Cisco N9164E-NS4-O Hardware Installation Guide

Cisco N9100 Series Switches
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1 Overview

Topics:

- Overview

Overview of the Cisco N9164E-NS4-O switch and its components.

Overview

This topic explains the hardware specifications and features of the Cisco N9164E-NS4-O switch. It describes how this high-speed device supports AI and machine learning networks using 64 powerful ports, efficient cooling fans, and reliable power supplies.

The Cisco N9164E-NS4-O switch is a 2-rack unit (RU), fixed-port high-density switch designed to support high-density, 800G fabrics for next-generation leaf-and-spine designs. This switch contains Nvidia Spectrum 4 to support AI-ready data center deployments. The switch is designed for Ethernet-based artificial intelligence and machine learning (AI/ML), and for web-scale spine deployments. The switch offers full adaptive routing.

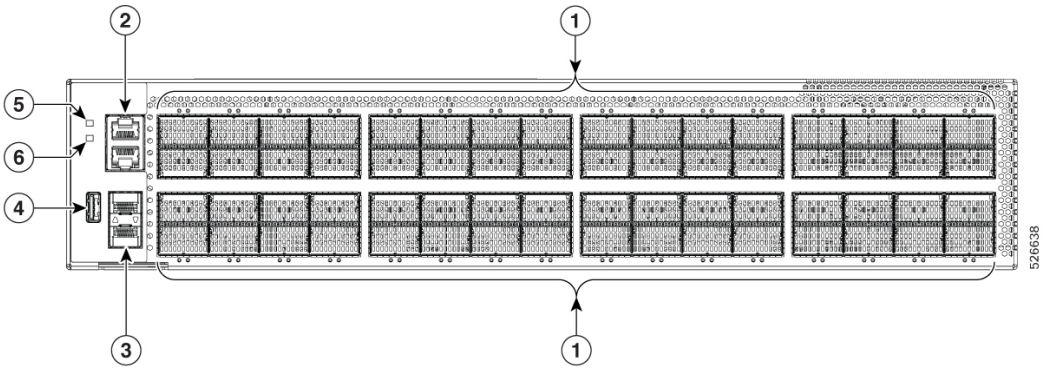
The switch uses a 5 nm process and provides 51.2 terabits per second (Tbps) bandwidth with 512 × 112 Gbps serializer-deserializer (SerDes) channels. This switch has 64 × 800 GbE OSFP (Octal Small Form-Factor Pluggable) ports that provide high-speed connectivity to networking equipment. Each breakout port supports a breakout mode of 2 × 400G and 4 × 200G. This switch has these ports and capabilities:

- 1 console port,
- One management port (one RJ-45 port),
- One USB port, and
- Two SFP28 25G in-band management ports.

Operating system support

This switch supports both Cisco NX-OS and Cisco Nexus Hyperfabric operating systems.

Figure 1: Cisco N9164E-NS4-O Switch—Front View



This table lists the components on the front panel of the Cisco N9164E-NS4-O switch.

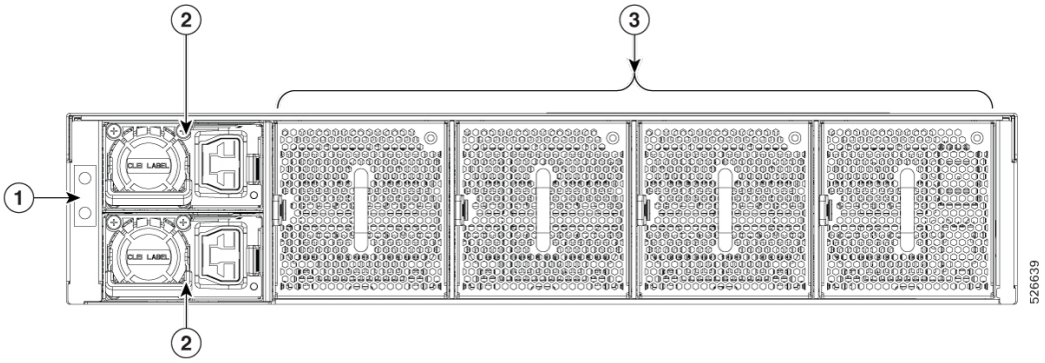
Table 1: Front view of the Cisco N9164E-NS4-O switch

Port	Description
1	64 x 800G OSFP ports
2	RJ45 ports (2): 1 Console + 1G Management port
3	SFP28 x 2 in-band management ports
4	USB 3.0 port, Type A
5	Attention (ATTN) LED
6	System LEDs

Each OSFP port has its own bi-color (amber or green) LED to indicate link status. For port LED status information, see Switch chassis LEDs on page 67.

The maximum power provided to each OSFP port is 18W per instance.

Figure 2: Cisco N9164E-NS4-O—Rear View



This table lists the components on the rear view of the Cisco N9164E-NS4-O switch with power supplies and fan tray.

Table 2: Rear view of the Cisco N9164E-NS4-O switch

Port	Description
1	Ground lug location
2	Power supplies (PSU-1 and PSU-2)
3	Fan tray Four fans: FT1, FT2, FT3, and FT4

This switch includes these user-replaceable components:

Fan modules (four) with one airflow choice: Port side intake fan module (NXASFAN-190CFMPI).

> **Note**
>
> If more than one fan tray fails, the switch issues a warning and powers down within two minutes unless corrective action is taken to replace the failed fan trays.

The switch has four latched fan modules that install into the chassis from the rear. Fans cool the system and maintain proper airflow through the system. The fan modules work with N+1 redundancy.

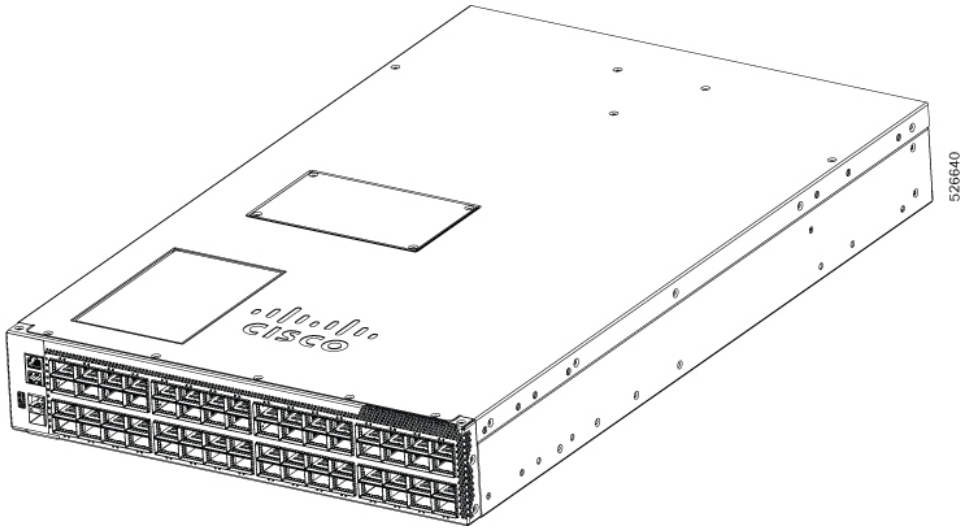
The switch supports two power supply modules: one for operations and one for redundancy (1+1). The module can use AC power; the available option is a 3 kilowatt (kW) AC power supply module (PSU3KW-HVPI).

Note

All fan modules and power supplies must use the same airflow direction. For this switch, the airflow direction is front to back.

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

Figure 3: Cisco N9164E-NS4-O—Port side of the chassis



2 Prepare the site

Topics:

- Temperature requirements
- Humidity requirements
- Altitude requirements
- Dust and particulate requirements
- Minimizing electromagnetic and radio frequency interference
- Shock and vibration requirements
- Preventing electrostatic discharge damage
- Ground requirements
- Plan for power requirements
- Airflow requirements
- Rack and cabinet requirements
- Clearance requirements
- Network Equipment-Building System (NEBS) Statements

Prepare the site to install your N9164E-NS4-O switch.

Temperature requirements

This section describes the required environmental temperature operating ranges for the Cisco N9164E-NS4-O switch.

The operating temperature of the switch is 32° F to 104° F (0° C to 40° C) at 5000 feet (1524 meters) at sea level.

For every 1000 feet (300 meters) above sea level, the maximum temperature is reduced by 1° C.

