that you are installing the replacement module. To ground the chassis, see [Grounding the Chassis](#), on page 19.

- 
- Step 1** If the power supply slot has a blank filler panel, remove it from the slot by moving its release latch to the left and pulling the panel out of the slot.
- Step 2** Holding the replacement power supply with one hand underneath the module and the other hand holding the handle, align the back end of the power supply (the end with the electrical connections) to the open power supply slot and slide the power supply all the way into the slot until it clicks into place.
- Step 3** If the DC power cables and a grounding cable are already connected to an electrical connector block, insert the block into the power receptacle on the power supply.  
If the electrical cables have not been connected to the electrical connector block, wire them as described in [Wiring a 48 V DC Electrical Connector Block](#), on page 37.
- Step 4** Turn on the circuit breaker for the DC power source connected to the power supply.
- Step 5** Verify that the power supply  LED turns on and becomes green.
- 

## Wiring a 48 V DC Electrical Connector Block

You must connect the ground, negative, and positive DC power cables to a connector block in order to connect the power cables to a 48 V DC power supply.



#### Note

The recommended wire gauge is 8 AWG. The minimum wire gauge is 10 AWG.



#### Warning

**Statement 342**—Before Connecting to System Power Supply

High leakage current □ earth connection essential before connecting to system power supply.


**Warning Statement 1024—Ground Conductor**

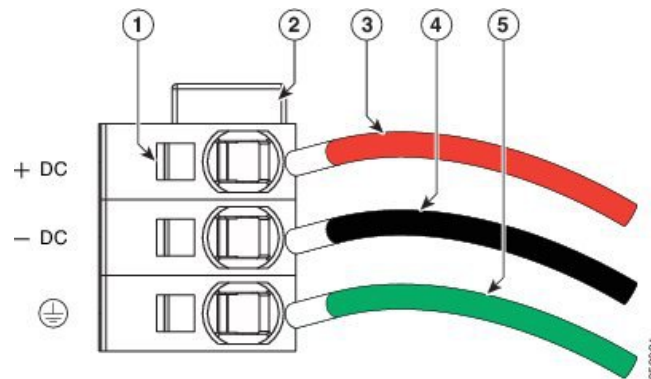
This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.

**Before You Begin**

You must turn off the circuit breaker for the DC power cables that you are connecting to prevent electrocution.

- Step 1** Verify that the circuit breaker for the DC power source you are connecting is turned off.
- Step 2** Remove the DC power connector block from the power supply by doing the following:
- Push the orange plastic button on the top of the connector block inward toward the power supply.
  - Pull the connector block out of the power supply.
- Step 3** Strip 0.6 inches (15 mm) of insulation off the DC wires that you are using.
- Step 4** Orient the connector as shown in the following figure with the orange plastic button on top.

**Figure 9: Wiring a 930W -48VDC Power Supply Connector Block**



1	Wire retainer lever	4	-48V (-DC) cable
2	Orange plastic button on top of the connector	5	Grounding cable (8 AWG recommended)
3	-48V Return (+DC) cable		



- Step 5** Use a small screwdriver to depress the spring-loaded wire retainer lever on the lower spring-cage wire connector. Insert your green (ground) wire into the aperture and then release the lever.
- Step 6** Use a small screwdriver to depress the spring-loaded wire retainer lever on the middle spring-cage wire connector. Insert your black (DC negative) wire into the aperture and then release the lever.
- Step 7** Use a small screwdriver to depress the spring-loaded wire retainer lever on the upper spring-cage wire connector. Insert your red (DC positive) wire into the aperture and then release the lever.
- Step 8** Insert the connector block back into the power supply. Make sure that your red (DC positive) wire aligns with the power supply label, "+ DC".
- Step 9** Verify that the other ends of the cables are attached to the DC power source and ground. You are then ready to turn on the DC power source.
-





## Rack Specifications

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- [Overview of Racks, page 41](#)
- [General Requirements for Cabinets and Racks, page 41](#)
- [Requirements Specific to Standard Open Racks, page 42](#)
- [Requirements Specific to Perforated Cabinets, page 42](#)
- [Cable Management Guidelines, page 42](#)

## Overview of Racks

You can install the switch in the following types of cabinets and racks, assuming an external ambient air temperature range of 0 to 104°F (0 to 40°C):

- Standard perforated cabinets
- Solid-walled cabinets with a roof fan tray (bottom to top cooling)
- Standard open racks



**Note**

If you are selecting an enclosed cabinet, we recommend one of the thermally validated types, either standard perforated or solid-walled with a fan tray.

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**Note**

We do not recommend that you use racks that have obstructions (such as power strips), because the obstructions could impair access to field-replaceable units (FRUs).

