1 Product Overview

The RG-S6980-64QC is a next-generation core switch, providing 400GE access, low latency, and comprehensive data center features. It has 64 x 400GE ports. The RG-S6980-64QC can be used with access and aggregation switches to build a high-performance and reliable data center network.

The RG-S6980-64QC has one model.

Model	400GE QSFPDD Ports	100GE QSFP28 Ports	10GE SFP+ Ports	Expansion Module Slots	Redundant Fans	RPS
RG-S6980-64QC	64	N/A	N/A	N/A	7+1	2+2

ⓘ The QSFPDD port supports the 400GE/100GE mode.

1.1 RG-S6980-64QC

Specifications

Model	RG-S6980-64QC
CPU	Intel Xeon D-1627: 4-core 8-thread processor with a clock speed of 2.9 GHz
BootROM	16 MB
SSD	240 GB
SDRAM	DDR4 8 GB (compatibility with 16 GB)
Expansion Module Slots	Not supported
Fan Module Slots	8 (7+1 redundancy) At least seven fan modules are required.
Fan Module	M2EFAN II-F
Power Module Slot	4 (2+2 redundancy)
Power Module	RG-PA1200I-F
Power Input	AC input: Rated voltage range: 100 V AC to 127 V AC Frequency: 50 Hz to 60 Hz Maximum input current: 12 A Rated voltage range: 200 V AC to 240 V AC Frequency: 50 Hz to 60 Hz Maximum input current: 8 A HVDC input: Rated voltage: 240 V DC Rated current: 6.5 A
Power Consumption	Maximum: 2524 W Typical: 1760 W
SFP Module	See Appendix B. ⓘ The module types may update without prior notification. Contact Ruijie Networks for details.
SFP28 Port	Not supported

QSFP28 Port	Supported
QSFPDD Port	Supported
10Gbase-T Port	Not supported
Temperature Alarm	Over-temperature protection
EMC Certification	GB9254-2008 CLASS A
Safety Regulation Compliance	GB4943-2011
Operating Temperature	0ºC to 40ºC (32ºF to 104ºF)
Storage Temperature	−40ºC to +70ºC (−40ºF to 158ºF)
Operating Humidity	10% to 90% RH (non-condensing)
Net Weight	38 kg (83.78 lbs, including eight fan modules and four power modules)
Dimensions (W x D x H)	442 mm x 760 mm x 175 mm (17.40 in. x 29.92 in. x 6.89 in.), 4 RU

⚠ This is a Class A product. In a living environment, this product may cause radio interference. In this case, proper measures should be taken to avoid the interference.

ⓘ The 100GE/400GE Ethernet port only supports the SFP module.

Appearance

The RG-S6980-64QC consists of the chassis, power supply system, and cooling system.

● The power supply system has four power module slots and supports 2+2 power redundancy. You are advised to configure power redundancy.

● The cooling system has eight fan module slots and supports 7+1 fan redundancy. You are advised to configure fan redundancy.

Figure 1-1 RG-S6980-64QC

●
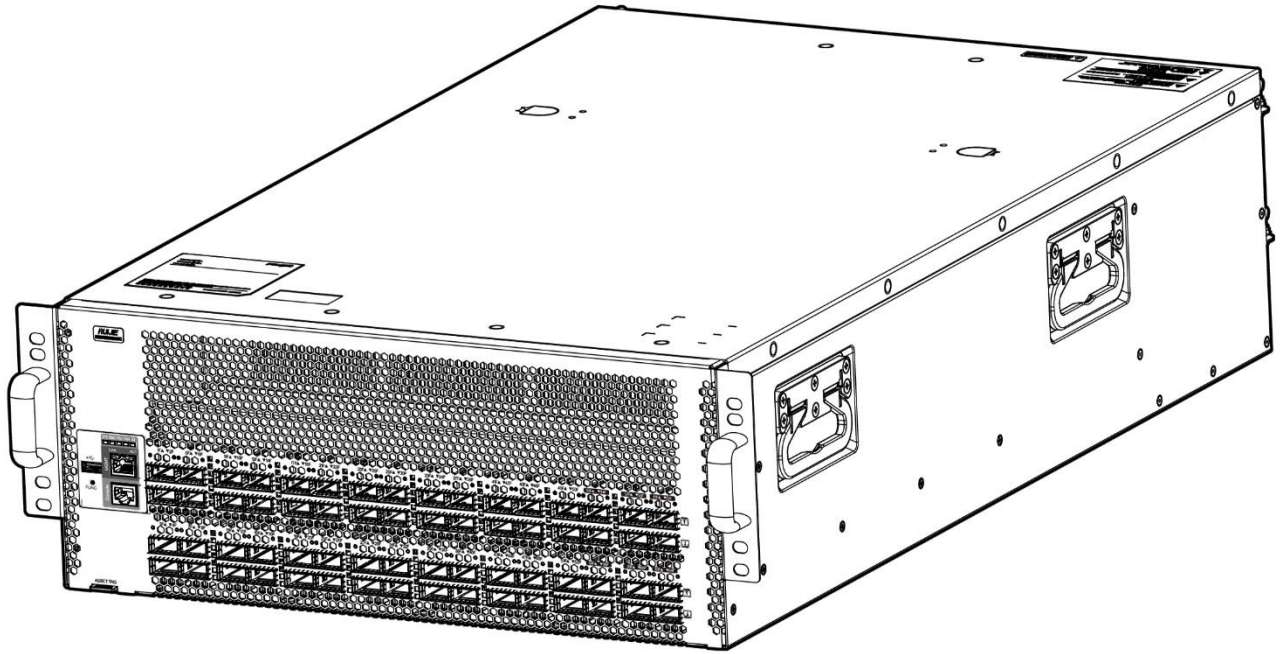
Front Panel

Figure 1-2 Front Panel
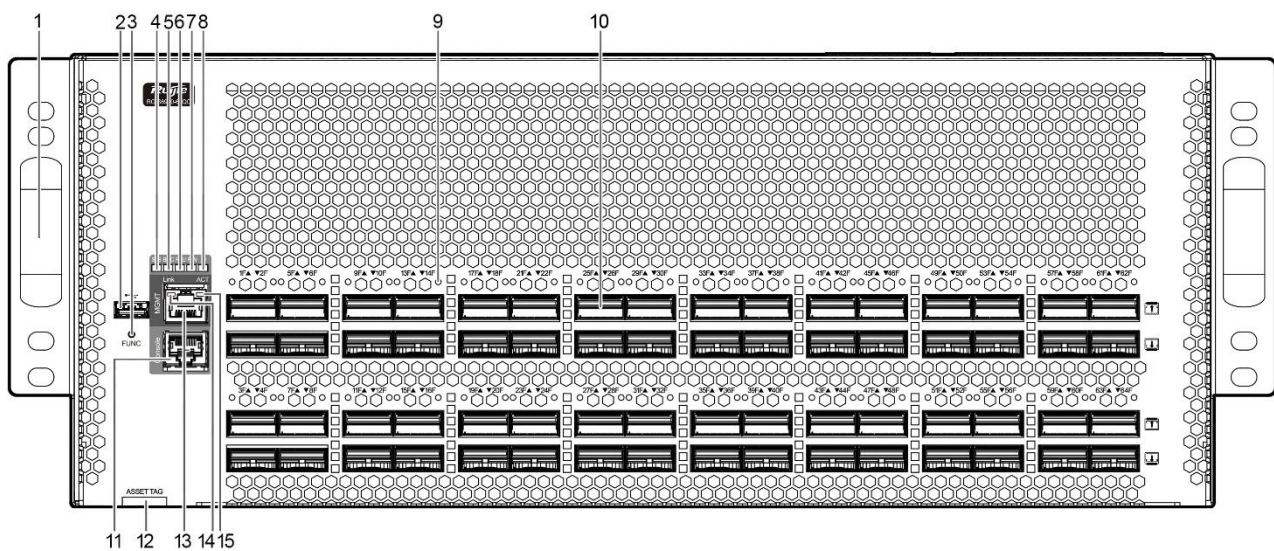
1.	Bracket	9.	QSFPDD port LED
2.	USB port	10.	QSFPDD port
3.	FUNC button	11.	Console port
4.	System status LED	12.	Asset label
5.	BMC status LED	13.	Management port
6.	Power supply status LED	14.	Link status LED
7.	Fan status LED	15.	ACT status LED
8.	Locator LED		

> ℹ️ The RG-S6980-64QC supports the 400GE QSFPDD module and 100GE QSFP28 module.
>
> ℹ️ FUNC and BMC buttons are reserved. The BMC status LED is off.

Rear Panel

Figure 1-3 Rear Panel
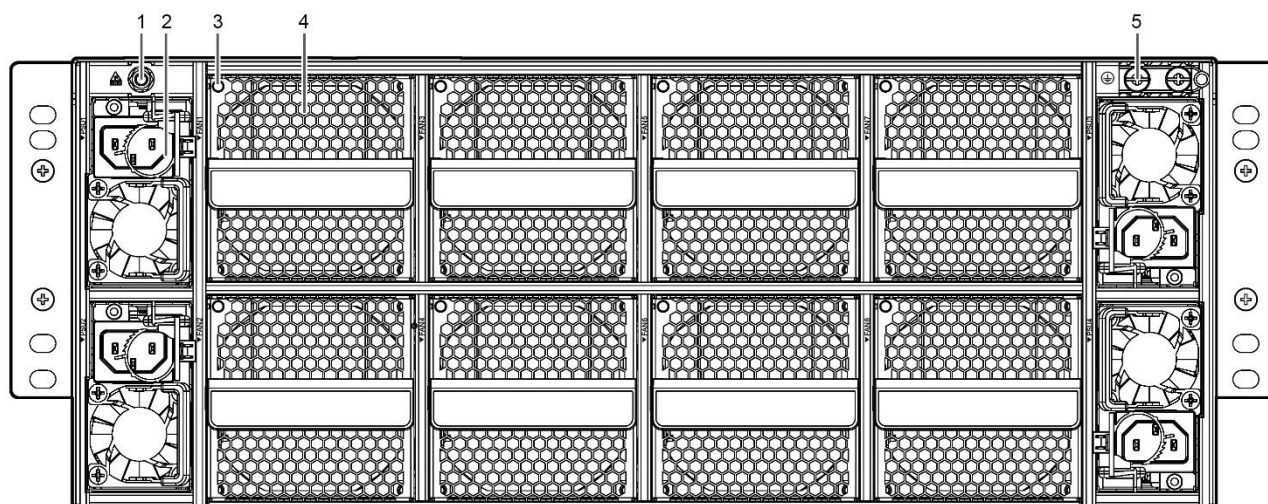
1.	Anti-static wrist strap hole	4.	Fan module slot
2.	Power module slot	5.	Grounding stud
3.	Fan status LED		

Asset Label

The asset label is in the lower left corner of the front panel and is removable from the switch. You can add custom information to the label, for example, asset name, category, number, and registration date, to improve management efficiency and accuracy.

Figure 1-4 Asset Label
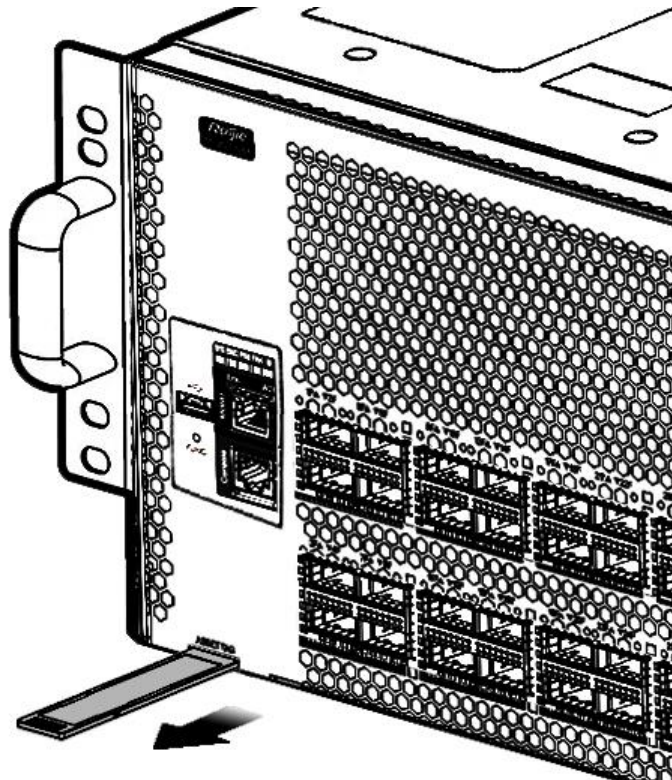
Ports

The RG-S6980-64QC has the following ports:

- USB port: connects to a USB storage device for online upgrade or log storage.

ℹ To ensure data security and prevent damage to your device, use USB flash drives of well-known brands and good quality. The USB port is compatible with most USB controllers and may not recognize some models of USB flash drives.

ℹ The RG-S6980-64QC supports configuration, maintenance, management, program loading, and system debugging through the console.

- Console port: is an RS-232 port that uses an RJ45 connector. The console port is used to connect a PC directly to the management system for debugging, configuration, maintenance, management, and program loading.

- Management port: is an out-of-band Ethernet port that uses an RJ45 connector. This port is connected to an Ethernet port of a PC for program download. You can manage and maintain the switch remotely by connecting the management port to the Ethernet port of a PC with an Ethernet cable.

- QSFPDD port: supports 400GE/100GE QSFPDD modules. The switch has 64 400GE QSFPDD ports.

LED

Function	Panel ID	Status	Description
System status LED	SYS	Off	The system is not powered on.
		Blinking green	The system is being initialized.
		Solid green	The system is operating normally.
		Solid yellow	At least one power module does not match the system.
		Solid red	The system is not functioning properly or the temperature is high.

