Ruijie Reyee

RG-NBS3100-48GT4SFP-P-V2 Switch

Installation Guide

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Preface

Intended Audience

This document is intended for:

- Network engineers
- Technical support and servicing engineers
- Network administrators

Technical Support

- Ruijie Reyee website: https://reyee.ruijie.com
- Online support center: https://reyee.ruijie.com/en-global/support
- Case portal: https://www.ruijie.com/support/caseportal
- Community: https://community.ruijie.com
- Email support: service_rj@ruijie.com
- Live chat: https://reyee.ruijie.com/en-global/rita

Conventions

1. Signs

The signs used in this document are described as follows:

Danger

An alert that contains important safety instructions. Before you work on any equipment, be aware of the hazards involved and be familiar with standard practices in case of accidents.

Warning

An alert that calls attention to important rules and information that if not understood or followed can result in data loss or equipment damage.

Caution

An alert that calls attention to essential information that if not understood or followed can result in function failure or performance degradation.

Note

An alert that contains additional or supplementary information that if not understood or followed will not lead to serious consequences.

Specification

An alert that contains a description of product or version support.

2. Note

This manual provides installation steps, troubleshooting, technical specifications, and usage guidelines for cables and connectors. It is intended for users who want to understand the above and have extensive experience in network deployment and management, and assume that users are familiar with related terms and concepts.

Contents

Preface I

1 Overview 1

1.1 About the RG-NBS3100-48GT4SFP-P-V2 1

1.2 Package Contents 1

1.3 Product Appearance 2

1.3.1 Front Panel 2

1.3.2 Rear Panel 4

1.4 Cooling 4

1.5 Technical Specifications 5

2 Preparing for Installation 8

2.1 Safety Guidelines 8

2.1.1 General Precautions 8

2.1.2 Chassis-Lifting Guidelines 8

2.1.3 Electricity Safety 8

2.1.4 Preventing ESD Damage 9

2.1.5 Laser Safety 10

2.2 Site Requirements 10

2.2.1 Floor Loading 10

2.2.2 Space 10

2.2.3 Temperature and Humidity 10

2.2.4 Cleanliness 11

2.2.5 Grounding 12

2.2.6 Surge Protection 12
2.2.7 EMI 13
2.2.8 Installation Site 13
2.3 Rack Requirements 13
2.4 Tools 14
3 Installing the Switch 15
3.1 Installation Procedure 15
3.2 Before You Begin 15
3.3 Precautions 16
3.4 Mounting a Switch 16
3.5 Connecting the Switch to Earth Ground 19
3.6 Connecting Cables 20
3.6.1 Precautions 20
3.6.2 Steps 20
3.7 Bundling Cables 21
3.7.1 Precautions 21
3.7.2 Bundling Steps 22
3.8 Verifying the Installation 22
4 Networking Configuration 23
4.1 Power-on 23
4.1.1 Checklist Before Power-on 23
4.1.2 Checklist After Power-on 23
4.2 Configuring the Switch through Web Login or QR Code Scanning 23
4.2.1 Configuring the Switch through Web Login 23

5 Common Troubleshooting 25
5.1 Troubleshooting Flowchart 25
5.2 Common Faults 25
6 Appendix 27
6.1 Interfaces, Interface Connectors, and Media 27
6.1.1 10/100/1000BASE-T Ports 27
6.1.2 SFP and SFP+ Ports 28
6.2 SFP and SFP+ Transceivers 28
6.2.1 SFP Transceivers 29
6.2.2 SFP+ Transceivers 31
6.3 Surge Protection 32
6.3.1 Installing AC Power Arrester (Power Strip with Surge Protection) 32
6.3.2 Installing the Ethernet Port Arrester 34
6.4 Cabling Recommendations 35
6.4.1 Requirement for the Minimum Bend Radius of Cables 35
6.4.2 Requirement for the Minimum Bend Radius of Optical Cables 36
6.4.3 Precautions for Cable Binding 36
6.5 Site Selection 39
6.6 Cleaning the Optical Cable Connector and End Face 39

1 Overview

1.1 About the RG-NBS3100-48GT4SFP-P-V2

The RG-NBS3100-48GT4SFP-P-V2 managed switch is tailored by Ruijie Reyee for small- and medium-sized enterprise customers. It can meet different network access requirements of the customers at different levels, including basic VLAN division and advanced security features such as ACLs. The switch can meet the PoE power supply requirements of wireless access points (APs), digital cameras, and other devices in various scenarios.

Table 1-1 Switch Specifications

Model	10/100/1000BASE-T Port	GE SFP Port	10GE SFP+ Port	Console Port	Power Unit	Fan
RG-NBS3100-48GT4SFP-P-V2	48 (support for PoE/PoE+)	4	/	/	Fixed power module	2 x fixed fan modules

1.2 Package Contents

Table 1-2 Package Contents

Item	Quantity
RG-NBS3100-48GT4SFP-P-V2 switch	1
Rack-mount bracket	2
Rubber pad	4
M4 x 8 mm cross recessed countersunk head screw	6
Power cord	1 x 1.5 m (4.92 ft.)
Power cord retention clip	1
Grounding cable	1 x 1 m (3.28 ft.)
User Manual	1
Warranty Card	1

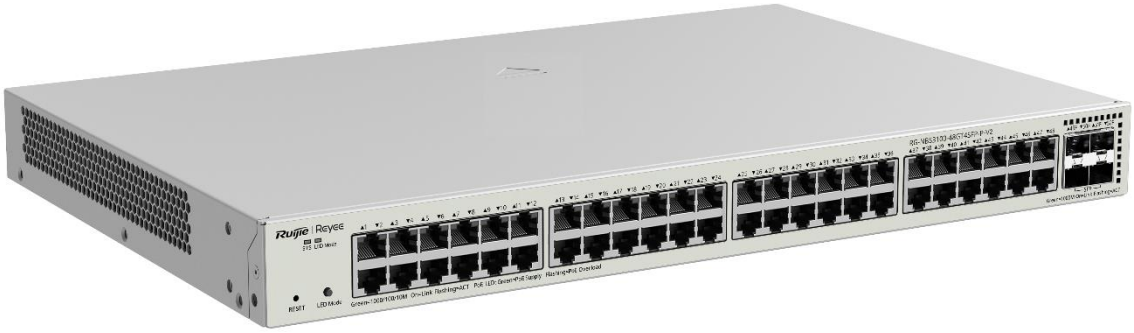
Note

The package contents are subject to the purchase contract, and actual delivery may vary. Please check the items carefully against the package contents or purchase contract. If you have any questions, please contact the distributor.

1.3 Product Appearance

The RG-NBS3100-48GT4SFP-P-V2 provides 48 x 10/100/1000BASE-T ports, 4 x SFP ports, 1 x Reset button, 1 x LED Mode button, 1 x SYS LED, and 1 x LED Mode LED on the front panel, and 1 x power input port, 1 x grounding stud, and 2 x power cord retention clip holes on the rear panel. The following figures show the product appearance.

Figure 1-1 Appearance



1.3.1 Front Panel

Figure 1-2 Front Panel

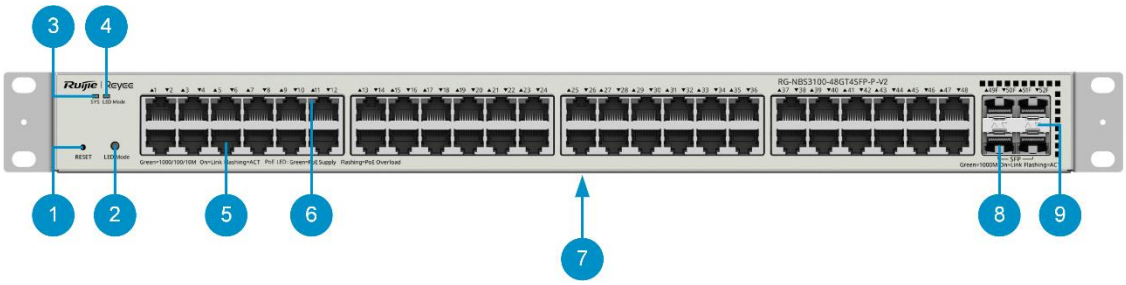


Table 1-3 Components on the Front Panel

No.	Item	Description
1	Reset button	● Press and hold the button for less than 2 seconds. Release the button to restart the system. ● Press and hold the button for more than 5 seconds. Release the button after the system LED starts blinking. Then, the web password is restored to the default value, and the system restores to factory

No.	Item	Description
		settings and restarts after the configuration file is saved. ● Press and hold the button for 2 to 5 seconds. The system is not responding.
2	LED Mode button	Press and hold the button for more than 3 seconds to switch the mode of the 10/100/1000BASE-T port status LEDs. The LED Mode LED status is described as follows: ● Off: The 10/100/1000BASE-T port status LEDs (indicated by No. 6 in the figure) show the Link/ACT status. ● Solid green: The 10/100/1000BASE-T port status LEDs (indicated by No. 6 in the figure) show the PoE status.
3	SYS status LED	● Off: The switch is not powered on. ● Fast blinking green (10 Hz): The system is starting or upgrading. ● Slow blinking green (0.5 Hz): The system is operating normally, but is not connected to Ruijie Cloud. ● Solid green: The system is operating normally, and is connected to Ruijie Cloud. ● Blinking yellow: The system has an alarm due to insufficient total PoE power. ● Blinking red: A system fault, switch loop, or PoE fault occurs.
4	LED Mode LED	● Off: The 10/100/1000BASE-T port status LEDs (indicated by No. 6 in the figure) show the Link/ACT status. ● Solid green: The 10/100/1000BASE-T port status LEDs (indicated by No. 6 in the figure) show the PoE status.
5	10/100/1000BASE-T ports	10/100/1000BASE-T ports with auto-negotiation, connected to Cat5e cables
6	10/100/1000BASE-T port status LEDs	● Link/ACT status: ○ Off: The port is not connected. ○ Solid green: The port is operating at 10 Mbps, 100 Mbps, or 1000 Mbps, but is not receiving or sending data. ○ Blinking green: The port is operating at 10 Mbps, 100 Mbps, or 1000 Mbps, and is receiving or sending data. ● PoE power status: ○ Off: PoE is disabled. ○ Solid green: PoE is enabled. ○ Blinking green: PoE overload occurs.
7	Nameplate	The nameplate is located at the bottom of the switch.
8	SFP ports	The ports can work with 1GE SFP transceivers and support hot swapping.
9	SFP port status LEDs	● Off: The port is not connected. ● Solid green: The port is operating at 1000 Mbps, but is not receiving or sending data. ● Blinking green: The port is operating at 1000 Mbps, and is receiving or sending data.

