Cisco Nexus 9348GC-FX3 ACI-Mode Switch Hardware Installation Guide

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Americas Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
http://www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 527-0883

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CHAPTER 1

Overview

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Overview

The Cisco Nexus 9348GC-FX3 switch (N9K-C9348GC-FX3) is a 1-rack unit (RU) switch that supports 696 Gbps of bandwidth and over 517 Mpps. The 48 x 100M/1G BASE-T downlink ports on the 9348GC-FX3 can be configured to work as 100-Mbps or 1-Gbps ports. The 4 x 10/25G SFP28 uplink ports can be configured as 1/10/25-Gbps; the 2 x 40/100G QSFP28 uplink ports can be configured as 40- and 100-Gbps ports. These configuratoin options allow for a combination of 10-, 25-, 40-, and 100-Gbps connectivity, offering flexible migration options for spine-leaf-APIC deployment in data centers.

Note Autonegotiation is supported on 100M/1G/10G ports.

This switch includes these user-replaceable components:

- Fan modules (three) with these airflow choices:
  - Port-side intake airflow with burgundy coloring (NXA-SFAN-30CFM-PI)
  - Port-side exhaust airflow with blue coloring (NXA-SFAN-30CFM-PE)

Note This switch will power down due to a fan-policy trigger if fewer than 2 fans are operational.

Note *Table 1: Fan Speeds for this Switch*

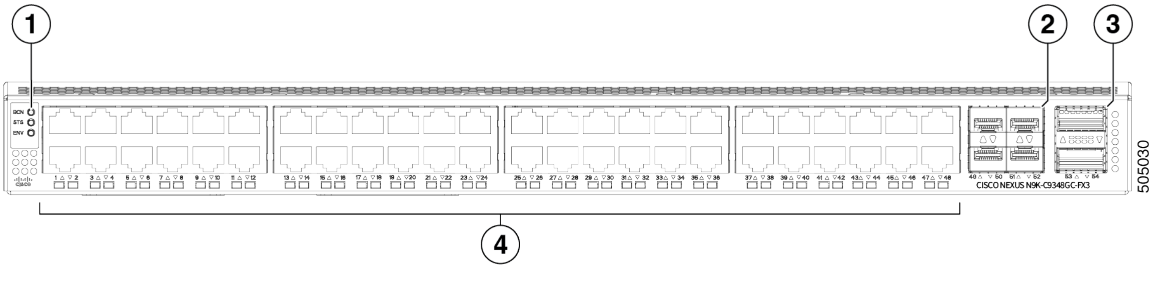
	Port-Side Intake Fan Speed %	**Port-Side Exhaust Fan Speed %**
Typical/Minimum	40%	40%
Maximum	100%	100%

Note Each fan module has two rotors. The switch can function normally if one rotor inside the any one fan module fails. In case of more than one rotor failure, the switch will issue a warning and power down in 2 minute.

- Power supply modules (two—one for operations and one for redundancy [1+1]) with these choices (a mix of AC and DC power sources is supported but do not mix airflow directions):
  - 350-W AC power supply with port-side intake airflow (burgundy coloring) (NXA-PAC-350W-PI2)
  - 350-W AC power supply with port-side exhaust airflow (blue coloring) (NXA-PAC-350W-PE2)
  - 350-W PHV power supply with port-side intake airflow (burgundy coloring) (NXA-PHV-350W-PI)
  - 350-W PHV power supply with port-side exhaust airflow (blue coloring) (NXA-PHV-350W-PE)
  - 440-W DC power supply with port-side intake airflow (burgundy coloring) (NXA-PDC-440W-PI)
  - 440-W DC power supply with port-side exhaust airflow (blue coloring) (NXA-PDC-440W-PE)

Note The 350-W AC power supply does not have the standby voltage to be able to carry to a second power supply, to allow it to communicate and poll the device.

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

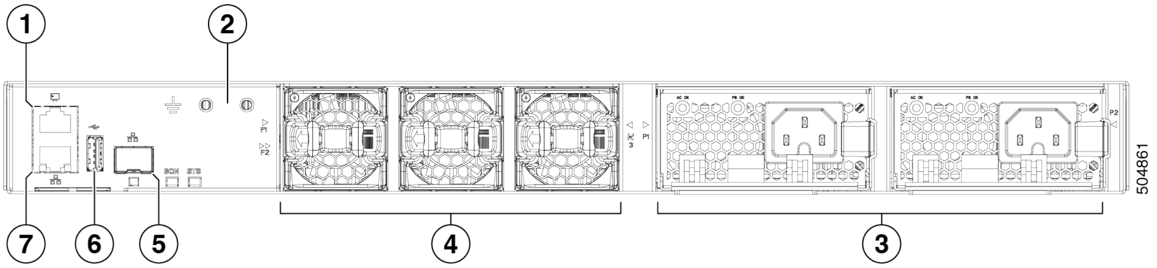


1	LEDs	2	10/25G SFP28 uplink ports (4)
3	40/100G QSFP28 uplink ports (2)	4	100M/1G BASE-T downlink ports (48)

To determine which transceivers, adapters, and cables support this switch, see the Cisco Transceiver Modules Compatibility Information document.

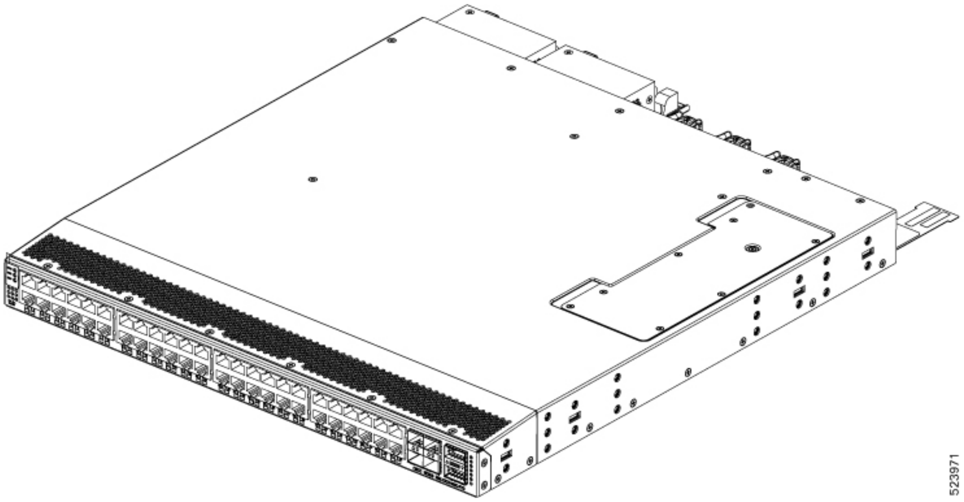
Note **IMPORTANT:** All compatible SFP28 tranceivers identified in the *Cisco Optics Interoperability Matrix User Manual* can be plugged into any of the SFP28 ports on this switch. All compatible QSFP28 tranceivers identified in the *Cisco Optics Interoperability Matrix User Manual* can be plugged into any of the QSFP28 ports on this switch.

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



1	Console port	2	Grounding pad
3	Power supply modules (1 or 2) (AC power supplies shown) with slots numbered 1 (left) and 2 (right)	4	Fan modules (3) with slots numbered from 1 (left) to 3 (right)
5	Management port (SFP)	6	USB port
7	Management port (RJ45)		

The figure shows the Cisco Nexus 9348GC-FX3 switch.



The fan and power supply modules are field replaceable. 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.

Caution 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.

CHAPTER 2

Preparing the Site

- Temperature Requirements, on page 5
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Temperature Requirements

The operating temperature of the switch is 32 to 104 degrees Fahrenheit (0 to 40 degrees Celsius) at sea level. For every 300 meters (1000 feet) above sea level, the maximum temperature is reduced by 1 degree Celsius. The non-operating temperature of the switch is -40 to 158 degrees Fahrenheit (-40 to 70 degrees Celsius).

Overview of Module Temperatures

Built-in, automatic sensors in all switches in the Cisco Nexus 9000 Series monitor your switch at all times. Each module (supervisor, I/O, and fabric) has temperature sensors with two thresholds:

- Minor temperature threshold—If exceeded, a minor alarm occurs and these actions happen for all four sensors:
  - System messages display.
  - System sends Call Home alerts (if configured).
  - System sends SNMP notifications (if configured).
  - System fan speed will increment.
- Major temperature threshold—If exceeded, a major alarm occurs and these actions happen:

  If the threshold is exceeded in a switching module, only that module is shut down.

  For all sensors:

- System messages display.
- System sends Call Home alerts (if configured).
- System sends SNMP notifications (if configured).
- System fan speed will increment.
- If the major threshold is exceeded in a switching module, only that module is shut down.
- If the major threshold is exceeded in an active supervisor module with HA-standby or standby present, only that supervisor module is shut down and the standby supervisor module takes over.
- If you do not have a standby supervisor module in your switch, you have 2 minutes to decrease the temperature. During this interval, the software monitors the temperature every 5 seconds and continuously sends system messages every 10 seconds, as configured.

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 withstand from 5- to 95-percent (nonoperating) and 5- to 90-percent (operating) relative humidity.

Climate-controlled buldings usually maintain an acceptable level of humidity for the switch equipment. If the switch is located in an unusually humid location, use a dehumidifier to maintain the humidity within an acceptable range.

Altitude Requirements

Altitude rating is 10,000 ft (3048 m). For China, it is 6,562 ft (2000 m).

Dust and Particulate Requirements

Exhaust fans cool power supplies. System fans cool switches by drawing in air and exhausting air out through various openings in the chassis. Fans also introduce dust and other particles, causing contaminant buildup in the switch and increased internal chassis temperature. Dust and particles can act as insulators and interfere with the mechanical components in the switch. Keep a clean operating environment to reduce the negative effects of dust and other particles.

In addition to keeping your environment free of dust and particles, use these precautions to avoid contamination of your switch:

- Do not smoke near the switch.
- Do not eat 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. 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 are emitted by computing equipment. Each switch meets these FCC regulations.

To reduce the possibility of EMI and RFI, use 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 to the signals on the wires with these 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 To predict and prevent strong EMI, consult experts in radio frequency interference (RFI).

The wiring is unlikely to emit radio interference if you use a twisted-pair cable with a good distribution of grounding conductors. Copper cables should not be longer than maximum distances for the media type.