BMC status LED	BMC	Off	The BMC module is not installed or is not functioning properly.
		Solid green	The BMC module is operating normally.
		Blinking green	The BMC module is not initialized.
		Solid red	The BMC module is not functioning properly.
Fan status LED	FAN	Off	The system is not powered on.
		Blinking green	The fan module is not initialized.
		Solid green	The fan module is operating normally.
		Solid red	At least one fan module is not functioning properly.
Power supply status LED	PSU	Off	The system is not powered on.
		Blinking green	The power module is not initialized.
		Solid green	The power module is working normally.
		Solid yellow	At least one power module does not match the system.
		Solid red	At least one power module is not functioning properly.
ID status LED	ID	Off	The O&M personnel does not locate the device.
		Solid blue	It is used for onsite locating. The O&M personnel can remotely enable or disable this LED.
Management port LED	Link/ACT	Link off	The port is not in link-up state.
		Link solid green	The port works in link-up state at a rate of 1000 Mbps.
		Link solid yellow	The port works in link-up state at a rate of 100 Mbps.
		ACT Off	The port is not sending or receiving traffic.
		ACT blinking green	The port is sending and receiving traffic at a rate of 1000 Mbps.
		ACT blinking yellow	The port is sending and receiving traffic at a rate of 100 Mbps.
QSFPDD port LED (front panel)	1F to 64F	Off	The port is not in link-up state.
		Solid green	The port works in link-up state at a rate of 100/400 Gbps.
		Blinking green	The port is sending and receiving traffic at a rate of 100/400 Gbps.

Power Supply

The RG-S6980-64QC supports the smart power module RG-PA1200I-F. The RG-PA1200I-F module supports power management and can obtain the power status, output power, output current, and operating temperature in real time. The power module supports hot swapping.


ⓘ The RG-S6980-64QC supports 2+2 power redundancy. To improve system stability and reliability, you are advised to configure power redundancy. If four power modules are used, the switch works in current balancing mode.

ⓘ At least two power modules are required to work properly. If any slot is unoccupied, install a filler panel to ensure proper airflow.

Cooling

The operating temperature ranges from 0ºC to 40ºC (32ºF to 104ºF). The cooling design must ensure system reliability, safety, and maintainability. The RG-S6980-64QC uses fan modules for cooling and ventilation forced convection, so it can work properly in a specific environment. It is recommended that you clean the RG-S6980-64QC once every three months to prevent dust from blocking ventilation openings.

The RG-S6980-64QC supports the M2EFAN II-F fan module. The fan module supports hot swapping, speed control, and fault alarms.

Figure 1-5 Airflow Direction
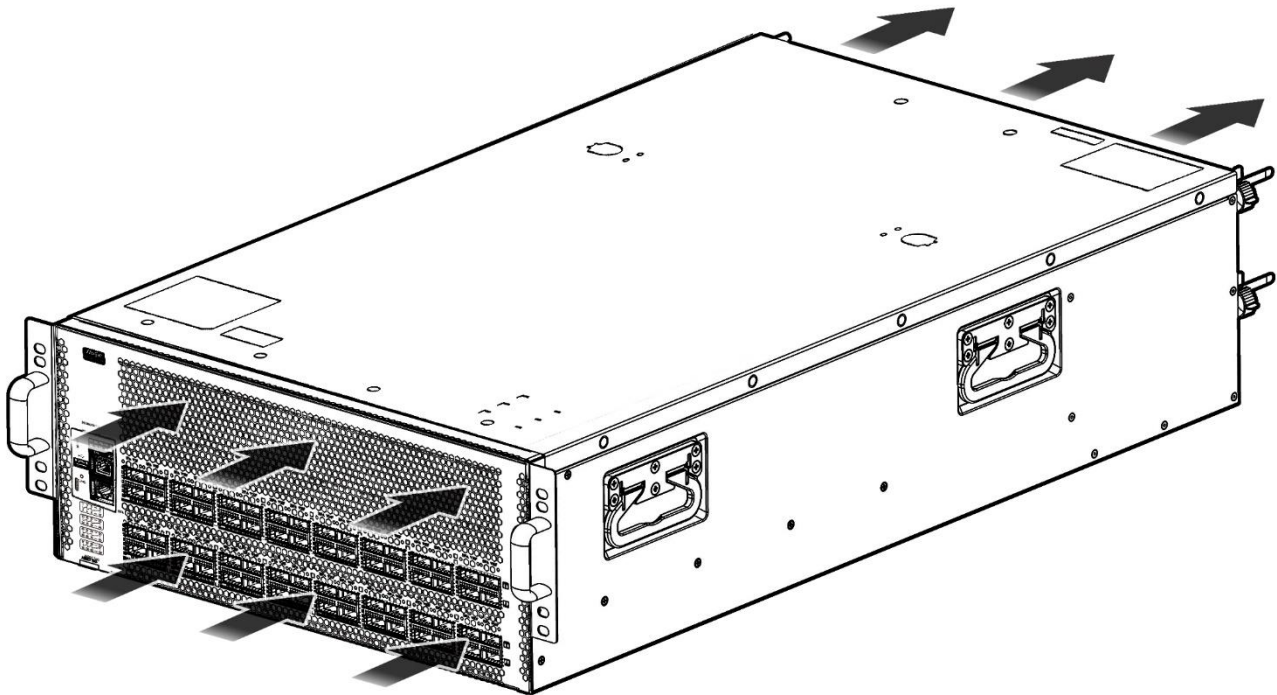
ℹ Maintain a minimum clearance of 200 mm (7.87 in.) around the device for airflow.

ℹ At least seven fan modules are required. If any slot is unoccupied, install a filler panel to ensure proper airflow.

ℹ The power modules and fan modules with different airflow directions cannot be used together.
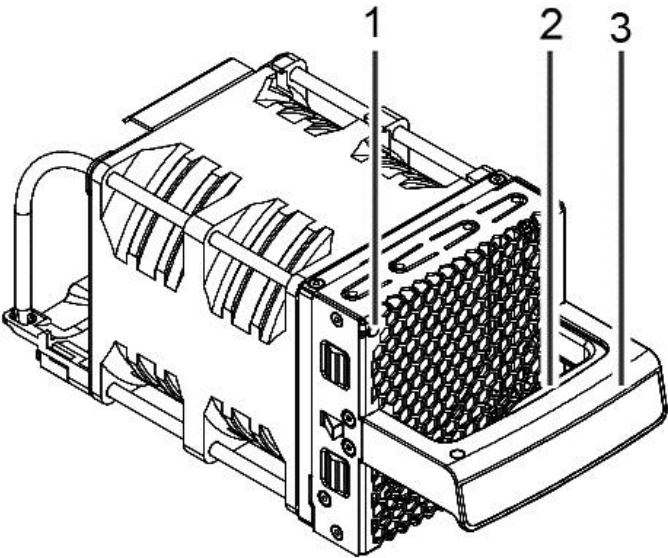
1.2 Modules

The RG-S6980-64QC supports the M2EFAN II-F fan module and the RG-PA1200I-F power module.

1.2.1 M2EFAN II-F

The M2EFAN II-F module provides a cooling mechanism for the entire system. The M2EFAN II-F module supports hot swapping, speed control, and fault alarms.

Appearance

Figure 1-6 M2EFAN II-F Module

1. FAN status LED
2. Fan module latch
3. Fan module handle

LED

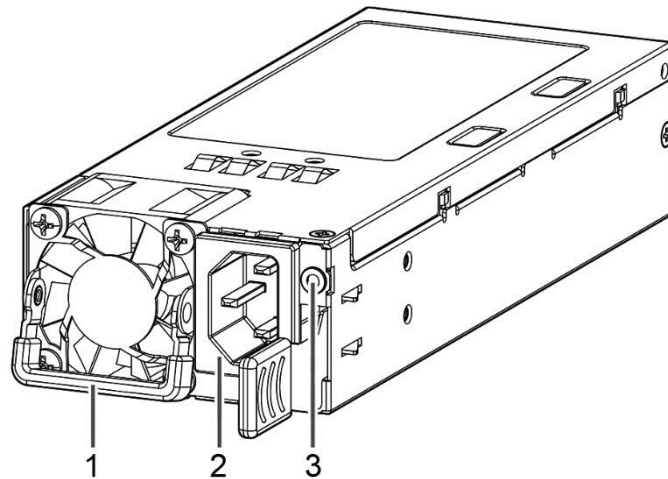| Function	Panel ID	Color	Status
FAN status LED	Status	Off	The fan module is not powered on.
		Blinking green	The fan module is being initialized.
		Solid green	The fan module is operating normally.
		Solid red	The fan module is not functioning properly.

Specifications

Fan Module	M2EFAN II-F
Airflow Rate	154.68 CFM
Maximum Speed	12300 RPM
Power Consumption	80.64 W
Weight	0.75 kg (1.65 lbs)
Dimensions (W x D x H)	182 mm x 80 mm x 80 mm (7.17 in. x 3.15 in. x 3.15 in.)

1.2.2 RG-PA1200I-F

The smart RG-PA1200I-F module can obtain the power status, output power, output current, and operating temperature in real time. It supports both AC and HVDC input.

Appearance

Figure 1-7 RG-PA1200I-F Module

1. Power module handle

2. Power connector (10 A)

3. Power supply status LED

Ports

The front panel has a three-pin AC power plug for connecting a standard 10 A power cord.

LED

Function	Panel ID	Color	Status
Power supply status LED	N/A	Off	There is no power input or the power module is not functioning properly.
		Solid green	The power module is supplying power normally.
		Blinking green	1. The power module is off and has 12 VSB output. 2. The power module in cold backup state is not supplying power.
		Solid orange	1. A power module fault occurs, for example, overcurrent, overvoltage, or fan module fault. 2. The power module in redundancy mode is removed.
		Blinking orange	The system can continue to work with an alarm generated, for example, high voltage, high current, high temperature, or low fan speed.

Specifications

Power Module	RG-PA1200I-F (AC input)	RG-PA1200I-F (HVDC input)
Rated Input Voltage Range	100 V to 240 V, 50 Hz/60 Hz	240 V DC
Maximum Input Voltage Range	90 V to 264 V, 47 Hz to 63 Hz	180 V DC to 310 V DC
Maximum Power Output	1300 W	1300 W

Ground Leakage Current	≤ 1.75 mA
Weight	0.9 kg (1.98 lbs)
Dimensions (W x D x H)	225 mm x 73.5 mm x 40 mm (8.86 in. x 2.89 in. x 1.57 in.)
Power Cord	10 A power cord

⚠ Ensure that power cords are unplugged before installing or removing a power module.

2 Preparing for Installation

2.1 Safety Precautions

⚠ To avoid personal injury and device damage, carefully read the safety precautions before you install the device.

⚠ The following safety precautions may not cover all possible dangers.

2.1.1 Installation

● Keep the chassis clean and free from any dust.

● Do not place the device in a walking area.

● Do not wear loose clothes, ornaments, or any other things that may be hooked by the chassis during installation and maintenance.

● Turn off all the power supplies and dismantle all power cords and cables before installing or removing the chassis.

● Avoid transferring the bare device. Instead, transfer the device with its packing materials.

● When transferring devices, do not stack more layers than the value indicated on the shipping container. Do not place the device sideways or upside down.

● When unpacking the device, do not remove foam pads attached to the device or stack the bare device. Do not stack over three layers. Each layer cannot exceed 1 meter (39.37 in.). The foam pads must be placed in a stable alignment.

2.1.2 Movement

● Do not frequently move the device.

● Turn off all the power supplies and dismantle all power cords and cables before moving or transferring the device.

● When moving the device, note the balance and avoid hurting legs and feet or straining the back.

⚠ When moving the device, do not grab the handle of the power module or fan module. Grabbing the handle may cause damage or even injury to your body.

⚠ Before moving the device, remove the expansion module, fan module, and power module to reduce the weight.

⚠ The device must be installed or operated in a location where movement is restricted.

2.1.3 Electricity

● Observe local regulations and specifications when performing electric operations. Only qualified personnel can perform such operations.

● Check whether there are potential risks in the working area. For example, check whether the power supply is grounded properly and whether the ground is wet.

● Find out the position of the indoor emergency power switch before installation. Cut off the power switch in case of accidents.

- Make sure that the device is powered off when you cut off the power supply.

- Do not place the device in a wet position and keep the device away from liquid.

⚠ Improper electric operations may cause a fire, electric shock, and other accidents, and lead to severe and fatal personal injury and device damage.

⚠ Direct or indirect contact with high voltage or mains power supply through wet objects may cause fatal dangers.

2.1.4　ESD

When the static electricity exceeds a specified value, it will damage the circuit and device. The electrostatic induction mainly comes from outdoor high voltage power lines, lightning, other external electric fields, indoor floor materials, and internal structure of the device.

To prevent damage from static electricity, pay attention to the following points:

- Properly ground the device and floor.

- Keep the indoor installation environment clean and free of dust.

- Maintain appropriate humidity conditions.

- Before installing various pluggable modules, wear an anti-static wrist strap and make sure that it is well grounded.

- Do not directly touch the components and printed circuit board (PCB) of the module with your hands.

- Use an ESD bag to keep the module.

- Avoid clothing and other items in contact with the circuit board. The anti-static wrist strap can only prevent damage to the circuit board caused by static electricity on the body. Static electricity on clothing cannot be prevented.

2.1.5　Laser

The RG-6980-64QC supports varying models of optical modules (Class I laser products).

Pay attention to the following points:

- When an optical transceiver is working, ensure that the port has been connected to a fiber cable or covered with a dust cap, to keep out dust and prevent it from burning your eyes.

- When an optical transceiver is working, do not pull out the fiber cable or look directly into the fiber transceiver. The optical module emits laser light that may hurt your eyes.

⚠ Do not stare into any optical port under any circumstances because this may cause permanent damage to your eyes.

