Ruijie Reyee RG-ES220GS-LP and RG-ES228GS-LP Switches

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

This document also uses signs to indicate some important points during the operation. The meanings of these signs are as follows:

Danger

An alert that calls attention to safety instruction that if not understood or followed can result in personal injury.

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.

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1 Product Overview

Table 1-1 Port Specifications

Model	Number of 10/100/1000BASE-T Ports	Number of 1000BASE-X SFP Ports
RG-ES220GS-LP	18 (ports 1 to 16 support PoE/PoE+)	2
RG-ES228GS-LP	26 (ports 1 to 24 support PoE/PoE+)	2

Note

- 1000BASE-T ports are downward compatible with 100BASE-TX and 10BASE-T.
- SFP ports are not downward compatible with 100BASE-FX.

1.1 About the RG-ES220GS-LP

The RG-ES220GS-LP cloud managed switch features 18 x 10/100/1000BASE-T ports (ports 1 to 16 support PoE/PoE+) and 2 x 1000BASE-X SFP ports on the front panel, and can be managed through eWeb.

1.1.1 Package Contents

Table 1-2 Package Contents

No.	Item	Quantity
1	RG-ES220GS-LP switch	1
2	Rubber pads	4
3	User manual	1
4	M3 x 6 mm cross recessed countersunk head screws	6
5	Power cord	1
6	Power cord retention clip	1
7	Mounting brackets	2
8	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.

1.1.2 Product Appearance

The RG-ES220GS-LP cloud managed switch features 18 x 10/100/1000BASE-T ports, 2 x 1000BASE-X SFP ports, 1 x system status LED, 20 x port LEDs, 1 x Reset button, and 1 x LED Mode toggle switch on the front panel. The rear panel includes 1 x AC power connector and 1 x grounding stud. The following figure illustrates the product's appearance.

Figure 1-2 Appearance of the RG-ES220GS-LP



1. Front Panel

Figure 1-3 Front Panel of the RG-ES220GS-LP

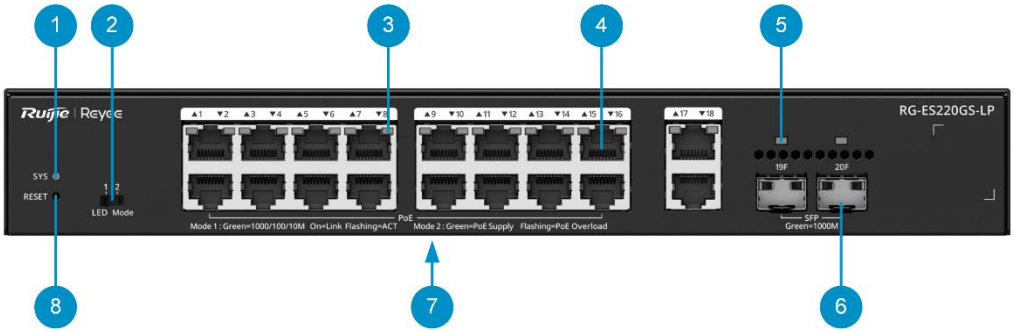


Table 1-3 Components on the Front Panel

No.	Component	Description
1	System status LED	● Off: The switch is not powered on. ● Blinking green: The switch is initializing. ● Solid green: The switch is operating normally. ● Blinking yellow: The PoE power is insufficient. ● Blinking red: The switch is faulty.
2	LED Mode toggle switch	● Switching mode (Mode 1): When the switch is toggled to the left, the LEDs of ports 1–16 display the data transmission status of the Ethernet ports. ● PoE mode (Mode 2): When the switch is toggled to the right, the LEDs of ports 1–16 display the PoE status of the Ethernet ports.

No.	Component	Description
3	10/100/1000BASE-T port status LED	The LEDs of ports 1–16 can operate in either switching mode or PoE mode, while the LEDs of ports 17 and 18 can only operate in switching mode. ● Switching mode: ○ Off: The port is not connected. ○ Solid green: The port is operating at 10/100/1000 Mbps, but is not receiving or sending data. ○ Blinking green: The port is operating at 10/100/1000 Mbps, and is receiving or sending data. ● PoE mode: ○ Off: PoE is disabled. ○ Solid green: PoE is enabled. ○ Blinking green: PoE overload occurs.
4	10/100/1000BASE-T ports (ports 1–18)	10/100/1000BASE-T ports, with ports 1–16 supporting PoE.
5	SFP port status LED	● 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.
6	1000BASE-X SFP ports (ports 19F and 20F)	The 1000BASE-X SFP port is not downward compatible with 100BASE-FX.
7	Nameplate	The nameplate is located at the bottom of the switch.
8	Reset button	● Press and hold the button for less than 2s: Restart the switch. ● Press and hold the button for more than 5s: Press and hold the button for more than 5s until the system status LED starts blinking to restore factory settings and restart the switch. ● Press and hold for 2s to 5s: No action is triggered.

2. Rear Panel

Figure 1-4 Rear Panel of the RG-ES220GS-LP



Table 1-4 Components on the Rear Panel

No.	Component	Description
1	Grounding stud	For connecting to a grounding wire.
2	Power connector	For connecting to an AC power supply.
3	Power cord retention clip hole	For securing the power cord retention clip.

1.1.3 Technical Specifications

Table 1-5 Technical Specifications

System Specifications	Flash memory	8 MB
	Forwarding rate	29.76 Mpps
Port Specifications	Total number of RJ45 ports	18
	Total number of optical ports	2
	Number of 1GE SFP ports	2
	Number of 10/100/1000BASE-T ports	18
	Reset button	1
	Optical Transceiver Type	See Appendix 6.2. Copper transceivers are not supported. The transceiver types may update without prior notification. Please contact Ruijie Networks for details.
Power Supply and Consumption	PoE Out standard	PoE/PoE+ (IEEE 802.3af/at)
	Number of PoE/PoE+ Out ports	16
	PoE budget per port	30 W
	PoE budget	130 W
	PoE power pins	1–2 (+), 3–6 (-)
	Power input	220 V AC power supply: ● Rated input voltage: 100 V AC to 240 V AC, 50 Hz to 60 Hz ● Maximum input voltage: 90 V AC to 264 V AC, 47 Hz to 63 Hz