Caution 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 that is caused by lightning or other high-energy phenomena can easily couple enough energy into unshielded conductors to destroy electronic switches. Consult experts in electrical surge suppression and shielding if you have 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.

Preventing Electrostatic Discharge Damage

Many switch components can be damaged by static electricity. Not exercising the proper electrostatic discharge (ESD) precautions can result in intermittent or complete component failures. To minimize the potential for ESD damage, always use an ESD-preventive anti-static wrist strap (or ankle strap) and ensure that it makes adequate skin contact.

Note Check the resistance value of the ESD-preventive strap periodically. The measurement should be 1–10 megohms. Before you perform any of the procedures in this guide, attach an ESD-preventive strap to your wrist and connect the leash to the chassis.

Grounding Requirements

The switch is sensitive to variations in voltage that is supplied by the power sources. Overvoltage, undervoltage, and transients (spikes) can erase data from memory or cause components to fail. To protect against these types of problems, ensure that there is an earth-ground connection for the switch.

Connect the grounding pad on the switch either directly to the earth-ground connection or to a fully bonded and grounded rack.

When the chassis is properly installed in a grounded rack, the switch is grounded because it has a metal-to-metal (no paint, stain, dirt, or anything else on it) connection to the rack.

Alternatively, ground the chassis by using a customer-supplied grounding cable that meets your local and national installation requirements. For U.S. installations, we recommend 6-AWG wire. Connect your grounding cable to the chassis with a grounding lug (provided in the switch accessory kit) and to the facility ground.

Note Create an electrical conducting path between the product chassis and the metal surface of the enclosure, or rack in which it is mounted, or to a grounding conductor. Provide electrical continuity by using thread-forming type mounting screws that remove any paint or non-conductive coatings and establish a metal-to-metal contact. Remove any paint or other non-conductive coatings on the surfaces between the mounting hardware and the enclosure or rack. Clean the surfaces and apply an antioxidant before installation.

Rack and Cabinet Requirements

Install these 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

Work with your cabinet vendors to determine which of their cabinets meet these 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 rails (for proper mounting of the bottom-support brackets or other mounting hardware).

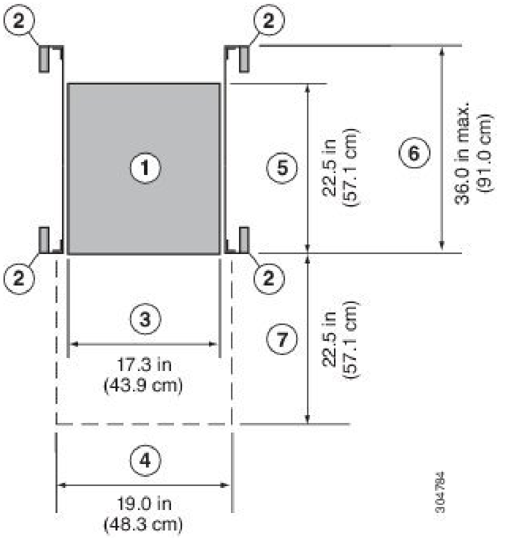
Also, you must have power receptacles that are located within reach of the power cords that are used with the switch.

Warning **Statement 1048**—Rack Stabilization

The rack stabilizing mechanism must be in place, or the rack must be bolted to the floor before installation or servicing. Failure to stabilize the rack can cause bodily injury.

Clearance Requirements

Provide the chassis with adequate clearance between the chassis and any other rack, device, or structure so that you can properly install the switch. Provide the chassis with adequate clearance to 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 figure.



1	Chassis	5	Depth of the chassis
2	Vertical rack-mount posts and rails	6	Maximum extension of the bottom-support rails 36.0 in (91.4 cm)
3	Chassis width 17.3 in (43.9 cm)	7	Depth of the front clearance area (equal to the depth of the chassis).

4	Width of the front clearance area (equal to the width of the chassis with two rack-mount brackets that are attached to it). 19.0 in (48.3 cm)		

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

Cautions and Regulatory Compliance Statements for NEBS

The regulatory compliance statements and requirements for the Network Equipment Building System (NEBS) certification are listed here.

Note **Statement 7001—**ESD Mitigation

This equipment may be ESD sensitive. Always use an ESD ankle or wrist strap before handling equipment. Connect the equipment end of the ESD strap to an unfinished surface of the equipment chassis or to the ESD jack on the equipment if provided.

Warning **Statement 7003—**Shielded Cable Requirements for Intrabuilding Lightning Surge

The intrabuilding port(s) of the equipment or subassembly must use shielded intrabuilding cabling/wiring that is grounded at both ends.

The following port(s) are considered intrabuilding ports on this equipment:

RJ-45 Management Ethernet Port

Note **Statement 7004—**Special Accessories Required to Comply with GR-1089 Emission and Immunity Requirements

To comply with the emission and immunity requirements of GR-1089, shielded cables are required for the following ports:

Copper RJ-45 Ethernet Management port

Warning **Statement 7005—**Intrabuilding Lightning Surge and AC Power Fault

The intrabuilding port(s) of the equipment or subassembly is suitable for connection to intrabuilding or unexposed wiring or cabling only. The intrabuilding port(s) of the equipment or subassembly MUST NOT be metallically connected to interfaces that connect to the OSP or its wiring for more than 6 meters (approximately 20 feet). These interfaces are designed for use as intrabuilding interfaces only (Type 2, 4, or 4a ports as described in GR-1089) and require isolation from the exposed OSP cabling. The addition of primary protectors is not sufficient protection in order to connect these interfaces metallically to an OSP wiring system.

The following ports are considered intrabuilding ports on the equipment:

RJ-45 Management Ethernet Port

Warning **Statement 7012—**Equipment Interfacing with AC Power Ports

Connect this equipment to AC mains that are provided with a surge protective device (SPD) at the service equipment that complies with NFPA 70, the National Electrical Code (NEC).

Note **Statement 7013—**Equipment Grounding Systems—Common Bonding Network (CBN)

This equipment is suitable for installations using the CBN.

Note **Statement 7018—**System Recover Time

The equipment is designed to boot up in less than 30 minutes provided the neighboring devices are fully operational.

Note **Statement 8015—**Installation Location Network Telecommunications Facilities

This equipment is suitable for installation in network telecommunications facilities.

Note **Statement 8016—**Installation Location Where the National Electric Code (NEC) Applies

This equipment is suitable for installation in locations where the NEC applies.

Warning **Statement 1056—**Unterminated Fiber Cable

Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not view directly with optical instruments. Viewing the laser output with certain optical instruments, for example, eye loupes, magnifiers, and microscopes, within a distance of 100 mm, may pose an eye hazard.

Warning **Statement 1255—**Laser Compliance Statement

Pluggable optical modules comply with IEC 60825-1 Ed. 3 and 21 CFR 1040.10 and 1040.11 with or without exception for conformance with IEC 60825-1 Ed. 3 as described in Laser Notice No. 56, dated May 8, 2019.

CHAPTER 3

Installing the Switch Chassis

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Safety

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

⚠

Warning **Statement 1071**—Warning Definition

IMPORTANT SAFETY INSTRUCTIONS

Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Read the installation instructions before using, installing, or connecting the system to the power source. Use the statement number provided at the end of each warning statement to locate its translation in the translated safety warnings for this device.

SAVE THESE INSTRUCTIONS

Warning **Statement 1089**—Instructed and Skilled Person Definitions

An instructed person is someone who has been instructed and trained by a skilled person and takes the necessary precautions when working with equipment.

A skilled person or qualified personnel is someone who has training or experience in the equipment technology and understands potential hazards when working with equipment.

There are no serviceable parts inside. To avoid risk of electric shock, do not open.

Warning **Statement 1074**—Comply with Local and National Electrical Codes

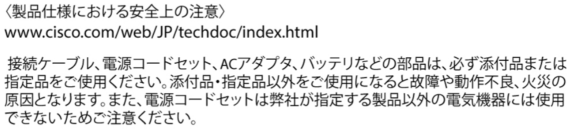
To reduce risk of electric shock or fire, installation of the equipment must comply with local and national electrical codes.

Note **Statement 407**—Japanese Safety Instruction

You are strongly advised to read the safety instruction before using the product.

https://www.cisco.com/web/JP/techdoc/pldoc/pldoc.html

When installing the product, use the provided or designated connection cables/power cables/AC adapters.



〈製品仕様における安全上の注意〉
www.cisco.com/web/JP/techdoc/index.html

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Warning **Statement 1017**—Restricted Area

This unit is intended for installation in restricted access areas. Only skilled, instructed, or qualified personnel can access a restricted access area.

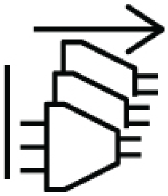
Warning **Statement 1091**—Installation by an Instructed Person

Only an instructed person or skilled person should be allowed to install, replace, or service this equipment. See statement 1089 for the definition of an instructed or skilled person.

There are no serviceable parts inside. To avoid risk of electric shock, do not open.

Warning **Statement 1028—**More Than One Power Supply

This unit might have more than one power supply connection. To reduce risk of electric shock, remove all connections to de-energize the unit.



Warning **Statement 1003—**Power Disconnection

To reduce risk of electric shock or personal injury, disconnect power before removing or replacing components or performing upgrades.

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

To reduce risk of electric shock, when installing or replacing the unit, the ground connection must always be made first and disconnected last.

If your unit has modules, secure them with the provided screws.

Warning **Statement 1022—**Disconnect Device

To reduce the risk of electric shock and fire, a readily accessible disconnect device must be incorporated in the fixed wiring.

Warning **Statement 1033—**Safety Extra-Low Voltage (SELV)—IEC 60950/ES1–IEC 62368 DC Power Supply

To reduce the risk of electric shock, connect the unit *only* to a DC power source that complies with the SELV requirements in the IEC 60950-based safety standards or the ES1 requirements in the IEC 62368-based safety standards.

Warning **Statement 1033—**Safety Extra-Low Voltage (SELV)—IEC 60950/ES1–IEC 62368 DC Power Supply

To reduce the risk of electric shock, connect the unit *only* to a DC power source that complies with the SELV requirements in the IEC 60950-based safety standards or the ES1 requirements in the IEC 62368-based safety standards.