The non-operating temperature of the switch is -40 to 158 degrees Fahrenheit (-40 to 70° C) at 3000 meters (9842 feet).

Overview of Module Temperatures

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

> **Note**
>
> For any major temperature alarms from the sensors, the switch powers down in two minutes. Power on the switch after fixing the temperature issue.

- Minor temperature threshold—If exceeded, a minor alarm occurs and these actions happen for all four sensors:
  - The system displays system messages.
  - The system sends Call Home alerts if those alerts are configured.
  - The system sends Simple Network Management Protocol (SNMP) notifications if those notifications are configured.
  - The system increases fan speed.
- Major temperature threshold—If exceeded, a major alarm occurs and these actions happen for all sensors:
  - The system displays system messages.
  - The system sends Call Home alerts if those alerts are configured.
  - The system sends Simple Network Management Protocol (SNMP) notifications if those notifications are configured.
  - The system increases fan speed.
  - For any major alarms, the switch powers down in two minutes.

Humidity requirements

This topic explains the effects of high humidity on the Cisco N9164E-NS4-O switch, including potential moisture damage and corrosion, and specifies the acceptable operating and nonoperating humidity ranges.

High humidity can cause moisture to enter the switch. Moisture can cause corrosion of internal components. It can also degrade 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 buildings 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

This topic explains the altitude requirements for operating the Cisco N9164E-NS4-O switch.

Altitude rating is 5,000 feet (1,524 meters).

The maximum ambient temperature decreases by one degree Celsius (1° C) for every 1,000 feet (300 meters) of elevation.

Dust and particulate requirements

This topic explains how to keep your switch environment free of dust and particles.

Exhaust fans cool power supplies. System fans cool switches by drawing in air and exhausting it through various openings in the chassis. However, fans can introduce dust and other particles. These contaminants build up inside the switch, raising the internal chassis temperature. Dust and particles insulate components and interfere with the mechanical components of the switch. Maintain a clean operating environment to reduce the negative impact 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

This topic explains the effects of electromagnetic interference (EMI) and radio frequency interference (RFI) from the switch on nearby devices such as radios, televisions, and telephones, and outlines guidelines to reduce EMI and RFI.

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 emitted by the switch can interfere with cordless and low-power telephones. 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 kilohertz (kHz). This type of interference travels 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. These switches comply with FCC regulations.

Reduce the possibility of EMI and RFI by following 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.

- Improper wiring can result in radio interference emanating from the building's wiring.
- Strong EMI from lightning or radio transmitters can damage signal drivers and receivers in the chassis and create electrical hazards by sending power surges through lines into equipment.

Note

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

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

Caution

If the wire length exceeds the recommended distance, or if wires pass between buildings, consider the risks associated with lightning strikes. 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

This topic explains whether the switch will withstand shock and vibration.

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

Preventing electrostatic discharge damage

This topic explains why you must use and regularly test electrostatic discharge (ESD) preventive wrist straps to protect switch components from static electricity damage.

Many switch components can be damaged by static electricity. Failing to exercise proper ESD precautions can cause intermittent or complete component failures. To minimize ESD damage, always use an ESD-preventive wrist strap or ankle strap and ensure it makes direct 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.

Ground requirements

This topic explains how to ground the switch to avoid voltage issues.

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 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 metal-to-metal contact with the rack–free of paint, stain, dirt, or any other substances. Refer to the note to ensure proper conductivity between the rack and the switch is maintained.

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.

Plan for power requirements

This topic explains how to prepare power requirements for the Cisco N9164E-NS4-O switch.

The switch includes two power supplies (1-to-1 redundancy with current sharing) in this combination:

PSU-1 and PSU-2 are both 3 kW dual AC power supplies (PSU3KW-HVPI) in a 1+1 redundancy.

Note

For 1+1 redundancy, you must use two power sources and connect each power supply to a separate power source.

The power supplies are rated to output up to 3,000 W (AC power supplies).

Note

Some of the power supply modules have rating capabilities that exceed the switch requirements. When calculating your power requirements, use the switch requirements to determine the amount of power that is required for the power supplies.

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

This Warning applies to AC input application.

Warning

Statement 1005– Circuit breaker when using AC power supplies

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

Airflow requirements

This topic explains how to identify and configure the correct airflow direction for the Cisco N9164E-NS4-O switch.

The switch can be positioned with its ports facing either the front or the rear of the rack. The position depends on your cabling and maintenance requirements. Refer to the user-replaceable components in the *Overview* section to identify airflow options for your switch. Position the fan and power supply modules to move the coolant air from the cold aisle to the hot aisle in one of these ways:

- Port-side intake airflow–Cool 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.
- Single-direction airflow–The direction of the installed fan modules determines the airflow.
- For the N9164E-NS4-O switch, port-side exhaust configuration is *not* supported.
- For the N9164E-NS4-O switch, only port-side intake configuration is supported.

The airflow direction of each fan and power supply module is identified by its coloring; burgundy indicates port-side intake airflow.

Note

To prevent the switch from overheating and shutting down, position the air intake for the switch in a cold aisle. The fan and power supply modules must have the same direction of airflow. Airflow direction is front (ports) to back (fans and power supplies) of the chassis.

Rack and cabinet requirements

This topic explains the types of racks and cabinets suitable for installing your switch.

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), and
- standard open four-post Telco racks.

Work with your cabinet vendors to determine which of their cabinets meet these requirements, or consult the Cisco Technical Assistance Center (TAC) for recommendations.

- Use a standard 19 inches (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 23 to 42 inches (58.4 to 106.7 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

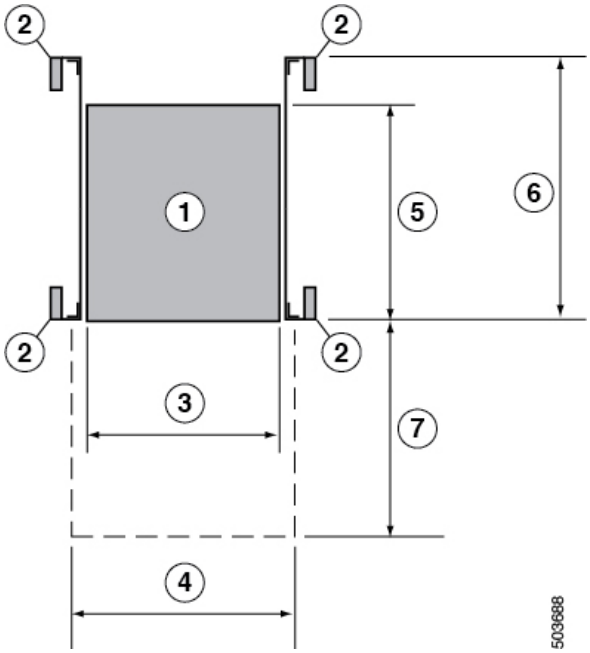
The rack stabilizing mechanism must be in place, or the rack must be bolted to the floor before installation or servicing. Failure to stabilize the rack can cause bodily injury.

Clearance requirements

This topic explains the required chassis clearances between the chassis and any other rack, device, or structure for installation, cable routing, airflow, and maintenance.

Ensure adequate clearance between the chassis and any other rack, device, or structure for proper installation, cable routing, airflow, and maintenance of the switch. The required clearances for installing this chassis in a four-post rack are illustrated in the figure.