		● Rated input current: 3 A
	Maximum power consumption	● Less than 15W with no PoE load (110 V) ● Less than 14W with no PoE load (220 V) ● Less than 160W with PoE full load (110 V) ● Less than 157W with PoE full load (220 V)
	Power supply	Fixed power supply
Dimensions and Weight	Casing	Metal
	Product dimensions (W x D x H)	300 mm x 223 mm x 43.6 mm (11.81 in. x 8.78 in. x 1.72 in.)
	Weight	● 2.10 kg (4.63 lbs) (without packaging materials) ● 3.10 kg (6.83 lbs) (with packaging materials)
System Specifications	Switching capacity	40 Gbps(bit/s)
Environment and Reliability	Fan	Fanless design
	Cooling	Natural cooling
	Acoustic noise	N/A
	Mounting options	Desk/Rack
	Hot swapping of cables	Hot swapping supported by the service port and power connector
	MTBF	200,000 hours
	Operating temperature	0°C to 40°C (32°F to 104°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	–500 m to +5,000 m (–1,640.42 ft. to +16,404.20 ft.)
	ESD protection	● Air discharge: 8 kV ● Contact discharge: 6 kV
	Surge protection	● Service port: ±6 kV for common mode ● Power connector: ±6 kV for common mode and ±6 kV for differential mode
	Ground Leakage Current	≤ 3.5 mA
Certification and Regulatory Compliance	EMC	EN 55032 EN IEC 61000-3-2 EN 61000-3-3

		EN 55035 EN 300 386
	Safety compliance	EN 62368-1 IEC 62368-1
	Certification	CE, CB
Interface	EEE	Yes

Warning

Operation of this equipment in a residential environment could cause radio interference.

1.1.4 Cooling

The RG-ES220GS-LP adopts natural cooling. To ensure that the switch works properly in the specified environment, a minimum clearance of 100 mm (3.94 in.) must be maintained around the device to ensure proper ventilation. Dust the device every three months to avoid blocking the ventilation openings on the housing.

Caution

The switch dissipates heat through the metal housing. Do not touch the housing when the device is operating.

1.2 About the RG-ES228GS-LP

The RG-ES228GS-LP cloud managed switch features 26 x 10/100/1000BASE-T ports (ports 1 to 24 support PoE/PoE+) and 2 x 1000BASE-X SFP ports on the front panel, and can be managed through eWeb.

1.2.1 Package Contents

Table 1-6 Package Contents

No.	Item	Quantity
1	RG-ES228GS-LP switch	1
2	Rubber pads	4
3	User manual	1
4	M4 x 8 mm cross recessed countersunk head screws	6
5	Power cord	1
6	Power cord retention clip	1
7	Mounting brackets	2
8	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.

1.2.2 Product Appearance

The RG-ES228GS-LP cloud managed switch features 26 x 10/100/1000BASE-T ports, 2 x 1000BASE-X SFP ports, 1 x system status LED, 28 x port LEDs, 1 x Reset button, and 1 x LED Mode toggle switch on the front panel. The rear panel includes 1 x AC power connector and 1 x grounding stud. The following figure illustrates the product's appearance.

Figure 1-5 Appearance of the RG-ES228GS-LP



1. Front Panel

Figure 1-6 Front Panel of the RG-ES228GS-LP

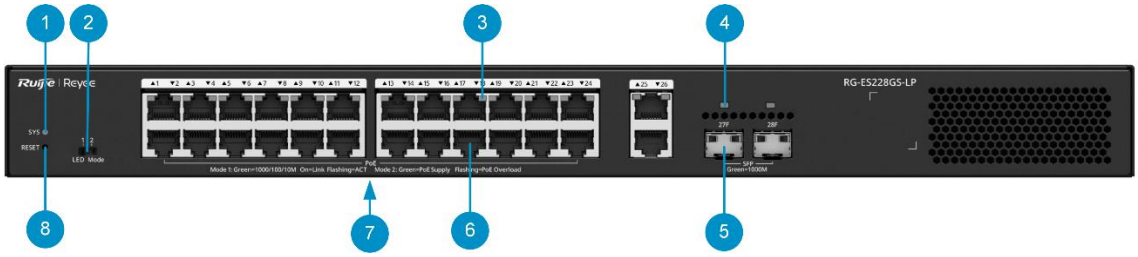


Table 1-7 Components on the Front Panel

No.	Component	Description
1	System status LED	● Off: The switch is not powered on. ● Blinking green: The switch is initializing. ● Solid green: The switch is operating normally. ● Blinking yellow: The PoE power is insufficient. ● Blinking red: The switch is faulty.

No.	Component	Description
2	LED Mode toggle switch	● Switching mode (Mode 1): When the switch is toggled to the left, the LEDs of ports 1–24 display the data transmission status of the Ethernet ports. ● PoE mode (Mode 2): When the switch is toggled to the right, the LEDs of ports 1–24 display the PoE status of the Ethernet ports.
3	10/100/1000BASE-T port status LED	The LEDs of ports 1–24 can operate in either switching mode or PoE mode, while the LEDs of ports 25 and 26 can only operate in switching mode. ● Switching mode: ○ Off: The port is not connected. ○ Solid green: The port is operating at 10/100/1000 Mbps, but is not receiving or sending data. ○ Blinking green: The port is operating at 10/100/1000 Mbps, and is receiving or sending data. ● PoE mode: ○ Off: PoE is disabled. ○ Solid green: PoE is enabled. ○ Blinking green: PoE overload occurs.
4	SFP port status LED	● 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.
5	1000BASE-X SFP ports (ports 27F and 28F)	The 1000BASE-X SFP ports are not downward compatible with 100BASE-FX.
6	10/100/1000BASE-T ports (ports 1–26)	10/100/1000BASE-T ports, with ports 1–24 supporting PoE.
7	Nameplate	The nameplate is located at the bottom of the switch.
8	Reset button	● Press and hold the button for less than 2s: Restart the switch. ● Press and hold the button for more than 5s: Press and hold the button for more than 5s until the system status LED starts blinking to restore factory settings and restart the switch. ● Press and hold for 2s to 5s: No action is triggered.