Warning **Statement 1024—**Ground Conductor

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

Warning **Statement 1032—**Lifting the Chassis

To prevent personal injury or damage to the chassis, never attempt to lift or tilt the chassis using the handles on modules, such as power supplies, fans, or cards. These types of handles are not designed to support the weight of the unit.

Warning **Statement 1006—**Chassis Warning for Rack-Mounting and Servicing

To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:

- This unit should be mounted at the bottom of the rack if it is the only unit in the rack.
- When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.
- If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.

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.

Note For AC input application, please refer to the statement below:

Warning **Statement 1005—**Circuit Breaker

This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective devices is rated not greater than 20A (North America), 16A (Europe), and 13A (UK).

Installation Options with Rack-Mount Kits

The rack-mount kit enables you to install the switch into racks of varying depths. Position the switch with easy access to either the port connections or the fan and power supply modules.

Install the switch using these rack-mount options:

- Rack-mount kit (NXK-ACC-KIT-1RU) which you can order from Cisco. This option offers you easy installation, greater stability, increased weight capacity, added accessibility, and improved removability with front and rear removal.
- Rack-mount kit (N3K-C3064-ACC-KIT) which you can order from Cisco.

The rack or cabinet that you use must meet the requirements listed in the section General Requirements for Cabinets and Racks, on page 45.

Note You are responsible for verifying that your rack and rack-mount hardware comply with the guidelines that are described in this document.

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, verify 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, verify that the switch has port-side exhaust fan modules with blue colorings. All fan modules must have the same direction of airflow.

Installation Guidelines

When installing the switch, follow these guidelines:

- Ensure that there is adequate clearance space around the switch to allow for servicing the switch and for adequate airflow.
- Ensure that the chassis can be adequately grounded. If the switch is not mounted in a grounded rack, we recommend connecting the system ground on the chassis directly to an earth ground.
- Ensure that the site power meets the power requirements for the switch. If available, use an uninterruptible power supply (UPS) to protect against power failures.

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.

- Ensure that circuits are sized according to local and national codes. Typically, this often requires one or both of these:
  - AC power supplies typically require at least a 15-A or 20-A AC circuit, 100 to 240 VAC, and a frequency of 50 to 60 Hz.

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 Inspecting the Switch

Before you install the switch, 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).

Procedure

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

- Accessory Kit

Step 2 Check for damage and report any discrepancies or damage to your customer service representative. Have this 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

Installing the Switch Using the NXK-ACC-KIT-1RU Rack-Mount Kit

To install the switch, 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 supply the eight 10-32 or 12-24 screws required to mount the slider rails and switch to the rack.

Before you begin

- Inspected the switch shipment to ensure that you have everything ordered.
- Verify that the switch rack-mount kit includes these parts:
  - Front rack-mount brackets (2)
  - Rear rack-mount brackets (2)
  - Slider rails (2)
  - M4 x 0.7 x 8-mm Phillips countersink screws (10-12)
- The rack is installed and secured to its location.

Procedure

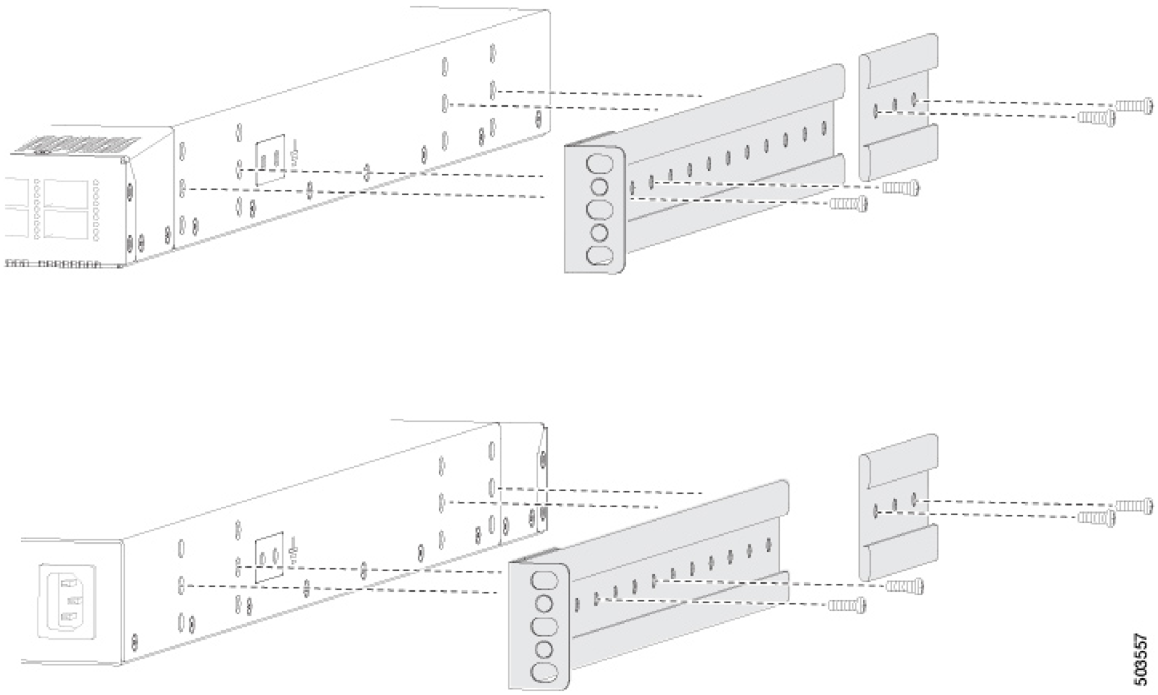
Step 1 Install two front rack-mount brackets and the two rear rack-mount brackets to the switch.

a) Determine which end of the chassis is to be located in the cold aisle.

  - 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.

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

Note
Align the holes in the rack-mount bracket to the holes on the side of the chassis (see the two ways to mount these brackets on a typical chassis, in the 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).



c) Secure the front-mount bracket and the back-mount bracket to the chassis using four M4 screws. Tighten each screw to 12 in-lb (1.36 N·m) of torque.

d) Repeat Step 1 for the other front rack-mount bracket and the other back-mount bracket on the other side of the switch. Be sure to position that bracket the same distance from the front of the switch.

Note

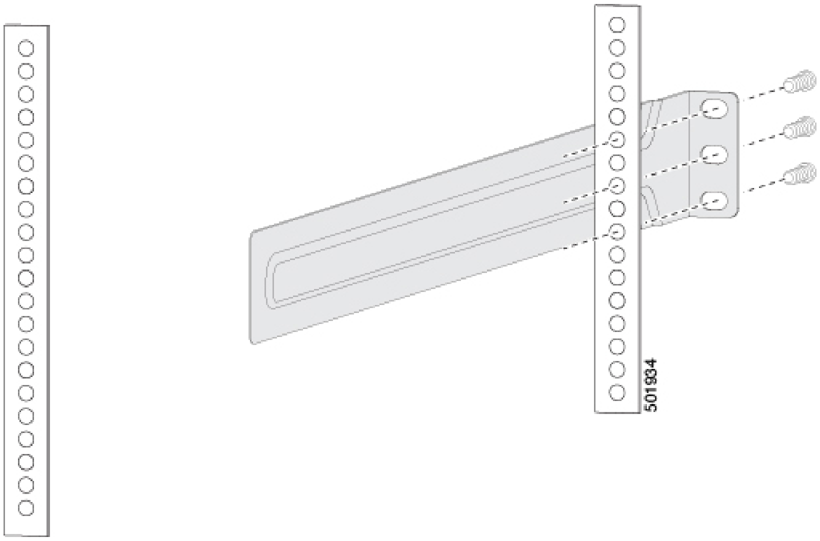
Depending on the chassis depth, the back rack-mount bracket may not fit. In that case, you do not need the back rack-mount bracket.

Step 2 If you are not installing the chassis into a grounded rack, attach a customer-supplied grounding wire to the chassis as explained in the Grounding the Chassis, on page 27 section. If you are installing the chassis into a grounded rack, skip this step.

Step 3 Install the slider rails on the rack or cabinet.

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. 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. Use 12-24 screws or 10-32 screws, depending on the rack thread type. To attach the rails to the rack, see the figure. Tighten 12-24 screws to 30 in-lb (3.39 N·m) of torque. Tighten 10-32 screws to 20 in-lb (2.26 N m) of torque.

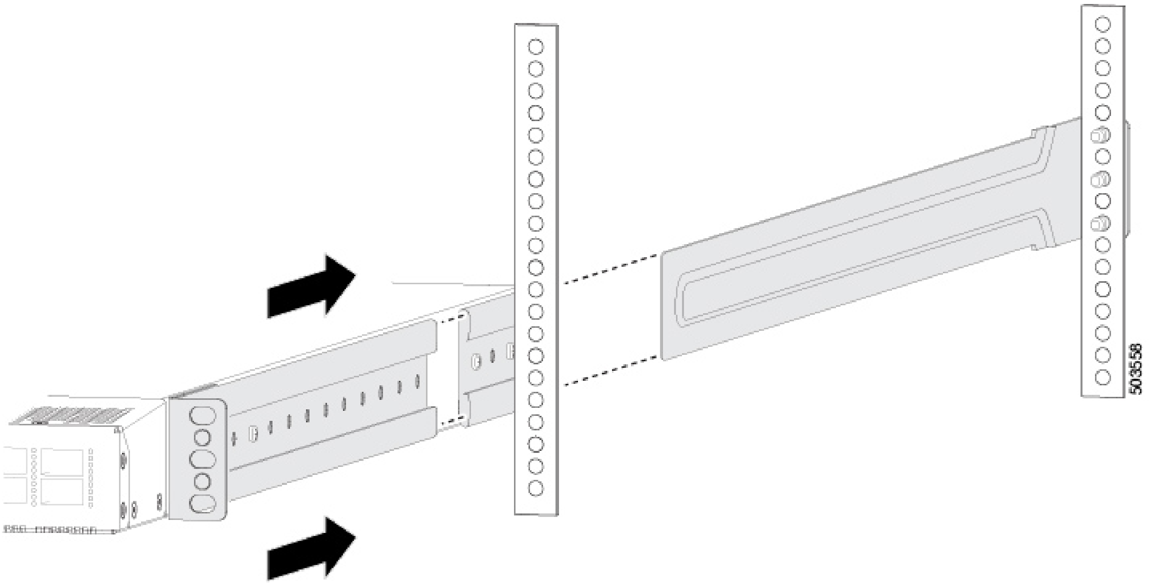


c) Repeat Step 3 to attach the other slider rail to the other side of the rack.