Figure 4: Clearance requirements in a four-post rack



Note

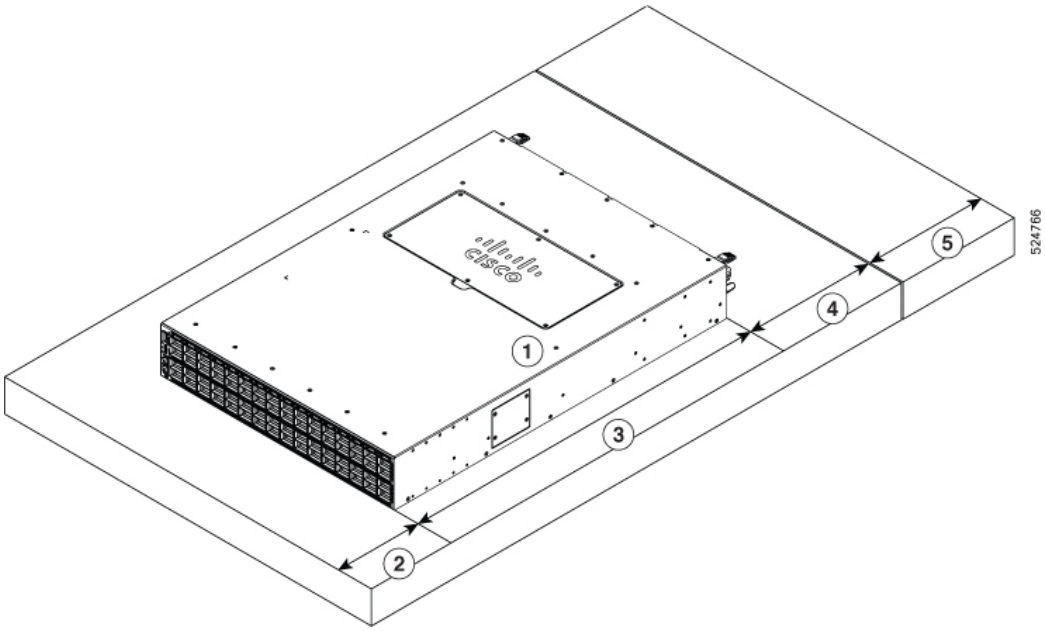
Both the front and rear of the chassis must be open to both aisles for airflow.

This table lists the dimensions that are required when you install this chassis in a four-post rack. The chassis height is 3.46 in. (8.79 cm).

Table 3: Dimensions required for chassis clearance in a four-post rack

Callout	Description
1	Chassis
2	Vertical rack-mount posts and rails
3	Chassis width 17.28 in. (43.9 cm)
4	The width of the front clearance area equals the width of the chassis when two rack-mount brackets are attached 19.0 in. (48.26 cm)
5	Depth of the chassis 27.76 in. (70.5 cm) without fan module and power supply module 28.70 in. (72.9 cm) with fan module and power supply module
6	Maximum extension of the bottom-support rails 42.3 in. (107.4 cm)
7	The depth of the front clearance area is equal to the depth of the chassis.

Figure 5: Clearance Required around the Chassis for the Cisco N9164E-NS4-O Switch



This table lists the dimensions that are required for clearance around the chassis.

Table 4: Dimensions required for clearance around the chassis

Callout	Description
1	Chassis
2	6 in. (15.24 cm) front clearance for air intake
3	The chassis dimensions are: width is 17.28 in. (43.9 cm), depth with Fan Module and Power Supply is 28.70 in. (72.9 cm), height is 3.46 in. (8.8 cm).
4	6 in. (15.24 cm) rear clearance for air exhaust
5	Additional 6 in. (15.24 cm) rear clearance for removal and installation of power supplies and fan modules

Network Equipment-Building System (NEBS) Statements

This topic explains the NEBS statements for safety, spatial and environmental design that are applicable to the Cisco N9116E-NS4-O switches.

NEBS describes the environment of a typical United States Regional Bell Operating Company (RBOC) central office. NEBS is the most common set of safety, spatial, and environmental design standards applied to telecommunications equipment in the United States. It is not a legal or regulatory requirement, but rather an industry requirement.

These NEBS statements apply to the Cisco N9116E-NS4-O switches.

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 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 must not be metallically connected to interfaces that connect to the outside plant (OSP) or its wiring. These interfaces are designed for use as intrabuilding interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of primary protectors is not sufficient protection to connect these interfaces metallically to OSP wiring.

This statement applies to the intrabuilding ports listed below:

RJ-45 Ethernet Management 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 7015–Equipment Bonding and Grounding

When you use thread-forming screws to bond equipment to its mounting metalwork, remove any paint and nonconductive coatings and clean the joining surfaces. Apply an antioxidant compound before joining the surfaces between the equipment and mounting metalwork.

Note

Statement 7016 –Battery Return Conductor

Treat the battery return conductor of this equipment as DC-I.

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.

3 Install the chassis

Topics:

- Safety
- Install options with rack-mount kits
- Install rack
- Unpack and inspect a new switch
- Procure tools and equipment
- Switch accessory kit
- Plan the position of the chassis in the rack
- Install the chassis in a four-post rack
- Ground the chassis
- Start the switch overview

Describes the safety warnings, how to install, rack-mount, and start the switch.

Safety

This topic explains the safety warnings to adhere to before you install the switch.

Before you install, operate, or service the switch, see the *Regulatory, Compliance, and Safety Information for the Cisco N9164E-NS4-O Switch* 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

Note

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.

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.

〈製品使用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

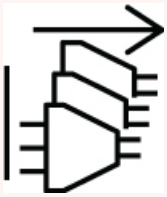
Statement 1091–Installation by an Instructed Person or Skilled Person

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 person or skilled person.

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 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).

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.



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.

Install options with rack-mount kits

This topic explains how the rack-mount kit enables flexible switch installation in racks of varying depths, ensuring accessible ports and modules.

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

You can install the switch using these rack-mount options.

For four-post racks:

- NXK-ACC-KIT3-L
- NXK-ACC-KIT3-S

Your rack or cabinet must meet the requirements listed in the General requirements for cabinets and racks on page 57 section.

Note

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

Install rack

Learn how to install a rack for the N9164E-NS4-O switch.

Before you install the switch, you must install a standard four-post, 19 in. (48.26 cm) Electronics Industries Alliance (EIA) data center rack (or a cabinet that contains such a rack) that meets the requirements listed in Overview of racks on page 57.

Follow these steps to install a rack.

Procedure

1. Bolt the rack to the concrete subfloor before moving the chassis onto it.

   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.

2. If the rack has bonded construction, connect it to the earth ground. This allows you to ground the switch and its components easily, as well as ground your electrostatic discharge (ESD) wrist strap, to prevent damage from discharges when handling ungrounded components before installing them.
3. Include one or two power sources at the rack. For AC power, provide a power receptacle.

   Warning

   Statement 1018–Supply Circuit

   To reduce risk of electric shock and fire, take care when connecting units to the supply circuit so that wiring is not overloaded.

   Note

   If you are not using power redundancy or are using *n* +1 redundancy, you need only one power source. If you are using *n* + *n* redundancy, you need two power sources.

Unpack and inspect a new switch

Learn how to properly unpack, inspect, and handle a new switch chassis.

Before you install a new chassis, unpack and inspect it to be sure that you have all the items that you ordered. Verify that the switch was not damaged during shipment. If anything is damaged or missing, contact your customer representative immediately.

Follow these steps to unpack and inspect the switch.

Caution

When you handle the chassis or its components, always follow ESD protocol to prevent damage. The protocol includes wearing an ESD wrist strap connected to the earth ground.

Tip

Do not discard the shipping container when you unpack the switch. Flatten the shipping cartons and store them. Keep the shipping container to use again if you move or ship the system in the future.

Procedure

1. Compare the shipment to the equipment list from your customer service representative and verify that you have received all ordered items.

   The shipment should include:

   - Switch chassis, and
   - Switch accessory kit.

2. Check the contents of the shipping box for damage.
3. If you notice any discrepancies or damage, send this information to your customer service representative by email:
   - Invoice number of the shipper (see packing slip),
   - Model and serial number of the missing or damaged unit, and
   - Description of the problem and how it affects the installation.

Procure tools and equipment

This topic explains how to procure the essential tools and equipment required for installing the chassis.

Obtain the necessary tools and equipment for installing the chassis:

- Number one and number two Phillips screwdrivers with torque capability to rack-mount the chassis,
- Three-sixteenths-inch flat-blade screwdriver,
- Tape measure and level,
- Electrostatic discharge (ESD) wrist strap or other grounding device,
- Antistatic mat or antistatic foam,
- Crimping tool for lug,
- Wire stripping tool,

- Sixteen M4 screws to fix brackets, and
- Two M4 screws to fix a ground lug.

Switch accessory kit

This topic explains the contents of the switch accessory kit for the chassis.

The switch accessory kit contains a rack mount kit and a ground lug kit. The rack mount kit includes screws and brackets required for installation. The table shows the product identifications (PIDs) for the switch accessory kit.

This table lists the items contained in the switch accessory kit.

Table 5: Switch accessory kit contents for the chassis

Switch	Accessory Kit	Items in Accessory Kit and Rack Depth Range
Cisco N9116E-NS4-O	NXK-ACC-KIT3-L	2RU chassis rail kit 33 to 42 inches depth, 19-inch rack
	NXK-ACC-KIT3-S	2RU chassis rail kit 23 to 33 inches depth, 19-inch rack

Plan the position of the chassis in the rack

This topic explains how to configure and position the switch for port-side intake airflow.