2. Rear Panel

Figure 1-7 Rear Panel of the RG-ES228GS-LP

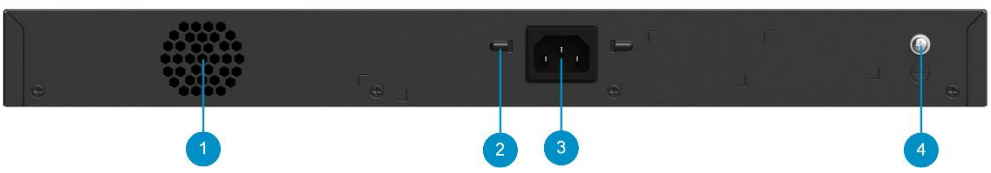


Table 1-8 Components on the Rear Panel

No.	Component	Description
1	Ventilation openings	For heat dissipation.
2	Power cord retention clip hole	For securing the power cord retention clip.
3	Power connector	For connecting to an AC power supply.
4	Grounding stud	For connecting to a grounding wire.

1.2.3 Technical Specifications

Table 1-9 Technical Specifications

System Specifications	Flash memory	8 MB
	Forwarding rate	41.664 Mpps
Port Specifications	Total number of RJ45 ports	26
	Total number of optical ports	2
	Number of 1GE SFP ports	2
	Number of 10/100/1000BASE-T ports	26
	Reset button	1
	Optical Transceiver Type	See Appendix 6.2. Copper transceivers are not supported. The transceiver types may update without prior notification. Please contact Ruijie Networks for details.
Power Supply and Consumption	PoE Out standard	PoE/PoE+ (IEEE 802.3af/at)
	Number of PoE/PoE+ Out ports	24
	PoE budget per port	30 W
	PoE budget	250W
	PoE power pins	1–2 (+), 3–6 (-)
	Power input	220 V AC power supply: ● Rated input voltage: 100 V AC to 240 V AC, 50 Hz to 60 Hz

		● Maximum input voltage: 90 V AC to 264 V AC, 47 Hz to 63 Hz ● Rated input current: 6 A
	Maximum power consumption	● Less than 21W with no PoE load (110 V) ● Less than 20W with no PoE load (220 V) ● Less than 302W with PoE full load (110 V) ● Less than 294W with PoE full load (220 V)
	Power supply	Fixed power supply
Dimensions and Weight	Casing	Metal
	Product dimensions (W x D x H)	440 mm x 214.9 mm x 43.2 mm (17.32 in. x 8.46 in. x 1.70 in.)
	Weight	● 2.80 kg (4.63 lbs) (without packaging materials) ● 3.85 kg (6.83 lbs) (with packaging materials)
System Specifications	Switching capacity	56 Gbps(bit/s)
Environment and Reliability	Fan	1 x fixed fan
	Cooling	Air cooling, front-to-rear airflow
	Acoustic noise	< 40 dB: 25℃ (77℉)
	Mounting options	Desk/Rack
	Hot swapping of cables	–500 m to +5,000 m (–1,640.42 ft. to +16,404.20 ft.)
	MTBF	200,000 hours
	Operating temperature	0°C to 40°C (32°F to 104°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	–500 m to +5,000 m (–1,640.42 ft. to +16,404.20 ft.)
	ESD protection	● Air discharge: 8 kV ● Contact discharge: 6 kV
	Surge protection	● Service port: ±6 kV for common mode ● Power connector: ±6 kV for common mode and ±6 kV for differential mode
	Ground Leakage Current	≤ 3.5 mA
	EMC	EN 55032

Certification and Regulatory Compliance		EN IEC 61000-3-2 EN 61000-3-3 EN 55035 EN 300 386
	Safety compliance	EN 62368-1 IEC 62368-1
	Certification	CE, CB
Interface	EEE	Yes

Warning

Operation of this equipment in a residential environment could cause radio interference.

1.2.4 Cooling

The RG-ES228GS-LP adopts fan cooling with front-to-rear airflow. To ensure that the switch works properly in the specified environment, a minimum clearance of 100 mm (3.94 in.) must be maintained around the device to ensure proper ventilation. Dust the device every three months to avoid blocking the ventilation openings on the housing.

2 Preparing for Installation

2.1 Safety Guidelines

Note

- To avoid personal injury and 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

- Do not place the switch in a wet position, and keep the switch away from liquid. Keep the chassis clean and dust-free.
- Keep the equipment away from heat sources.
- Keep the equipment away from walking areas.
- During the installation and maintenance, do not wear loose clothes, ornaments, or any other things that may be hooked by the device.
- Cut off all the power supplies and unplug all power cords before placing the device in a rack or removing the device from a rack.

2.1.2 Chassis-Lifting Guidelines

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

2.1.3 Electric 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 trained and qualified personnel should be allowed to operate the device.
- 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. In the case of an electrical accident, cut off the power supply immediately.
- Be sure to make a careful check before shutting down the power supply.
- Equip the power supply system with a leakage protector (also referred to as "leakage current switch" or "leakage current breaker") to automate the power cut-off in the case of power leakage or shock. When

selecting the leakage protector, observe the following rule:

- The rated leakage action current of each leakage protector is greater than twice of 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, the leakage current of each power supply is at most 3.5 mA, and the leakage current of the system totals 56 mA (maximum theoretical value). A leakage protector with 30 mA rated action current supports less than nine 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 other words, the leakage protector with a rated action current of 30 mA supports up to four power supplies. In this case, the 16 power supplies in the system require at least four leakage protectors with a rated action current of 30 mA and each leakage protector supports four power supplies.

  If power supplies in a system differ in models, the rated leakage action current of each leakage protector divided by two is greater than the sum of maximum leakage currents of all the power supplies.

- The rated leakage non-action current of a leakage protector shall be 50% of the leakage action current. If the non-action current value is too small, the high sensitivity level may cause the circuit to break, causing power cut-off and service interruption even if the leakage current value is normal.

  Take a leakage protector with a rated action current of 30 mA as an example. The rated leakage non-action current shall be 15 mA. When the leakage current is less than 15mA, the protector shall not act.

Caution

- To guarantee personal safety, the rated leakage action current of each leakage protector in the system must be equal to or less than 30 mA (human body safety current is 30 mA). When twice of the total leakage current of the system is greater than 30 mA, the system must be equipped with two or more leakage protectors.
- The leakage current values vary with products. For the leakage current value of each product model, see the product technical specifications.

2.1.4 Static Electricity

- Ensure that the chassis is connected to earth ground. 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.

2.1.5 Laser Safety

The equipment supports various types of optical transceivers, which are Class I laser products.

- When a media converter 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.
- Do not stare into an optical port.

Figure 2-1 Laser Product Label



Caution

Do not approach or look into any 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 Ventilation Requirements

- Maintain a minimum clearance of 100 mm (3.94 in.) around the switch for air circulation and ventilation.
- After the cables are connected, bundle the cables or place them in the patch panel to avoid blocking air inlets.
- Dust the device every three months to avoid blocking the ventilation openings on the housing.