1.3.2 Rear Panel

Figure 1-3 Rear Panel

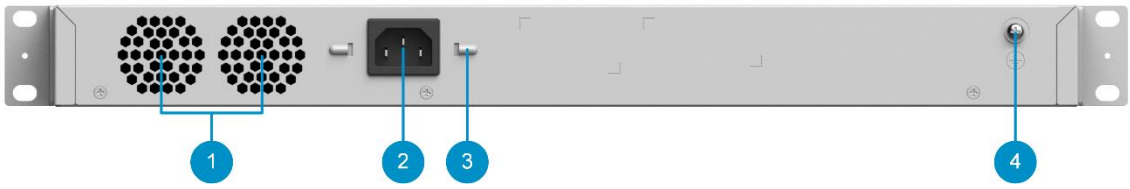


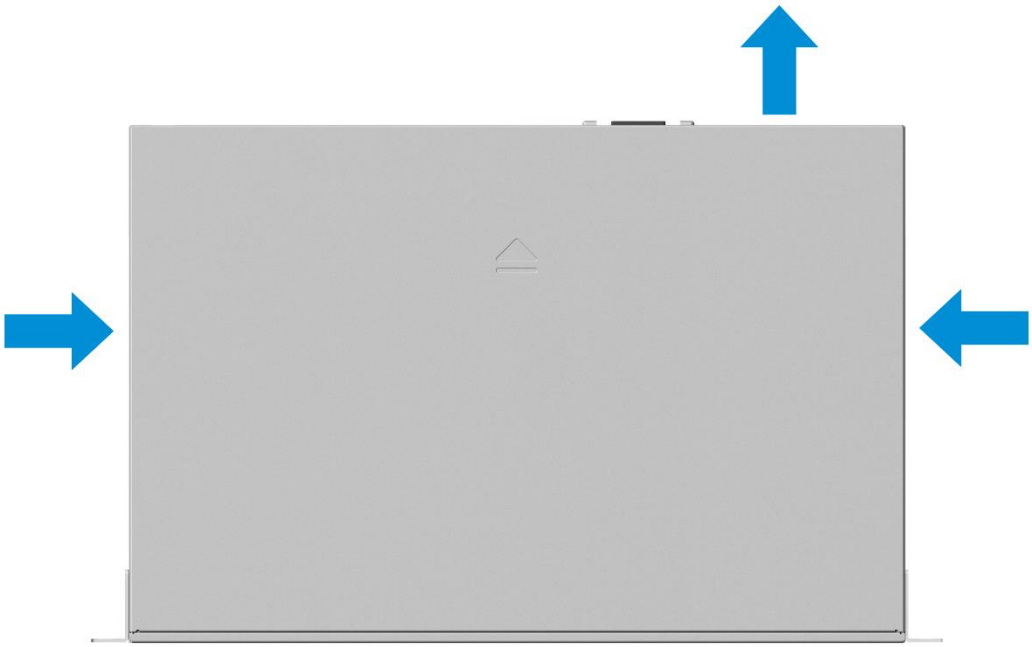
Table 1-4 Components on the Rear Panel

No.	Item	Description
1	Air exhaust	Used for air cooling.
2	Power input port	Connected to an external AC power supply.
3	Power cord retention clip hole	You can secure the power cord retention clip to the holes.
4	Grounding stud	You can secure the terminal of a grounding wire to the grounding stud to connect the chassis to earth ground.

1.4 Cooling

The RG-NBS3100-48GT4SFP-P-V2 switch adopts the side-to-rear airflow design to ensure that the switch works properly in the specified environment. Maintain sufficient clearance on both sides and at the rear panel of the chassis (according to the reserved values indicated in the specific installation section) for air circulation. Dust the switch every three months to avoid blocking the ventilation openings on the housing. The following figure shows the cooling.

Figure 1-4 Cooling



1.5 Technical Specifications

Warning

- Operation of this equipment in a residential environment could cause radio interference.
- This equipment is not suitable for use in locations where children are likely to be present.
- Double pole/neutral fusing. Risk of electric shock. The circuit breaker is on the neutral wire of the grid power supply. Cut off the grid power supply to disconnect each phase conductor.



Table 1-5 Technical Specifications

Parameter Type	Parameter Name	RG-NBS3100-48GT4SFP-P-V2
Product Information	Warranty	5 years
System Specifications	RAM	● V1.xx hardware version: 256 MB ● V2.xx hardware version: 128 MB
	Flash memory	● V1.xx hardware version: 256 MB ● V2.xx hardware version: 128 MB
Port Specifications	Total number of RJ45 ports	48

	Total number of optical ports	4
	Number of 1GE SFP ports	4
	Number of 10/100/1000BASE-T ports	48
	Ethernet cable type	CAT5e
	LEDs	1 x system status LED 48 x Ethernet port LEDs 4 x SFP port LEDs 1 x LED mode LED
	Supported Optical Transceiver and Cable Module Types	For details, see 6.2 SFP and SFP+ Transceivers. Copper cables are not supported.
Power Supply and Consumption	PoE Out standard	PoE/PoE+ (IEEE 802.3af/at)
	Number of PoE Out ports	48
	Number of PoE/PoE+ Out ports	48
	PoE power pins	1–2 (+), 3–6 (-)
	PoE budget per port	30 W
	PoE budget	370 W
	Power supply	Fixed power supply
	Power input	220 V AC power supply: Rated input voltage: 100 V AC to 240 V AC, 50/60 Hz Maximum input voltage: 90 V AC to 264 V AC, 47 Hz to 63 Hz Maximum input current: 6 A
	Power supply to external devices	The Ethernet interface provides a PoE budget of 54 V/30 W.
	Maximum power consumption	46 W (with no PoE load) 450 W (with full PoE load)
	EEE	Yes
Dimensions and Weight	Casing	Metal

	Product dimensions (W x D x H)	440 mm x 293 mm x 44 mm (17.32 in. x 11.54 in. x 1.73 in.)
	Weight	4.32 kg (9.52 lbs) (without packaging materials)
	Shipping weight	5.86 kg (12.92 lbs)
	Rack space	Rack requirement: 19-inch rack
Environment and Reliability	Fan	2 x fixed fan
	Cooling	Air cooling, side-to-rear airflow
	Mounting options	Rack
	MTBF	400,000 hours
	Operating temperature	0°C to +50°C (32°F to 122°F)
	Storage temperature	–40°C to +70°C (–40°F to +158°F)
	Operating humidity	10% RH to 90% RH (non-condensing)
	Storage humidity	5% RH to 95% RH (non-condensing)
	Altitude	Operating altitude: 0 m to +5,000 m (0 ft. to +16,404.20 ft.) Storage altitude: 0 m to +5,000 m (0 ft. to +16,404.20 ft.)
	Surge protection	Service port: ±6 kV for common mode Power connector: ±6 kV for both common mode and differential mode
Certification and Regulatory Compliance	Certification	CE, FCC

2 Preparing for Installation

2.1 Safety Guidelines

Note

- To avoid personal injury or equipment damage, review the safety guidelines in this chapter before you begin the installation.
- The following safety guidelines may not include all the potentially hazardous situations.

2.1.1 General Precautions

- Install the equipment in a standard 19-inch rack.
- Cut off all power supplies and unplug all cables before mounting the equipment in a rack or removing it from a rack.
- Never operate the equipment in a wet environment, and avoid any liquids inside it. Keep the chassis clean and dust-free.
- Keep the equipment away from heat sources.
- Ensure that the rack and power distribution system are properly grounded.
- Keep the equipment away from walk areas.
- During installation and maintenance, do not wear loose clothing or ornament that may get caught in the chassis.
- Keep tools and accessories away from walk areas.

2.1.2 Chassis-Lifting Guidelines

- Avoid moving the equipment frequently.
- Turn off all power supplies and disconnect all cables before lifting or moving the equipment.
- Keep balance and prevent personal injuries when lifting or moving the equipment.

2.1.3 Electricity Safety

Warning

- Any deviation from standard or improper electrical operations can result in accidents such as fires or electric shocks, potentially causing severe or even fatal harm to both individuals and equipment.
- Direct or indirect touch through a wet object on high-voltage and mains supply can bring a fatal danger.

- Always observe the local regulations and standards. Only qualified personnel should be allowed to operate the equipment.
- Carefully check the work area for potential hazards, including ungrounded power system, absent safety grounds, and damp floors.
- Locate the emergency power-off switch in the room before installation. In the case of an accident, cut off the

power supply immediately.

- Do not assume that the power supply is turned off. Never assume that power is disconnected from a circuit. Always check.
- Select the right leakage protector (also called “leakage current switch” or “leakage current breaker”) for the power supply system. This equipment automatically disconnects the power supply in the event of leakage and the risk of electric shock. A leakage protector should meet the following requirements:
  - The rated leakage action current of each leakage protector is greater than twice the theoretical maximum leakage current of all the power supplies in the system.

    For example, if a system is equipped with 16 identical power supplies, and the leakage current of each power supply is equal to or less than 3.5 mA, then the leakage current of the system totals 56 mA. A leakage protector with a rated leakage action current of 30 mA supports no more than four power supplies (that is, action current of the leakage protector/2/Maximum leakage current of each power supply = 30/2/3.5 ≈ 4.28). In this case, 16 power supplies in the system require at least four leakage protectors with a rated action current of 30 mA, with each leakage protector supporting four power supplies.

    Although the number of power supplies in a system differs in models, the rated leakage action current of each leakage protector divided by two must be greater than the sum of the maximum leakage current of all the power supplies.
  - The rated leakage non-action current of a leakage protector should be 50% of the leakage action current. If the non-action current value is too small, the high sensitivity level can cause the circuit to break, leading to power cutoff and service interruption, even if the leakage current value is normal.