The switch is designed to allow coolant air to flow through in only one direction—port-side intake airflow. Coolant air enters through the port side and exits through the power supply side.

For port-side intake airflow, the switch must have port-side intake fan and AC power supply modules with burgundy coloring on fan modules and AC power supplies.

Position the switch so that its ports are close to ports on connected devices, or so that the fan and power supply modules are convenient to a maintenance aisle. Order the modules that support airflow from the cold aisle toward the hot aisle.

All fan and power supply modules in the same switch must operate with the same direction of airflow. The air intake portion of the switch must be located in a cold aisle.

Install the chassis in a four-post rack

This topic explains how to prepare for chassis installation by ensuring the rack is securely fastened to the data center floor and reviewing the items included in the rack-mount kit.

Before you install the chassis, be sure that the rack is fully secured to the data center floor.

This table lists the items contained in the rack-mount kit.

Table 6: Contents in the rack-mount kit

Quantity	Part Description
2	Rack-mount brackets

Quantity	Part Description
2	M4 x 8 mm Phillips pan-head screws
2	Rack-mount guides
2	Rack-mount guide rails
1	Grounding lug and screws
20	M4 x 6 mm Phillips flat-head screws

Note

This switch does not support port-side exhaust configuration.

Rack-mount the chassis in a 4-post rack

Learn how to install rack-mount brackets, guides, and guide rails on your switch in a four-post rack.

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.

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.

Procedure

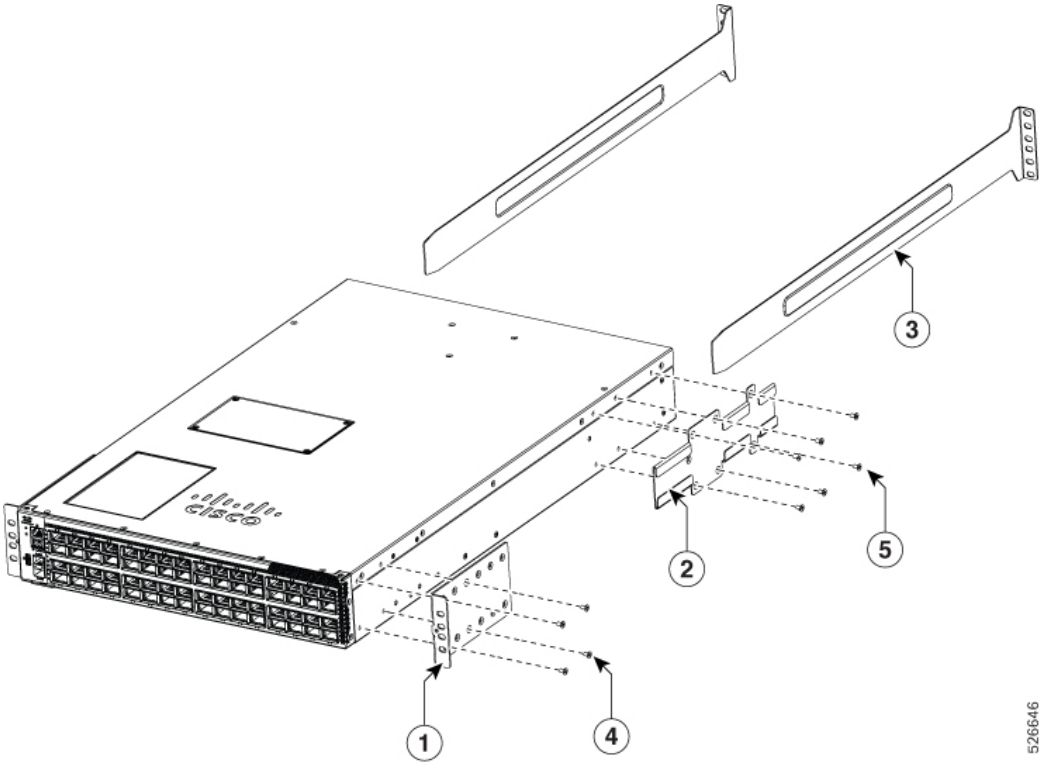
1. Install the rack-mount brackets on the switch.
   a) Determine which end of the chassis is to be located in the cold aisle.

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

   b) Position a rack-mount bracket on the side of the chassis with its four holes that are aligned to four of the screw holes on the side of the chassis. Use four M4 flat-head screws with 13.25 in-lb (1.5 N·m) torque value to attach the bracket to the chassis.

> **Note**
>
> Align four holes in the rack-mount bracket to four screw holes on the front side of chassis or four screw holes on the rear side of the chassis. The holes that you use depend on which end of your chassis is located in the cold aisle.

Figure 6: Rack Mount Brackets on Cisco N9164E-NS4-O Switch—Port Side Intake



This table lists the components required to rack-mount the chassis in a four-post rack.

Table 7: Components to rack-mount chassis

Callout	Description
1	Rack-mount brackets
2	Rack-mount guides
3	Rack-mount guide rails
4	M4 x 6 mm Phillips flat-head screw
5	M4 x 6 mm Phillips flat-head screw

c) Repeat Step 1b with the other rack-mount bracket on the other side of the switch.

2. Install the two rack-mount guides on the chassis.

a) Position a rack-mount guides on the side of the chassis with its six holes aligned to the six screw holes on the side of the chassis, and use six M4 flat-head screws to attach the guides to the chassis. Tighten the screws to a torque of 13.25 in-lb (1.5 N·m).

b) Repeat with the other rack-mount guide on the other side of the switch.

3. Install the guide rails to the rack.
   a) Position the guide rails at the desired levels on the back side of the rack. Use four 12-24 screws or four 10-32 screws, depending on the rack thread type, to attach the rails to the rack.

> **Note**
>
> For racks with square holes, you may need to position a 12-24 or 10-32 cage nut behind each mounting hole in a guide rail before using a 12-24 or 10-32 screw.

   b) Repeat with the other guide rail on the opposite side of the rack.
   c) Use a tape measure and a level to verify that the rails are at the same height and are horizontal.
4. Insert the switch into the rack and attach it.
   a) Use both hands to position the back of the switch between the front posts of the rack.
   b) Align the two rack-mount guides on each side of the switch with the guide rails installed in the rack. Slide the rack-mount guides onto the guide rails. Gently slide the switch all the way into the rack.

> **Note**
>
> If the switch does not slide easily, try realigning the rack-mount guides on the guide rails.

   c) While holding the chassis level, insert two screws (12-24 or 10-32, depending on the rack type) through the holes in each rack-mount bracket and into the cage nuts or threaded holes in the rack-mounting rail.
   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).

Ground the chassis

Learn how to properly ground the switch 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 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 metal-to-metal contact.
>
> Remove paint or other non-conductive coatings from surfaces between mounting hardware and the enclosure or rack. Clean the surfaces and apply an antioxidant before installation.

If you use AC power supplies, the power cord provides grounding for the chassis. To supplement the grounding or bonding, attach a customer-supplied grounding cable to the chassis ground pad.

Ground the chassis. If you are using a two-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 four-post rack, ensure that your chassis is grounded through the rack mount system or the power cable (AC).

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.

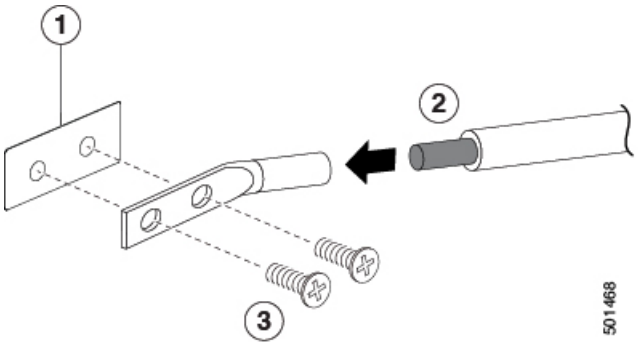
If your unit has modules, secure them with the provided screws.

Before you can ground the chassis, verify the earth ground contact has a solid connection to the data center building.

Procedure

1. Use a wire-stripping tool to remove approximately 0.75 inch (19 mm) of the covering from the end of the grounding wire. For installations in the United States, use 6-AWG wire.
2. Insert the stripped end of the grounding wire into the open end of the grounding lug. Crimp the lug to the wire using a crimping tool. Refer to 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).