2.2.2 Temperature and Humidity

To ensure the normal operation and a prolonged service life of the device, maintain an appropriate temperature and humidity in the installation environment.

Prolonged exposure to inappropriate temperature and humidity conditions can cause damage to the equipment.

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

The following table lists the ambient temperature and humidity requirements of the RG-ES220GS-LP and RG-ES228GS-LP.

Temperature	Relative Humidity
0ºC to 40ºC (32ºF to 104ºF)	10% RH to 90% RH (non-condensing)

Note

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

2.2.3 Cleanliness

Dust poses a significant hazard to the equipment. The indoor dust takes on a positive or negative static electric charge when falling on the switch, causing poor contact of the metallic joint. Such electrostatic adhesion may occur more easily when the relative humidity is low, 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

Dust	Unit	Concentration
≥ 0.5 μm	Particles/m^3	≤ 3.5 x 10^6
≥ 5 μm	Particles/m^3	≤ 3.5 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 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.

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 one week, and the maximum value cannot last for more than 30 minutes every day.

2.2.4 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.

Electromagnetic compatibility (EMC) grounding includes shielded grounding, filter grounding, noise and interference suppression, and level reference.

Note

- The grounding resistance should be smaller than 1 ohm.
- Connect the grounding stud to the ground before operating the equipment.
- The grounding wire of the switch is not delivered with the switch and needs to be purchased by the customer.

2.2.5 Preventing Electromagnetic Interference

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

2.2.6 Surge Protection

Although the equipment can guard against lightning strikes, strong lightning strikes may still damage the equipment. Take the following surge protection measures:

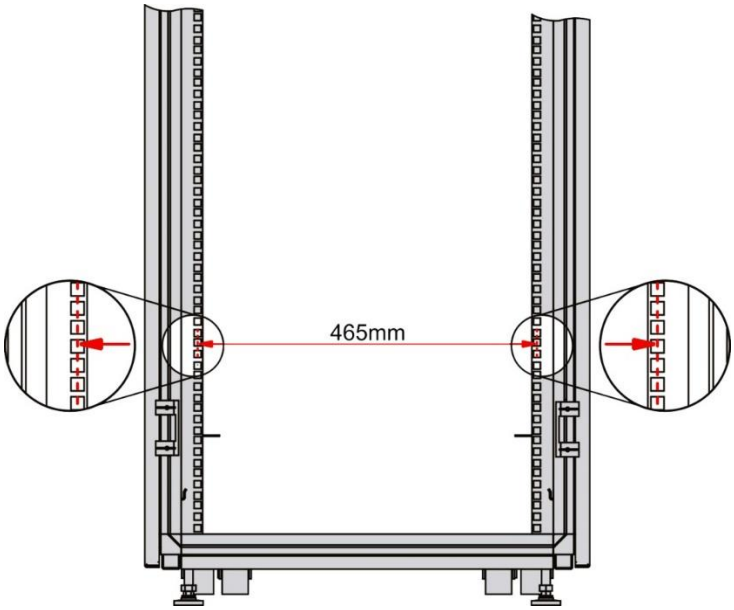
- Ensure that the grounding wire of the rack is in good contact with the ground.
- Ensure that the neutral point of the AC power socket is in good contact with the ground.
- Install a power arrester in front of the power input end to enhance surge protection for the power supply.

2.3 Rack Requirements

If you plan to install the equipment onto a rack, ensure that the rack meets the following conditions.

- Use a four-post 19-inch rack.
- 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, the distance between front and rear doors, is at least 1000 mm (39.37 in.).
- The guide rails can bear the weight of the equipment and its accessories.
- The rack has a reliable grounding stud for the chassis to connect to earth ground.
- The rack has a good 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, power cords, Ethernet cables, cage nuts, diagonal pliers, cable ties, and optical cables
Special Tools	ESD-preventive glove, wire stripper, crimper, RJ45 connector crimping plier, and wire cutter
Meters	Multimeter
Relevant Equipment	PC, display, and keyboard

Note

The equipment is not shipped with a tool kit. You need to prepare a tool kit by yourself.

3 Product Installation

Caution

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

3.1 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.
- Locate the emergency power-off switch in the room before installation. In the case of an accident, cut off the power supply immediately.

3.2 Precautions

To ensure normal operation and prolong the service life of the equipment, observe the following safety precautions:

- Do not power on the equipment during installation.
- Place the equipment in a well-ventilated environment.
- Do not expose the equipment to high temperatures.
- Keep the equipment away from high-voltage power cables.
- Install the equipment indoors.
- Do not expose the equipment to a thunderstorm or strong electric field.
- Keep the equipment clean and dust-free.
- Cut off the power supply before cleaning the equipment.
- Do not wipe the equipment with a damp cloth.
- Do not wash the equipment with liquid.
- Do not open the enclosure when the equipment is working.
- Secure the equipment properly.
- Connect the power cords of different colors to the corresponding grounding studs.
- Ensure that the power cords are securely connected.
- Do not place heavy objects on the equipment.
- Maintain a minimum clearance of 100 mm (3.94 in.) around the equipment to ensure proper airflow. Do not stack switches.
- Keep the equipment away from high-power radio launch pads, radar launch pads, and high-frequency large-current devices. Take electromagnetic shielding measures to minimize interference when necessary, for

example, use shielded cables.

- Route port cables only indoors to prevent ports from getting damaged by overvoltage or overcurrent caused by lightning strikes.