   Make sure that the slider rails are at the same level. Use a level tool, tape measure, or carefully count the screw holes in the vertical mounting rails.

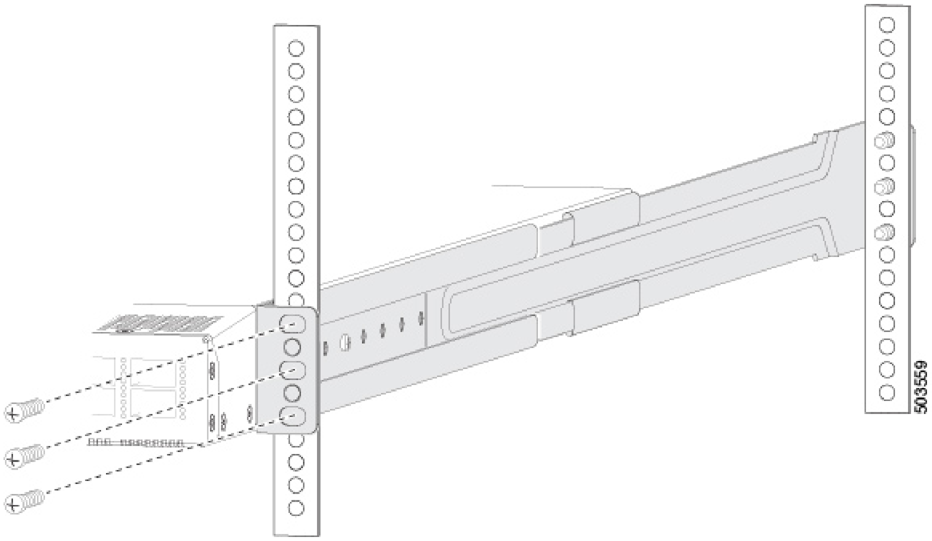
Step 4 Insert the switch into the rack and attach it.

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 figure).



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



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 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 Two-Post Rack Using the NXK-ACC-KIT-1RU Rack-Mount Kit

To install the switch, you attach the front mounting brackets to the switch 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 This is not the preferred rack installation method. This method may not be earthquake safe and will not be NEBS compliant.

Note You supply six 10-32 or 12-24 screws required to mount the rails 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 these parts:
    - Front rack-mount brackets (2)
    - Rear rack-mount brackets (2) (not needed for this procedure)
    - Slider rails (2) (not needed for this procedure)
    - M4 x 0.7 x 8-mm Phillips countersink screws (12)

- The rack is installed and secured to its location.

SUMMARY STEPS

1. Install two front rack-mount brackets to the switch.
2. If you are not installing the chassis into a grounded rack, attach a customer-supplied grounding wire to the chassis as explained in the Grounding the Chassis, on page 27 section. If you are installing the chassis into a grounded rack, skip this step.
3. Insert the switch into the rack and attach it.
4. If you attached a grounding wire to the chassis grounding pad, connect the other end of the wire to the facility ground.

DETAILED STEPS

Procedure

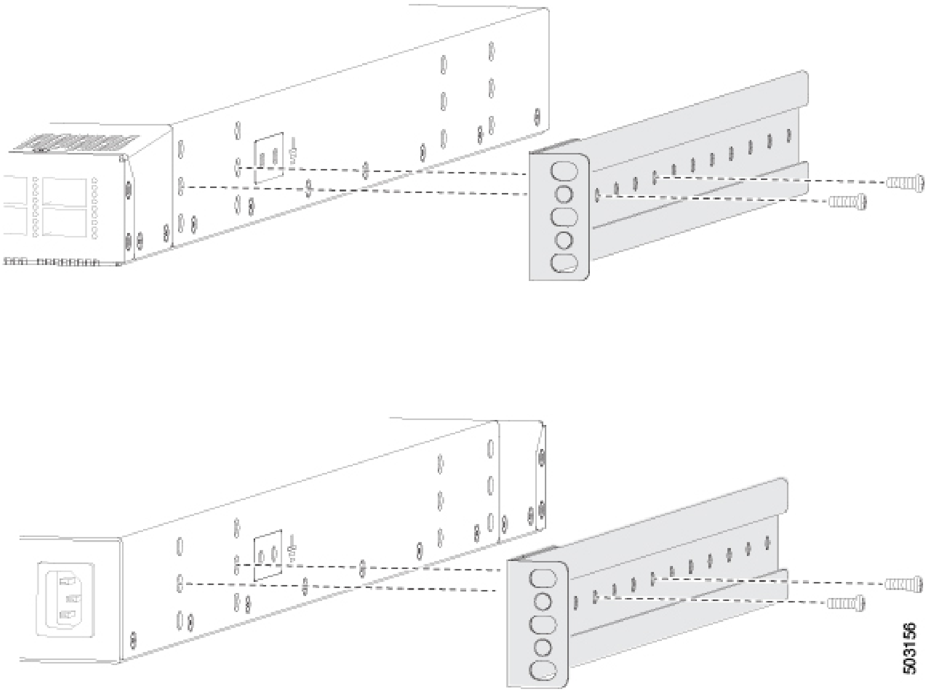
Step 1 Install two front rack-mount brackets to the switch.

a) Determine which end of the chassis goes in the cold aisle.

   - 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.

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

   Note
   Align the holes in the rack-mount bracket to the holes on the side of the chassis (see the two ways to mount these brackets on a typical chassis, in the 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).



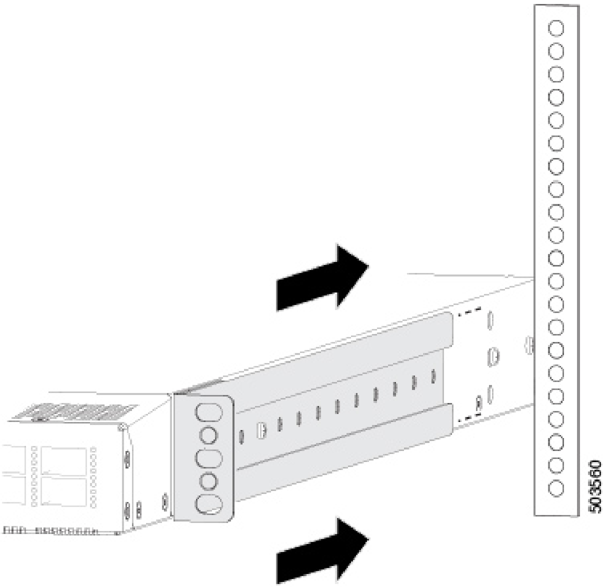
c) Secure the front-mount bracket to the chassis using four M4 screws and tighten each screw to 12 in-lb (1.36 N·m) of torque.

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 If you are not installing the chassis into a grounded rack, attach a customer-supplied grounding wire to the chassis as explained in the Grounding the Chassis, on page 27 section. If you are installing the chassis into a grounded rack, skip this step.

Step 3 Insert the switch into the rack and attach it.

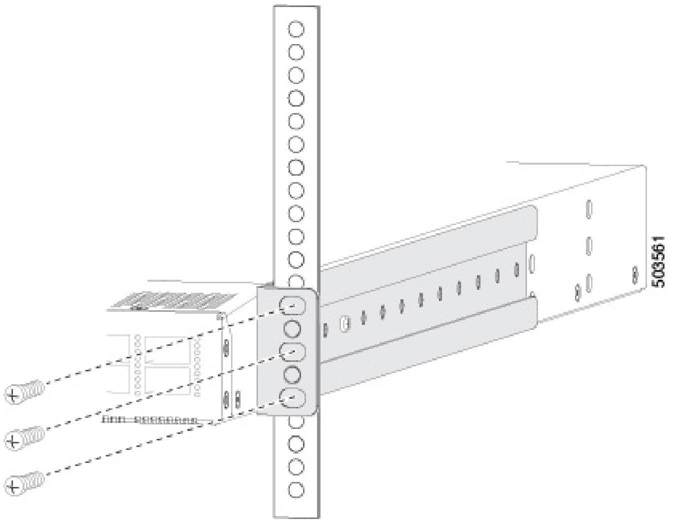
a) Holding the switch with both hands, position the brackets on the switch between the cabinet posts (see the figure).



b) Gently slide the switch all the way into the rack until the front rack-mount brackets come in contact with the cabinet posts.

Note
If you attached a grounding cable to the chassis, bend one of the rack-mounts slightly to allow the grounding lug to go behind the rail.

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



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

Installing the Airflow Sleeve (N9K-AIRFLOW-SLV)

Install the airflow sleeve (N9K-AIRFLOW-SLV) to allow proper airflow, so that the switch is properly cooled. This airflow sleeve is only compatible with rack mount kit (N3K-C3064-ACC-KIT).

Table 2: Airflow Sleeve (N9K-AIRFLOW-SLV) Minimum and Maximum Rack Rail Depth.

Chassis	Minimum Rack Depth	Maximum Rack Depth
N9K-C92348GC-X	636.49 mm	748.25 mm
N9K-C9316D-GX	824.80 mm	916.60 mm
N9K-C9332C	794.20 mm	898.70 mm
N9K-C9332D-GX2B	824.00 mm	915.80 mm
N9K-C9336C-FX2	802.39 mm	903.98 mm
N9K-C9336C-FX2-E	806.90 mm	898.70 mm

Chassis	Minimum Rack Depth	Maximum Rack Depth
N9K-C9348GC-FXP	672.49 mm	764.29 mm
N9K-C93108TC-FX	781.29 mm	873.09 mm
N9K-C93108TC-FX3P	672.49 mm	769.69 mm
N9K-C93180YC-FX	781.29 mm	873.09 mm
N9K-C93180YC-FX3	672.49 mm	784.25 mm
N9K-C93180YC-FX3S	672.49 mm	784.25 mm
N9K-C93400LD-H1	663 mm	775 mm
N9K-C93600CD-GX	824.80 mm	916.60 mm

Note You supply the screws to mount the airflow sleeve.