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## General Requirements for Cabinets and Racks

The cabinet or rack must also meet the following requirements:

- Standard 19-inch (48.3 cm) (four-post EIA cabinet or rack, with mounting rails that conform to English universal hole spacing per section 1 of ANSI/EIA-310-D-1992). For more information, see [Requirements Specific to Perforated Cabinets](#), on page 42.
- The minimum vertical rack space requirement per chassis is one RU (rack unit), equal to 1.75 inches (4.4 cm).
- The width between the rack-mounting rails must be at least 17.75 inches (45.0 cm) if the rear of the device is not attached to the rack. For four-post EIA racks, this measurement is the distance between the two front rails.

Four-post EIA cabinets (perforated or solid-walled) must meet the following requirements:

- The minimum spacing for the bend radius for fiber-optic cables should have the front-mounting rails of the cabinet offset from the front door by a minimum of 3 inches (7.6 cm).
- The distance between the outside face of the front mounting rail and the outside face of the back mounting rail should be 23.0 to 30.0 inches (58.4 to 76.2 cm) to allow for rear-bracket installation.

## Requirements Specific to Standard Open Racks

If you are mounting the chassis in an open rack (no side panels or doors), ensure that the rack meets the following requirements:

- The minimum vertical rack space per chassis must be one rack unit (RU), equal to 1.75 inches (4.4 cm).
- The distance between the chassis air vents and any walls should be 2.5 inches (6.4 cm).

## Requirements Specific to Perforated Cabinets

A perforated cabinet has perforations in its front and rear doors and side walls. Perforated cabinets 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 square inches (96.8 square cm) of open area per rack unit of door height.
- The roof should be perforated with at least a 20 percent open area.
- The cabinet floor should be open or perforated to enhance cooling.

The Cisco R Series rack conforms to these requirements.

## Cable Management Guidelines

To help with cable management, you might want to allow additional space in the rack above and below the chassis to make it easier to route all of the fiber optic or copper cables through the rack.



## System Specifications

- [Environmental Specifications, page 43](#)
- [Switch Dimensions, page 43](#)
- [Switch and Module Weights and Quantities, page 44](#)
- [Transceiver and Cable Specifications, page 44](#)
- [Power Input Requirements, page 44](#)
- [Power Cord Specifications, page 45](#)

## Environmental Specifications

Environment		Specification
Temperature	Ambient operating temperature	32 to 104°F (0 to 40°C)
	Ambient nonoperating	−40 to 158°F (−40 to 70°C)
Relative humidity	Ambient (noncondensing)	5 to 95%
Altitude	Operating	0 to 13,123 feet (0 to 4,000 meters)

## Switch Dimensions

Switch Component	Width	Depth	Height
Cisco Nexus 9372PX chassis	17.3 inches (43.9 cm)	22.5 inches (57.1 cm)	1.72 inches (4.4 cm) (1 RU)

## Switch and Module Weights and Quantities

Component	Weight per Unit	Quantity
Cisco Nexus 9372PX and 9372PX-E Chassis (N9K-C9372PX and N9K-C9372PX-E)	22.2 lb (10.1 kg)	1
Fan Module	—	4
– Port-side exhaust (blue) (NXA-FAN-30CFM-F)	0.25 lb (0.1 kg)	
– Port-side intake (burgundy) (NXA-FAN-30CFM-B)	0.25 lb (0.1 kg)	
Power Supplies	—	2 (1 for operations and 1 for redundancy)
– 1200-W HVAC/HVDC dual-direction (white) (N9K-PUV-1200W)	2.4 lb (1.1 kg)	
– 650-W AC port-side exhaust (blue) (N9K-PAC-650W-B)	2.64 lb (1.2 kg)	
– 650-W AC port-side intake (burgundy) (N9K-PAC-650W)	2.64 lb (1.2 kg)	
– 930-W DC port-side intake (green) (UCSC-PSU-930WDC)	2.39 lb (1.1 kg)	
– 930-W DC port-side exhaust (gray) (UCS-PSU-6332-DC)	2.38 lb (1.08 kg)	

## Transceiver and Cable Specifications

To determine which transceivers and cables are supported by this switch, see <http://www.cisco.com/c/en/us/support/interfaces-modules/transceiver-modules/products-device-support-tables-list.html>.

To see the transceiver specifications and installation information, see <http://www.cisco.com/c/en/us/support/interfaces-modules/transceiver-modules/products-installation-guides-list.html>.

## Power Input Requirements

The following table lists the typical amount of power consumed by the switch, and it lists the maximum amount of power that you must provision from the power source as input to the power supply and switch for peak conditions.

**Table 2: Switch Power Input Requirements**

	Typical Power Consumption	Maximum Power Consumption
Cisco Nexus 9372PX and 9372PX-E	210 W	537 W

# Power Cord Specifications

The following tables specify the power cables that you should order and use with AC, DC, or HVAC/HVDC power supplies.