Figure 7: Parts required to ground the chassis



This table lists the parts required to properly ground the chassis to a rack.

Table 8: Parts required to ground the chassis

Callout	Description
1	Chassis grounding pad

Callout	Description
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.
3	2 M4 screws secure the grounding lug to the chassis.

3. Secure the grounding lug to the chassis grounding pad with two M4 screws. Refer to the figure. Tighten the screws to a torque of 11 to 15 in-lb (1.24 to 1.69 N·m).
4. Prepare the other end of the grounding wire, and connect it to the facility ground.

Start the switch overview

This topic explains the electrical ratings that must be supported before you start 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.

This table lists the electrical ratings for the Cisco N9164E-NS4-O switch.

Table 9: Electrical Ratings

AC Power Supply Unit PIDs	Supported Switches	Input Voltage	Input Current (Max)	Input Frequency	Output Power
PSU3KW-HVPI	Cisco N9164E-NS4-O	200-277 V	16 A	50-60 Hz	3000 W

Start the switch prerequisites

This topics explains the prerequisites before you start the switch.

Before you start the switch, ensure you follow these prerequistes:

- The switch must be installed and secured to a rack or cabinet.
- The switch must be adequately grounded.
- The rack must be positioned close to the dedicated power source. This proximity ensures that you can connect the switch to the power source using the designated power cables.

> **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.

Start the switch

Learn how to start the switch to verify that it is booting up without issues.

Procedure

1. For the 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.
2. Verify that the power supply LED is on and green.

   > **Note**
   >
   > When one PSU is connected, the STATUS LED color is amber. With two PSUs connected, the STATUS LED color is green.

3. Listen for the fans; they should begin operating when the power supply is powered.
4. 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.
5. Verify that the system software has booted and the switch has initialized without error messages.

   When you access the switch for the first time, a setup utility automatically launches 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.

4 Connect the switch to the network

Topics:

- Overview of network connections
- Connect a console to the switch
- Create the initial switch configuration overview
- Set up the management interface
- Connect interface ports to other devices
- Maintain transceivers and optical cables

Connect your N9164E-NS4-O to the network.

Overview of network connections

This topic explains how to connect the switch to your network, including an overview of supported connection types and guidance for proper cabling and port selection to ensure optimal performance.

After you install the switch in a rack and power it up, make these network connections:

- Console connection: use this direct-local management connection to initially configure the switch. First connect the console to configure the switch and determine its IP address. You will need the IP address for the other connections.
- Management connection: after you complete the initial configuration using a console, make this connection to manage all future switch configurations.
- Uplink and downlink interface connections: these are connections to hosts and servers in the network.

Each of these connection types is explained in its own section.

Note

When running 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.

Note

When using SFP+ or SFP transceivers in a QSFP+ or QSFP28 uplink port, install a QSFP-to-SFP adapter (such as the CVR-QSFP-SFP10G adapter) in the QSFP port, and then install the SFP+ or SFP transceiver. The switch automatically sets the port speed to the speed of the installed transceiver.

Connect a console to the switch

Connect a console terminal to your switch's serial port for initial configuration.

Create a local management connection through a console terminal before you make a network management connection for the switch or connect it to the network. Then configure an IP address for the switch. Perform these functions using the console. After you set up the management interface, you can perform each function through it.

- Configure the switch using the command-line interface (CLI).
- Monitor network statistics and errors.
- Configure Simple Network Management Protocol (SNMP) agent parameters.
- Download software updates.

Make this local management connection between the asynchronous serial port on a supervisor module and a console device capable of asynchronous transmission. A computer terminal typically serves as the console device. Use the console serial port on the supervisor modules.

> **Note**
>
> Ensure that the computer terminal supports VT100 terminal emulation before connecting the console port. The terminal emulation software enables communication between the switch and the computer during setup and configuration.

- The switch must be fully installed in its rack, connected to a power source, and grounded.
- The necessary cabling for the console, management, and network connections must be available.
  - An RJ-45 rollover cable is provided in the switch accessory kit.
  - Network cabling is routed to the location of the installed switch.

Procedure

1. Configure the console device to match these default port characteristics:
   - 115200 baud
   - eight data bits
   - one stop bit
   - No parity
2. Connect an RJ-45 rollover cable to the console port on the switch.

   This cable is in the accessory kit.
3. Route the RJ-45 rollover cable to the console or a modem.
4. Connect the other end of the RJ-45 rollover cable to the console or to a modem.

Create the initial switch configuration overview

Learn about the initial setup you must perform to ensure management access and network connectivity for the switch depending on your operating system.

The initial switch configuration enables basic system management access and provides network connectivity for the switch. By entering your IP address and netmask, you ensure that your device is initialized and the initial configuration settings are saved correctly.

For the initial switch configuration setup for Cisco NX-OS, see Create the initial switch configuration for NX-OS on page 42.

For the initial switch configuration setup for Cisco Nexus Hyperfabric switch software, see Create the initial switch configuration for Nexus Hyperfabric on page 44.

Create the initial switch configuration for NX-OS

Learn how to power on your switch, create a strong security password, and configure the Management (Mgmt0) interface.

Before you begin, ensure the device is ready and the prerequisites are met:

- A console device must be connected to the switch.
- The switch must be connected to a power source.
- Determine the IP address and the netmask that is needed for the Management (Mgmt0) interface.

Procedure

1. Power up the switch by connecting each installed power supply to an AC circuit.

   If you are using the input-source (*n*+*n*) power mode, connect half of the power supplies to one AC circuit. Connect the other half of the power supplies to another AC circuit.

   The Input and Output LEDs on each power supply light up green when the power supply units are sending power to the switch. The software asks you to specify a password to use with the switch.

2. Enter a new password for this switch.

   The software checks the security strength of your password. It rejects your password if it does not meet these guidelines.

   - At least 8 characters,
   - Minimizes or avoids the use of consecutive characters (such as "abcd"),
   - Minimizes or avoids repeating characters (such as "aaabbb"),
   - Does not contain recognizable words from the dictionary,
   - Does not contain proper names,
   - Contains both uppercase and lowercase characters, and
   - Contains numbers and letters.

   Examples of strong passwords are:

   - If2CoM18
   - 2004AsdfLkj30
   - Cb1955S21

   Note

   Clear text passwords cannot include the dollar sign ($) special character.

   Note

   If a password is trivial, such as a short or easy-to-decipher password, the software will reject your password configuration. Enter a strong password. Passwords are case-sensitive

   When you enter a strong password, the software asks you to confirm the password.

3. Enter the same password again.

   If you enter the same password, the software accepts the password and then prompts you with a series of configuration questions.

4. Enter the default configuration for each question until you are asked for an IP address.

   Repeat this step for each question until you are asked for the Mgmt0 IPv4 address.

5. Enter the IP address for the management interface.

   The software asks for the Mgmt0 IPv4 netmask.

6. Enter a network mask for the management interface.

   The software asks if you need to edit the configuration.

7. Enter **no**, to not edit the configuration.

   The software asks if you need to save the configuration.

8. Enter **yes** to save the configuration.

Create the initial switch configuration for Nexus Hyperfabric

This topic explains the requirements for initial switch configuration, including establishing connectivity to hyperfabric.cisco.com and connecting to the Nexus Hyperfabric cloud controller. It also outlines the process for changing the switch's software from Nexus Hyperfabric to NX-OS on Cisco N9000-series switches.

To create the initial switch configuration, the switch must have connectivity to hyperfabric.cisco.com. To connect the switch to the Nexus Hyperfabric cloud controller, see the Connect the first switch to the Cisco Nexus Hyperfabric cloud service section in the Cisco Nexus Hyperfabric – Getting Started document. If you want to change the switch's software from Nexus Hyperfabric to NX-OS, see the Cisco Nexus Hyperfabric – Migrating the Operating System of Cisco N9000-Series Switches document.

Set up the management interface

Use this procedure to configure the management interface for your switch.

The switch must be powered on.

Procedure

1. Connect the management cable into the management port on the switch. Use a cable with RJ-45 connectors.
2. Connect the other end of the cable to a 10/100/1000 megabit per second (Mbps) Ethernet port on a network device.

Connect interface ports to other devices

This topic outlines how to connect switch ports using various transceivers, cables, and adapters while ensuring hardware compatibility.

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, connect the switch to other devices using interface cables with OSFP transceivers.