3.3 Installing the RG-ES220GS-LP

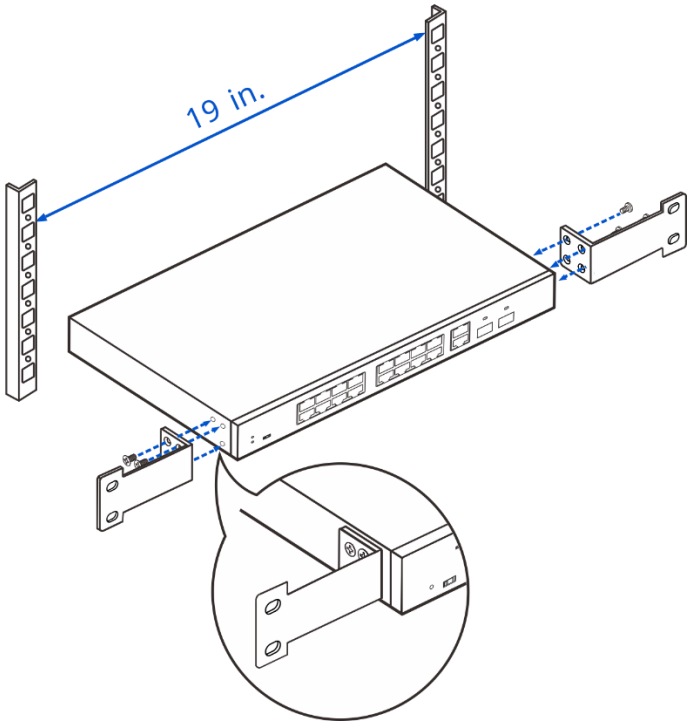
3.3.1 Mounting the Switch onto a Rack

The RG-ES220GS-LP meets the standard defined by the Electronic Industries Alliance (EIA), and can be installed onto a 19-inch rack. The installation steps are as follows:

(1) Take out the mounting brackets delivered with the switch and the M3 x 6 mm screws, and secure one end of the mounting brackets to the switch.

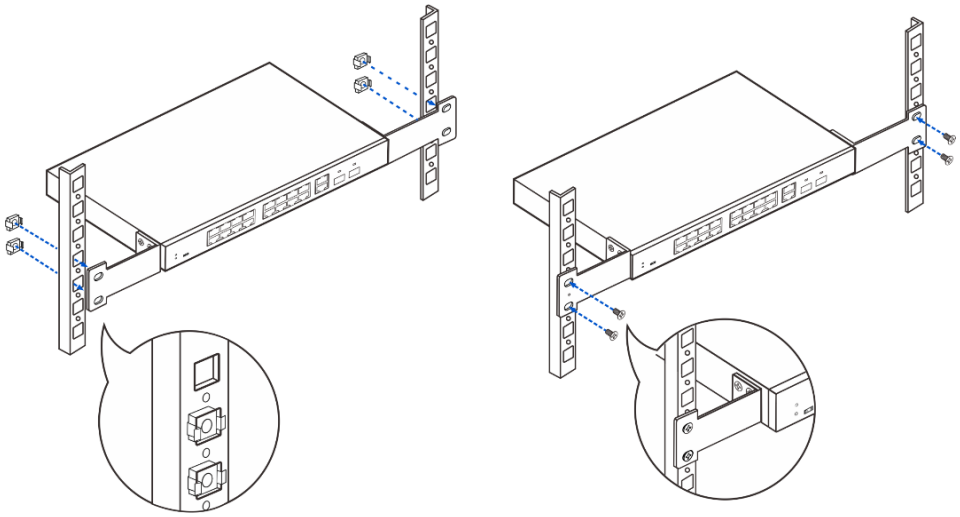
Figure 3-1 Securing the Mounting Brackets

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(2) Place the switch horizontally to an appropriate position in the rack. Use four M6 screws and matching cage nuts (both screws and nuts are to be provided by the user) to secure the other end of the mounting brackets to the square hole rack posts.

Figure 3-2 Mounting the Switch onto a Rack

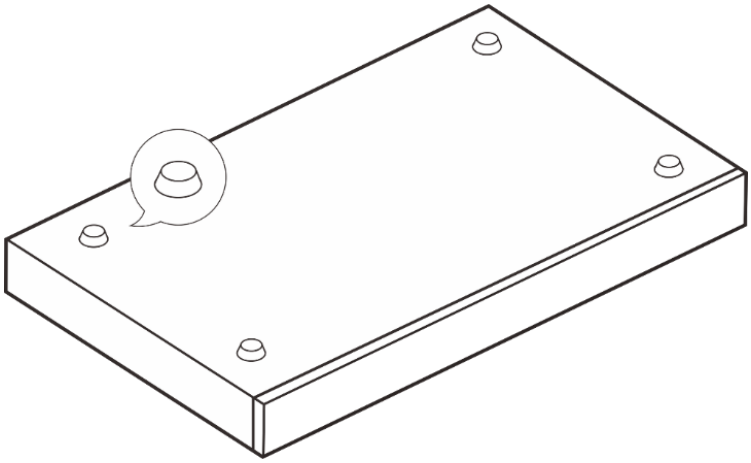


3.3.2 Mounting the Switch on a Workbench

If a standard rack is not available, install the switch on a clean workbench. The installation steps are as follows:

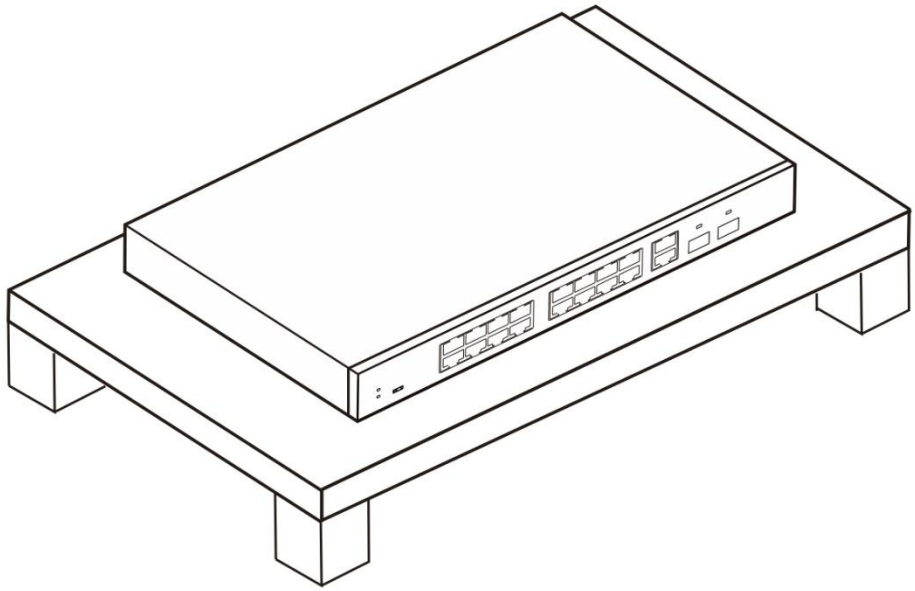
(1) Attach four rubber pads to the four corners at the bottom of the switch.

Figure 3-3 Attaching the Rubber Pads



(2) Place the switch on a workbench and ensure that the switch is properly ventilated.

Figure 3-4 Mounting the Switch on a Workbench



Caution

The switch must be installed in a location where movement is restricted.