2.2　Installation Site Requirements

The RG-S6980-64QC must be used indoors. The installation site must meet the following requirements to ensure the normal operation and prolonged service life of the switch.

2.2.1　Cabinet Installation

- If the switch is installed inside a cabinet, the following conditions must be met:

- Install the switch into an open cabinet. If the switch is installed into a closed cabinet, ensure that the cabinet has proper ventilation and heat dissipation.

- The cabinet is sturdy enough to support the weight of the switch and its accessories.

- You are advised to install the switch into a standard cabinet and maintain a proper clearance around the air vents for heat dissipation.

- The cabinet is properly grounded.

2.2.2 Ventilation

Reserve sufficient space in front of the air vents to ensure normal heat dissipation. Maintain a minimum clearance of 200 mm (7.87 in.) around the device for airflow. After various cables are connected, bundle the cables or place them in the cable management bracket to avoid blocking air inlets. You are advised to clean the device every three months to prevent dust from blocking ventilation openings.

2.2.3 Temperature and Humidity

- To ensure the normal operation and prolonged service life of the switch, maintain an appropriate temperature and humidity in the equipment room. The equipment room with improper temperature and humidity for a long period may damage the switch.

- In an environment with a high humidity, insulating materials may have bad insulation or even leaking electricity. Sometimes the materials may suffer from mechanical performance change and metallic parts may get rusted.

- In an environment with low relative humidity, static electricity is prone to occur and damage internal circuits of the switch.

- A high temperature can accelerate the aging of insulation materials, greatly reducing the reliability of the switch and severely affecting its service life.

Temperature and Humidity Requirements

Model	Operating Temperature	Operating Humidity
RG-S6980-64QC	0ºC to 40ºC (32ºF to 104ºF)	10% to 90% (non-condensing)

ℹ The ambient temperature and humidity of the switch are measured at the point that is 1.5 m (59.06 in.) above the floor and 0.4 m (15.75 in.) before the switch rack when there is no protective plate in front or at the back of the rack

2.2.4 Cleanliness

Dust poses a severe threat to the running of the device. The indoor dust falling on the device may be absorbed by the static electricity, causing bad contact of the metallic joint. Such electrostatic absorption may occur more easily when the relative humidity is low. This affects the device lifecycle and causes communication faults. Table 2-1 describes the requirements for the dust content and granularity in the equipment room.

Dust	Unit	Content
Dust particles (diameter ≥ 0.5 μm)	Particles/m^3	≤ 3.5 x 10^6
Dust particles (diameter ≥ 5 μm)	Particles/m^3	≤ 3 x 10^4

Apart from dust, the salt, acid, and sulfide in the air in the equipment room must meet strict requirements. These harmful substances will accelerate metal corrosion and component aging. Therefore, the equipment room should be properly

protected against the intrusion of harmful gases, such as sulfur dioxide, hydrogen sulfide, nitrogen dioxide, and chlorine gas. The following table lists limit values for harmful gases.

Gas	Average (mg/m^3)	Maximum (mg/m^3)
Sulfur dioxide (SO$_2$)	0.3	1.0
Hydrogen sulfide (H$_2$S)	0.1	0.5
Nitrogen dioxide (NO$_2$)	0.5	1.0
Chlorine gas (Cl$_2$)	0.1	0.3

ℹ️ Average refers to the average value of harmful gases measured in one week. Maximum is the upper limit of the harmful gas measured in one week for up to 30 minutes every day.

2.2.5   Grounding

A good grounding system is the basis for stable and reliable operation of the device, preventing lightning strokes and resisting interference. Carefully check the grounding conditions at the installation site according to the grounding requirements, and perform grounding operations properly as required.

Safety Grounding

Ensure that the cabinet and power distribution device are securely grounded when the switch uses the AC or high-voltage DC power supply. Otherwise, an electric shock may occur when a grounding error occurs to the high-voltage circuit inside the switch.

⚠️ The building should provide a protective ground connection to ensure that the device is connected to a protective earth.

Surge Protection

The surge protection system of a facility is an independent system that consists of the lightning rod, down conductor, and connector to the grounding system, which usually shares the power reference ground and ground cable. The lightning discharge ground is targeted for the facility.

ℹ️ For more information about surge protection, see Appendix C.

EMC Grounding

The grounding required for EMC design includes the shielding ground, filter ground, noise and interference suppression, and level reference, which contribute to the overall grounding requirements. The grounding resistance should be smaller than 1 ohm. The grounding lug is in the upper right corner of the rear panel. It is marked with a conspicuous label.

Figure 2-1 Grounding
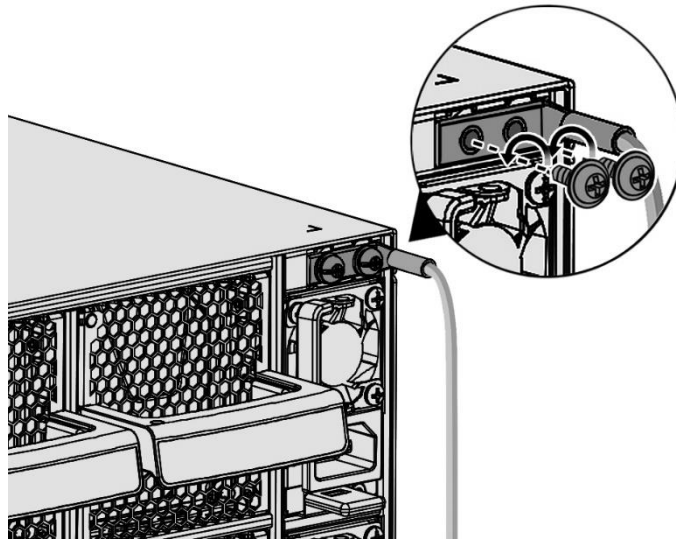
2.2.6 EMI

Electro-Magnetic Interference (EMI), from either outside or inside the device or application system, affects the system in the conductive ways such as capacitive coupling, inductive coupling, and electromagnetic radiation. There are two types of electromagnetic interference: radiated interference and conducted interference, depending on the type of the transmission path. When the energy, often RF energy, from a component arrives at a sensitive component through the space, the energy is known as radiated interference. The interference source can be either a part of the interfered system or a completely electrically isolated unit. Conducted interference results from an electromagnetic wire or signal cable connection between the source and the sensitive component, along which cable the interference conducts from one unit to another. Conducted interference often affects the power supply of the device, but can be controlled by a filter. Radiated interference may affect any signal path in the device and is difficult to shield.

● Take interference prevention measures for the power supply system.

● Keep the switch far away from the surge protection and grounding system of the power device.

● Keep the switch far away from high-frequency current devices such as the high-power radio transmitting station and radar launcher.

● Take electromagnetic shielding measures when necessary.

2.3 Fiber Connections

Ensure that the optical module type and fiber match the optical port. The transmit end on the local device should be connected to the receive end on the peer device, and the receive end on the local device should be connected to the transmit end on the peer device.

2.4 Tools

Common Tools	Phillips screwdriver, related electrical and optical cables, cage nuts, diagonal pliers, and cable ties
Special Tools	Anti-static gloves, wire stripper, crimping plier, crystal connector crimping plier, and wire cutter
Cleaning Tools	Dust-free paper and fiber end-face microscope
Meters	Multimeter, bit error rate tester (BERT), and optical power meter

⚠ The switch is delivered without a tool kit. The tool kit is customer-supplied.

2.5   Unpacking the Switch

Package Contents

Chassis Kit	Switch, yellow and green grounding cable, and *Quick Start Guide* and *Package Contents*
Module Kit	Modules, and *Quick Start Guide* and *Package Contents*

⚠ The preceding table lists common items. The actual items may vary during delivery and are subject to the order contract. Check your goods carefully against the order contract. If you have any questions, contact the distributor.

Unpacking the Switch

1. Cut off the packing tape of the shipping container with scissors, place it on a flat surface with the shipping container facing upward, and check whether the seal on its top surface is intact.

2. Use a paper cutter to cut the container open. Note: The foam blocks may vary with the products.

3. Take out the accessory kit and check that no accessories are missing from the accessory kit. The accessories may vary with the products.

4. Stand the switch upright with the foam block facing upward.

5. Remove the foam block.

6. Carry the switch with both hands to the shipping container of another product and remove the foam block at the other side of the switch.

7. Cut the tape on the ESD bag, remove the switch from the ESD bag with both hands and place it on the ESD workbench.

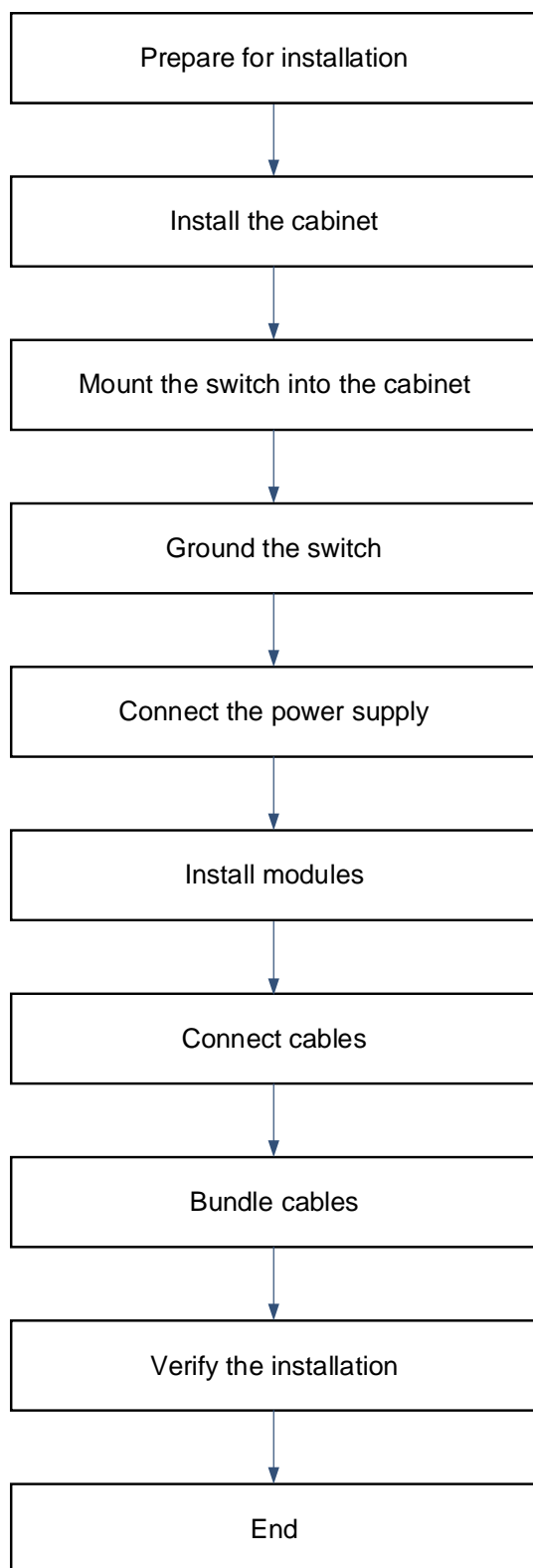8. Press the power supply inward to ensure that the power supply is fully seated into the system.

3   Installing the Switch

The RG-S6980-64QC must be installed indoors.

⚠ Ensure that requirements in Chapter 2 are all met.

3.1   Installation Procedure

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┌─────────────────────────────────────┐
│       Prepare for installation       │
└─────────────────────────────────────┘
                  │
                  ▼
┌─────────────────────────────────────┐
│          Install the cabinet         │
└─────────────────────────────────────┘
                  │
                  ▼
┌─────────────────────────────────────┐
│    Mount the switch into the cabinet │
└─────────────────────────────────────┘
                  │
                  ▼
┌─────────────────────────────────────┐
│          Ground the switch           │
└─────────────────────────────────────┘
                  │
                  ▼
┌─────────────────────────────────────┐
│       Connect the power supply       │
└─────────────────────────────────────┘
                  │
                  ▼
┌─────────────────────────────────────┐
│           Install modules            │
└─────────────────────────────────────┘
                  │
                  ▼
┌─────────────────────────────────────┐
│           Connect cables             │
└─────────────────────────────────────┘
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                  ▼
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│           Bundle cables              │
└─────────────────────────────────────┘
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│         Verify the installation      │
└─────────────────────────────────────┘
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                  ▼
┌─────────────────────────────────────┐
│                End                   │
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3.2 Before You Begin

Carefully plan and arrange the installation position, networking mode, power supply, and cabling before installation. Confirm the following requirements before installation:

● The installation site provides sufficient space for heat dissipation.

- The installation site meets temperature and humidity requirements of the device.

- The power supply and required current are available at the installation site.

- Network cables have been deployed at the installation site.

3.3   Mounting the Cabinet

Precautions

When mounting the cabinet, ensure that the following conditions are met:

- All expansion bolts for fastening the cabinet base to the ground are installed and tightened in sequence from bottom to up (large flat washer, spring washer, and nut), and installation holes on the base and expansion bolts are properly aligned.

- The installed cabinet must be steady.

- The installed cabinet is vertical to the ground.

- When multiple cabinets are placed side by side in the equipment room, they are aligned with each other, with an error less than 5 mm (0.20 in.).

- The front and rear doors of the cabinet are installed to allow you open and close them smoothly. The locks work normally, and all keys are complete.

- There are no unnecessary and informal labels inside the cabinet and on service modules.

- Filler panels are installed in empty slots.

- The screws in the cabinet are fastened tightly and be of the same model.

- The device is securely installed, and the screws on the panel are fastened tightly.

- All wiring outlets at the top and bottom of the cabinet are installed with rodent-resistant nets with clearance of no more than 15 mm (0.59 in.) in the diameter to prevent rodents and other small animals from entering the cabinet.

- Antistatic wrist straps are provided in the cabinet.