If the transceivers that you are using can be separated from their optical cables, install the transceivers without their cables before inserting the cables into the transceivers. This action prolongs the life of both the transceiver and the cables. When removing transceivers from the switch, remove the optical cable first and then remove the transceiver.

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

Maintain transceivers and optical cables

This topic explains how to maintain transceivers and fiber-optic cables through proper cleaning, handling, and ESD protection practices.

To maintain high signal accuracy and prevent connector damage, keep transceivers and fiber-optic cables clean and free of dust. Contamination increases attenuation (loss of light). Levels should remain below 0.35 decibel (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 frequently than 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 additional contamination.
- Clean the connectors regularly. Determine the cleaning frequency based on the environment. Additionally, clean connectors if they are exposed to dust or accidentally touched. Both wet and dry cleaning techniques are 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.

5 Replace components

Topics:

- Replace a fan module during operations
- Replace a power supply module
- Install and remove small-form pluggable modules
- Install and remove OSFP transceiver modules
- Attach the optical network cable

Guides users on how to replace and reinsert the FRUs in the switch.

Replace a fan module during operations

Learn how to replace a fan module by ensuring the new module matches the existing airflow direction.

All fan and power supply modules must have the same airflow direction. Otherwise, the switch can overheat and shut down. You can determine the airflow direction of a fan module by checking the color of the stripe on the front of the module. If the fan module has a red stripe for port-side intake airflow, the power supplies must have red coloring for the same airflow direction. To avoid overheating the switch, ensure that fan modules with red coloring for port-side intake airflow are positioned with the ports facing a cold aisle.

Before you can replace a fan module, ensure that these conditions exist:

- There are four functioning fan modules in the other fan slots. To replace a fan module during operations, there must be three fan modules circulating air in the chassis at all times. The other fan module is redundant and can be replaced.
- The replacement fan module must have the same airflow direction as the other modules in the chassis.

If you need to replace the fan module during operations and these conditions are not met, leave the fan module in the chassis to preserve the designed airflow until you have the required module.

Use these steps to replace the missing fan module within two minutes to avoid a shutdown.

Procedure

1. Remove the replacement fan module from its packing materials, and place it on an antistatic surface.

   Hold the module by the handle, and do not touch the electrical connectors on the backside. To protect the electrical connectors, avoid letting them come in contact with anything other than the electrical connectors inside the chassis.

2. Verify that you have the right fan module for the chassis. The correct fan module has one of these part numbers:

   NXASFAN-190CFMPI (port-side intake airflow direction and a red stripe)

   > **Note**
   >
   > Be sure that the airflow direction of the new fan module matches the airflow direction of the other fan and AC power supply modules already installed in the chassis. Port-side intake airflow is indicated with red coloring. Power supplies with dual-direction airflow (airflow direction is set by the fan modules) have white coloring.

3. Position the fan module in front of the open fan slot. Make sure that the backside of the module with the electrical connectors is positioned to enter the slot first. Slide the module all the way into the chassis until its front side comes in contact with the chassis. For the last 0.2 inches (0.5 cm), carefully mount the module onto the chassis connectors by pushing more firmly. Do not force the module if it does not move further. Excessive force can damage the connectors.

   > **Note**
   >
   > If you are not able to push the module all the way into the slot, carefully slide the module out of the slot and check its electrical connectors for damage. If damaged, contact Cisco Technical Assistance for help. If undamaged, repeat this step to reinstall the module.

4. Verify that the STS LED turns on and becomes green.

If the STS LED does not turn on, slide the module out of the chassis, and visually check the electrical connectors on the back side of the chassis for damage. If damaged, contact Cisco Technical Assistance for help. If undamaged, repeat the previous step to reinstall the module.

Replace a power supply module

This topic introduces the essential requirements for replacing switch power supplies, including the need to maintain consistent power source types and airflow directions for operational continuity.

The switch requires two power supplies for redundancy. One power supply provides the necessary power for operation. You can replace the other power supply during operation if 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. To determine the airflow direction used by the switch, refer to the coloring of the fan modules.

Remove an AC power supply

This topic explains the necessary steps to safely disconnect and remove a power supply from the switch, including how to properly disconnect power cables and handle the module during removal to avoid damage.

To disconnect the power supply from its power cables, shut off the power from the power source and disconnect the connector for the power cables.

Procedure

1. Remove the power cable from the power supply: Press the tab on the Anderson Power SAF-D-Grid connector, then pull the cable and connector out of the power supply.

   Verify that the LEDs turn off on the power supply that you are removing.
2. While pressing the release latch toward the power supply handle, grasp the handle.
3. Place your other hand under the power supply to support it as you slide it out of the chassis.

> ⚠ **Caution**
>
> Do not touch the electrical connectors on the back side of the module. Ensure that nothing comes into contact with or damages the connectors.

Install an AC power supply

Use this procedure to install a replacement power supply in your switch, ensuring proper grounding and redundancy while verifying the connection and operational status.

You can replace one power supply while the other one provides power to the switch.

> **Note**
>
> If the power supply that you are replacing has a different color handle than the replacement power supply, verify that it has or will have the same airflow direction as the other modules in the switch.

If you use *n*+*n* power redundancy, there must be a separate power source for each power supply installed in the chassis. Power sources must be of the same type. Do not mix AC and DC power sources for the same switch. Otherwise, only one power source is required.

Ensure the chassis is connected to earth ground when installing the replacement module. Typically, the chassis is grounded by its metal-to-metal connection to a grounded rack. If you need to ground this chassis by another means, see Ground the chassis on page 35.

Procedure

1. With one hand underneath the replacement power supply and the other hand holding the handle, turn the power supply so that its release latch is on the side. Align the back end of the power supply (the end with the electrical connections) to the open power supply slot. Carefully slide 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. Slide it into the open slot.

2. Test the installation by attempting 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 into place.

3. Insert the Anderson SAF-D-Grid power supply cord connector into the power supply inlet. Ensure the connector is locked. Gently tug on the cord near the connector to ensure the locking tab is engaged.
4. Verify that the other end of the power cable is connected to the appropriate power source for the power supply.
5. Verify that the power supply is operational by making sure that the power supply LED is green.

Install and remove small-form pluggable modules

Use this procedure to install SFP and SFP+ modules while observing critical timing intervals and ESD protection measures to ensure proper initialization and prevent hardware damage.

See the Cisco N9164E-NS4-O switch datasheet on cisco.com for a list of supported SFP and SFP+ modules. Use only supported SFP and SFP+ modules on the platform.

Warning

Statement 1008–Class 1 Laser Product

This product is a Class 1 laser product.

Note

We recommend that you wait thirty seconds between removal and insertion of an SFP on an interface module. This allows the transceiver software to initialize and synchronize with the standby RSP. Changing an SFP more quickly could result in transceiver initialization issues that disable the SFP.

- Do not remove the dust plugs from the SFP or SFP+ modules, or the rubber caps from the fiber-optic cables, until you are ready to connect the cable. These plugs and caps protect the module ports and cables from contamination and ambient light.
- Removing and installing an SFP or SFP+ module can shorten its useful life. Remove and insert an SFP or SFP+ module only when necessary.
- To prevent ESD damage, use standard board and component handling procedures when connecting cables to the switch or other devices.
- When you insert several SFP or SFP+ modules into multiple ports, wait five seconds between each insertion. This prevents the ports from entering error or disabled mode. Similarly, after removing an SFP or SFP+ module from a port, wait five seconds before reinserting it.

Procedure

1. Attach an ESD-preventive wrist strap to your wrist and to an earth ground surface.
2. Find the send (TX) and receive (RX) markings that identify the top of the SFP/SFP+ module.

   On some SFP/SFP+ modules, the send and receive (TX and RX) markings might be shown by arrows that show the direction of the connection.
3. If the SFP/SFP+ module has a bale-clasp latch, move it to the open, unlocked position.
4. Align the module in front of the slot opening and push until you feel the connector snap into place.
5. If the module has a bale-clasp latch, close it to lock the SFP/SFP+ module in place.
6. Remove and save the SFP and SFP+ dust plugs.
7. Connect the SFP and SFP+ cables.