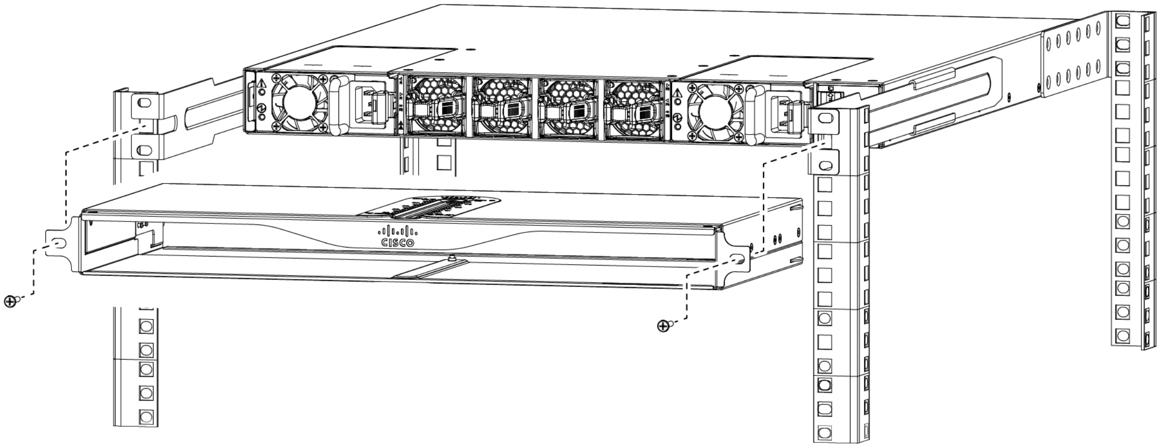
Before you begin

- Verify that your shipment is complete.
- Install your rack in a secure location.

Procedure

Insert the airflow sleeve into the rack and attach it.

a) Holding the airflow sleeve (N9K-AIRFLOW-SLV) with both hands, position it in front of the fan side of the chassis.
b) Holding the airflow sleeve level, insert screws (12-24 or 10-32, depending on the rack type) in each of the two front rack-mount flanges (using a total of two screws) and into the cage nuts or threaded holes in the vertical rack-mounting rails (see the figure).



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) of torque.

Grounding the Chassis

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

Note Provide an electrical conducting path between the product chassis and the metal surface of the enclosure or rack in which it is mounted or to a grounding conductor. To ensure electrical continuity, use thread-forming type mounting screws that remove any paint or non-conductive coatings and establish a metal-to-metal contact. Remove any paint or other non-conductive coatings on the surfaces between the mounting hardware and the enclosure or rack. Clean the surfaces and apply an antioxidant before installation.

Ground the rack if using LVDC power supplies. If using AC or HVDC power supplies, the power cord for the chassis provides grounding.

Ground the rack if using AC power supplies. The power cord for AC power supplies provides the chassis grounding.

Ground the chassis. If you are using a 2-post rack, attach a customer-supplied grounding cable. Attach the cable to the chassis grounding pad and the facility ground. If you are using a 4-post rack, ensure that your chassis is grounded through the rack mount system or the power cable (AC or HVDC).

Warning **Statement 1024—**Ground Conductor

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

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

To reduce risk of electric shock, when installing or replacing the unit, the ground connection must always be made first and disconnected last.

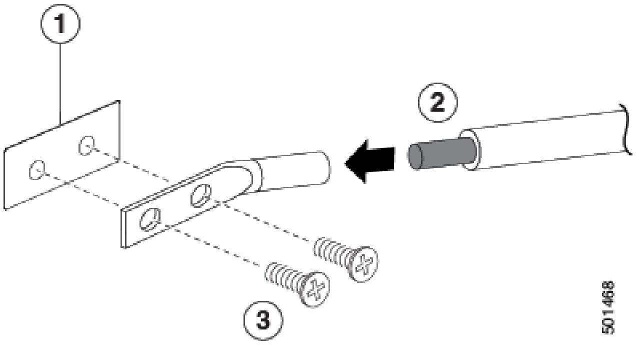
Before you begin

Before you can ground the chassis, connect to earth ground of the data center building.

Procedure

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. We recommend 6-AWG wire for the U.S. installations.

Step 2 Insert the stripped end of the grounding wire into the open end of the grounding lug. Use a crimping tool to crimp the lug to the wire. See the figure. Verify that the ground wire is securely attached to the grounding lug by attempting to pull the wire out of the crimped lug (tug test).



1	Chassis grounding pad	3	2 M4 screws are used to secure the grounding lug to the chassis
2	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 3 Secure the grounding lug to the chassis grounding pad with two M4 screws, see figure 1. 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 the facility ground.

Starting the Switch

Start the switch by connecting it to its dedicated power source. If you need *n*+*n* redundancy, connect each power supply in a switch to a different power source.

Note This equipment is designed to boot up in less than 30 minutes, dependent on its neighboring devices being fully up and running.

Before you begin

- The switch must be installed and secured to a rack or cabinet.
- The switch must be adequately grounded.
- The rack must be close enough to the dedicated power source so that you can connect the switch to the power source by using the designated power cables.
- You have the designated power cables for the power supplies that you are connecting to the dedicated power sources.

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.

Procedure

Step 1 For any AC power supply, do this:

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

Step 2 For any HVAC/HVDC power supply, connect it to a power source like this:

a) 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.
b) Connect the other end of the power cable to a power source.

- When connecting to an HVAC power source, insert the plug in a receptacle for the HVAC power source.
- When connecting to an HVDC power source, do this:

  1. Verify that the power is turned off at a circuit breaker for the power source terminals.
  2. Remove the nuts from each of the terminal posts for the power source.
  3. Place the power cable ground-wire terminal ring on the ground terminal for the power source and secure them with a terminal nut.
  4. Place the power cable negative-wire terminal ring on the negative terminal for the power source and secure them with a terminal nut.
  5. Place the power cable positive-wire terminal ring on the positive terminal for the power source and secure them with a terminal nut.
  6. If there is a safety cover for the power source terminals, place and secure it over the terminals.
  7. Turn on the power at the power source circuit breaker.

Step 3 For any DC power supply, do this:

a) Turn off the circuit breaker for the power source.
b) When using an LV DC power supply that does not use a lug, connect the supplied wiring harness to the source. Or connect the user-supplied wires to the LV DC power source.
c) When using an LV DC power supply that does not use a lug, connect the attached plug of the supplied wiring harness to the power supply. Or attach the lugs of the user supplied wires to the power supply.
d) If there is a safety cover for the power source terminals, place and secure it over the terminals.
e) Turn on the power at the circuit breaker for the DC power source.

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 these 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.

- After initialization, the switch chassis Status (labeled as STA or STS) LED is green.

Step 7 Verify that the system software has booted and the switch has initialized without error messages.

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 9000 Series Configuration Guides.

CHAPTER 4

Connecting the Switch to the ACI Fabric

- ACI Fabric Topology, on page 31
- Preparing to Connect to Other Devices, on page 32
- Connecting Leaf Switches to APICs, on page 33
- Connecting Leaf Switches to Spine Switches, on page 35
- Installing a Gigabit Ethernet module (GEM), on page 36
- Replacing an Existing Switch in the ACI Fabric, on page 37
- Setting Up an Optional Console Interface, on page 37
- Setting Up an Optional Management Connection, on page 37
- Maintaining Transceivers and Optical Cables, on page 38

ACI Fabric Topology

The ACI fabric topology includes these major components:

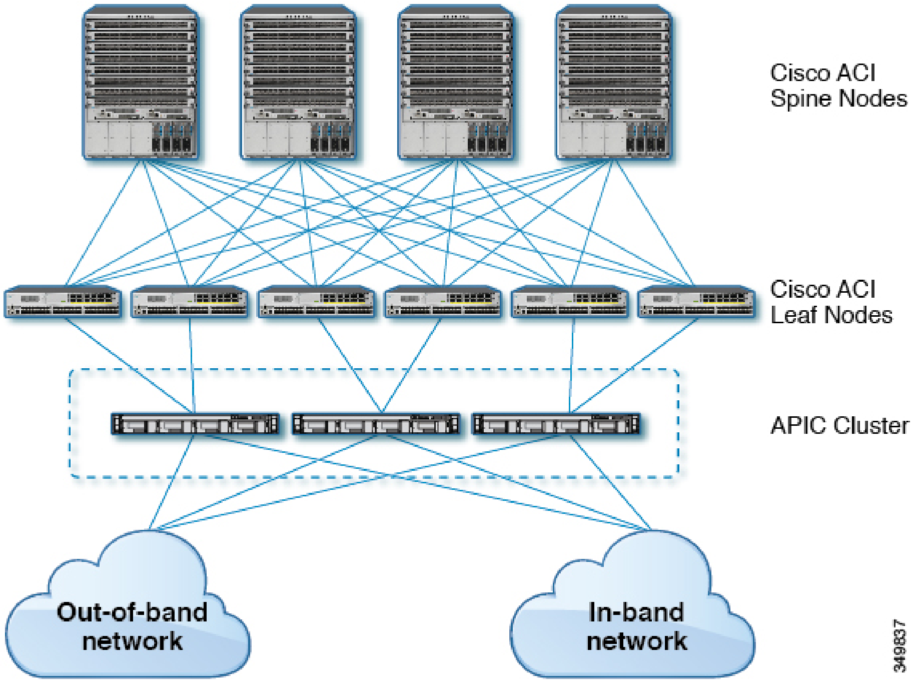
- Application Centric Infrastructure Controller (APIC) appliance (cluster of APICs)
- Leaf switches (for switch compatibility, please see the data sheets)
- Spine switches (for switch compatibility, please see the data sheets)

For additional information, please see the Cisco APIC Installation, Upgrade, and Downgrade Guide.

Note To prevent sub-optimal forwarding between endpoints, connect every leaf switch in the fabric to every spine switch in the same fabric.

As shown in the figure, each APIC is connected to one or two leaf switches and each leaf switch should be connected to every spine switch in the same fabric.

Figure 1: Connections Between APIC Clusters, Leaf Nodes, and Spine Nodes



Preparing to Connect to Other Devices

When preparing to connect the fabric devices, consider these items for each type of interface, and gather all of the required equipment before making the connections:

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

Note 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.