    For example, if a leakage protector has a rated leakage action current of 30 mA, the rated leakage non-action current should be 15 mA. The leakage protector will not activate unless the leakage current exceeds 15 mA.

Caution

- To ensure personal safety, each leakage protector in the system must have a rated leakage action current equal to or below 30 mA, which is the recognized safety threshold for the human body current. If the total leakage current of the system exceeds twice the 30 mA limit, the system must be equipped with two or more leakage protectors to maintain safety.
- The leakage current values vary with equipment. For the leakage current value of each equipment model, see the technical specifications in 1.5 Technical Specifications.

2.1.4 Preventing ESD Damage

- Ensure that the grounding stud on the rear panel of the equipment is grounded.
- Ensure that the AC power socket is a single-phase three-core power socket with protective earthing conductors (PE).
- Keep the site as dust free as possible.
- Maintain appropriate humidity conditions.
- Before installing any pluggable modules, wear an anti-ESD wrist strap and make sure that it is properly grounded.

2.1.5 Laser Safety

The equipment with optical ports supports various types of optical transceivers, which are Class I laser products. Pay attention to the following:

- When an optical transceiver is working, ensure that its port is connected to an optical cable or covered by a dust cap to keep out dust and prevent it from burning your eyes.
- When an optical transceiver is working, do not stare into its port after removing the optical fiber. Otherwise, your eyes may be hurt.

Figure 2-1 Laser Product ID



Warning

Do not approach or stare into an optical port under any circumstances. This may cause permanent damage to your eyes.

2.2 Site Requirements

The equipment must be installed indoors for normal operation and prolonged service life. The installation site must meet the following requirements.

2.2.1 Floor Loading

Assess the combined weight of the equipment and its accessories, such as rack and cables, and verify that the floor under the rack can bear the weight.

2.2.2 Space

You are advised to have a pathway of at least 0.8 meters (2.62 ft.) wide in the equipment room. This space ensures that you can move the chassis and swap the modules easily.

Do not install the equipment against a wall. Instead, maintain a minimum clearance (as indicated in the installation section) around the equipment for heat dissipation and equipment maintenance.

2.2.3 Temperature and Humidity

To ensure normal operation and prolonged service life of the equipment, maintain appropriate temperature and humidity conditions in the equipment room. Prolonged exposure to inappropriate temperature and humidity conditions can cause damage to the equipment.

- In an environment with high relative humidity, insulating materials are prone to poor insulation or even

electricity leakage.

- In an environment with low relative humidity, insulating gaskets may shrink, resulting in screw loosening.
- In a dry environment, static electricity is more likely to occur, posing a risk to the internal circuits of equipment.
- A high temperature can accelerate the aging process of insulation materials, greatly reducing the availability of the equipment and severely affecting its service life.

Note

The operating temperature and humidity of the equipment are measured at the point that is 1.5 m (4.92 ft.) above the floor and 0.4 m (1.31 ft.) before the equipment when there is no protective plate in front or at the back of the equipment.

2.2.4 Cleanliness

Dust poses a significant hazard to the equipment. Dust on the enclosure causes electrostatic adhesion, leading to poor contact of the metallic joints. Electrostatic adhesion is more likely to occur in an indoor environment with relatively low humidity, not only affecting the service life of the equipment, but also causing communication faults. The following table lists the requirements for dust concentration and particle size in the equipment room.

Table 2-1 Requirements for Dust

Particle Diameter	Unit	Concentration
≥ 0.5 μm	Particles/m^3	≤ 3.5 x 10^6
≥ 5 μm	Particles/m^3	≤ 3 x 10^4

Apart from dust, there are also requirements on the salt, acid, and sulfide in the air of the equipment room. These harmful substances will accelerate metal corrosion and component aging. Therefore, the equipment room should be properly protected against harmful gases, such as sulfur dioxide, hydrogen sulfide, nitrogen dioxide, chlorine gas, and so on. The following table lists the limits on harmful gases.

Table 2-2 Requirements for Gases

Gas	Average (mg/m^3)	Maximum (mg/m^3)
Sulfur dioxide (SO_2)	0.3	1.0
Hydrogen sulfide (H_2S)	0.1	0.5
Nitrogen dioxide (NO_2)	0.5	1.0
Chlorine gas (Cl_2)	0.1	0.3

Note

Average refers to the average value of harmful gases measured in a week. **Maximum** refers to the upper limit of harmful gases measured in a week for up to 30 minutes every day.

2.2.5 Grounding

A proper grounding system is crucial for ensuring stable and reliable operation, as well as preventing lightning strikes and interference. Carefully check the grounding conditions at the installation site according to the grounding requirements, and complete grounding properly based on the site situation.

- **Safety Grounding**

  Ensure that the equipment is securely grounded using grounding wires if the equipment uses the AC power supply. Otherwise, electric shocks may occur when the insulation resistance between the power module and the chassis decreases.

  Caution

  - The building should provide a protective ground connection to ensure that the equipment is connected to a protective ground.
  - The O&M personnel should verify that the AC socket is reliably connected to the protective grounding system of the building. If not, the O&M personnel should use a protective grounding wire to connect the protective grounding lug of the AC socket to the protective grounding system of the building.
  - The power socket should be installed near the equipment and easily accessible.
  - During the installation, the ground connection must always be made first and disconnected last.
  - The cross-sectional area of the protective grounding cable should be at least 0.75 mm2 (18 AWG).
  - Install the equipment by using 3-core power cords, with a minimum cross-sectional area of 0.75 mm2 or 18 AWG per pin.

- **Lightning Grounding**

  The lightning protection system is an independent system composed of a lightning rod, a downlead conductor, and a connector connected to the grounding system. The grounding system is typically used for power reference grounding and safety grounding of the rack. Lightning grounding is required only for facilities and is not required for the equipment.

  Note

  For surge protection, see 6.3 Surge Protection.

- **EMC Grounding**

  Electromagnetic compatibility (EMC) grounding includes shielded grounding, filter grounding, noise and interference suppression, and level reference, which contribute to the overall grounding requirements. The grounding resistance should be smaller than 1 ohm. The RG-NBS3100-48GT4SFP-P-V2 switch provides one grounding stud on the back panel.

2.2.6 Surge Protection

- Ensure that the neutral point of the AC power socket is in good contact with the ground.
- Install a power arrester in front of the power input end to enhance surge protection for the power supply.
- When an AC power cord is introduced from outdoors and directly connected to the power port of the switch, the AC power port must be connected to an external power strip with surge protection to protect the switch against lightning strokes. Connect the mains AC power cord to the power strip with surge protection, and then connect the equipment to the power strip with surge protection. This prevents the current of high-voltage

lightning from directly passing through the switch along the mains cable.

Note

- Power strips with surge protection are customer-supplied.
- For details on how to use a power strip with surge protection, see the related user guide.

2.2.7 EMI

All interference sources, either from outside or inside of the equipment or application system, affect the equipment by capacitive coupling, inductive coupling, or electromagnetic waves. Electromagnetic interference (EMI) occurs due to radiated interference or conducted interference, depending on 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 occurs when interference is transferred from one unit to another unit through cables, which are usually electromagnetic wires or signal cables connected between the source and the sensor. Conducted interference often affects the power supply of the equipment, but can be controlled by a filter. Radiated interference may affect any signal path in the equipment, and is difficult to shield.

The requirements for the equipment anti-interference are as follows:

- Take interference prevention measures for the power supply system.
- Keep the switch away from the grounding system or surge protection grounding system of the power facility.
- Keep the equipment far away from high-frequency current equipment such as high-power radio transmitting stations and radar stations.
- Take electromagnetic shielding measures when necessary.

2.2.8 Installation Site

Regardless of whether the equipment is installed in a rack or on a workbench, ensure that the following conditions are met:

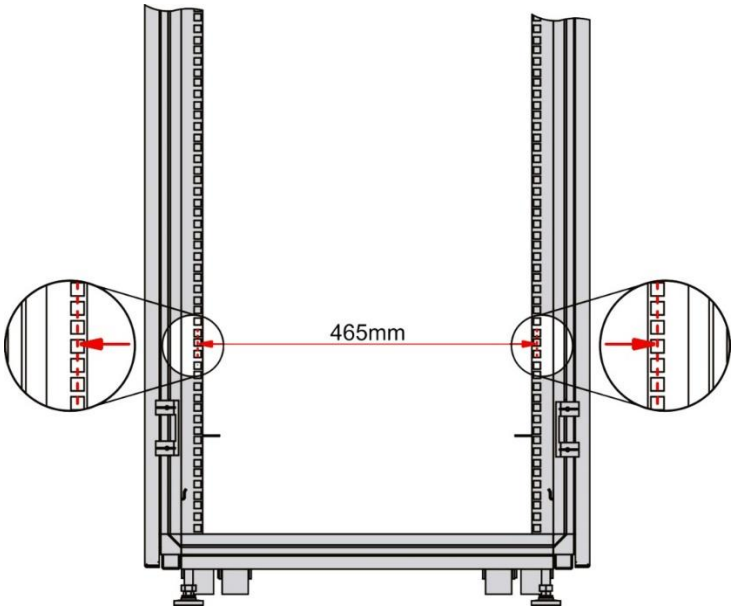
- Maintain a proper clearance around the air inlets and outlets for heat dissipation.
- The installation site has a good cooling and ventilation system.
- The installation site is sturdy enough to support the weight of the chassis and its components.
- The installation site is properly grounded.

2.3 Rack Requirements

The RG-NBS3100-48GT4SFP-P-V2 switch can be installed in a 19-inch EIA rack. If you want to install the equipment in a rack, make sure that the rack observes the following requirements:

- Use a four-post 19-inch cabinet.
- The left and right square-hole rack posts are 465 mm (18.31 in.) apart.

Figure 2-2 19-Inch Rack



- The square-hole rack post is at least 180 mm (7.09 in.) from the front door, and the front door is at most 25 mm (0.98 in.) thick. This ensures an available clearance of at least 155 mm (6.10 in.). The rack depth (distance between front and rear doors) is at least 1000 mm (39.37 in.).
- The guide rails or tray can bear the weight of the equipment and its accessories.
- The rack has a reliable grounding lug for the chassis to connect to earth ground.
- The rack has a reliable ventilation system. The open area of front and rear doors is greater than 50%.