Installation Steps

1. Plan the available space before installing the cabinet. Reserve enough space for the front and rear doors for device maintenance.

2. Install and fasten the cabinet in the designed position as planned.

3. Install the appropriate cable troughs and cables.

4. Install the tray and cable management brackets on the rack according to the number of devices installed into the cabinet.

3.4   Mounting the Switch

Precautions

Before installing the RG-S6980-64QC in a cabinet, check whether the racks are properly positioned. If the racks are too close to the front door of the cabinet, you may fail to close the front door after installing Ethernet and optical cables. The

front panel of the switch should be at least 10 mm (0.39 in.) away from the front door of the cabinet. Confirm the following before installing the switch:

- The cabinet is secured.

- The modules in the cabinet are installed.

- There are no obstructions in and around the cabinet.

- The device is prepared and transported to a location close to the cabinet.

3.4.1   Mounting the Brackets

1. Fix eight M6 cage nuts to the corresponding installation position of the support, and then fix four M6 cage nuts to the rack where mounting brackets on both sides of the front panel of the switch are aligned.

   Figure 3-1 Installing Cage Nuts
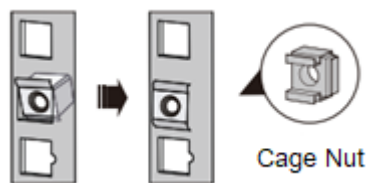
2. Remove the two guide rails from the packing materials and secure them on the rack by using eight M6 screws..

   Figure 3-2 Installing Guide Rails
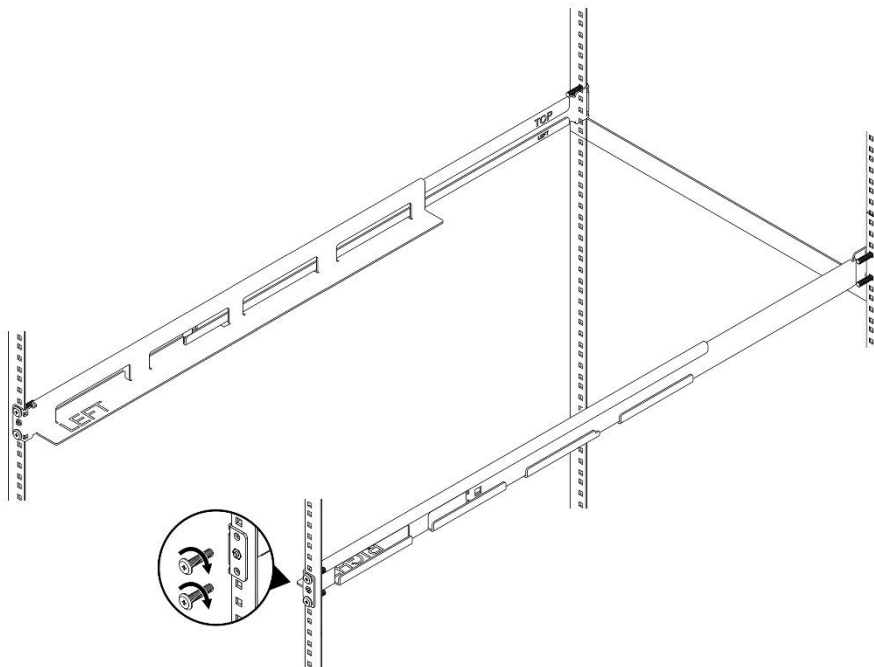
3.4.2   Installing the Switch in a Cabinet

1. Install the grounding cable.

   The grounding cable is crimped to the grounding lug. On the upper right side of the rear panel of the chassis, use a Phillips screwdriver to tighten the grounding screws to the grounding lug.

Figure 3-3 Installing the Grounding Lug
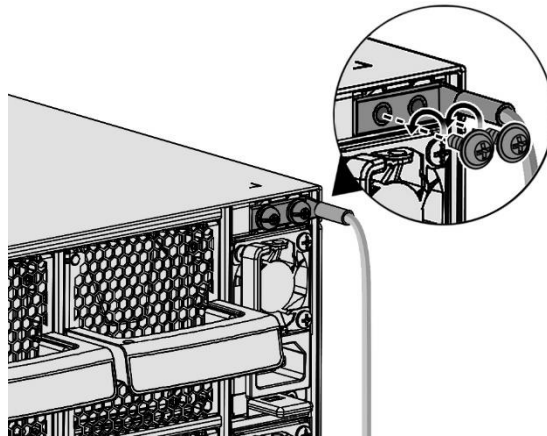
2.   Slide the switch along the guide rails until holes of the mounting brackets secured on the front panel are aligned with the cage nuts on the front racks. Insert the screws and tighten them.

Figure 3-4 Mounting the Switch
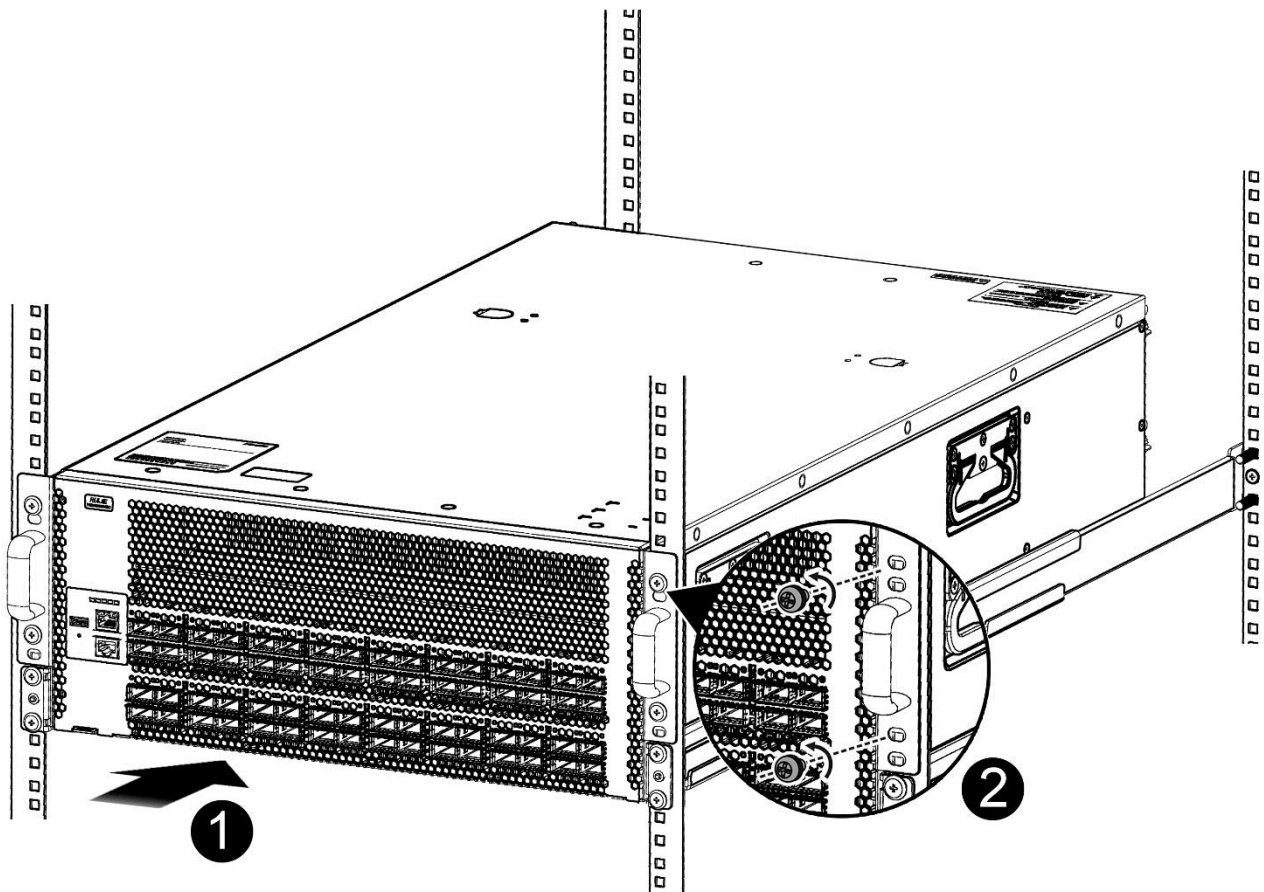
⚠️ The mounting bracket is installed against the four screw holes in the left and right rows of the six screw holes on the side of the rear panel of the main unit.

⚠️ Distinguish the left and right guide rails according to the mark on the guide rails.

⚠ The guide rails delivered with the switch are applicable to a cabinet with a depth ranging from 800 mm (31.50 in.) to 1200 mm (47.24 in.).

3.5   Installing and Removing a Fan Module

Wear an anti-static wrist strap before performing the following operations.

1.   Remove the fan module from its packing materials.

2.   Grasp the handle and slide the module into the slot along the guide rail until you feel the connector snap into place.

Figure3-5 Installing a Fan Module
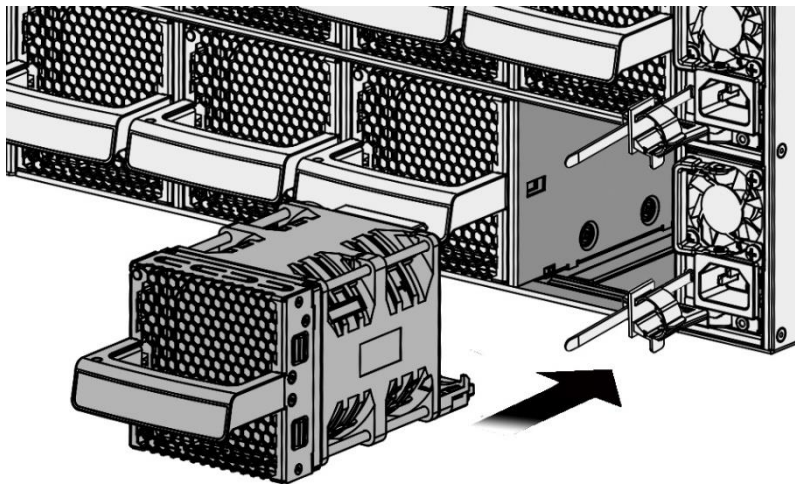
🛈 Slide the fan module into the slot. Verify that the fan module is in the correct orientation.

🛈 If you find it difficult to fully insert the fan module, pull the fan module out, and slide it into the slot again.

🛈 If you can pull the fan module out of the slot without pressing the fan module latch, the fan module is not fully inserted into the fan slot.

🛈 The power modules and fan modules with different airflow directions cannot be used together.

Removing a Fan Module

1.   Press the fan module latch and pull the fan module out.

2.   Install the filler panel in the empty slot. Put the removed fan module back into its packing materials.

Figure 3-6 Removing a Fan Module
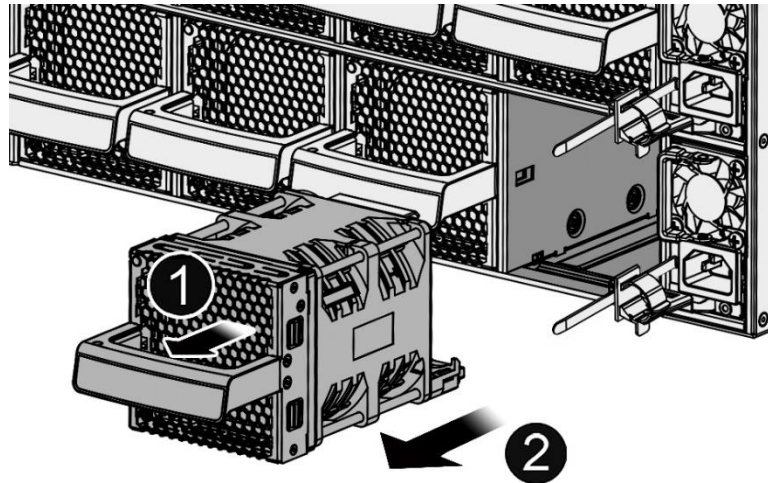
ⓘ   Pull the fan module out of the slot gently.

ⓘ   Install the filler panel in the empty slot to allow for airflow and prevent dust.
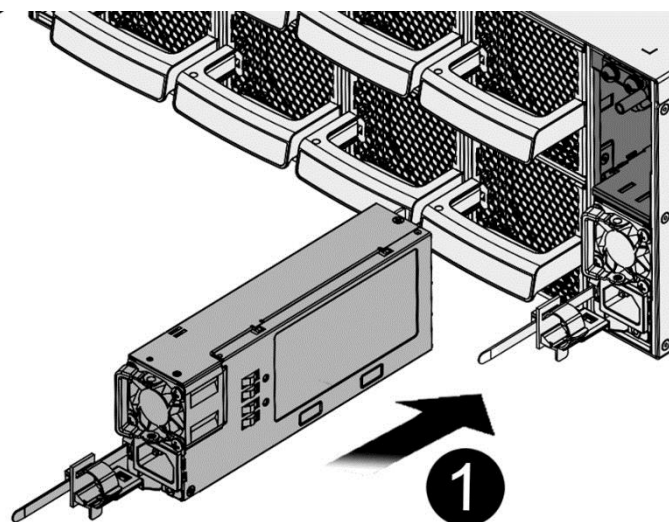
3.6   Installing and Removing a Power Module

Wear an anti-static wrist strap before performing the following operations.

Installing a Power Module

1.   Remove the power module from its packing materials and ensure that the input mode and specifications meet requirements.

2.   Remove the filler panel covering the slot. Keep the module nameplate face upward. Grasp the handle with one hand and place your other hand under the power module to support its weight. Slide the power module into the slot along the guide rail.

Figure 3-7 Sliding a Power Module into the Slot

3.   Slide the power module into the slot along the guide rail until you feel the connector snap into place. Plug in the power cord and strap in the power cord retainer.