The optical transceivers that are not already assembled to their cables come separate from their cables. To prevent these transceivers and their cables from being damaged, we recommend that you keep the transceivers disconnected from their cables when installing them in ports and then insert the optical cable into the transceiver. When removing transceivers from ports, remove their cables before removing the transceivers.

For more information about removing and installing the transceivers, see the Cisco Nexus 9408 ACI-Mode Switch Hardware Installation Guide, "*Optic Transceiver Removal Using the Optics Extraction Tool*".

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

- Wear an ESD-preventative wrist strap that is connected to an earth ground whenever handling transceivers. The switch is typically grounded when you install transceivers and provides an ESD port to which you can connect your wrist strap. If you cannot find an ESD port, connect the wrist strap to an earth ground (such as the grounding connection for the chassis).
- Do not remove or insert a transceiver more often than 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) increases with contamination and should be kept below 0.35 dB.
    - Clean these parts before installing them 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.

Connecting Leaf Switches to APICs

Downlink one or two (recommended for redundancy) Cisco Nexus 9300 platform ACI-mode leaf switches to each Application Policy Infrastructure Controller (APIC) in your ACI fabric. The type of virtual interface card (VIC) installed on the APIC determines the types of interface cables that you use to connect the leaf switches to the APICs.

- The **VIC 1225T** module supports copper connectors, copper cables, and switches with copper downlink ports (such as: Cisco Nexus 93108TC-FX switch).
- The **VIC 1225** module supports optical transceivers, optical cables, and switches with optical downlink ports (such as: Cisco Nexus 93600CD-GX switch).
- The **VIC 1455** module supports optical transceivers, optical cables, and switches with optical downlink ports (such as: Cisco Nexus 93600CD-GX switch).

Note You cannot use breakout ports for Cisco APIC connectivity.

Before you begin

The APIC and leaf switches in the fabric must be fully installed in their racks and grounded.

Procedure

Step 1 Connect an interface cable to one of the two to four ports on the virtual interface card (VIC) installed on the APIC. If the cable is not already assembled to its transceiver, insert the transceiver into the VIC port. Connect the optical interface cable to the transceiver.

- For a **VIC 1225T** 10GBASE-T copper module, use 10GBASE-T cables with RJ-45 connectors.
- For a **VIC 1225** optical module, use one of these sets of transceivers and cables:
  - Cisco 10GBASE-LR transceivers (SFP-10G-LR) supporting a link length of up to 6.1 miles (10 km)
  - Cisco 10GBASE-SR transceivers (SFP-10G-SR) supporting these link lengths:
    - Using 2000 MHz MMF (OM3) for up to 984 feet (300 m)
    - Using 4700 MHz MMF (OM4) for up to 1312 feet (400 m)
  - Cisco SFP+ Active Optical Cables (SFP-10G-AOC*x*M [where *x*=1, 3, 5, 7 for lengths in meters])
  - Cisco SFP+ Twinax Cables (SFP-H10GB-CU*x*M [where *x*=7 for lengths in meters])
- For a **VIC 1455** SFP28 module, 10-Gigabit only, use one of these sets of transceivers and cables:
  - Cisco 10GBASE-LR transceivers (SFP-10G-LR) supporting a link length of up to 6.1 miles (10 km)
  - Cisco 10GBASE-SR transceivers (SFP-10G-SR) supporting these link lengths:
    - Using 2000 MHz MMF (OM3) for up to 984 feet (300 m)
    - Using 4700 MHz MMF (OM4) for up to 1312 feet (400 m)
  - Cisco SFP+ Active Optical Cables (SFP-10G-AOC*x*M [where *x*=1, 2, 3, 5, 7, or 10 for lengths in meters])
  - Cisco SFP+ Twinax Cables (SFP-H10GB-CU*x*M [where *x*=1, 2, 3, 5, 7, or 10 for lengths in meters])

Note
The VIC 1455 has 4 ports: port-1, port-2, port-3, and port-4 from left to right.

- All ports must have the same speed, either 10-Gigabit or 25-Gigabit.
- Port-1 and port-2 is one pair, corresponding to eth2-1 on APIC and port-3 and port-4 is another pair, corresponding to eth2-2 on APIC. Only one connection is allowed for each pair. For example, connect one cable to either port-1 or port-2. Connect another cable to either port-3 or port-4. **Do not connect two cables on any pair**.

To determine which transceivers, adapters, and cables support this switch, see the Cisco Transceiver Modules Compatibility Information document.

To see the transceiver specifications and installation information, see Transceiver Module Installation Guides.

Step 2 Connect the other end of the interface cable to a downlink port on a leaf switch.

- For a Cisco 10GBASE-LR or -SR transceiver and cable, insert the transceiver into a downlink optical port on a leaf switch before connecting the cable to the transceiver.

- For Cisco SFP+ Active Optical Cables, insert the transceiver on the cable into a downlink optical port on a leaf switch.
- For a 10GBASE-T copper cable, insert the RJ-45 connector on the cable into a downlink BASE-T port on a leaf switch.

Note
To determine which transceivers, adapters, and cables support this switch, see the Cisco Transceiver Modules Compatibility Information document.

Connecting Leaf Switches to Spine Switches

For optimal forwarding between endpoints, connect each leaf switch to every spine switch in the same ACI fabric.

To determine which transceivers, adapters, and cables support this switch, see the Cisco Transceiver Modules Compatibility Information document.

To see the transceiver specifications and installation information, see Transceiver Module Installation Guides.

Warning **Statement 1055**—Class 1/1M Laser

Invisible laser radiation is present. Do not expose to users of telescopic optics. This applies to Class 1/1M laser products.

CAUTION
LASER
1/1M

Warning **Statement 1056**—Unterminated Fiber Cable

Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not view directly with optical instruments. Viewing the laser output with certain optical instruments, for example, eye loupes, magnifiers, and microscopes, within a distance of 100 mm, may pose an eye hazard.

Warning **Statement 1255**—Laser Compliance Statement

Pluggable optical modules comply with IEC 60825-1 Ed. 3 and 21 CFR 1040.10 and 1040.11 with or without exception for conformance with IEC 60825-1 Ed. 3 as described in Laser Notice No. 56, dated May 8, 2019.

Before you begin

- The leaf and spine switches in the fabric (such as: N9K-C9364C, N9K-C9332C, N9K-C9316D-GX, and N9K-C9332D-GX2B) must be fully installed in their racks and grounded.

- If there are modular switches in the fabric, their ACI-mode line cards must already be installed. The line cards can be of these types:
    - 32-port 100-Gigabit (such as: N9K-X9732C-EX)
    - 36-port 100-Gigabit (such as: N9K-X9736C-FX)

Note
- You cannot include NX-OS line cards in the same chassis when running in ACI mode.
- Multiple uplinks from a leaf switch to a spine switch is supported. A symmetrical topology is recommended so that all devices have equal access to resources.

Procedure

Step 1 For the transceivers with removable cables, separate the transceivers from their interface cables.

Step 2 Insert the appropriate transceiver into an active uplink port on the leaf switch.

Step 3 Insert the same type of transceiver in the spine switch port on the line card.

Step 4 For transceivers with removable cables, insert the interface cable into the open end of each of those transceivers.

Step 5 Repeat Steps 1 through 4 for each spine switch in the ACI fabric.
The leaf switch is connected to each spine switch in the ACI fabric.

Step 6 Repeat Steps 1 through 5 for each leaf switch in the ACI fabric.
Each leaf switch in the ACI fabric is connected to each spine switch in the network.

The fabric automatically implements Equal Cost Multi-Pathing (ECMP) and enables all links. You do not need to configure the links.

Installing a Gigabit Ethernet module (GEM)

Procedure

Step 1 Clear the switch's current configuration. Use the `setup-clean-config` command.

Step 2 Power off the switch; disconnect the power.

Step 3 Replace the current GEM card with the new GEM card.

Step 4 Power on the switch.

Replacing an Existing Switch in the ACI Fabric

To replace an existing switch in the ACI fabric, see "Upgrading the Switch Hardware" in the Cisco APIC Installation and ACI Upgrade and Downgrade Guide.

Setting Up an Optional Console Interface

Optionally set up a console interface for performing the initial configuration of the switch. Use the interface cable provided in the accessory kit to connect the switch to your console device. Connect the console port on the switch to a modem. If you do not connect it to a modem, make the connection either before powering up the switch or after completing the boot process for the switch.

Before you begin

The console device must support VT100 terminal emulations and asynchronous transmissions.

Procedure

Step 1 Configure the terminal emulator program to match each of these default port characteristics:

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

Step 2 Insert the RJ-45 connector on the interface cable found in the accessory kit into the RS-232 port on the switch. Insert the DB-9 connector on the other end of the cable to the serial port on the console device.

What to do next

Perform the initial configuration for the switch (see the *Cisco ACI Getting Started Guide*).

Setting Up an Optional Management Connection

Optionally set up an out-of-band management connection for monitoring and troubleshooting purposes. Depending on your switch, connect either the RJ-45 management port or the SFP management port on the switch to an external hub, switch, or router.

Before you begin

To prevent an IP address conflict, complete the initial configuration for the switch and establish an IP address before you create the management connection.

Procedure

Step 1 Connect the interface cable to a management port on the switch.

Step 2 Connect the other end of the cable to an external hub, switch, or router.

Maintaining Transceivers and Optical Cables

Keep transceivers and fiber-optic cables clean and dust free to maintain high signal accuracy and prevent damage to the connectors. Contamination increases attenuation (loss of light) and should be below 0.35 dB.

Consider these maintenance guidelines:

- Transceivers are static sensitive. To prevent ESD damage, wear an ESD-preventative wrist strap that is connected to the grounded chassis.
- Do not remove and insert a transceiver more often than is necessary. Repeated removals and insertions can shorten its useful life.
- Keep all optical connections covered when not in use. Clean them before using to prevent dust from scratching the fiber-optic cable ends.
- Do not touch the ends of connectors. Touching the ends can leave fingerprints and cause other contamination.
- 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 the fiber-optic connection cleaning procedures for your site.
- 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.

Note When you need to remove a fiber-optic transceiver, first remove the fiber-optic cable from the transceiver **before** you remove the transceiver from the port.