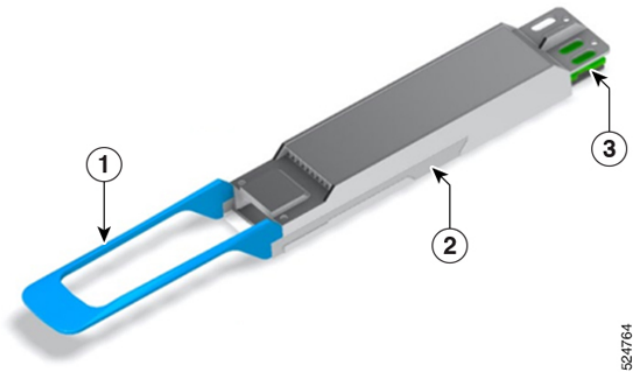
Install and remove OSFP transceiver modules

Learn how to install and remove OSFP transceiver modules safely using proper ESD and handling procedures.

This section provides the installation, cabling, and removal instructions for the Octal Small Form-factor Pluggable (OSFP) transceiver modules. Refer to the Cisco Transceiver Modules Compatibility Information for additional details on optical transceivers.

This figure shows a typical 800-Gigabit OSFP transceiver module.

Figure 8: OSFP Transceiver Module



This table lists the components of the 800-Gigabit OSFP transceiver module.

Table 10: Components of the OSPF Transceiver Module

Callout	Description
1	Pull tab
2	OSFP transceiver body
3	electrical connection to the module circuitry

Warning

Statement 1079—Hot Surface

This icon is a hot surface warning. To avoid personal injury, do not touch without proper protection.



Caution

The transceiver module is a static-sensitive device. Always use an ESD wrist strap or similar individual grounding device when handling transceiver modules or system modules.

Caution

Protect the transceiver ports by inserting clean dust caps, part number 8000-QSFP-DCAP, into any ports not in use or that do not have optical modules plugged in. If optical modules are plugged in but not in use, use the dust caps that were supplied with the optical modules to protect the TX and RX surfaces of the optical module.

Clean the optic surfaces of the fiber cables before you plug them back into the optical ports of another module.

The switch ships with dust caps plugged in. Keep the dust caps plugged in until you are ready to plug an optic. The dust caps protect the ports from possible EMI interference and also avoid contamination due to dust collection.

Caution

To meet the EMI interference requirements, use the metal dust caps when the ports are not in use by optical modules.

Required Tools and Equipment

- Wrist strap or other personal grounding device to prevent ESD occurrences
- Antistatic mat or antistatic foam to set the transceiver on
- Fiber-optic end-face cleaning tools and inspection equipment

Installing the transceiver module.

Procedure

1. Attach an ESD wrist strap to yourself and a properly grounded point on the chassis or the rack.

2. Remove the transceiver module from its protective packaging.
3. Check the label on the transceiver module body to verify that you have the correct model for your network. Do not remove the dust plug until you are ready to attach the network interface cable. The dust plug does not appear in the images.
4. Hold the transceiver by the pull-tab so that the identifier label is on the top.
5. Align the transceiver module in front of the transceiver socket opening. Carefully slide the transceiver into the socket until the transceiver contacts the socket electrical connector.
6. Press firmly on the front of the transceiver module with your thumb to fully seat the transceiver in the transceiver socket.

   IMPORTANT: If the latch is not fully engaged, you might accidentally disconnect the transceiver module.

Attach the optical network cable

Learn how to properly inspect, clean, and connect fiber-optic cables.

Before you remove the dust plugs and make any optical connections, review these guidelines.

- Keep the protective dust plugs installed in the unplugged fiber-optic cable connectors and in the transceiver optical bores until you are ready to make a connection.
- Inspect and clean the optical connector end faces just before you make any connections.
- Grasp the optical connector only by the housing to plug or unplug a fiber-optic cable.

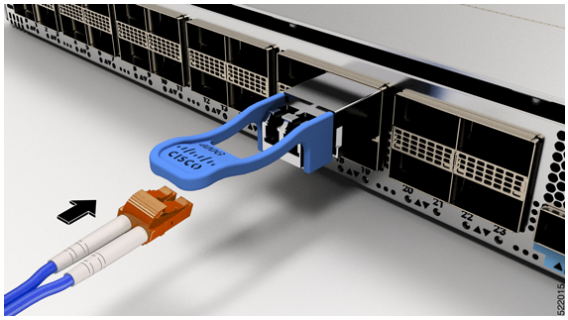
Note

- The transceiver modules and fiber connectors are keyed to prevent incorrect insertion.
- The multiple-fiber push-on (MPO) connectors on the optical transceivers support network interface cables with either physical contact (PC) or ultra-physical contact (UPC) flat polished face types. The MPO connectors on the optical transceivers do not support network interface cables with an angle-polished contact (APC) face type.
- Inspect the MPO connector for the correct cable type, cleanliness, and any damage. For complete information on inspecting and cleaning fiber-optic connections, see the *Inspection and Cleaning Procedures for Fiber-Optic Connections* document.

Procedure

1. Remove the dust plugs from the optical network interface cable MPO connectors and from the transceiver module optical bores. Save the dust plugs for future use.
2. Attach the network interface cable MPO connectors immediately to the transceiver module.

Figure 9: Cabling a Transceiver Module



A Rack specifications

Topics:

- Overview of racks
- General requirements for cabinets and racks
- Requirements specific to standard open racks
- Requirements specific to perforated cabinets
- Cable management guidelines

Provides the requirements for the different types of racks and cabinets used for mounting the switch.

Overview of racks

This topic explains the environmental and structural requirements for installing a switch, including recommended cabinet types, temperature ranges, and the need to keep access paths clear of obstructions.

Install the switch in these types of cabinets and racks if the external ambient air temperature is between 32 and 104° F (0 and 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, because they could impair access to field-replaceable units (FRUs).

General requirements for cabinets and racks

This topic explains the essential physical requirements for installing a switch, including rack compatibility, vertical space specifications, and necessary rail spacing guidelines.

The cabinet or rack must meet these requirements:

Note

This switch rack-mount kit contains the rack mounting brackets for 19-inch rack. To install the chassis in a 23-inch rack or an ETSI rack, you need adapter plates to accommodate the 19-inch rack mount brackets.

- Standard 19-inch (48.3 cm) (two- or four-post EIA cabinet or rack, with mounting rails that conform to English universal hole spacing according to section 1 of ANSI/EIA-310-D-1992). For more information, see Requirements specific to perforated cabinets on page 58.

  The spacing between the posts of the rack must conform to EIA-310-D-1992 19-inch rack compatibility and be wide enough to accommodate 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 inches (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 requires the front-mounting rails of the cabinet to be offset from the front door by at least 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

This topic explains the vertical space and wall clearance requirements for mounting in 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 centimeters).

The distance between the chassis air vents and any walls should be 2.5 inches (6.4 centimeters).

Requirements specific to perforated cabinets

This topic explains the requirements for perforated cabinets, including door, roof, and floor ventilation standards.

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 centimeters) 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

This topic explains the need for extra rack space to facilitate fiber and copper management.

To help with cable management, allow additional space in the rack. This extra space above and below the chassis makes routing all fiber optic and copper cables through the rack easier.

B System specifications

Topics:

- Environmental specifications
- Switch dimensions
- Switch and module weights and quantities
- Transceiver and cable specifications
- Switch power input requirements
- 3000-W HV Power supply specifications
- Power cable specifications
- Regulatory standards compliance specifications

Requirements for environmental specifications, switch and module dimensions, and power supply specifications.

Environmental specifications

This topic explains the environmental specifications of the Cisco N9164E-NS4-O switch.

This table lists the temperature, humidity, and altitude specifications of the Cisco N9164E-NS4-O switch.

Table 11: Environmental specifications of the Cisco N9164E-NS4-O switch

Environment		Specification
Temperature	Ambient operating temperature	32 to 104° F (0 to 40° C)
	Ambient nonoperating	-40 to 158° F (-40 to 70° C)
Humidity	Ambient operating humidity	5 to 90%
	Ambient nonoperating	5 to 95%
Altitude*	operating altitude	0 to 5,000 feet (0 to 1524 meters)
	nonoperating altitude	-1000 to 30,000 feet (-304 to 15,150 meters)

* The Cisco N9164E-NS4-O switch functions in operating temperatures of up to 40° C at sea level. For every 300 meters (1000 ft) above sea level, the maximum temperature is reduced by 1° C. For more details on environmental requirements, see the Cisco Datasheet.

Switch dimensions

This topic explains the switch dimensions of the Cisco N9164E-NS4-O switch.

This table lists information about the size of the Cisco N9164E-NS4-O switch.