2.4 Tools

Table 2-3 Tools

Common Tools	Phillips screwdriver, flat-blade screwdriver, cables, Ethernet cables, four M6 screws and their cage nuts (for cabinet installation), diagonal pliers, cable ties, SC-SC optical fibers
Dedicated Tools	Anti-ESD glove, wire stripper, crimper, RJ45 connector crimping plier, and wire cutter
Meters	Multimeter
Relevant Equipment	PC, display, and keyboard

Note

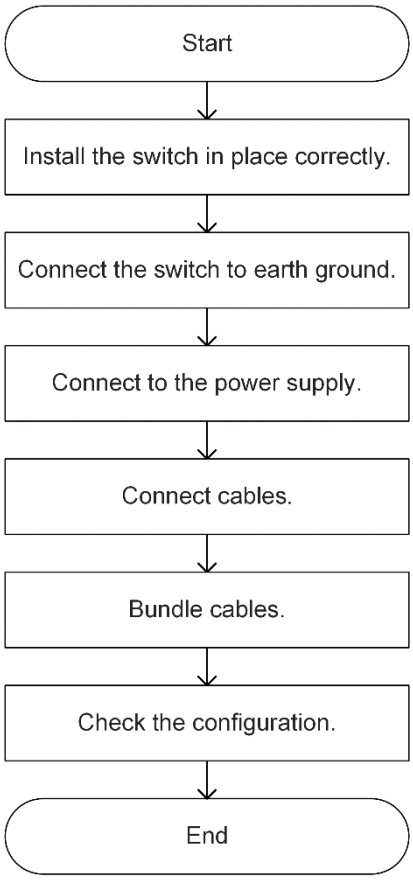
The equipment is delivered without a toolkit. Prepare the preceding tools by yourself.

3 Installing the Switch

Caution

Before installing the equipment, ensure that guidelines and requirements in Chapter 2 have been met.

3.1 Installation Procedure



3.2 Before You Begin

- The installation site provides sufficient space for heat dissipation.
- The installation site meets the temperature and humidity requirements.
- The power supply is available at the installation site, and its current meets the requirements.
- The Ethernet cables have been deployed at the installation site.
- The power supply meets the requirements.
- Locate the emergency power-off switch in the room before installation. In the case of an accident, cut off the power supply immediately.

3.3 Precautions

During installation, pay attention to the following:

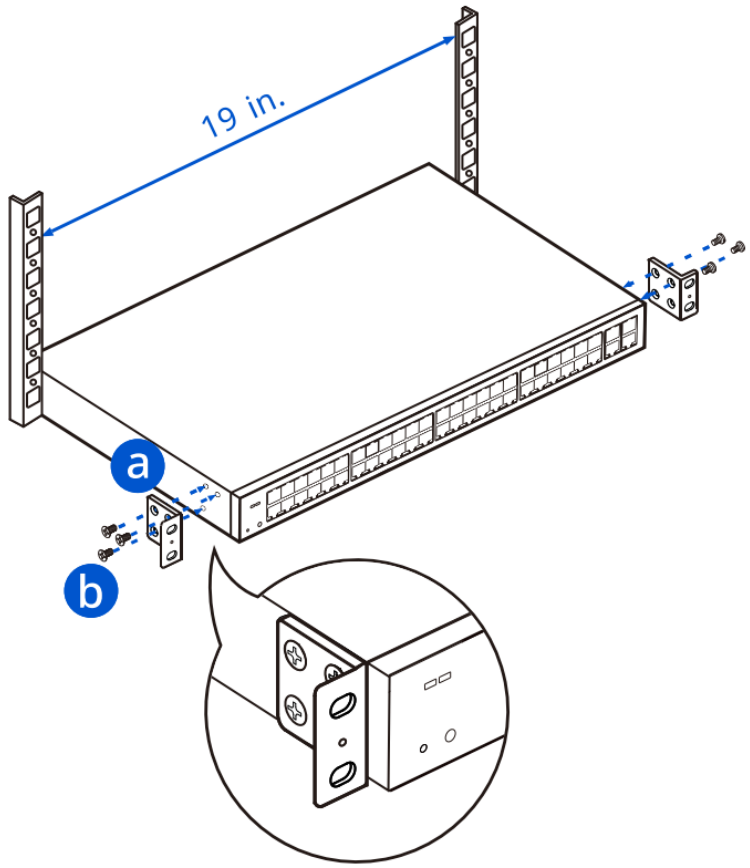
- Connect the power cords of different colors to the corresponding cable terminals.
- Ensure that the connector of the power cord is properly seated in the power port of the equipment. After plugging the power cord into the equipment, secure the power cord with a power cord retention clip.
- Do not place anything on the RG-NBS3100-48GT4SFP-P-V2 switch.
- Maintain sufficient clearance (as indicated in the installation section) around the equipment to ensure proper airflow. Do not stack switches.
- Keep the RG-NBS3100-48GT4SFP-P-V2 switch away from high-power radio transmitting stations, radar stations, and high-frequency large-current devices. Take electromagnetic shielding measures to minimize interference when necessary, for example, use shielded interface cables.
- Route Ethernet cables with a distance of 100 meters (328.08 ft.) indoors. Take surge protection measures if they need to be routed outdoors.
- Route optical fibers indoors. Take protection measures to ensure that optical fibers are not damaged when they are routed outdoors.

3.4 Mounting a Switch

The RG-NBS3100-48GT4SFP-P-V2 switch can be installed in a 19-inch rack. Take the following installation steps:

(1) Take out six M4 x 8 mm cross recessed countersunk head screws (provided with the rack-mount brackets). Secure one end of each rack-mount bracket to the switch using the screws, as shown in Figure 3-1.

Figure 3-1 Securing Rack-Mount Brackets



(2) Horizontally mount the switch to an appropriate position inside the rack, and use M6 screws and cage nuts to secure the other end of the rack-mount brackets to square holes of the rack.

Figure 3-2 Securing Rack-Mount Brackets to the Rack (1)

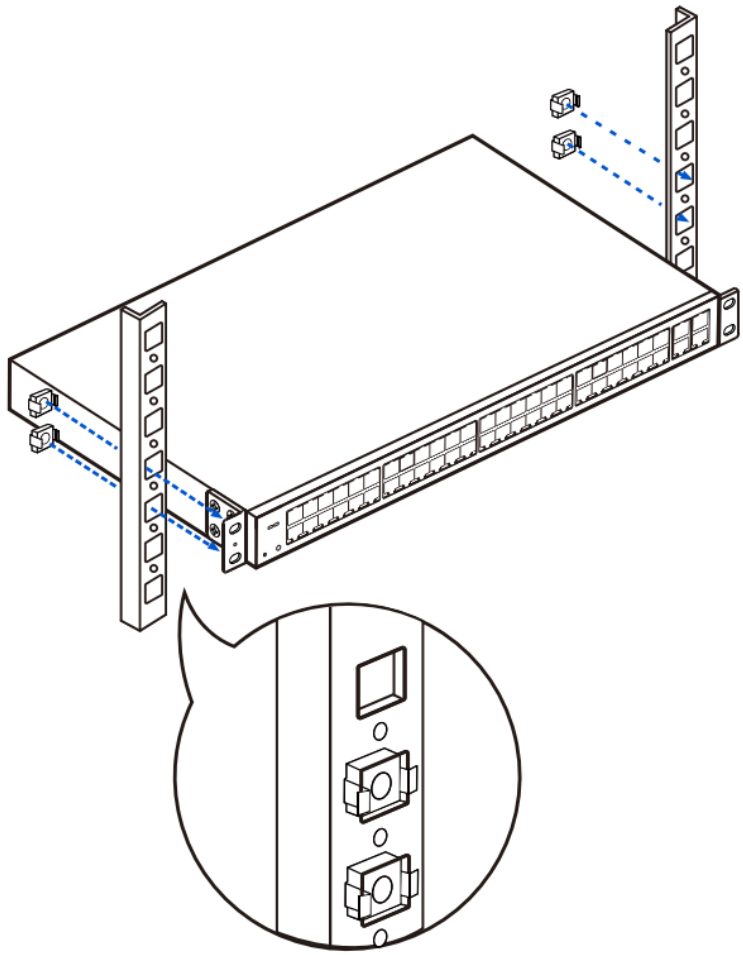
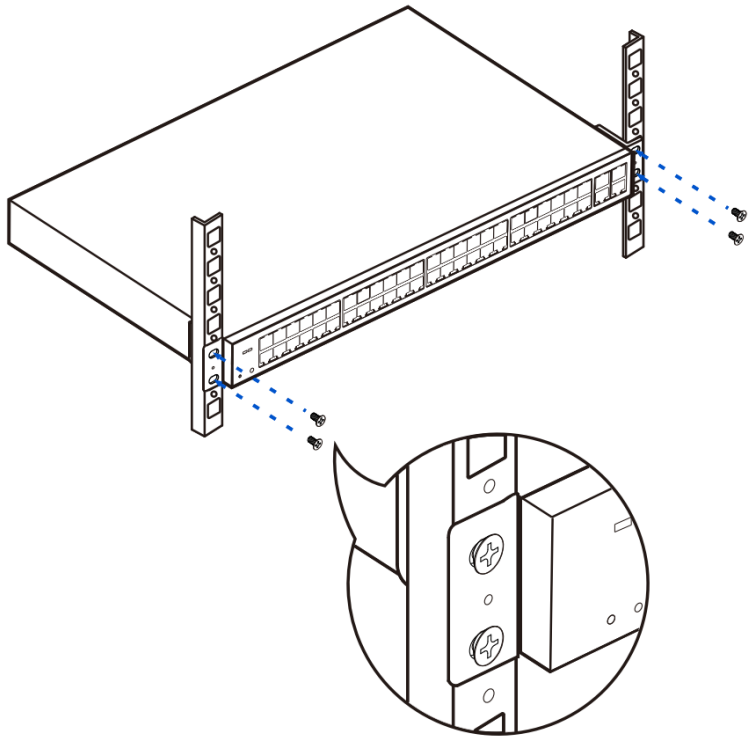