CHAPTER 5

Replacing Components

- Replacing a Power Supply Module, on page 39

Replacing a Power Supply Module

The switch requires two power supplies for redundancy. With one power supply providing the necessary power for operations, replace the other power supply during operations as long as the new power supply has the same airflow direction as the other modules in the chassis.

Replace a power supply with another supported power supply that has the same power source type as the other installed power supply. Additionally, the airflow direction of the power supply must match or conform to the airflow direction of the installed fan modules. For the airflow direction used by the switch, see the coloring of the fan modules.

Replacing an AC Power Supply

Replace an AC power supply during operations as long as the other power supply provides power to the switch.

Before you begin

Note Determine the airflow direction by looking at the coloring of the latch on each power supply. AC power supplies with burgundy latches have port-side *intake* airflow direction AC power supplies with blue latches have port-side *exhaust* airflow direction.

-

- 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.
- There must be an earth ground connection to the chassis that you are installing the replacement module. AC power supplies connected to AC power sources are automatically grounded through their power cable.

Procedure

Step 1 Remove an AC power supply.

a) 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.
b) Grasp the power supply handle while pressing the colored release latch towards the power supply handle.
c) 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 connections on the back side of the module and prevent anything else from coming into contact with and damaging the connectors.

Step 2 Install the replacement power supply.

a) Holding the replacement power supply with one hand underneath the module and the other hand holding the handle, turn the power supply so that its release latch is on the right side and align the back end of the power supply (the end with the electrical connections) to the open power supply slot before carefully sliding the power supply all the way into the slot until it clicks into place.

Note
If the power supply does not fit into the open slot, turn the module over before sliding it carefully into the open slot.

b) 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.

c) Attach the power cable to the electrical outlet on the front of the power supply.
d) Make sure that the other end of the power cable is attached to the appropriate power source for the power supply.

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.

e) Verify that the power supply is operational by making sure that the power supply LED is green.

Replacing a High Voltage (HVAC/HVDC) Power Supply

Replace an HVACHVDC power supply during operations as long as the other power supply provides power to the switch.

Before you begin

-
- An HVAC/HVDC 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.

- There must be an earth ground connection to the chassis in which you are installing the replacement power supply. HVAC/HVDC power supplies connected to AC power sources are automatically grounded by their power cable when connected to the power supply and AC power source. HVAC/HVDC power supplies connected to DC power sources have Saf-D-Grid power cables with three connectors on the power source end--you connect one of those connectors to the earth ground.

Procedure

Step 1 Remove an HVAC/HVDC power supply.

a) Turn off the circuit breaker for the power feed to the power supply that you are replacing.

   Be sure that the LEDs turn off on the power supply that you are removing.

b) 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.
c) Grasp the power supply handle while pressing the colored release latch towards the power supply handle.
d) 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 connections on the back side of the module and prevent anything else from coming into contact with and damaging the connectors.

Step 2 Install the replacement power supply.

a) Holding the replacement power supply with one hand underneath the module and the other hand holding the handle, turn the power supply so that its release latch is on the right side and align the back end of the power supply (the end with the electrical connections) to the open power supply slot before carefully sliding the power supply all the way into the slot until it clicks into place.

   Note
   If the power supply does not fit into the open slot, turn the module over before sliding it carefully into the open slot.

b) 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.

c) Attach the Saf-D-Grid end of the power cable to the electrical outlet on the front of the power supply.
d) Make sure that the other end of the power cable is attached to the appropriate power source for the power supply.

   - For an HVAC power source, plug the other end of the power cable into the power source.
   - For a HVDC power source, verify that the circuit breaker is turned off and then connect each of the three cable connectors to the appropriate DC and grounding terminals on the power source. If there is a cover plate for the DC terminals, install the plate to prevent accidental contact with the terminals.

e) If using an HVDC power source, turn on the circuit breaker for the power source.
f) Verify that the power supply is operational by making sure that the power supply LED is green.

Replacing a DC Power Supply

Replace a DC power supply during operations so long as the other power supply provides power to the switch.

Before you begin

Note Determine the airflow direction by looking at the coloring of the latch on each power supply. AC power supplies with burgundy latches have port-side *intake* airflow direction. AC power supplies with blue latches have port-side *exhaust* airflow direction.

- A DC power source must be within reach of the power cables 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.
- There must be an earth ground connection to the chassis in which you are installing the replacement power supply. If the switch is mounted properly in a grounded rack then there is no need to ground the PSU. Some DC power supplies connected to DC power sources have three power cables (two for DC power and one for grounding). Some, like the (NXA-PDC-1100W) only have two power cables (both for DC power).
- We recommend 8-AWG wire for DC installation in the U.S.
- All DC power supplies have reverse polarity protection. When you inadvertently connect the input power (+) to the DC PSU's – terminal and the input power – to the DC PSU's (+) terminal, the PSU will not be damaged and will operate fine after the input power feeds are correctly wired.

Procedure

Step 1 Remove a DC power supply.

a) Turn off the circuit breaker for the power feed to the power supply that you are replacing.

   Be sure that the LEDs turn off on the power supply that you are removing.

b) Remove the DC power connector block from the power supply.

   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.

c) Grasp the power supply handle while pressing the release latch towards the power supply handle.

d) 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 connections on the back side of the module and prevent anything else from coming into contact with and damaging the connectors.

Step 2 Install the replacement power supply.

a) Holding the replacement power supply with one hand underneath the module and the other hand holding the handle, turn the power supply so that its release latch is on the right side and align the back end of the power supply (the end with the electrical connections) to the open power supply slot before carefully sliding the power supply all the way into the slot until it clicks into place.

   Note
   If the power supply does not fit into the open slot, turn the module over before sliding it carefully into the open slot.

b) 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.

c) Attach the power connector block end of the power cable to the electrical outlet on the front of the power supply.
d) Turn on the circuit breaker for the power source.
e) Verify that the power supply is operational by making sure that the power supply LED is green.

APPENDIX A

Rack Specifications

- Overview of Racks, on page 45
- General Requirements for Cabinets and Racks, on page 45
- Requirements Specific to Standard Open Racks, on page 46
- Requirements Specific to Perforated Cabinets, on page 46
- Cable Management Guidelines, on page 46

Overview of Racks

Install the switch in these 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 using an enclosed cabinet, we recommend one of the thermally validated types, either standard perforated or solid-walled with a fan tray.
- We do not recommend using racks that have obstructions (such as power strips). The obstructions could impair access to field-replaceable units (FRUs).

General Requirements for Cabinets and Racks

The cabinet or rack must meet these requirements:

- Standard 19-inch (48.3 cm) (two- or 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 46.

  The spacing between the posts of the rack must be (EIA-310-D-1992 19-inch rack compatible) wide enough to accommodate the width of the chassis.

- The minimum vertical rack space requirement per chassis is:
    - For a one RU (rack unit) switch, 1.75 inches (4.4 cm)
    - For a one and a half RU (rack unit) switch, 2.63 (6.68 cm)
    - For a two RU (rack unit) switch, 3.5 inches (8.8 cm)
    - For a three RU (rack unit) switch, 5.25 inches (13.3 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 these 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 these requirements:

- The minimum vertical rack space per chassis must be equal to the rack unit (RU) of the chassis. One rack unit is 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 these 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, 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.

APPENDIX B

System Specifications

- Environmental Specifications, on page 47
- Switch Dimensions, on page 48
- Switch and Module Weights and Quantities, on page 48
- Transceiver and Cable Specifications, on page 48
- Switch Power Input Requirements, on page 49
- Power Specifications, on page 49
- Power Cable Specifications, on page 50
- Regulatory Standards Compliance Specifications, on page 53

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	Nonoperating	5 to 95%
	Operating	5 to 90%
Altitude	Operating	0 to 13,123 feet (0 to 4,000 meters)

Switch Dimensions

Switch	Width	Depth	Height
Cisco Nexus 9348GC-FX3	17.3 inches (43.9 cm)	Chassis without PSUs - 18.0 in (45.72 cm) With NXA-PAC-350W PSUs - 19.7 in (49.9 cm) With NXA-PHV-350W PSUs - 19.7 in (49.9 cm) With NXA-PDC-440W PSUs - 21.0 in (53.34 cm)	1.72 inches (4.4 cm) (1 RU)

Switch and Module Weights and Quantities

Component	Weight per Unit	Quantity
Cisco Nexus 9348GC-FX3 Chassis (N9K-C9348GC-FX3)	14.5 lb (6.57 kg)	1
Fan Module – Port-side exhaust (blue) (NXA-SFAN-30CFM-PE) – Port-side intake (burgundy) (NXA-SFAN-30CFM-PI)	— 0.26 lb (0.12 kg)	3
Power Supply module – 350-W AC port-side intake (burgundy) (NXA-PAC-350W-PI) **– 350-W AC port-side exhaust (blue) (NXA-PAC-350W-PE)** – 350-W AC port-side intake (burgundy) (NXA-PAC-350W-PI2) – 350-W AC port-side exhaust (blue) (NXA-PAC-350W-PE2) **– 350-W PHV port-side intake (burgundy) (NXA-PHV-350W-PI)** **– 350-W PHV port-side exhaust (blue) (NXA-PHV-350W-PE)** **– 440-W DC port-side intake (burgundy) (NXA-PDC-440W-PI)** – 440-W DC port-side exhaust (blue) (NXA-PDC-440W-PE)	— 2.64 lb (1.2 kg)	2 (1 for operations and 1 for redundancy)

Transceiver and Cable Specifications

To see the transceiver specifications and installation information, see https://www.cisco.com/c/en/us/support/interfaces-modules/transceiver-modules/products-device-support-tables-list.html.

Switch Power Input Requirements

This table lists the typical amount of power that the switch consumes. It also lists the maximum amount of power that you must provision for the switch and power supply for peak conditions.

Note Some power supplies have capabilities that are greater than the maximum power requirements for a switch. To determine the power consumption characteristics for the switch, use the typical and maximum requirements that are listed here.

Switch	Typical Power Consumption (AC or DC)	Maximum Power Consumption (AC or DC)	Heat Dissipation Requirement
Cisco Nexus 9348GC-FX3	226 W	242 W	825.738 BTUs per hour

Power Specifications

Power specifications include the specifications for each type of power supply module.