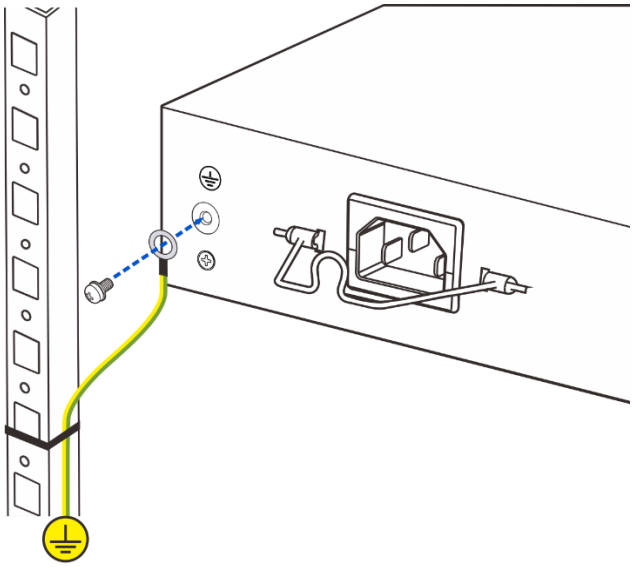
3.3.3 Grounding the Switch

Connect the grounding wire to the grounding stud on the rear panel of the switch.

Note

The grounding wire is not delivered with the switch. Please purchase it based on actual requirements.

Figure 3-5 Connecting the Cables



3.3.4 Connecting the Cables

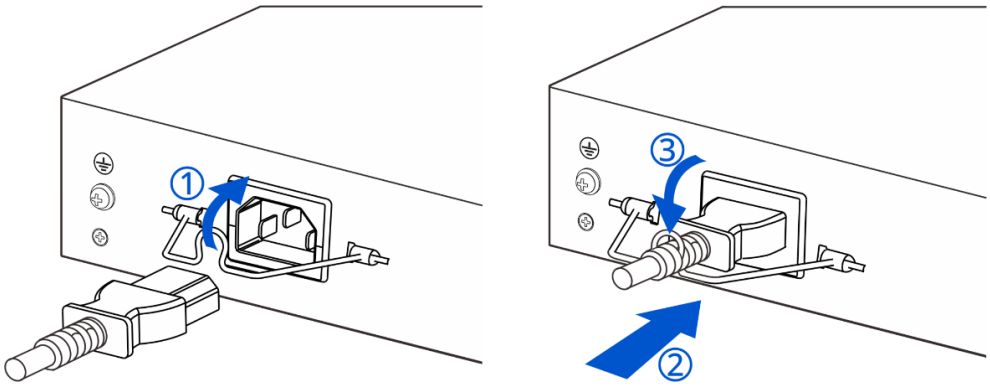
Take the following steps to connect the power cord and cables.

(1) Connect the power cord

a Insert the power cord retainer clip delivered with the switch into the power cord retainer clip holes on the rear panel of the switch.

b Pull the power cord retainer clip upwards, insert the power plug, and then release it to secure the plug in place.

Figure 3-6 Connecting the Power Cord



c Connect the other end of the power cord to the power socket of the external power system.

(2) Connect the Ethernet cable: Connect an Ethernet cable with an RJ45 connector to a port.

(3) Connect the optical cable (ensure that an optical transceiver is inserted into the port):

a Use the appropriate optical cable based on the type of device connected to the other end of the optical port (e.g., single-fiber optical transceiver).

b Connect the cable to the devices at both ends, making sure to match the correct transmit and receive wavelengths for the optical transceiver or media converter.

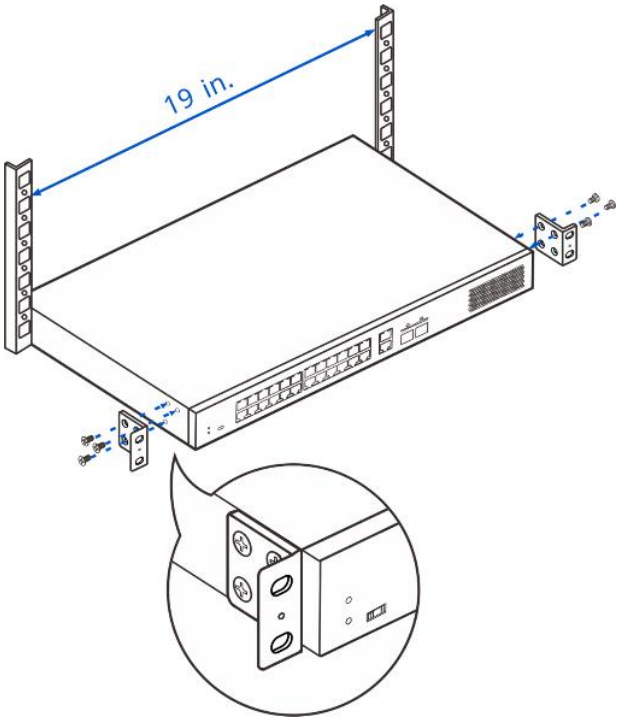
3.4 Installing the RG-ES228GS-LP

3.4.1 Mounting the Switch onto a Rack

The RG-ES228GS-LP meets the standard defined by the Electronic Industries Alliance (EIA), and can be installed onto a 19-inch rack. The installation steps are as follows:

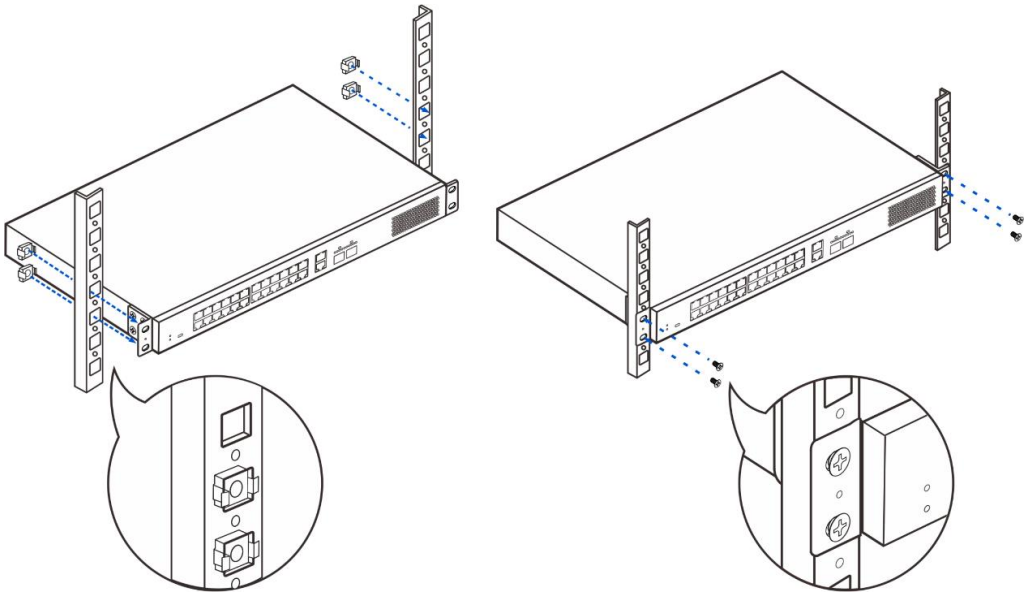
(1) Take out the mounting brackets delivered with the switch and the M4 x 8 mm screws, and secure one end of the mounting brackets to the switch.

Figure 3-7 Securing the Mounting Brackets



(2) Place the switch horizontally to an appropriate position in the rack. Use four M6 screws and matching cage nuts (both screws and nuts are to be provided by the user) to secure the other end of the mounting brackets to the square hole rack posts.

Figure 3-8 Mounting the Switch onto a Rack

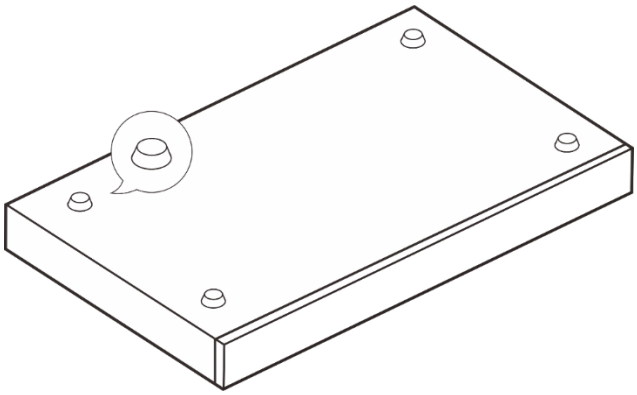


3.4.2 Mounting the Switch on a Workbench

If a standard rack is not available, install the switch on a clean workbench. The installation steps are as follows:

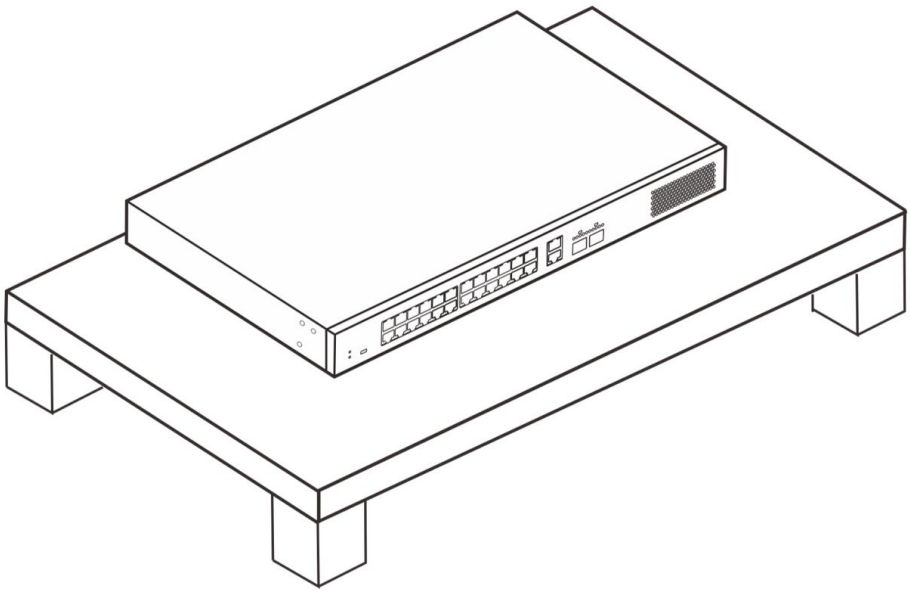
(1) Attach four rubber pads to the four corners at the bottom of the switch.

Figure 3-9 Attaching the Rubber Pads



(2) Place the switch on a workbench and ensure that the switch is properly ventilated.

Figure 3-10 Mounting the Switch on a Workbench



Caution

The switch must be installed in a location where movement is restricted.

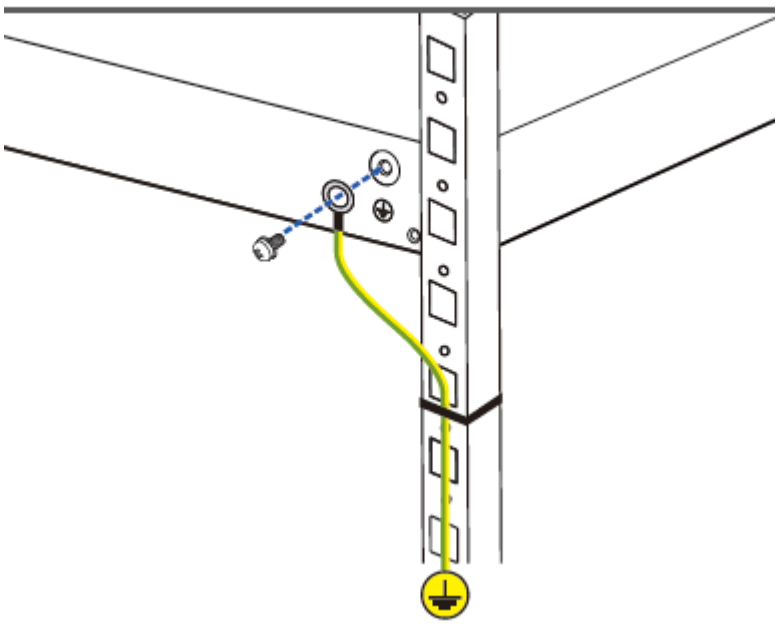
3.4.3 Grounding the Switch

Connect the grounding wire to the grounding stud on the rear panel of the switch.

Note

The grounding wire is not delivered with the switch. Please purchase it based on actual requirements.

Figure 3-11 Connecting the Cables



3.4.4 Connecting the Cables

Take the following steps to connect the power cord and cables.