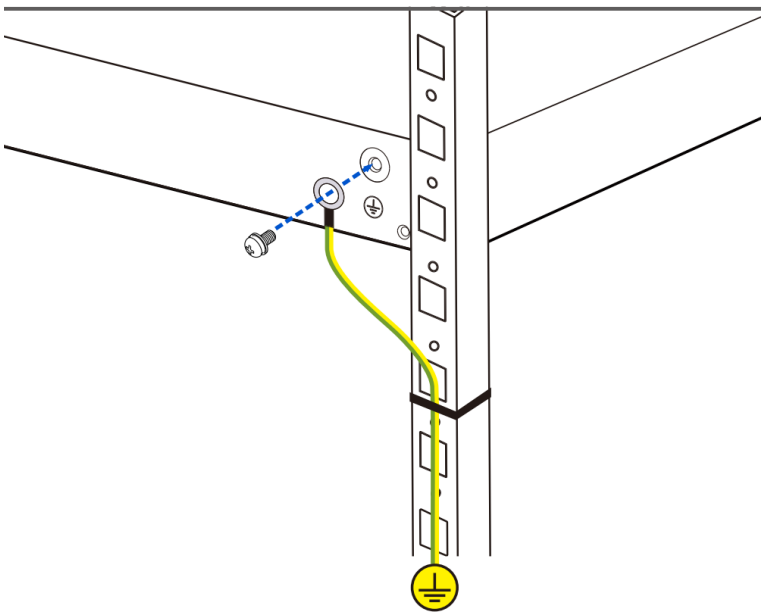
Figure 3-3 Securing Rack-Mount Brackets to the Rack (2)



3.5 Connecting the Switch to Earth Ground

The switch has a grounding point on the rear panel. Connect the grounding point to the grounding lug of the rack and then connect the grounding lug of the rack to the grounding bar of the equipment room.

Figure 3-4 Grounding Installation



- The sectional area of a grounding wire should be determined according to the possible maximum current.

- Grounding wires with good conductors should be used.
- Do not use bare wire.
- The resistance between the chassis and ground should be less than 1 ohm.

3.6 Connecting Cables

3.6.1 Precautions

- Make sure that the models of optical transceivers and optical cables match with SFP ports. The transmitting port on the local device should be connected to the receiving port on the peer device and vice versa.
- Avoid a small bend radius at the connector.

3.6.2 Steps

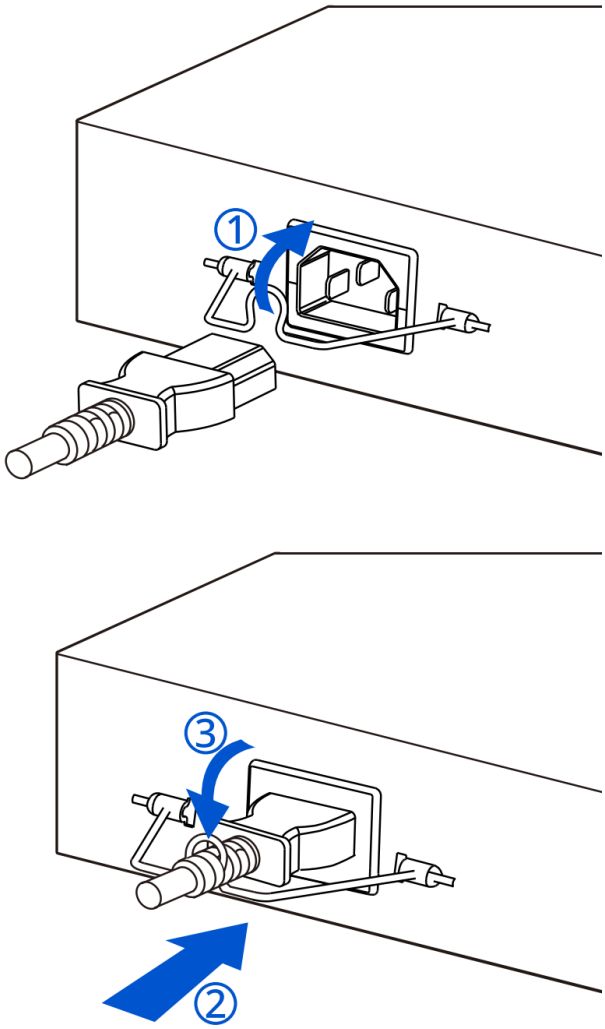
- Connect the power cord.

  Insert the power cord retention clip into the power cord retention clip holes, place the power cord retention clip upward, insert the power cord, and then place the power cord retention clip downward to secure the power cord.

  Warning

  Use the delivered power cords. Otherwise, security accidents may occur.

Figure 3-5 Connecting the Power Cord



- Connect cables.
  a Connect the RJ45 connector of a twisted pair cable to the Ethernet port on the switch, and the other end to a managed device or PC.
  a Plug the SMF and MMF optical fibers into the corresponding ports according to the panel identification, and distinguish the transmitting and receiving ends of the optical fibers.

3.7 Bundling Cables

3.7.1 Precautions

- Bundle the power cord and other cables in an esthetically pleasing way.
- Make sure that the fibers at the connectors have natural bends or bends of large radius.
- Do not bind fibers and twisted pair cables too tightly, as this may press the fibers and affect their service life and transmission performance.

3.7.2 Bundling Steps

(1) Bind the drooping part of the optical cables and twisted pairs, and lead them to both sides of the chassis for convenience.

(2) On both sides of the chassis, fasten the optical fibers and twisted pair cables to the cable management ring or cabling chute.

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

3.8 Verifying the Installation

- Verify that the grounding wire is connected.
- Verify that the cables including power cords are properly connected.
- Check whether the cables with a distance of 100 meters (328.08 ft.) are routed indoors. If not, check whether the power strip with surge protection, Ethernet surge protector, and others are installed for the AC power supply.
- Verify that there is sufficient clearance around the equipment (as indicated in the installation section) to ensure proper airflow.

4 Networking Configuration

4.1 Power-on

4.1.1 Checklist Before Power-on

- The equipment is properly grounded.
- The power cord is reliably connected.
- The input voltage meets the requirement.
- The network port of the PC is properly connected to the console port of the switch.

4.1.2 Checklist After Power-on

- The LED status is normal.
- Service ports can forward data properly.

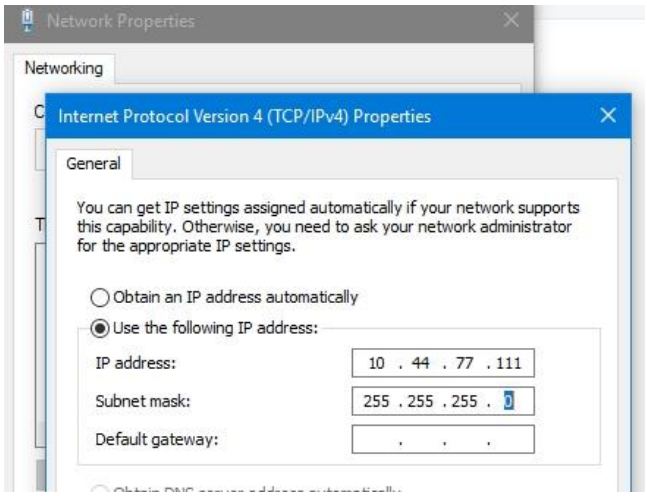
4.2 Configuring the Switch through Web Login or QR Code Scanning

4.2.1 Configuring the Switch through Web Login

(1) Connect a PC to an Ethernet port on the switch through an Ethernet cable.

(2) Set the IP address of the PC to 10.44.77.XXX (1 to 254, excluding 200).

Figure 4-1 Modifying the PC's IP Address



(3) Open a browser, and enter 10.44.77.200 in the address bar to log in to the configuration system. The default password is admin.

(4) Perform device commissioning and configuration based on service requirements.

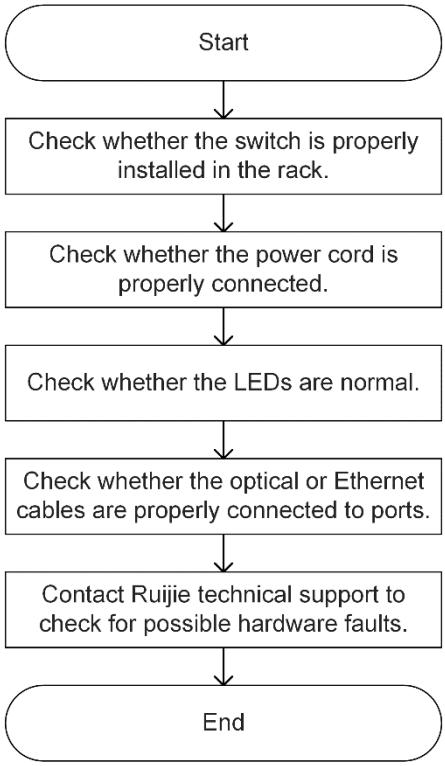
Caution

For security purposes, change the password after login.

5 Common Troubleshooting

5.1 Troubleshooting Flowchart

Figure 5-1 Troubleshooting Flowchart



5.2 Common Faults

Table 5-1 Common Faults and Troubleshooting

Fault Symptom	Possible Cause	Solution
The login password cannot be retrieved.	The login password is forgotten after being configured.	Press and hold the Reset button for over five seconds to reset your username and password.
The SYS LED is off after the switch is powered on.	No power is supplied to the switch or the power cord is loose.	Check whether the power socket in the equipment room is normal and whether the power cord connected to the switch is loose.
An RJ45 port is disconnected or a frame	● The twisted pair cable is not connected properly. ● The cable length exceeds 100 m (328.08 ft.). ● The port is specially configured	● Replace the twisted pair cable. ● Use optical cables or connect to an intermediate switch for relay. ● Make sure that the port works in the same mode as the interconnected

Fault Symptom	Possible Cause	Solution
sending/receiving error occurs.	and does not use the same work mode as the interconnected switch.	switch.
An optical port cannot be connected.	● The transmit and received ends are connected incorrectly. ● The types of the interconnected optical transceivers do not match. ● The optical fiber type does not meet requirements. ● The optical fiber length is beyond the allowed length marked on the optical transceiver. ● The optical cable or connector is contaminated.	● Exchange the transmit and received ends of the optical cable. ● Replace the optical transceiver with another one of the same type. ● Replace the optical fiber with a qualified one. ● Use an optical fiber with the required length. ● Clean the connector with a lint-free cloth or a cleaning pen. For details, see Appendix.