Figure 3-Installing a Power Module
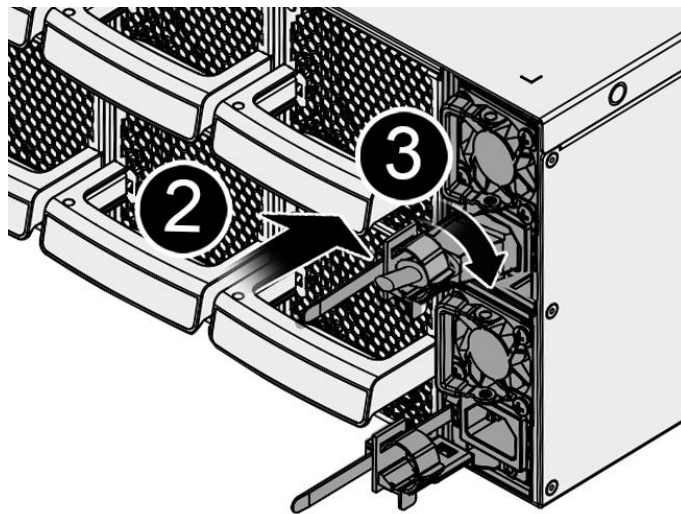
ℹ Slide the power module into the slot gently. Verify that the power module is in the correct orientation.

ℹ If you find it difficult to fully insert the power module, pull the power module out, align it to the guide rails, and slide it into the slot again.

ℹ The power modules and fan modules with different airflow directions cannot be used together.
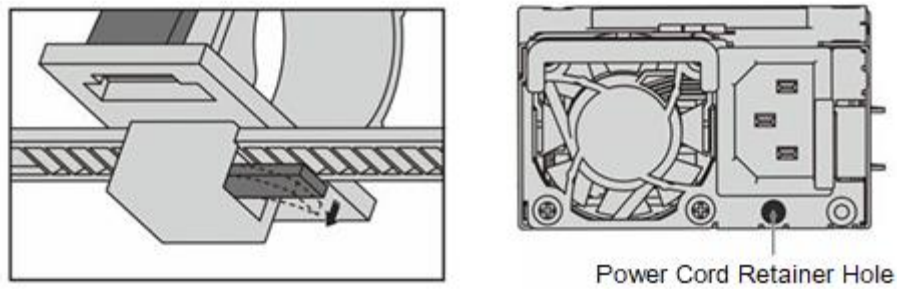
Installing a Power Cord Retainer

1. Remove the power cord retainer from its packing materials. The power cord retainer consists of a retainer strip and a flexible retainer clamp. Both the strip and the clamp have two sides, one side smooth and the other side grooved. The power cord retainer has two latches. If you want to remove the retainer strip, press the retainer strip latch first. If you want to loosen or remove the retainer clamp, press the clamp latch first.

Figure 3-9 Retainer Strip, Retainer Clamp, and Latches
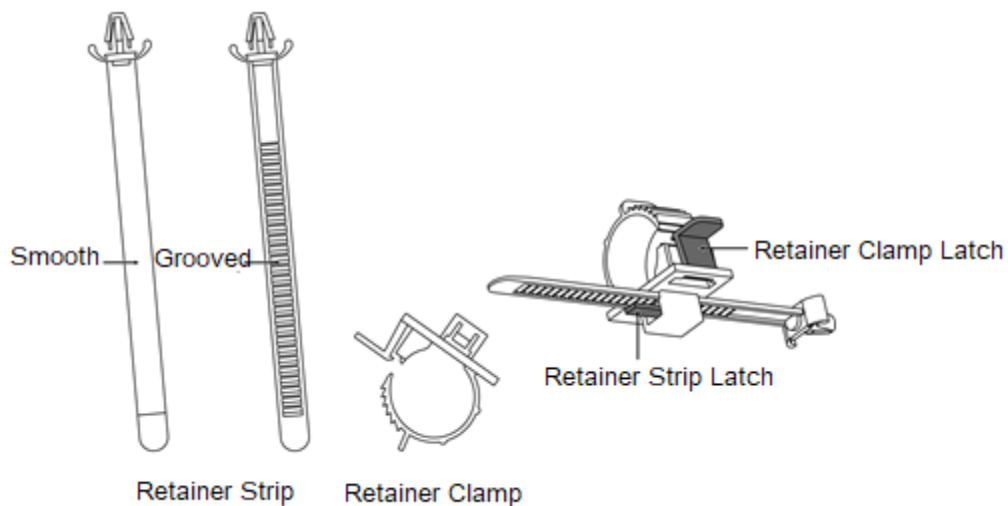
2. Thread the retainer strip through the hole at the bottom of the clamp and lock it into place. If you want to remove the strip, press the retainer strip latch and pull the strip out.

Figure 3-10 Retainer Strip

Power Cord Retainer Hole

3. Check whether the retainer strip is seated securely. If you can remove the strip without pressing the retainer strip latch, the strip is not installed properly. Try the other side of the strip.

4. Fix the strap in the power cord retainer to the power module, to hold the clamp in place.

5. Slide the retainer clamp around the AC power cord. If you want to adjust the clamp to secure the AC power cord, press the retainer clamp latch first.
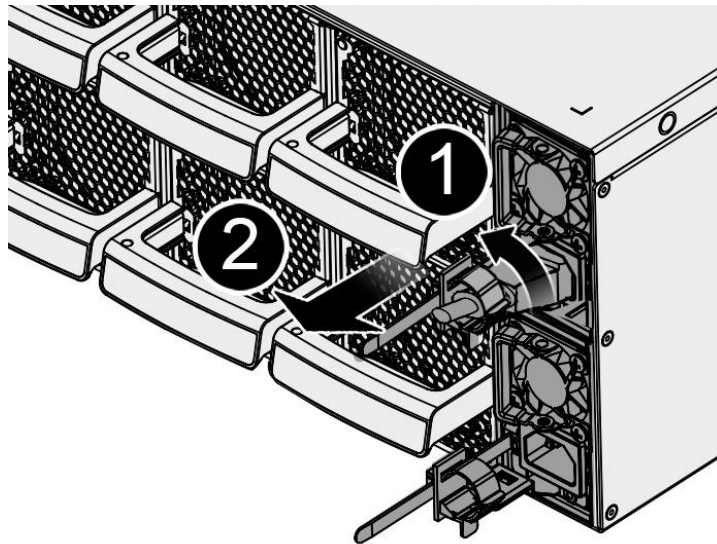
Figure 3-11 Retainer Clamp
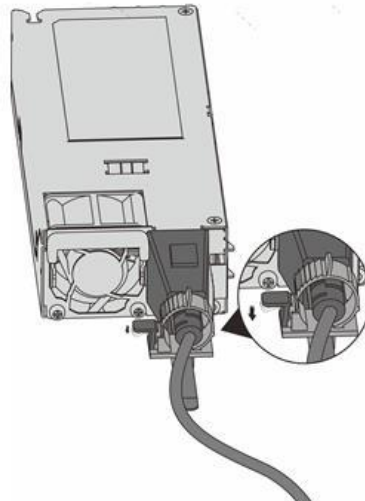
Removing a Power Module

1. Adjust the clamp to remove the power cord.

Figure 3-12 Removing a Power Cord

2.   Press the latch on the power module and grasp the handle with one hand. Place your other hand under the power module to support its weight. Pull the power module fully out of the slot.

Figure 3-13 Removing a Power Module
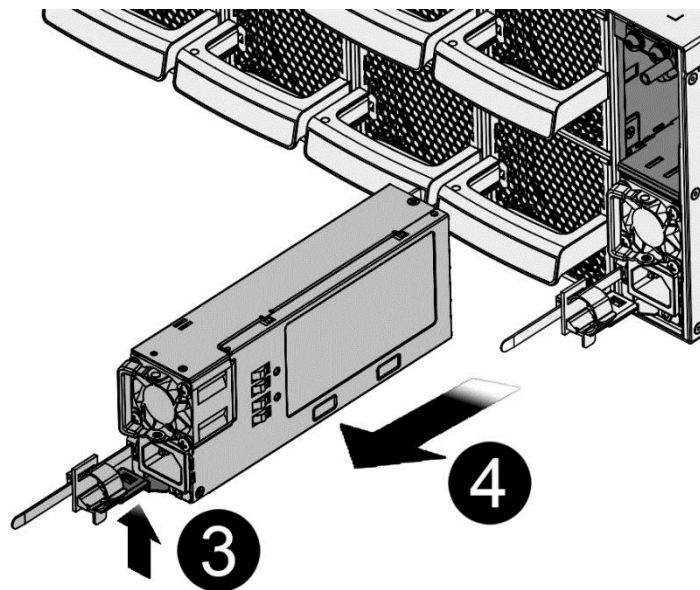
3.   Install the filler panel in the empty slot. Put the removed power module back into its packing materials.

🔵 Pull the power module out of the slot gently.

🔵 Install the filler panel in the empty slot to allow for adequate airflow and prevent dust.

3.7   Connecting a Grounding Cable

Connect the PGND to the grounding lug of the cabinet and then connect the grounding lug to the grounding bar of the equipment room.

Precautions

● The sectional area of the grounding cable should be determined according to the possible maximum current. Cables with good conductor should be used.

● Do not have bare wires exposed.

● The resistance between the chassis and ground should be less than 1 ohm.

ⓘ To guarantee the security of the person and device, the switch must be grounded properly. The grounding resistance between the chassis and the ground should be less than 1ohm.

ⓘ The maintenance personnel should check whether the AC socket is reliably connected to the protection ground of the building. If not, the maintenance personnel should use a protection ground wire to connect the protection ground terminal of the AC socket to the protection ground of the building.

ⓘ The power socket should be installed in an easily operable position near the device.

ⓘ During device installation, connect the grounding cable and disconnect it in sequence.

ⓘ The cross-sectional area of the protection ground cable should be at least 2.5 mm2 (12 AWG).

3.8   Connecting the Console Port

Steps

Connect the RJ-45 connector of the delivered Ethernet cable to the console port of the switch and the other end to the NMS or management terminal.

⚠ Parameter settings are as follows:

Baud rate: **115200**

Data bit: **8**

Parity check: **None**

Stop bit: **1**

Flow control: **None**

3.9   Connecting the Management Port

Precautions

● Distinguish single-mode and multimode fiber cables and ports.

● Avoid a small bend radius at the connector.

Steps

1. Connect the RJ-45 connector of the delivered Ethernet cable to the management port of the switch and the other end to the NMS or management terminal.

2. Insert the single-mode and multimode optical cables into the corresponding ports according to the panel identification, and distinguish the transmitting and receiving ends of fiber cables.

3. Insert the twisted pair cable with RJ45 connector into the corresponding ports according to the panel identification, and distinguish the crossover cable and the straight-through cable.

3.10 Bundling Cables

Precautions

- The power cords and other cables should be bundled neatly.

- When you bundle fibers, make sure that the fibers at the connectors have natural bends or bends of a large radius.

- Do not bundle fiber cables and twisted pair cables too tightly, which may press hard the fibers and affect their useful life and transmission performance.

Bundling Steps

1. Bind the drooping part of the fiber cables and twisted pairs of each board, and lead them to both sides of the chassis for convenience.

2. On the both sides of the chassis, fasten the fibers and twisted pairs to the cabinet cable management ring or cabling chute.

3. For the power cords, you should bundle them closely along the bottom of the chassis, in a straight line wherever possible.

3.11 Checking After Installation

Checking the Cabinet

- Verify that the external power supply matches the distribution panel of the cabinet.

- Verify that the front or back cabinet doors can be closed after installing the device.

- Verify that the cabinet and all cables are securely fastened.

- Verify that the switch has been installed in the cabinet.

- Maintain a minimum clearance of 200 mm (7.87 in.) around the device for airflow.

Checking Cable Connections

- Ensure that the UTP/STP cable matches the port type.

- Verify that cables are properly bundled.

- Verify that the grounding cables are connected properly and specifications meet requirements.

- Verify that interface cables are routed indoors. If not, verify that the AC lightning resistance socket and network interface lightning protector are connected.

Checking the Power Supply

- Verify that the power cord is properly connected and compliant with safety requirements.

- ℹ️ Turn off the power to avoid personal injury and damage to components caused by improper connections.

4 Verifying the Operating Status

4.1 Setting Up the Configuration Environment

Setting Up the Configuration Environment

Connect a PC to the console port on your switch by using an Ethernet cable.

Figure 4-1 Setting Up the Configuration Environment
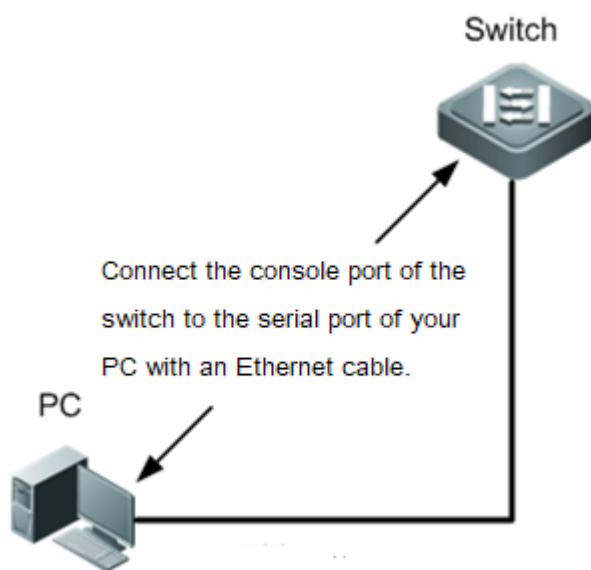
Connecting the Ethernet Cable

1. Connect the DB-9 connector of the cable to the serial port of the PC used to configure the switch.

2. Connect the RJ45 end to the console port of the switch.

Setting Parameters

● Start the PC and run the terminal simulation program on your PC, such as Terminal on Windows 3.1 or HyperTerminal on Windows 95/98/NT/2000/XP.