**Table 3: Power Cable Specifications for AC Power Supplies**

Power Type	Power Cord Part Number	Cord Set Description
HVAC	CAB-HVAC-SD-0.6M	2-foot (0.6 m) cable with Saf-D-Grid and SD connectors
HVAC	CAB-HVAC-C14-2M	6.6-foot (2.0 m) cable with Saf-D-Grid and C14 connector (use for up to 240 V)
HVAC	CAB-HVAC-RT-0.6M	2-foot (0.6 m) cable with Saf-D-Grid and RT connector
	CAB-C13-C14-2M	Power Cord Jumper, C13-C14 Connectors, 6.6 feet (2.0 m)
	CAB-C13-C14-AC	Power cord, C13 to C14 (recessed receptacle), 10 A, 9.8 feet (3 m)
	CAB-C13-CBN	Cabinet jumper power cord, 250 VAC, 10 A, C14-C13 connectors, 2.3 feet (0.7 m)
Argentina	CAB-250V-10A-AR	250 V, 10 A, 8.2 feet (2.5 m)
Australia	CAB-9K10A-AU	250 VAC, 10 A, 3112 plug, 8.2 feet (2.5 m)
Brazil	CAB-250V-10A-BR	250 V, 10 A, 6.9 feet (2.1 m)
European Union	CAB-9K10A-EU	250 VAC, 10 A, CEE 7/7 plug, 8.2 feet (2.5 m)
India	CAB-IND-10A	10 A, 8.2 feet (2.5 m)
Israel	CAB-250V-10A-IS	250 V, 10 A, 8.2 feet (2.5 m)
Italy	CAB-9K10A-IT	250 VAC, 10 A, CEI 23-16/VII plug, 8.2 feet (2.5 m)
North America	CAB-9K12A-NA	125 VAC, 13 A, NEMA 5-15 plug, 8.2 feet (2.5 m)
North America	CAB-AC-L620-C13	NEMA L6-20-C13, 6.6 feet (2.0 m)
North America	CAB-N5K6A-NA	200/240V, 6A, 8.2 feet (2.5 m)

Power Type	Power Cord Part Number	Cord Set Description
Peoples Republic of China	CAB-250V-10A-CN	250 V, 10 A, 8.2 feet (2.5 m)
South Africa	CAB-250V-10A-ID	250 V, 10 A, 8.2 feet (2.5 m)
Switzerland	CAB-9K10A-SW	250 VAC, 10 A, MP232 plug, 8.2 feet (2.5 m)
United Kingdom	CAB-9K10A-UK	250 VAC, 10 A, BS1363 plug (13 A fuse), 8.2 (2.5 m)

**Table 4: Power Cable Specifications for DC Power Supplies**

Power Supply	Power Cord	Cord Set Description
UCSC-PSU-930WDC (port-side intake airflow)	(customer supplied)	8 AWG insulated cable (10 AWG minimum) for each power supply
UCS-PSU-6332-DC (port-side exhaust airflow)	CAB-48DC-40A-8AWG	8-AWG cable with 3-pin keyed power supply connector and three wires (power source connection)

**Table 5: Power Cable Specifications for HVAC/HVDC Power Supplies**

Power Type	Power Cord Part Number	Cord Set Description
HVAC	CAB-HVAC-SD-0.6M	2-foot (0.6 m) cable with Saf-D-Grid and SD connectors
HVAC	CAB-HVAC-C14-2M	6.6-foot (2.0 m) cable with Saf-D-Grid and C14 connector (use for up to 240 V)
HVAC	CAB-HVAC-RT-0.6M	2-foot (0.6 m) cable with Saf-D-Grid and RT connector
HVDC	CAB-HVDC-3T-2M	6.6-foot (2.0 m) cable with Saf-D-Grid and three terminal connectors





## APPENDIX

# C

## LEDs

- [Switch Chassis LEDs, page 47](#)
- [Fan Module LEDs, page 48](#)
- [Power Supply LEDs, page 48](#)

### Switch Chassis LEDs

The BCN, STS, and ENV LEDs are located on the left side of the front of the switch. The port LEDs are appear as triangles pointing up or down to the nearest port.



LED	Color	Status
BCN	Flashing blue	The operator has activated this LED to identify this module in the chassis.
	Off	This module is not being identified.
STS	Green	The switch is operational.
	Flashing amber	The switch is booting up.
	Flashing red	Temperature exceeds major alarm threshold.
	Off	The switch is not receiving power.
ENV	Green	Fans and power supply modules are operational.
	Amber	At least one fan or power supply module is not operating.
(port)	Green	Port is connected with a transceiver or other connector.
	Amber	Port is not connected.