6 Appendix

6.1 Interfaces, Interface Connectors, and Media

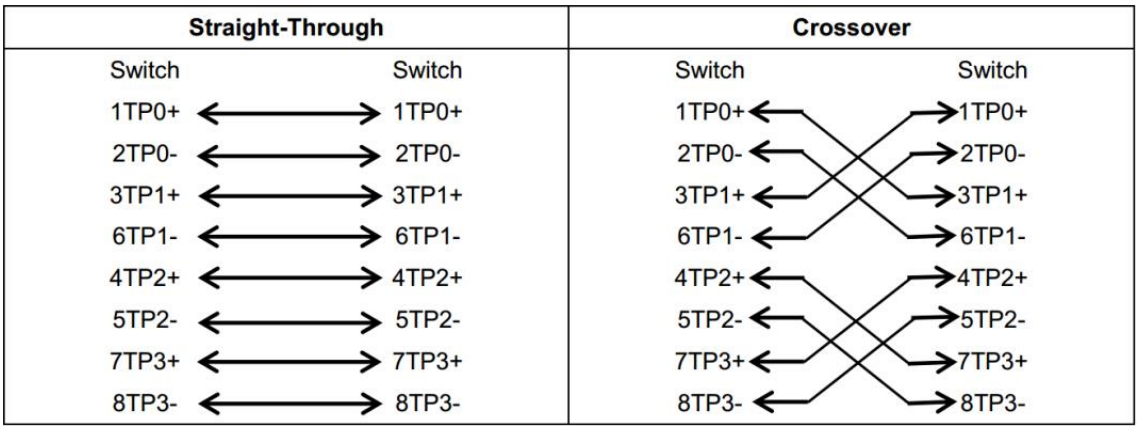
6.1.1 10/100/1000BASE-T Ports

The 10/100/1000BASE-T port supports auto-negotiable 10/100/1000 Mbps and automatic MDI/MDIX crossover. It can be connected to an RJ45 connector.

Compliant with IEEE 802.3ab, 1000BASE-T requires 100-ohm Category 5 or Category 5e UTP or STP (STP is recommended) with a maximum distance of 100 meters (328.08 ft.).

The 1000BASE-T port requires that all four pairs of wires be connected for data transmission. Figure 6-1 shows twisted pair connections for the 1000BASE-T port.

Figure 6-1 1000BASE-T Twisted Pair Connections



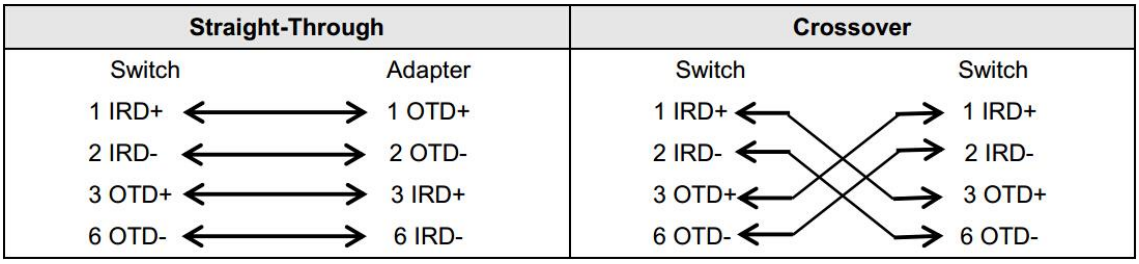
The 10/100BASE-T port can also be connected by cables of the preceding specifications. Besides, the 10BASE-T port can be connected by 100-ohm Category 3, Category 4, and Category 5 cables with a maximum distance of 100 meters (328.08 ft.). The 100BASE-TX port can be connected by 100-ohm Category 5 cables with a maximum distance of 100 meters (328.08 ft.). Table 6-1 lists pin assignments for the 10/100BASE-T port.

Table 6-1 10/100BASE-T 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 6-2 shows feasible connections of the straight-through and crossover twisted pairs for a 10/100BASE-T port.

Figure 6-2 10/100BASE-T Twisted Pair Connections



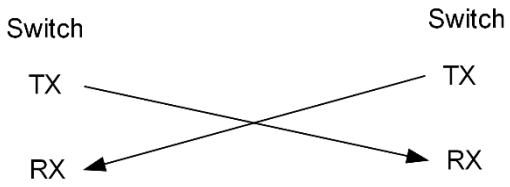
6.1.2 SFP and SFP+ Ports

Optical transceivers or copper transceivers need to be inserted into the SFP and SFP+ ports.

- Optical transceivers inserted into SFP and SFP+ use LC connectors and are connected to the peer end through optical cables.
- Copper transceivers inserted into the SFP ports use RJ45 connectors and are connected to the peer end through an Ethernet cable.

Select single-mode fibers (SMFs) or multimode fibers (MMFs) for connections according to the types of the optical transceivers connected. Figure 6-3 shows the connections. The local TX end must be connected to the remote RX end, and the local RX end must be connected to the remote TX end.

Figure 6-3 Connecting the Optical Cables



6.2 SFP and SFP+ Transceivers

We provide SFP and SFP+ transceivers based on port types, allowing you to choose the one that best suits your needs.

SFP transceivers are 1GE modules (support for optical transceivers). SFP+ transceivers are 10GE modules. The following models and technical specifications of some SFP and SFP+ transceivers are listed for your reference. For details about technical specifications, see the *Ruijie Transceiver Installation and Reference Guide*.

6.2.1 SFP Transceivers

Table 6-2 1GE Mini-GBIC (SFP) Models and Technical Specifications

Model	Wavelength (nm)	Optical Fiber Type	DDM Supported (Yes/No)	Transmit Power (dBm)		Receive Power (dBm)	
				Min	Max	Min	Max
MINI-GBIC-SX-MM850	850	MMF	No	-9.5	-3	-17	0
MINI-GBIC-LX-SM1310	1310	SMF	No	-9.5	-3	-20	-3
MINI-GBIC-LH40-SM1310	1310	SMF	Yes	-2	3	-22	-3
GE-SFP-LX20-SM1310-BIDI	1310TX/1550RX	SMF	Yes	-9	-3	-20	-3
GE-SFP-LX20-SM1550-BIDI	1550TX/1310RX	SMF	Yes	-9	-3	-20	-3
GE-SFP-LH40-SM1310-BIDI	1310TX/1550RX	SMF	Yes	-5	0	-24	-1
GE-SFP-LH40-SM1550-BIDI	1550TX/1310RX	SMF	Yes	-5	0	-24	-1
MINI-GBIC-ZX80-SM1550	1550	SMF	Yes	0	4.7	-22	-3
NIS-GE-SFP-10KM-SM1310	1310	SMF	Yes	–9.5	–3	–20	–3
NIS-GE-SFP-20KM-SM1310-BIDI	1310TX/1550RX	SMF	Yes	–9	–3	–22	–3
NIS-GE-SFP-20KM-SM1550-BIDI	1550TX/1310RX	SMF	Yes	–9	–3	–22	–3
NIS-GE-SFP-550M-MM850	850	MMF	Yes	–9.5	–3	–17	0

Table 6-3 Cabling Specifications of SFP Transceivers

Model	Interface Type	Optical Fiber Type	Core Size (μm)	Max Cabling Distance
MINI-GBIC-SX-MM850	LC	MMF	62.5/125	275 m (902.23 ft.)
			50/125	550 m (1804.46 in.)
MINI-GBIC-LX-SM1310	LC	SMF	9/125	10 km (6.21 miles)
MINI-GBIC-LH40-SM1310	LC	SMF	9/125	40 km (24.85 miles)
GE-SFP-LX20-SM1310-BIDI	LC	SMF	9/125	20 km (12.43 miles)
GE-SFP-LX20-SM1550-BIDI	LC	SMF	9/125	20 km (12.43 miles)
GE-SFP-LH40-SM1310-BIDI	LC	SMF	9/125	40 km (24.85 miles)
GE-SFP-LH40-SM1550-BIDI	LC	SMF	9/125	40 km (24.85 miles)
MINI-GBIC-ZX80-SM1550	LC	SMF	9/125	80 km (49.71 miles)

Note

- For optical transceivers with a cabling distance of no less than 40 km (24.85 miles), install an optical attenuator to avoid overload when using short-distance SMFs.
- An optical transceiver is a laser transmitter. Do not look into the light source to prevent it from burning your eyes.
- To keep the optical transceiver clean, make sure that the unused ports remain capped.

Table 6-4 Pairing Description of the BIDI Optical Transceiver

Rate/Distance	Pairing Model
GE/20 km (12.43 miles)	GE-SFP-LX20-SM1310-BIDI and GE-SFP-LX20-SM1550-BIDI NIS-GE-SFP-20KM-SM1310-BIDI and NIS-GE-SFP-20KM-SM1550-BIDI
GE/40 km (24.85 miles)	GE-SFP-LH40-SM1310-BIDI and GE-SFP-LH40-SM1550-BIDI

Caution

BIDI optical transceivers must be used in pairs. If GE-SFP-LX20-SM1310-BIDI is used at one end, GE-SFP-LX20-SM1550-BIDI then must be used at the other end.

6.2.2 SFP+ Transceivers

Current models of 10GE SFP+ optical transceivers:

Table 6-5 Models and Technical Specifications of 10GE SFP+ Transceivers

Model	Wavelength (nm)	DDM Supported (Yes/No)	Optical Fiber Type	Transmit Power (dBm)		Receive Power (dBm)	
				Min	Max	Min	Max
XG-SFP-SR-MM850	850	Yes	MMF	-7.3	-1	-9.9	-1
SFP+MM850	850	Yes	MMF	-7.3	-1	-9.9	-1
XG-SFP-LR-SM1310	1310	Yes	SMF	-8.2	0.5	-14.4	0.5
XG-SFP-ER-SM1550	1550	Yes	SMF	-4.7	4	-11.3	-1
XG-SFP-ZR-SM1550	1550	Yes	SMF	0	4	-24	-7

Table 6-6 10GE SFP+ Active Optical Cables

Model	Type	Connector Type	Copper Cable Length (m)	Conductor Diameter (AWG)	Data Speed (Gbps)	DDM Supported (Yes/No)
XG-SFP-AOC1M	Active	SFP+	1	\	10.3125	Yes
XG-SFP-AOC3M	Active	SFP+	3	\	10.3125	Yes
XG-SFP-AOC5M	Active	SFP+	5	\	10.3125	Yes
XG-SFP-AOC10M	Active	SFP+	10	\	10.3125	Yes

Note

- SFP+ transceiver types are subject to change without prior notice. For more accurate information about the optical transceivers, contact the Ruijie marketing or technical support personnel.
- In the DDM function of the AOC cable, the transmit power may be displayed as N/A.