350-W AC Power Supply Specifications

These specifications apply to these power supplies:

Characteristic	Specification
AC input voltage	100 to 120 VAC, 200 to 240 VAC
AC input frequency	Nominal range: 50 to 60 Hz
Maximum AC input current	4 A at 100 to 120 VAC 2A at 200 to 240 VAC
Maximum output power per power supply	350 W
Maximum inrush current	33 A (sub-cycle duration)
Efficiency rating	Climate Savers Platinum Efficiency (80Plus Platinum certified)
Form factor	RSP1

350-W PHV Power Supply Specifications

These specifications apply to these power supplies:

- NXA-PHV-350W-PE
- NXA-PHV-350W-PI

Characteristic	Specification
Input voltage	240 to 380 VDC 100 to 277 VAC
Input frequency	Nominal range: 50 to 60 Hz
Maximum output power per power supply	350 W
Efficiency rating	Climate Savers Platinum Efficiency (80Plus Platinum certified)
Form factor	RSP1

440-W DC Power Supply Specifications

These specifications apply to these power supplies:

- NXA-PDC-440W-PE
- NXA-PDC-440W-PI

Characteristic	Specification
Maximum output power	440 W
Input current	16 -8 A
DC input voltage	Nominal Range: -48 to -60 VDC

Power Cable Specifications

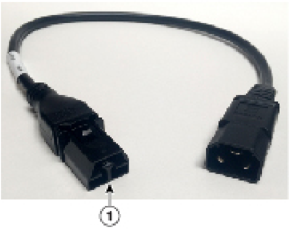
These sections show the power cables that you can order and use with this switch.

Power Cable Specifications for AC Power Supplies

Power Type	Power Cord Part Number	Cord Set Description
	CAB-C13-C14-2M	Power Cord Jumper, C13-C14 Connectors, 6.6 feet (2.0 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)

Power Type	Power Cord Part Number	Cord Set Description
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)
India	CAB-C13-C14-2M-IN	Power Cord Jumper, C13-C14 Connectors, 6.6 feet (2.0 m)
India	CAB-C13-C14-3M-IN	Power Cord Jumper, C13-C14 Connectors, 9.8 feet (3.0 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)
Japan	CAB-C13-C14-2M-JP	Power Cord Jumper, C13-C14 Connectors, 6.6 feet (2.0 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)
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)
All except Argentina, Brazil, and Japan	NO-POWER-CORD	No power cord included with switch

HVAC/HVDC Power Cables Supported by ACI-Mode and NX-OS Mode Switches

Part Number	Cord Set Description	Photo
CAB-HVAC-SD-0.6M	HVAC 2-foot (0.6 m) cable with Saf-D-Grid and SD connectors 277V AC	

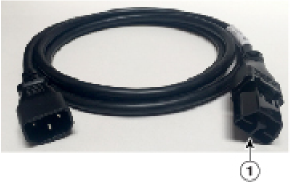
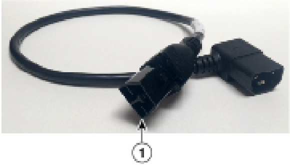
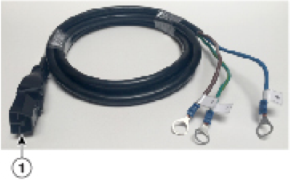
Part Number	Cord Set Description	Photo
CAB-HVAC-C14-2M	HVAC 6.6-foot (2.0 m) cable with Saf-D-Grid and C14 (use for up to 240 V) connector 250V AC	
CAB-HVAC-RT-0.6M	HVAC 2-foot (0.6 m) cable with Saf-D-Grid and RT connector 277V AC	
CAB-HVDC-3T-2M	HVDC 6.6-foot (2.0 m) cable with Saf-D-Grid and three terminal connectors 300V AC / 400V DC (+200/-200 V DC)	
NO-POWER-CORD	All except Argentina, Brazil, and Japan No power cord included with switch	Not applicable

Table 3: HVAC/HVDC Power Cables Callout Table

1	Connect this end to the power supply unit.

DC Power Cable Specifications

Part ID Number	**Description**	**Photo**
NXA-PDC-440W-PE/PI	The 440W DC power supply (NXA-PDC-440W-PE/PI) is shipped with wiring instructions along with these parts: LUG,FAST,UNIN,#8AWG,RED; LUG,FORK,INSL,16-14G,#6,NY,BLUwNARROW TONGUE; LUG,RING,16-14AWG,#6	

Regulatory Standards Compliance Specifications

This table lists the regulatory standards compliance for the switch.

Table 4: Regulatory Standards Compliance: Safety and EMC

Specification	**Description**
Regulatory compliance	Products should comply with CE Markings according to directives 2004/108/EC and 2006/95/EC.
Safety	• CAN/CSA-C22.2 No. 60950-1 Second Edition • CAN/CSA-C22.2 No. 62368-1-19 Third Edition • ANSI/UL 60950-1 Second edition • IEC 62368-1 • EN 62368-1 • AS/NZS 62368-1 • GB4943 • UL 62368-1

Specification	Description
EMC: Emissions	• 47CFR Part 15 (CFR 47) Class A • AS/NZS CISPR22 Class A • CISPR22 Class A • EN55022 Class A • ICES003 Class A • VCCI Class A • EN61000-3-2 • EN61000-3-3 • KN22 Class A • CNS13438 Class A
EMC: Immunity	• EN55024 • CISPR24 • EN300386 • KN 61000-4 series
RoHS	The product is RoH-6 compliant with exceptions for leaded-ball grid-array (BGA) balls and lead press-fit connectors.

APPENDIX C

LEDs

- Switch Chassis LEDs, on page 55
- Fan Module LEDs, on page 56
- Power Supply LEDs, on page 56

Switch Chassis LEDs

The BCN, STS, and ENV, LEDs are located on the left side of the front of the switch. The port LEDs 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 switch in the chassis.
	Off	This switch is not being identified.
STS	Green	The switch is operational.
	Flashing amber	The switch is booting up.
	Amber	Temperature exceeds the minor alarm threshold.
	Red	Temperature exceeds the 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 admin state is 'Enabled', SFP is present and the interface is connected (that is, cabled, and the link is up).
	Amber	Port admin state is 'Disabled, or the SFP is absent, or both.
	Off	Port admin state is 'Enabled' and SFP is present, but interface is not connected.

LED	Color	Status
(GPS)	Green	GPS interface provisioned and ports are turned on. ToD, 1PPS, 10MHz are all valid.
	Off	Either the interface is not provisioned, or the ports are not turned on. ToD, 1PPS, 10MHz are not valid.

Fan Module LEDs

The fan module status LED is located below the air holes on the front of the fan module. Every fan module has an LED.

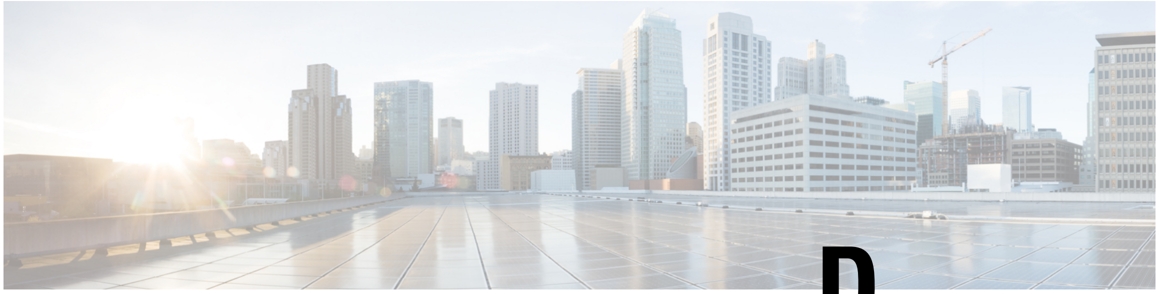
LED	Color	Status
Status	Green	The fan module is operational.
	Red	The fan module is not operational (fan is probably not functional).
	Off	Fan module is not receiving power.

Power Supply LEDs

The power supply LEDs are located on the right portion of the power supply. Combinations of states indicated by the **OK** and **Fault** LEDs signify the status for the module as shown in this table.

OK LED	FAIL or FAIL/ID 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. The power supply may not be properly installed in the chassis.
Off	Off	Either all the installed power supplies are not receiving power or an uninstalled power supply is not receiving power.
Off	Flashing amber	Power supply is operating but a warning condition has occurred—possibly one of these conditions: • High temperature • High power • Slow power supply fan • Low voltage • Power supply is installed in the chassis but was disconnected from the power source.

OK LED	FAIL or FAIL/ID LED	Status
Off	Flashing amber (10 seconds) then amber	Power supply is installed without a connection to a power source.
Off	Amber	Power supply failure—possibly one of these conditions: • Over voltage • Over current • Over temperature • Power supply fan failure



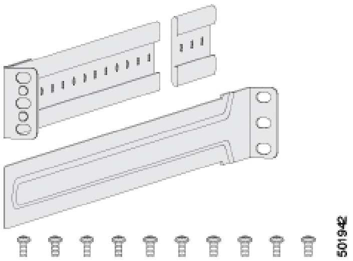
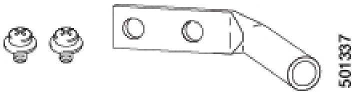
APPENDIX D

Additional Kits

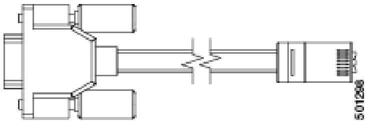
- Rack Mount Kit NXK-ACC-KIT-1RU, on page 59

Rack Mount Kit NXK-ACC-KIT-1RU

This table lists and illustrates the contents for the 1-RU rack-mount kit (NXK-ACC-KIT-1RU).

Illustration	**Description**	**Quantity**
	Rack-mount kit • Front brackets (2) • Rear brackets (2) • Slider rails (2) • M4 Phillips pan-head screws (10)	1
	Ground lug kit • Two-hole lug (1) • M4 x 8-mm Phillips pan-head screws (2)	1
Not applicable	EAC Compliance document	1
Not applicable	Hazardous substances list for customers in China	1

This table lists and illustrates the console cable (CAB-CONSOLE-RJ45) that can be ordered.

Illustration	**Description**	**Quantity**
	Console cable with DB-9F and RJ-45F connectors	1