● Set **Bits per second** to **115200**, **Data bits** to **8**, **Parity** to **None**, **Stop bits** to **1**, and **Flow control** to **None**.

● Follow the steps to set the parameters:

1. Navigate to **Start** > **All Programs** > **Accessories** > **Communications** and select **HyperTerminal**. The **Location Information** dialog box will appear.

2. Click **Cancel**. The **Connection Description** dialog box will appear.

3. In the **Name** text box, enter the new connection name and click **OK**. The **Connect to** dialog box will appear. From the **Connect using** drop-down list, select a COM port to be used.

4. Click **OK**. The **COM1 Properties** dialog box will appear, as shown in Figure 4-4. Set **Bits per second** to **115200**, **Data bits** to **8**, **Parity** to **None**, **Stop bits** to **1**, and **Flow control** to **None**.
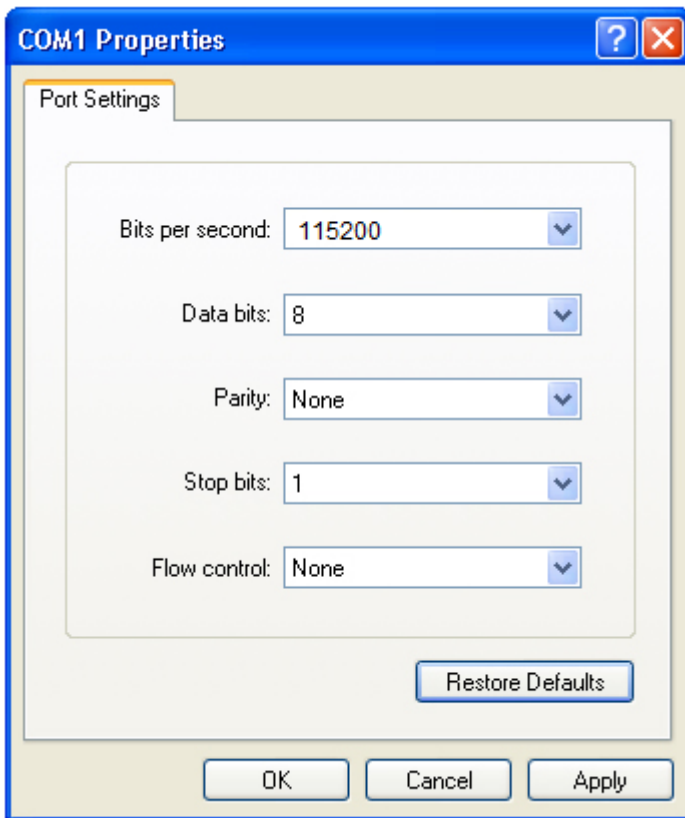
5.   Click **OK**. The **HyperTerminal** window will appear.

4.2   Powering On the Switch

Checklist Before Power-on

● Verify that the switch is fully grounded.

● Verify that fan modules and power modules are securely seated.

● Verify that power cords are properly connected.

● Verify that the power supply voltage meets the requirement of the switch.

● Verify that the Ethernet cable is properly connected, the client (for example, a PC) is started, and configuration parameters are configured.

Checklist After Power-on (Recommended)

● After power-on, check the following items:

● Check information on the terminal interface.

● Check the LED status.

5 Monitoring and Maintenance

5.1 Monitoring

LED

- When the switch is running, you can monitor the device and module status by observing LEDs.

- If the SYS LED is red, the system is not functioning properly or the temperature exceeds the threshold. Log in to the software management system to troubleshoot the fault.

- If the SYS LED keeps blinking, the system is not functioning properly. You are advised to identify the fault cause and power off the switch when necessary.

- If the PSU LED is red, the power module is not functioning properly. You are advised to replace the power module.

- If the PSU LED is yellow, the power module does not match the system. You are advised to replace the power module.

- If the FAN LED is red, the fan module is not functioning properly. Log in to the software management system to troubleshoot the fault.

CLI Commands

- You can run CLI commands to monitor the system status, including:

- System status

- Port configuration and status

- Fan and power module status

- System temperature

For more information about monitoring commands, see *RG-RG-S6980-64QC Switch Configuration Guide*.

5.2 Hardware Maintenance

Cooling System

- If the fan module fails, an alarm will be generated.

- Replace the faulty fan module.

Power Module

When a power module is faulty, unplug the power cord, replace the power module, and plug in the power cord again.

Replacing the Lithium Battery

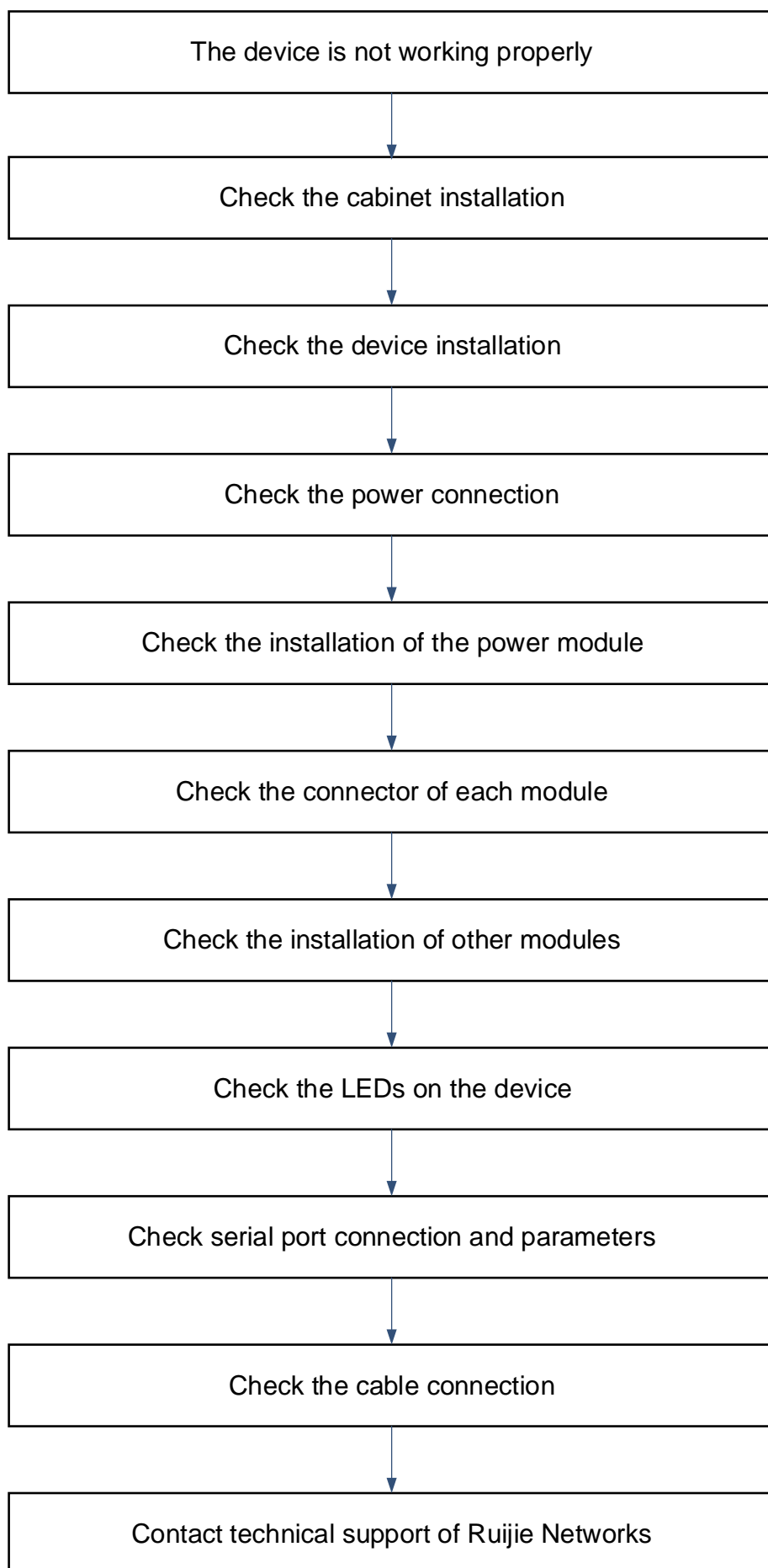- The device has a built-in lithium battery to maintain the real-time clock without external power to the switch.

- To replace the lithium battery, contact technical support personnel.

Replacing Fuses

To replace fuses, contact technical support personnel. The technical support personnel will select fuses of the same specifications for replacement.

6   Troubleshooting   - 34 -

6.1   Troubleshooting Flowchart

```
┌─────────────────────────────────────────────────┐
│          The device is not working properly      │
└─────────────────────────────────────────────────┘
                          │
                          ▼
┌─────────────────────────────────────────────────┐
│              Check the cabinet installation      │
└─────────────────────────────────────────────────┘
                          │
                          ▼
┌─────────────────────────────────────────────────┐
│               Check the device installation      │
└─────────────────────────────────────────────────┘
                          │
                          ▼
┌─────────────────────────────────────────────────┐
│                Check the power connection        │
└─────────────────────────────────────────────────┘
                          │
                          ▼
┌─────────────────────────────────────────────────┐
│        Check the installation of the power module│
└─────────────────────────────────────────────────┘
                          │
                          ▼
┌─────────────────────────────────────────────────┐
│            Check the connector of each module    │
└─────────────────────────────────────────────────┘
                          │
                          ▼
┌─────────────────────────────────────────────────┐
│          Check the installation of other modules │
└─────────────────────────────────────────────────┘
                          │
                          ▼
┌─────────────────────────────────────────────────┐
│              Check the LEDs on the device        │
└─────────────────────────────────────────────────┘
                          │
                          ▼
┌─────────────────────────────────────────────────┐
│        Check serial port connection and parameters│
└─────────────────────────────────────────────────┘
                          │
                          ▼
┌─────────────────────────────────────────────────┐
│                Check the cable connection        │
└─────────────────────────────────────────────────┘
                          │
                          ▼
┌─────────────────────────────────────────────────┐
│        Contact technical support of Ruijie Networks│
└─────────────────────────────────────────────────┘
```

6.2   Common Troubleshooting Procedures

Fault 1: The login password is forgotten.

Fault Symptom

The system login password is forgotten and data cannot be configured.

Handling Method

Contact Ruijie technical support.

Fault 2: The AC power module does not work.

Fault Symptom

- All LEDs on the front panel are off. The fan module status LED is off and the fan module does not rotate.

- The power supply status LED is off. The fan module does not rotate.

Handling Method

- Unplug the power cord from the power module.

- Check whether the cabinet is connected properly.

- Check whether the power cord is tightly connected to the power socket and power module.

- Check whether the power module is securely seated.

- If necessary, pull out the power module and check its connector.

Fault 3: The fan module does not rotate.

Fault Symptom

After the system is powered on, the fan module does not rotate or the fan module status LED is not on.

Handling Method

Check whether the fan module is securely seated. If so, replace the fan tray.

Fault 4: The serial port console has no output.

Fault Symptom

After the system is started, the serial port console does not display any information.

Handling Method

Check the serial cable. Ensure that the configuration of the connected serial port is consistent with that on the HyperTerminal. Check whether the configuration of the serial port on the HyperTerminal is consistent with that in *Configuration Guide*. If there is still no output on the serial port, contact Ruijie technical support.

Fault 5: Information of the serial port console contains garbled characters.

Fault Symptom

Information of the serial port console contains garbled characters.

Handling Method

The fault is related to the serial port configuration. Check whether the baud rate configuration is consistent with that in *Configuration Guide*.

Fault 6: The link cannot be set up on the optical port.

Fault Symptom

After the optical module is inserted into the optical port and the fiber cable is installed, the link cannot be set up on the optical port.

Handling Method

Perform the following steps:

1. Check whether the receiving end and transmitting end are reversed. The transmitting end of an optical port must be connected to the corresponding receiver at the other end. You can confirm both ends by exchanging the connection order of two fiber cables.

2. Check whether the wavelength of the optical modules on the two sides are consistent. For example, an optical module with a wavelength of 1310 nm cannot be connected to an optical module of 1550 nm.

3. Check whether the distance between the two sides exceeds the maximum length marked on the optical module.

4. Check whether the speeds of the two sides match and whether the fiber type meets requirements.

7   Appendix

7.1   Connectors and Media

10GBASE-T/1000BASE-T/100BASE-TX

The 1000BASE-T/100BASE-TX/10BASE-T supports adaptation of three rates and automatic MDI/MDIX crossover at these three rates.

10GBASE-T complies with IEEE 802.3an. The following table lists the supported cable and distance. The 10GBASE-T port requires that all four pairs of wires be connected for data transmission.

Cables	CAT7 STP	CAT6A STP	CAT6A UTP	CAT6 STP	CAT6 UTP
Description	Standard CAT7 shielded twist pairs	Standard CAT6A shielded twist pairs	Standard CAT6A unshielded twist pairs	Standard CAT6 shielded twist pairs	Standard CAT6 unshielded twist pairs
Type	Class F ISO/IEC 11801	Class Ea ISO/IEC 11801 Ed2.1/TIA-568-C.2		Class E ISO/IEC TR24750 TSB-155	
Max Transmission Distance	100 m	100 m		100 m	37 m to 55 m
Cabling System Bandwidth	600 MHz	500 MHz		250 MHz	
Remarks	Compliance with the minimum requirement of the 10GBASE-T standard			Compliance with the TSB-155 standard	

- The CAT6 UTP cable exposed in a severe condition may be affected by external crosstalk. In this case, its maximum transmission cannot be longer than 37 m.