Table 6-7 Cabling Specifications of SFP+ Transceivers

Model	Interface Type	Optical Fiber Type	Core Size (μm)	Modal Bandwidth (MHz·km)	Max Cabling Distance
XG-SFP-SR-MM850	LC	MMF	50/125	2000 (OM3)	300 m (984.25 ft.)
SFP+MM850	LC	MMF	50/125	2000 (OM3)	300 m (984.25 ft.)
XG-SFP-LR-SM1310	LC	SMF	9/125	N/A	10 km (6.21 miles)
XG-SFP-ER-SM1550	LC	SMF	9/125	N/A	40 km (24.85 miles)
XG-SFP-ZR-SM1550	LC	SMF	9/125	N/A	80 km (49.71 miles)

6.3 Surge Protection

6.3.1 Installing AC Power Arrester (Power Strip with Surge Protection)

When an AC power cord is introduced from outdoors and directly connected to the power port of the equipment, the AC power port must be connected to an external power strip with surge protection to protect the equipment against lightning strokes. The power strip with surge protection can be fixed on the rack, workbench, or wall in the equipment room by using cable ties and screws. AC power enters the power strip with surge protection and then enters the equipment.

Figure 6-4 Power Arrester

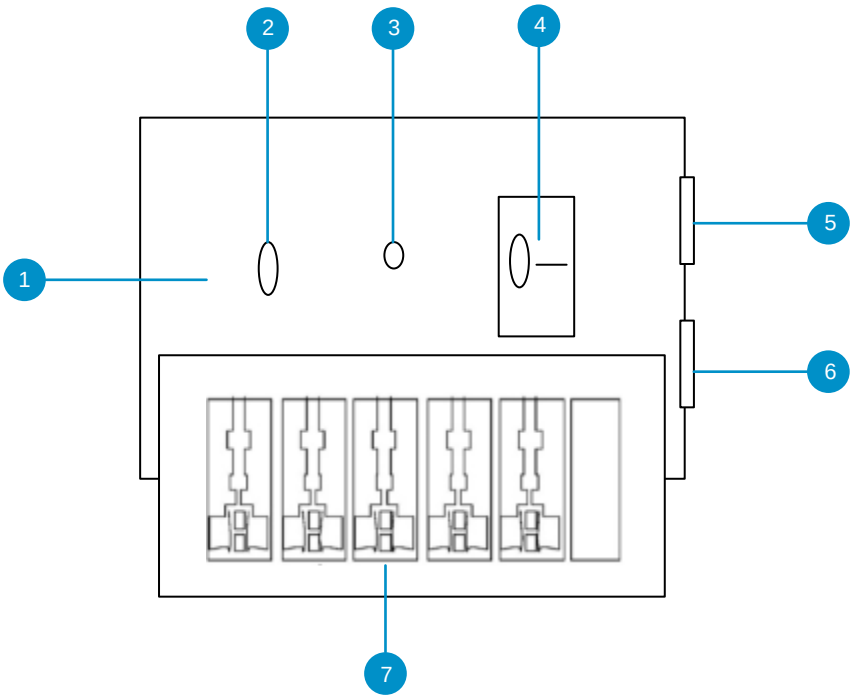


Table 6-8 Power Arrester

No.	Feature
1	Electronic circuit board (internal)
2	Normal operation LED. When the LED is green, the circuit is working properly. Otherwise, the protective circuit is damaged.
3	Grounding and polarity detection LED. If the LED is red, the cable connection is incorrect (the ground cable is not connected, or the N and L lines are reversely connected). Check your power supply lines.
4	Power switch.
5	IEC standard socket, which is connected to the power supply in the equipment room through a power cord.
6	Overload protector, which can be reset manually.
7	Multi-purpose socket (connected to the power supply of the equipment)

Caution

The power arrester is not delivered with the equipment. Please purchase it based on actual requirements.

Precautions during the installation:

- Make sure 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 (power strip with surge

protection), surge protection is implemented only if the running status LED is green and the alarm LED is off.

- If the alarm LED on the power arrester is red, check whether it is caused by a poor grounding connection or by the reversed connection of the neutral and live wires. The detection method is as follows: Use a multimeter to measure the polarity of the power socket for the arrester when the LED is red. If the neutral wire is on the left and the live wire is on the right (facing the socket), the arrester's PE terminal is not grounded. If not, the polarity of the arrester should be reversed. In this case, open the lightning arrester and rectify the polarity of the connection. If the LED is still red, the arrester's PE terminal is not grounded.

6.3.2 Installing the Ethernet Port Arrester

Please connect an Ethernet port arrester to the equipment to prevent the damage by lightning before connecting an outdoor Ethernet cable to the equipment.

Tools: Phillips screwdriver or flat-blade 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 enclosure of the Ethernet port arrester.

(2) Tear the other side of the protective paper for the double-sided adhesive tape and paste the Ethernet port arrester to the equipment enclosure as close to the grounding lug of the equipment as possible.

(3) According to the distance between the equipment grounding lug and the Ethernet port arrester, cut the grounding cable for the Ethernet port arrester and firmly crimp the grounding cable to the grounding lug of the equipment.

(4) Use a multimeter to check whether the grounding cable for the arrester is in good contact with the grounding lug and the enclosure of the equipment.

(5) Connect the arrester using an adapter cable (note that the external Ethernet cable is connected to the IN end, while the OUT end is connected to the adapter cable) and check whether the module LED is normal.

(6) Use a nylon cable tie to bind the cables.

Figure 6-5 Installing an Ethernet Port Arrester

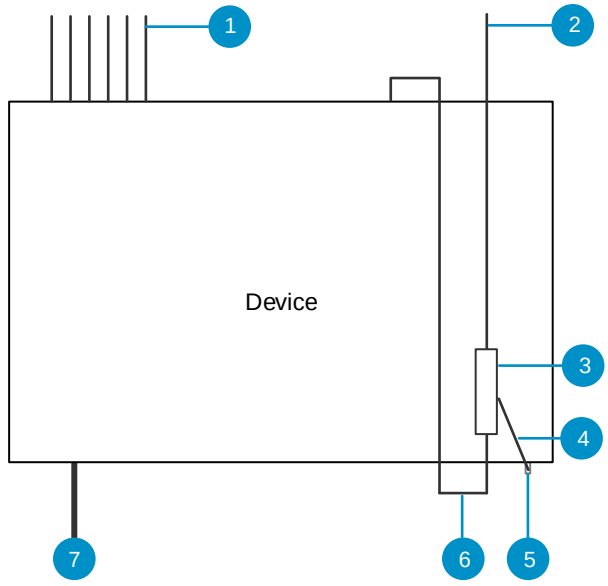


Table 6-9 Installing an Ethernet Port Arrester

No.	Description
1	Ethernet cable for indoor connection
2	Ethernet cable for outdoor connection
3	RJ45 Ethernet port arrester (pasted on the switch enclosure)
4	Grounding cable of the arrester
5	Grounding stud of the equipment
6	Adapter cable for the RJ45 Ethernet port
7	Power input

Caution

- The Ethernet port arrester applies only to Ethernet ports with an RJ45 connector.
- The Ethernet port arrester is not delivered with the equipment. Please purchase it based on actual requirements. The user manual for Ethernet port arresters contains technical parameters and maintenance and installation instructions. Carefully read this manual during installation.

Pay attention to the following situations during the actual installation to avoid influencing the performance of an Ethernet port arrester:

- The arrester is incorrectly connected to the cables. Connect the external Ethernet cable to the IN end and connect the Ethernet port of the equipment to the OUT end.
- The arrester is incorrectly grounded. The grounding cable of the arrester should be as short as possible to ensure that it is in good contact with the grounding lug of the equipment. Use a multimeter to confirm the contact condition after grounding.
- Not all Ethernet ports are installed with arresters. If more than one Ethernet port on the switch is connected to the peer equipment, arresters need to be installed on all the ports for surge protection.

6.4 Cabling Recommendations

When the switch is installed in a standard 19-inch rack, cables are routed upward or downward along the sides of the cable management bracket according to the actual situation in the equipment room. All adapted connectors should be placed at the bottom of the rack in an orderly manner instead of outside the rack that is easy to touch. Power cords are routed beside the rack. Top cabling 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 lightning protection box.

6.4.1 Requirement for the Minimum Bend Radius of Cables

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

- The bend radius of a fixed common coaxial cable should be over seven times greater than its external diameter. The bend radius of these cables that are often bent or plugged should be over 10 times greater than their respective external diameters.
- The minimum bend radius of a high-speed cable, such as an SFP+ cable, should be over five times greater than its external diameter. The bend radius of these cables that are often bent or plugged should be over 10 times greater than their respective external diameters.

6.4.2 Requirement for the Minimum Bend Radius of Optical Cables

- The diameter of the optical cable tray should be over 25 times greater than that of the optical cable.
- When an optical cable is moved, the bend radius of the optical cable should be over 20 times greater than the diameter of the optical cable.
- During cabling of an optical cable, its bend radius should be over 10 times greater than its diameter.

6.4.3 Precautions for Cable Binding

- Before cables are bundled, mark labels and stick the labels to cables wherever appropriate.
- Cables should be neatly and properly bundled in the rack without twisting or bending, as shown in Figure 6-6.