## Fan Module LEDs



The fan module LED is located below the air holes on the front of the module.



LED	Color	Status
STS	Green	The fan module is operational.
	Red	The fan module is not operational (fan is probably not functional).
	Off	Fan module is not receiving power.

## Power Supply LEDs

The power supply LEDs are located on the left front portion of the power supply. Combinations of states indicated by the Okay () and Fault () LEDs indicate the status for the module as shown in the following table.

**Table 6: Power Supply LED Descriptions**

 LED	 LED	Status
Green	Off	Power supply is on and outputting power to the switch.
Flashing green	Off	Power supply is connected to a power source but not outputting power to the switch—power supply might not be installed in the chassis.
Off	Off	Power supply is not receiving power.
Green	Flashing amber	Power supply warning—possibly one of the following conditions: <ul style="list-style-type: none"> <li>• High voltage</li> <li>• High power</li> <li>• Low voltage</li> <li>• Power supply installed in chassis but not connected to a power source</li> <li>• Slow power supply fan</li> </ul>

 LED	 LED	Status
Flashing green	Amber	Power supply failure—possibly one of the following conditions: <ul style="list-style-type: none"><li>• Over voltage</li><li>• Over current</li><li>• Over temperature</li><li>• Power supply fan failure</li></ul>





## Accessory Kits

- [Accessory Kit Contents, page 51](#)

### Accessory Kit Contents

The following table lists and illustrates the contents for the accessory kit (N3K-C3064-ACC-KIT).

Description	Quantity
Rack-mount kit <ul style="list-style-type: none"> <li>• Front-mount angled bracket (2)</li> <li>• Rear-mount slider bracket (2)</li> <li>• Slider rails (2)</li> <li>• M4 x 7 mm mounting screws (16)</li> </ul>	1
Console cable	1
Ground lug kit <ul style="list-style-type: none"> <li>• Two-hole lug (1)</li> <li>• M4 x 8-mm Phillips pan-head screws (2)</li> </ul>	1 kit
EAC Compliance document	1
DCNM DVD	1
Hazardous substances list for customers in China	1

**Note**

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If you do not receive a part listed in this document, contact Cisco Technical Support at this URL:  
<http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml>.

If you purchased this product through a Cisco reseller, you might receive additional contents in your kit, such as documentation, hardware, and power cables.

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For a list of the available power cables, see [r\\_n93xxx\\_power\\_cord\\_specs.xml](#).



# Site Preparation and Maintenance Records

- [Site Preparation Checklist, page 53](#)
- [Contact and Site Information, page 55](#)
- [Chassis and Module Information, page 55](#)

## Site Preparation Checklist

Planning the location and layout of your equipment rack or cabinet is essential for successful switch operation, ventilation, and accessibility.

The following table lists the site planning tasks that we recommend that you complete before you install the switch. Your completion of each task ensures a successful switch installation.

**Table 7: Site Preparation Checklist**

Planning Activity	Verification Time and Date
Space evaluation:	
Space and layout	
Floor covering	
Impact and vibration	
Lighting	
Physical access	
Maintenance access	
Environmental evaluation:	

Planning Activity	Verification Time and Date
Ambient temperature	
Humidity	
Altitude	
Atmospheric contamination	
Airflow	
Power evaluation:	
Input power type	
Power receptacles	
Receptacle proximity to the equipment	
Dedicated (separate) circuits for power redundancy	
UPS for power failures	
Grounding: proper wire gauge and lugs	
Circuit breaker size	
Grounding evaluation:	
Data center ground	
Cable and interface equipment evaluation:	
Cable type	
Connector type	
Cable distance limitations	
Interface equipment (transceivers)	
EMI evaluation:	



Planning Activity	Verification Time and Date
Distance limitations for signaling	
Site wiring	
RFI levels	

## Contact and Site Information

Use the following worksheet to record contact and site information for the installation.

Contact person	
Contact phone	
Contact e-mail	
Building/site name	
Data center location	
Floor location	
Address (line 1)	
Address (line 2)	
City	
State/Provence	
Contact person	
ZIP/postal code	
Country	

## Chassis and Module Information

Use the following three worksheets to record information about the chassis and modules.

**Table 8: Switch Information**

Contract number	
Chassis serial number	
Product number	

**Table 9: Network-Related Information**

Switch IP address	
Switch IP netmask	
Hostname	
Domain name	
IP broadcast address	
Gateway/router address	
DNS address	

**Table 10: Module Information for the Switch Chassis**

Slot	Module Type	Module Serial Number	Notes
Power supply 1 (left)			
Power supply 2 (right)			
Fan module 1 (left)			
Fan module 2 (center left)			
Fan module 3 (center right)			
Fan module 4 (right)			