- You are advised to use CAT6A shielded twisted pairs or higher for cabling in a new equipment room. Using the CAT6A or CAT7 cable can avoid external crosstalk to the maximum extent. Pay attention to the cabling system and device grounding when using shielded twisted pairs.

- The equipment room has already been installed with the CAT6A CTP cable or CAT6 cable, in compliance with the TSB-155 standard. The recommended cabling rules are as follows:

- 1. Avoid mixed cabling. Otherwise, use metal plates in the cable trough to separate them.

- 2. Separate the cables far away from each other as much as possible and do not cross them. Most crosstalk occurs within a distance of 20 m (65.62 feet) away from the cable end. You are advised not to bundle the cables 5 m to 20 m (16.40 feet to 65.62 feet) away from the cable end.

- 3. If you need to bundle cables, you are advised to tie CAT6A UTP cables every 50 cm to 70 cm (19.69 in. to 27.56 in.), and the CAT6 UTP cables every 160 cm to 180 cm (62.99 in. to 70.87 in.). Bundle cables as loosely as possible.

- 4. Tie up to 12 cables into a bundle.

ℹ️ 5. Replace the CAT6 connector with the CAT6A connector.

Conforming to IEEE 802.3ab, 1000BASE-T requires CAT5, CAT5e, or higher 100-ohm twisted pairs with a maximum distance of 100 meters (328 feet). The 1000BASE-T port requires that all four pairs of wires be connected for data transmission.

Figure 7-1 1000BASE-T Twisted Pair Connection
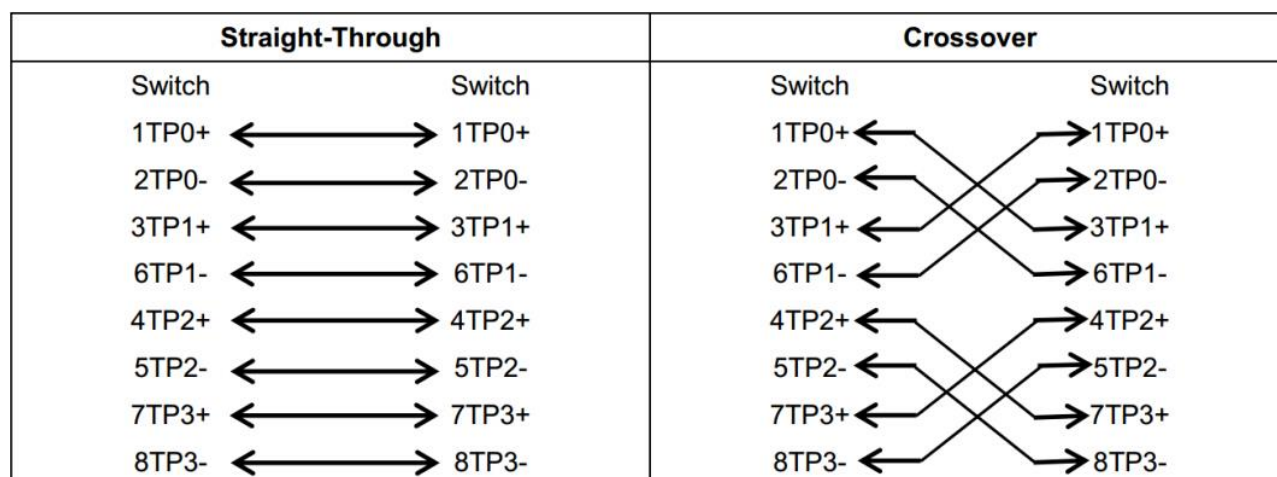
100BASE-TX also uses CAT5 100-ohm twisted pairs for connections with a maximum distance of 100 meters (328 feet). Figure 7-2 shows 100BASE-TX pin assignments.

Figure 7-2 100BASE-TX Pin Assignments

Pin	Socket	Plug
1	Input Receive Data+	Output Transmit Data+
2	Input Receive Data-	Output Transmit Data-
3	Output Transmit Data+	Input Receive Data+
6	Output Transmit Data-	Input Receive Data-
4,5,7,8	Not used	Not used

Figure 7-3 shows wiring of straight-through and crossover cables for 100BASE-TX.

Figure 7-3 100BASE-TX Twisted Pair Connection
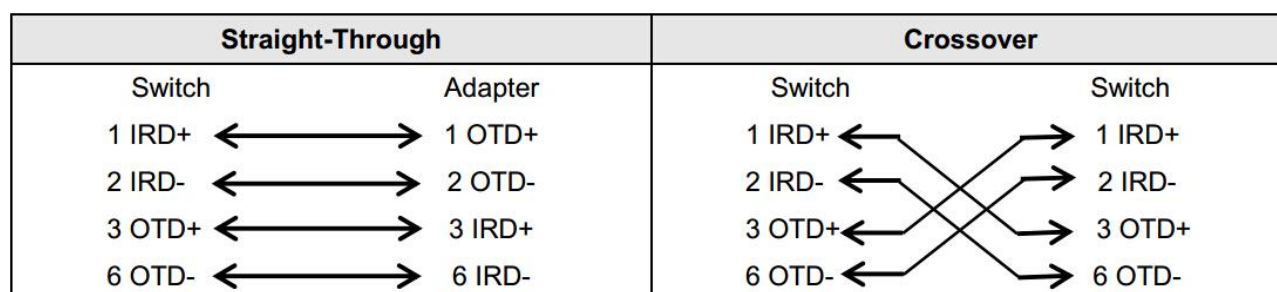
Fiber Cable Connections

Select single-mode or multi-mode fiber cables according to the module types.

Figure 7-4 Fiber Cable Connection

7.2 **100GE and 400GE SFP Modules**

Ruijie provides 100GE QSFP28 modules, 400GE QSFP-DD modules, and AOC modules according to port types. You can select the module to suit your specific needs. The following models and technical specifications of some 100GE QSFP28 modules, 400GE QSFP-DD modules, and AOC modules are listed for your reference.

100GE QSFP28 Modules and Specifications

Available 100GE QSFP28 Modules

Model	Wavelength (nm)	Cable Type	Core Size (µm)	Modular Bandwidth (MHz·km)	Max. Cabling Distance	Transmit Power (dBm)		Received Power (dBm)	
						Min.	Max.	Min.	Max.
100G-QSFP-SR-MM850	850	MMF (MPO)	50	2000	70 m (OM3)	–8.4	2.4	–10.3	2.4
			50	4700	100 m (OM4)				
100G-QSFP-LR4-SM1310	(1294.53,1296.59) (1299.02,1301.09) (1303.54,1305.63) (1308.09,1310.19)	SMF (LC)	9	N/A	10 km	–4.3	4.5	–10.6	4.5

Available 100GE QSFP28 DAC Models

Model	Module Type	Connector Type	Cable Length (m)	Conductor Diameter (AWG)	Speed (Gbps)	DDM Support (Yes/No)
100GE QSFP28 DAC, 1 m	Passive	QSFP28	1	30	4 lanes x 25.78125 (perlane)	No
100GE QSFP28 DAC, 3 m	Passive	QSFP28	3	30	4 lanes x 25.78125 (perlane)	No

400GE QSFP-DD Modules and Specifications

Available 400GE QSFP-DD Modules

Model	Wavelength (nm)	Cable Type	Core Size (µm)	Modular Bandwidth (MHz·km)	Max. Cabling Distance	Transmit Power (dBm)		Received Power (dBm)	
						Min.	Max.	Min.	Max.
400G-QDD-SR8-MM850	(840, 860)	MMF (MPO)	50	2,000	70 m (OM3)	–	4	–	4
				4,700	100 m	6.5		8.4	

400G-QDD-FR4-SM1310	(1264.5,1277.5) (1284.5,1297.5) (1304.5,1317.5) (1324.5,1337.5)	SMF (LC)	9	N/A	2 km	− 3.2	4.4	− 7.2	4.4
400G-QDD-DR4-SM1310	(1304.5,1317.5)	SMF (MPO/APC)	9	N/A	500 m	− 2.9	4.0	− 5.9	4.0

7.3 Surge Protection

Installing AC Power Arrester (Surge Protection Power Strip)

The AC power port must be connected to an external surge protection power strip to prevent the switch from being struck by lightning when the AC power cord is introduced from the outdoor and directly connected to the power port of the switch. The surge protection power strip can be fixed on the cabinet, workbench, or wall in the equipment room by using cable ties and screws. The AC power enters the surge protection power strip and then enters the switch.

Figure 7-5 Power Arrester

Grounding, Polarity detection LED:
Red: poor grounding

Power switch

RUN LED:
Green: the circuitry
is working normally

IEC standard socket
(connect the machine
room power)

Installed circuitry board

Overload auto-
protector, canbe reset
manually

Multi-service sockets(connect the switch power)
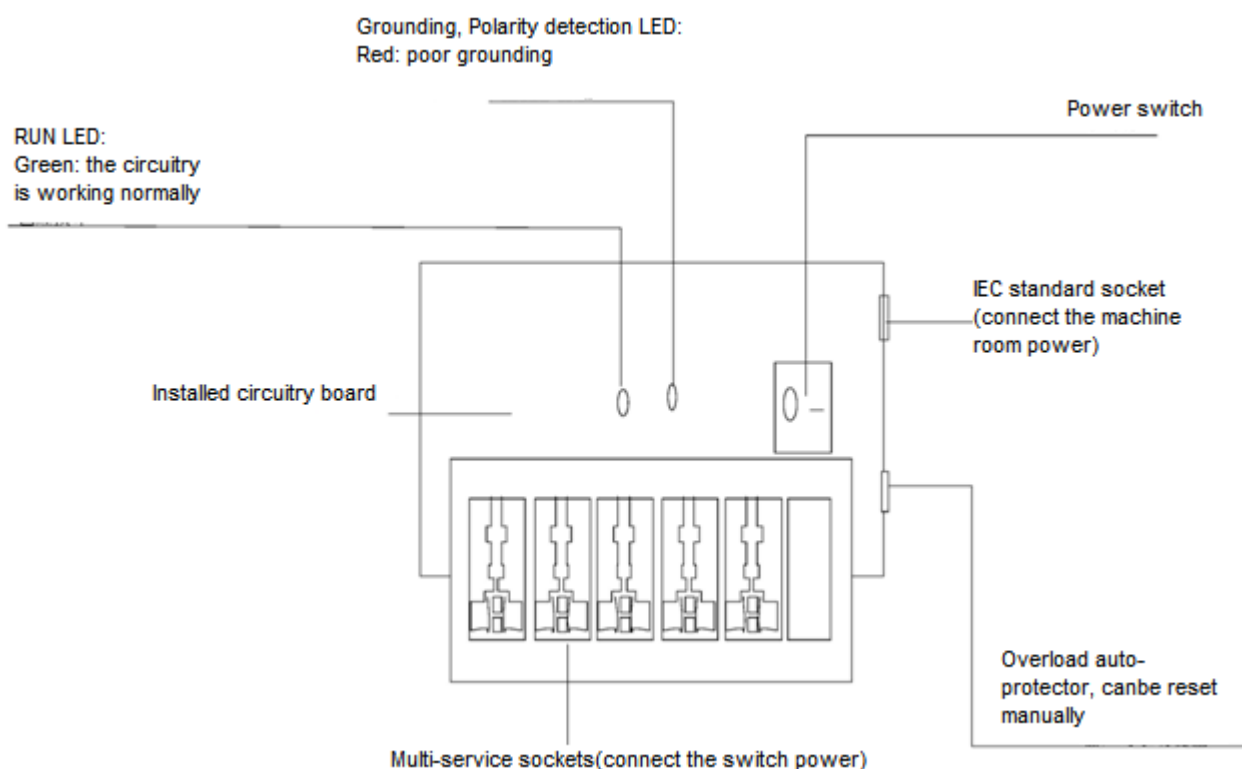
ⓘ The power arrester is not delivered with the switch. Purchase it as needed.

Pay attention to the following points:

- Ensure that the PE terminal of the power arrester is well grounded.

- After the AC power plug of the switch is connected to the socket of the power arrester (surge protection power strip), the surge protection function is implemented only if the RUN indicator is green and the ALARM indicator is OFF.

- If the ALARM indicator on the power arrester is red, check whether it is caused by the poor grounding connection or reversed connection of null and live lines. You can use a multimeter to measure the polarity of the power socket for the arrester when the indicator is red. If the N line is on the left and the L line is on the right (facing the socket), the arrester's PE terminal is not grounded. If not, the polarity of the arrester power cord should be reversed. In this case, you should open the power arrester and rectify the polarity of the connection. If the indicator is still red, the arrester's PE terminal has not been grounded.

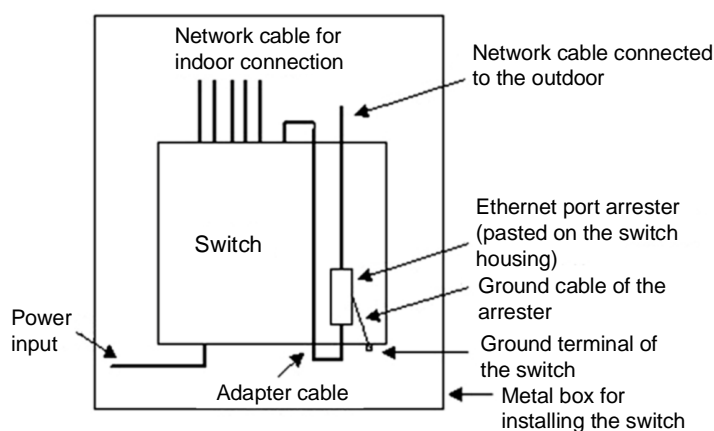**Installing the Ethernet Port Arrester**

Connect an Ethernet port arrester to the switch to prevent the damage by lightning before connecting an outdoor network cable to the switch.