Figure 6-6 Bundling Cables (1)

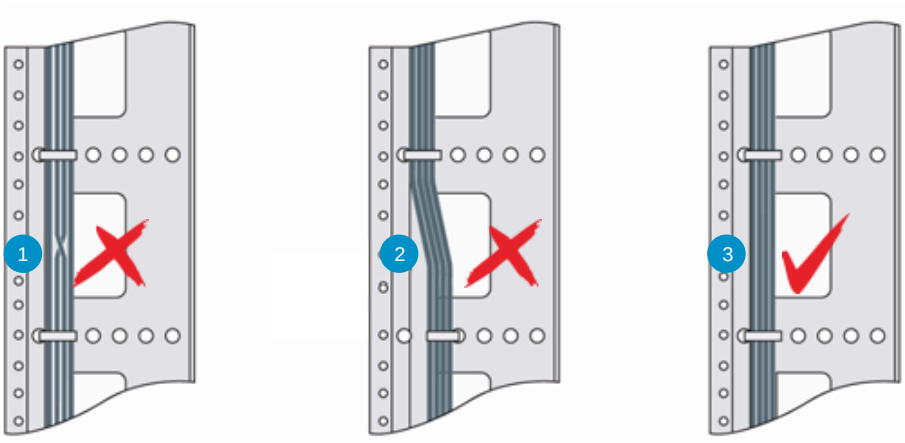


Table 6-10 Cable Bundling

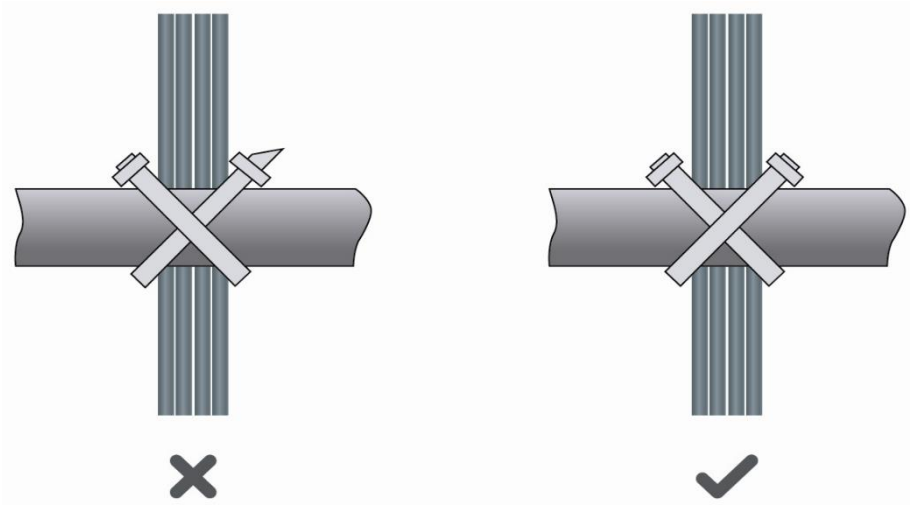
No.	Description
1	Cables should not be twisted after being bundled in the rack.
2	Cables should not be bent after being bundled in the rack.
3	Cables should be neatly and properly bundled in the rack.

- Cables of different types (such as power cords, signal cables, and grounding cables) should be separated in cabling and bundling. Mixed bundling is disallowed. When they are close to each other, you are advised to adopt crossover cabling. In the case of parallel cabling, maintain a minimum distance of 30 mm (1.18 in.)

between power cords and signal cables.

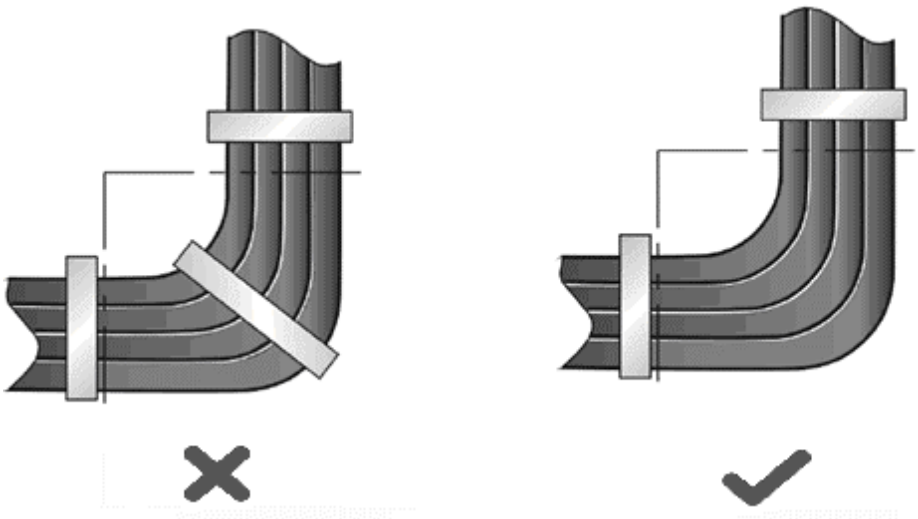
- The cable management brackets and cabling troughs inside and outside the rack should be smooth without sharp corners.
- The metal holes traversed by cables should have a smooth and fully rounded surface or an insulated lining.
- Use cable ties to bundle up cables properly. Please do not connect two 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, as shown in Figure 6-7.

Figure 6-7 Bundling Cables (2)



- When cables need to be bent, bundle them first but do not tie cables within the bend. Otherwise, stress may be generated on the cables and cause the wires inside to break, as shown in Figure 6-8.

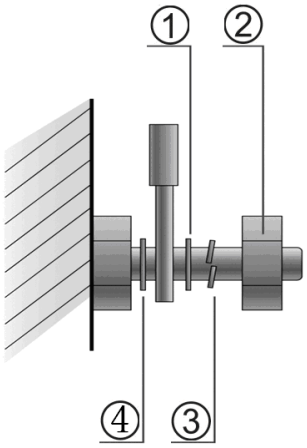
Figure 6-8 Binding Cables (3)



- Cables not to be assembled or the remaining parts of cables should be folded and placed in a proper position of the rack or cable trough. The proper position refers to a position that does not affect the equipment running or damage the equipment or cables.

- Do not bind power cords to the guide rails of moving parts.
- The power cords connecting moving parts such as door grounding cables should be reserved with some excess after being assembled. This can avoid tension or stress on power cords. After the moving part is installed, the remaining cable part should not touch heat sources, sharp corners, or sharp edges. If heat sources must be touched, high-temperature cables should be used.
- When using screw threads to secure a cable lug, ensure that the bolt or screw is properly tightened and take measures to prevent it from loosening, as shown in Figure 6-9.

Figure 6-9 Fastening Cable Lugs



①Flat washer ③Spring washer

②Nut ④Flat washer

- Hard power cords should be fastened in the terminal connection area to prevent stress on terminal connection and cable.
- Do not use tapping screws to secure cable lugs.
- 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.
- Bundle up cables by using cable ties according to the following table.

Cable Bunch Diameter	Bundling Spacing
10 mm (0.39 in.)	80–150 mm (3.15–5.91 in.)
10–30 mm (0.39–1.18 in.)	150–200 (5.91–7.87 in.)
30 mm (1.18 in.)	200–300 (7.87–11.81 in.)

- Do not tie cables or bundles in a knot.
- 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 during assembly.

6.5 Site Selection

- The equipment room should be at least 5 km (3.11 miles) away from heavy pollution sources, such as smelters, coal mines, and thermal power plants. The equipment room should be at least 3.7 km (2.30 miles) away from medium pollution sources, such as the chemical factory, rubber factory, and electroplating factory. The equipment room should be at least 2 km (1.24 miles) 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 (2.30 miles) away from the sea or salt lake. Otherwise, the equipment room must be sealed, with an air conditioner installed for temperature control. Saline soil cannot be used for construction. Otherwise, you should select equipment with advanced protection against severe environments.
- 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 windstorms 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 falls into Class A. Therefore, the equipment room should be located away from the residential area. Otherwise, the equipment room should meet construction specifications to avoid noise and radio interference.
- Make sure 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 boilers and heating boilers.
- The equipment room should be on the second floor or higher. Otherwise, the equipment room floor should be 600 mm (23.62 in.) higher than the highest flood level ever recorded.
- Make sure no cracks or holes exist 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, meeting standards for flame resistance, soundproofing, heat absorption, dust reduction, and electromagnetic shielding.
- Keep the door and the window closed to make the equipment room sealed.
- You are advised to use the steel door for soundproofing.
- Do not use sulfur-containing materials.
- Keep the air conditioner from blowing wind straight toward the equipment or blowing water drops from the window or air vent toward the equipment.

6.6 Cleaning the Optical Cable Connector and End Face

To ensure that a fiber jumper is properly connected to a fiber-optic coupler, clean the end faces, which directly affects the communication quality of the optical network. In routine optical network construction, the end faces of fibers are prone to be contaminated by non-standard operation or other causes. If a large amount of dust, oil, and other contaminants are attached to the end faces and are not detected or cleaned, the connection of the

fibers will lead to an increase in optical signal attenuation, causing an optical network failure, and even the breakdown of the entire optical signal system. The following describes common methods for cleaning optical cable connectors and end faces.

- Use a fiber cleaning pen.

  The fiber cleaning pen, also known as the one-click fiber cleaner, is made of ESD-resin, dust-free cleaning fiber, and cleaning agent, which can effectively prevent secondary dust pollution on the product. It comes with two endface cleaning pens of 1.25 mm (0.05 in.) and 2.5 mm (0.1 in.), which can meet routine cleaning requirements for SC, FC, and LC fiber connectors. Select a fiber cleaning pen based on the port to be cleaned. Gently insert the fiber cleaning pen into the port. Do not exert excessive force to avoid damage to the fiber connector. Slightly press the pen inward. When you hear a click, the end face is cleaned. You can repeat the operation two or three times to ensure a satisfactory cleaning result. Then, remove the fiber cleaning pen. The cleaning process is complete.

- Use a fiber cleaning box or lint-free cloth.
  - The fiber cleaning box is made of high-density textile fibers. It does not require alcohol during use, generates no static electricity, does not shed lint, and is convenient and efficient to use. It applies to SC, FC, and LC fiber connectors.
  - Hold the fiber cleaning box with one hand, press its switch to expose the cleaning tape, and gently wipe the end face of a fiber connector with the cleaning tape. Be careful not to apply too much force to avoid damaging the connector. This will effectively remove the contaminants attached to the end face.