Table 12: Switch dimensions of the Cisco N9164E-NS4-O switch

Switch	Width	Depth	Height
Cisco N9164E-NS4-O	17.28 inches (43.9 cm)	27.76 inches (70.5 cm) without fan module and power supply module 28.70 inches (72.9 cm) with fan module and power supply module	3.46 inches (8.8 cm)

Switch and module weights and quantities

This topic explains the weight of the switch and FRUs, and the number of items shipped in a box.

This table provides the weight of the switch and the FRUs. It also specifies the quantity of each item shipped along with the switch.

Table 13: Switch and module weight and quantity

Component	Weight per Unit	Quantity
Cisco N9164E-NS4-O Chassis	47.09 lb (21.36 kg), without fan module and power supply module. 60.54 lb (27.46 kg), with fan module and power supply module	1
Fan Module	–	4 modules
- Port-side intake (burgundy) (NXASFAN-190CFMPI)	1.83 lb (0.83 kg)	
Power supply module	–	2 modules (1 for operations and 1 for redundancy)
- 3000-W AC or HVPI port-side intake (burgundy) (PSU3KW-HVPI)	3.06 lb (1.39 kg)	

Transceiver and cable specifications

This topics explains the transceiver specifications and installation information.

To see the transceiver specifications and installation information, see Cisco Transceiver Modules Compatibility Information.

Switch power input requirements

This topic provides information about the amount of power the switch consumes.

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.

Table 14: Power requirements of the Cisco N9164E-NS4-O switch

Switch	Typical Power Consumption (AC)	Maximum Power Consumption (AC)
Cisco N9164E-NS4-O switch	1455 W*	2209 W*

Switch	Typical Power Consumption (AC)	Maximum Power Consumption (AC)

*The typical power consumption is for 50% capacity at 25° C, 32x800G DAC + 16x800G DR8 + 16x800G SR8.

* The maximum power consumption is for 100% capacity at 40° C, 32x800G DAC + 16x800G DR8 + 16x800G SR8.

Note

The value may change due to different optical/DAC/line rate configurations.

3000-W HV Power supply specifications

This topic explains the power specifications for the 300-W HV power supply module.

The table lists the specifications that apply to the PSU3KW-HVPI power supplies.

Table 15: 3000-W HV Power Supply Specifications

Property	Specification
Power	3000 W
Input voltage	The input voltage range: • 90 - 140 VAC • 180 - 305 VAC • 190 - 400 DC
Frequency	50 to 60 Hz
Efficiency	92% or greater (20 to 100% load)
Redundancy modes	Combined, *n*+1
RoHS compliance	Yes
Hot swappable	Yes
Airflow direction	Port-side intake airflow

Power cable specifications

This topic explains the power cable specifications of the Cisco N9164E-NS4-O switch.

This section describes the power cables that you can order and use with this switch.

This table lists the AC power cables specifications for the switch.

Table 16: AC Power Cable Specifications

Location	Part Number	Length	Power Cord Rating
Argentina	CAB-AC-16A-SG-AR	14 feet (4.26 m)	16A, 250 VAC
Australia	CAB-AC-16A-SG-AZ	14 feet (4.26 m)	16A, 250 VAC
Brazil	CAB-AC-16A-SG-BR	14 feet (4.26 m)	16A, 250 VAC
China	CAB-AC-16A-SG-CH	14 feet (4.26 m)	16A, 250 VAC
Europe	CAB-AC-16A-SG-EU	14 feet (4.26 m)	16A, 250 VAC
India	CAB-AC-16A-SG-IND	14 feet (4.26 m)	16A, 250 VAC
International or UK	CAB-AC-16A-SG-IN	14 feet (4.26 m)	16A, 250 VAC
Israel	CAB-AC-16A-SG-IS	14 feet (4.26 m)	16A, 250 VAC
Italy	CAB-AC-16A-SG-IT	14 feet (4.26 m)	16A, 250 VAC
Japan	CAB-AC-16A-SG-JPN	14 feet (4.26 m)	16A, 250 VAC
South Africa	CAB-AC-16A-SG-SA	14 feet (4.26 m)	16A, 250 VAC
Switzerland	CAB-AC-16A-SG-SW	14 feet (4.26 m)	16A, 250 VAC
South Korea	CAB-AC-16A-SG-SK	14 feet (4.26 m)	16A, 250 VAC
United Kingdom	CAB-AC-16A-SG-UK	14 feet (4.26 m)	16A, 250 VAC
North America (non locking) 200-240 VAC operation	CAB-AC-20A-SG-US2	14 feet (4.26 m)	20A, 250 VAC
North America (locking) 200-240 VAC operation	CAB-AC-20A-SG-US3	14 feet (4.26 m)	20A, 250 VAC
North America 277 VAC operation	CAB-AC-20A-SG-US4	14 feet (4.26 m)	20A, 277 VAC
North America Cabinet Jumper Power Distribution Unit (PDU)	CAB-AC-20A-SG-C20	14 feet (4.26 m)	20A, 250 VAC
Multi- Country	CAB-AC-20A-NA	6.56 feet (2 m)	20A, 250V
North America Twist Lock	CAB-AC-20A-SG-US1	14 feet (4.26 m)	20A, 250V

Regulatory standards compliance specifications

This topic explains the regulatory standards the switch must adhere to.

This table lists the regulatory standards compliance for the switch.

Table 17: Regulatory Standards Compliance: Safety and EMC

Specification	Description
Regulatory compliance	Products comply with CE Markings according to directives 2014/30/EU and 2014/35/EU.
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 • ANSI/UL 62368-1 • CNS 15598
EMC: Emissions	47CFR Part 15 (CFR 47) Class A • AS/NZS CISPR32 Class A • CISPR32 Class A • EN55032 Class A • ICES-003 Class A • VCCI-CISPR32 Class A • EN61000-3-2 • EN61000-3-3 • KS C 9832 Class A • CNS 15936 Class A
EMC: Immunity	• EN55035 • CISPR35 • EN300386 • KS C 9835
RoHS	The product is RoH-6 compliant with exceptions for leaded-ball grid-array (BGA) balls and lead press-fit connectors.

C LEDs

Topics:

- Switch chassis LEDs
- Uplink module LEDs
- Fan module LEDs
- Power supply LEDs

Details the status and meaning of the chassis, fan, and power supply LEDs.

Switch chassis LEDs

This topic describes the LED indicators and status meanings for the switch front panel components.

The ATTN and STS 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.

This table lists the LEDs and status states for the front panel.

Table 18: Front panel LEDs of the Cisco N9164E-NS4-O switch

LED	Color	Status
ATTN (Attention)	Flashing blue	The operator has activated this LED to identify this switch in the chassis.
	Off	This switch is not being identified or not functional.
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.
(port)	Green	The port admin state is "Enabled," the 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.

Uplink module LEDs

This topic describes the port status LED colors and their meanings for each switch port.

Each port has an LED.

The table lists the status of each port's LED.

Table 19: Port Status LEDs (one per port)

LED Color	Description
OFF	The port admin state is enabled, the SFP is present, but the interface is not up.
Amber	The port admin state is disabled, the SFP is absent, or both conditions apply.
Green	The port admin state is enabled and the link is up.

Fan module LEDs

This topic describes the fan LED indicators and the operational status of the fan module.

This table lists the LED status of the fan module on the switch.

Table 20: Fan module LED status

Fan LED	Color	Status Description
Status	OFF	Fan tray is not receiving power.
	Amber	The fan is inserted into the system and is waiting to become online.
	Green	Fans are operating normally.
	Flashing Amber	The module is one of these states: • Fan speed (RPM) is outside normal range. • The module has a minor, major, or critical alarm.
	Red	The fan module is not operational (fan is probably not functional).

Power supply LEDs

This topic describes the power supply LED indicators and their associated status for the module.

The power supply LEDs are located on the right portion of the power supply. This table lists the combinations of states indicated by the **OK** and **Fault** LEDs that signify the status for the module.

Table 21: Power supply LED status

Color	Status
Off	The power supply is not receiving power.
Green	The power supply is on, and power is being delivered to the system.
Flashing green	Power supply is connected to AC power source but is not outputting power to the system.
Amber	Power supply failure–possibly one of these conditions. • Overvoltage, • Overcurrent, • Overtemperature, or • Fan failure.

Color	Status
Flashing amber	Power supply is operating, but a warning condition has occurred—possibly one of these conditions. • High temperature, • High power, or • Slow fan.