Tools: Phillips screwdrivers or flat-head screwdriver, multimeter, and diagonal pliers

Installation steps:

1.　Tear one side of the protective paper for the double-sided adhesive tape and paste the tape to the housing of the Ethernet port arrester. Tear the other side of the protective paper for the double-sided adhesive tape and paste the Ethernet port arrester to the switch housing. The paste position for the Ethernet port arrester should be close to the ground terminal of the switch as much as possible.

2.　Based on the distance between the switch ground terminal and the Ethernet port arrester, cut the ground cable for the Ethernet port arrester and firmly tighten the ground cable to the ground terminal of the switch.

3.　Use a multimeter to check whether the ground cable for the arrester is in good contact with the ground terminal and the housing of the switch.

4.　Connect the arrester by using an adapter cable (note that the external network cable is connected to the IN end, while the adapter cable connected to the switch is connected to the OUT end) and check whether the service module indicator is normal.

5.　Use a nylon cable tie to bundle the power cords.

Figure 7-6 Ethernet Port Arrester Installation

ⓘ　The Ethernet port arrester is only for the 10M/100M electrical ports with an RJ-45 connector.

ⓘ　The Ethernet port arrester is not delivered with the switch. Purchase it as needed.

Avoid the following cases:

● Reversed installation direction of the arrester: Connect the external network cable to the IN end and connect the Ethernet port of the switch to the OUT end.

● Poor grounding of the arrester: The ground cable of the arrester should be as short as possible to ensure that it is in good contact with the ground terminal of the switch. Use a multimeter to confirm the contact condition after the grounding.

● Incomplete arrester installation: If there is more than one port connected to the peer device on the switch, arresters need to be installed on all connection ports for surge protection.

7.4   Cabling Recommendations

When the switch is installed in a standard 19-inch cabinet, secure the cables around the cable management brackets. Top or bottom cabling is adopted according to the actual situation in the equipment room. All cable connectors should be placed at the bottom of the cabinet, and cannot be exposed outside the cabinet. Power cords are routed beside the cabinet, and top or bottom cabling is adopted according to the actual situation in the equipment room, such as the positions of the DC power distribution box, AC socket, or surge protection box.

Requirement for the Minimum Cable Bend Radius

● The bend radius of a fixed power cord, network cable, or flat cable should be over five times greater than their respective diameters. The bend radius of these cables that are often bent or plugged should be over seven times greater than their respective diameters.

● The bend radius of a fixed common coaxial cable should be over seven times greater than its diameter. The bend radius of the common coaxial cable that is often bent or plugged should be over 10 times greater than its diameter.

● The minimum bend radius of a high-speed cable, such as an SFP+ cable should be 5 times the overall diameter of the cable. If the cable is constantly bent, plugged or unplugged, the bend radius should be 10 times the overall diameter.

Requirement for the Minimum Fiber Bend Radius

● The diameter of a fiber tray to hold fibers should be over 25 times greater than the diameter of the fiber.

● When a fiber is moved, the bend radius of the fiber should be over 20 times greater than the diameter of the fiber.

● During cabling of a fiber, the bend radius of the fiber should be over 10 times greater than the diameter of the fiber.

Precautions for Cable Bundling

● Before cables are bundled, mark labels and stick the labels to cables wherever appropriate.

● Cables should be neatly and properly bundled in the cabinet without twisting or bending.

Figure 7-7 Bundling Up Cables (1)
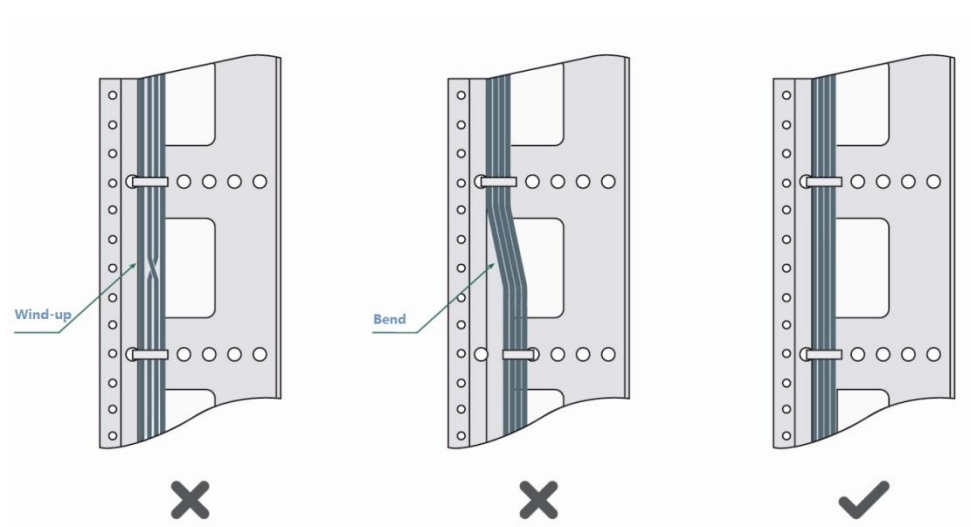
● Route and bundle power, signal, ground cables separately. When the cables are close to each other, cross them. Mixed bundling is not allowed. When they are close to each other, crossover cabling is recommended. In the case of parallel cabling, maintain a minimum distance of 30 mm (1.18 in.) between power cords and signal cables.

● The cable management brackets and cabling troughs inside and outside the cabinet should be smooth without sharp corners.

● The metal hole traversed by cables should have a smooth and fully rounding surface or an insulated lining.

● Use cable ties to bundle up cables properly. Please do not connect two or more cable ties to bundle up cables.

● After bundling up cables with cable ties, cut off the remaining part. The cut should be smooth and trim, without sharp corners.

Figure 7-8 Bundling Up Cables (2)
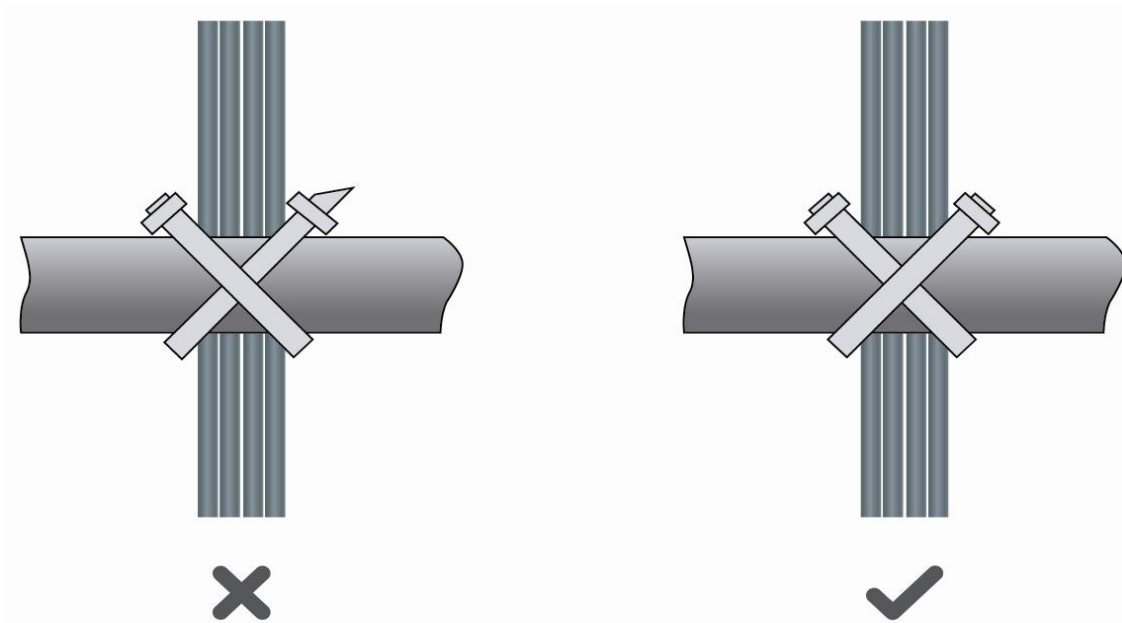
● When cables need to be bent, bundle them up but do not tie them where the cables will be bent. When cables need to be bent, bundle them up but do not tie them where the cables will be bent.

Figure 7-9 Bundling Up Cables (3)
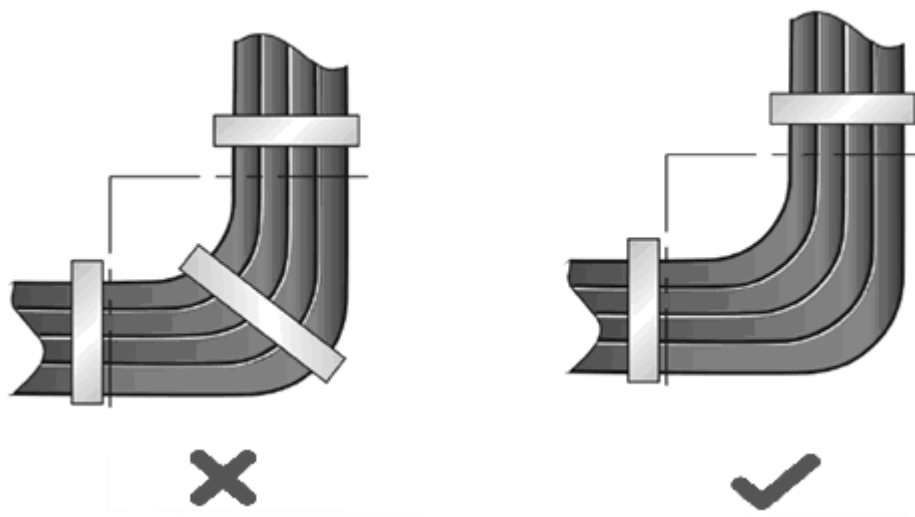
● Cables that are not assembled or remaining parts of cables should be folded and placed in a proper position of the cabinet or cable trough. The proper position refers to a position that does not affect device running or damage the switch or cable.

● Do not bundle up power cords to the rails for moving parts.

● The power cords connecting moving parts such as grounding cables should be reserved with some access after being assembled to avoid suffering tension or stress. After the moving part is installed, the remaining cable part should not touch heat sources, sharp corners, or sharp edges. If heat sources cannot be avoided, high-temperature cables should be used. If heat sources cannot be avoided, high-temperature cables should be used.

● When screw threads are used to fasten cable terminals, the bolt or screw must be tightly fastened, and anti-loosening measures should be taken.

Figure 7-10 Cable Fastening
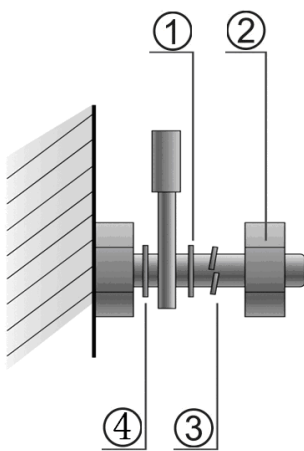
①Flat washer	③Spring washer
②Nut	④Flat washer

● When using a stiff cable, fix it near the cable lug to avoid stress on the lug and cable.

● Do not use self-tapping screws to fasten terminals.

● Power cords of the same type and in the same cabling direction should be bundled up into cable bunches, with cables in cable bunches clean and straight.

● Cables should be tied according to the following table.

Cable Bunch Diameter	Distance Between Every Binding Point
10 mm (0.39 in.)	80 mm to 150 mm (3.15 in. to 5.91 in.)
10 mm to 30 mm (0.39 in. to 1.18 in.)	150 mm to 200 mm (5.91 in. to 7.87 in.)
30 mm (1.18 in.)	200 mm to 300 mm (7.87 in. to 11.81 in.)

● No knot is allowed in cabling or bundling.

● For wiring terminal blocks (such as circuit breakers) with cord end terminals, the metal part of the cord end terminal should not be exposed outside the terminal block when assembled.

7.5 Site Selection

- The equipment room should be at least 5 km away from heavy pollution sources, such as the smelter works, coal mine, and thermal power plant. The equipment room should be at least 3.7 km away from medium pollution sources, such as the chemical factory, rubber factory, and electroplating factory. The equipment room should be at least 2 km away from light pollution sources, such as the food factory and leather plant. If the pollution source is unavoidable, the equipment room should be located on the windward side of the pollution source perennially with advanced protection.

- The equipment room should be at least 3.7 km away from the sea or salt lake. Otherwise, the equipment room must be sealed, with the air conditioner installed for temperature control. Saline soil cannot be used for construction. Otherwise, you should select devices with advanced protection against severe environment.

- Do not build the equipment room in the proximity of livestock farms. Otherwise, the equipment room should be located on the windward side of the pollution source perennially. The previous livestock house or fertilizer warehouse cannot be used as the equipment room.

- The equipment room should be firm enough to withstand severe weather conditions such as windstorm and heavy rain as well as away from dust. If the dust is unavoidable, keep the door and window away from the pollution source.

- The equipment room should be away from the residential area. Otherwise, the equipment room should meet the construction standard in terms of noise.

- Make sure that the air vent of the equipment room is away from the sewage pipe, septic tank, and sewage treatment tank. Keep the equipment room under positive pressure to prevent corrosive gas from entering the equipment room to corrode components and circuit boards.

- Keep the equipment room away from industrial boiler and heating boiler.

- The equipment room should be on the second floor or above. Otherwise, the equipment room floor should be 600 mm (23.62 in.) higher than the highest flood level ever recorded.

- Make sure that there are no cracks or holes in the wall and floor. If there are cable entries in the wall or window, take proper sealing measures. Ensure that the wall is flat, wear-resistant, and dust-free, which must meet requirements of flame retarding, soundproofing, heat absorption, dust reduction, and electromagnetic shielding.

- Keep the door and the window closed to make the equipment room sealed.

- The steel door is recommended for soundproofing.

- Sulfur-containing materials are forbidden.

- Keep the air conditioner from blowing wind straight toward the device or blowing water drops from the window or air vent toward the device.