(1) Connect the power cord

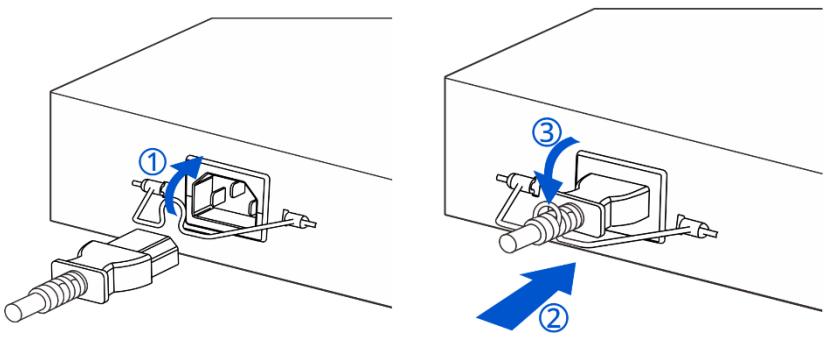
a Insert the power cord retainer clip delivered with the switch into the power cord retainer clip holes on the rear panel of the switch.

b Pull the power cord retainer clip upwards, insert the power plug, and then release it to secure the plug in place.

Note

The position of the power cord retainer clip holes is for reference only and may vary with device models.

Figure 3-12 Connecting the Power Cord



c Connect the other end of the power cord to the power socket of the external power system.

(2) Connect the Ethernet cable: Connect an Ethernet cable with an RJ45 connector to a port.

(3) Connect the optical cable (ensure that an optical transceiver is inserted into the port):

a Use the appropriate optical cable based on the type of device connected to the other end of the optical port (e.g., single-fiber optical transceiver).

b Connect the cable to the devices at both ends, making sure to match the correct transmit and receive wavelengths for the optical transceiver or media converter.

3.5 Checklist After Installation

Caution

Turn off the power to avoid personal injury and damage to components caused by incorrect connection.

- Verify that the grounding wire is properly connected.
- Verify that the cables and power cord are properly connected.
- Verify that the cables are routed indoors.
- If any cable is routed outdoors, verify that the power supply and interfaces are protected from lightning strikes.
- Maintain a minimum clearance of 100 mm (3.94 in.) around the equipment for air circulation.

4 Debugging

4.1 Powering On the Equipment

(1) Checklist Before Power-On

- Verify that the switch is properly grounded.
- Verify that the power cord is properly connected.
- Verify that the power supply voltage meets the requirement of the switch.

(2) Checklist after Power-On (Recommended)

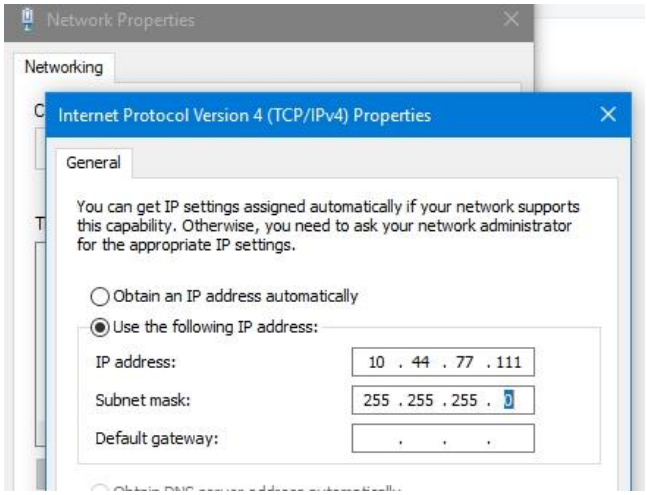
- The LEDs of the switch are in the normal state.
- Service ports can forward data properly.

4.2 Logging In to the Management Interface

(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 (Range: 1-254, excluding 200).

Figure 4-1 Changing the IP Address



(3) Open a browser, enter 10.44.77.200 in the address bar, and press Enter. On the login page, set a password and log in.

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

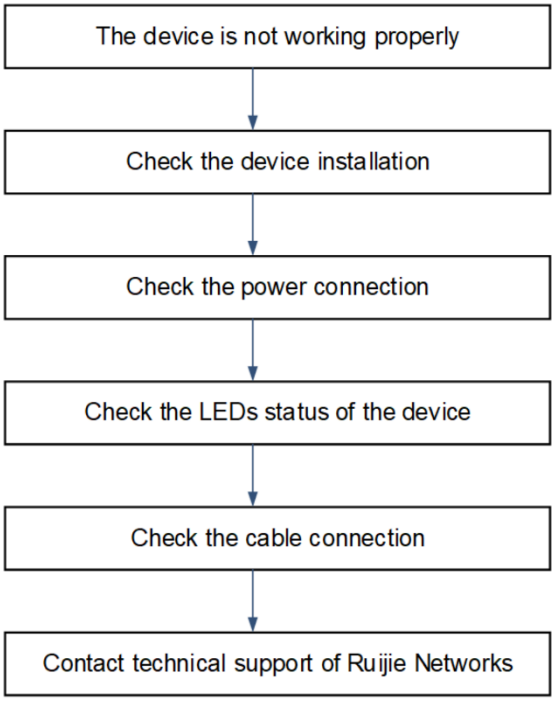
Note

For security purposes, you are advised to change the password regularly.

5 Troubleshooting

5.1 Troubleshooting Flowchart

Figure 5-1 General Troubleshooting Flowchart



5.2 Common Faults

Table 5-1 Common Faults and Troubleshooting

Fault Description	Possible Causes	Suggested Action
The system status 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 sending/receiving error occurs.	The twisted pair cable is not connected properly.	Replace the twisted pair cable.
	The cable length exceeds 100 m (328.08 ft.).	Use a cascaded switch.

Fault Description	Possible Causes	Suggested Action
An optical port cannot be connected.	The receiving and transmitting ends are connected incorrectly.	Exchange the transmission and receiving ends of the optical cable.
	The types of the interconnected optical transceivers do not match.	Replace the optical transceiver with another one of the same type.
	The optical cable does not meet the requirements.	Replace the optical cable with a qualified one.
	The length of the optical cable is beyond the allowed length marked on the optical transceiver.	Use an optical cable with the required length.
Forgot password	N/A	Press and hold the RESET button for more than 5 seconds to restore to switch to factory settings and reset the password.

6 Appendix

6.1 Connectors and Media

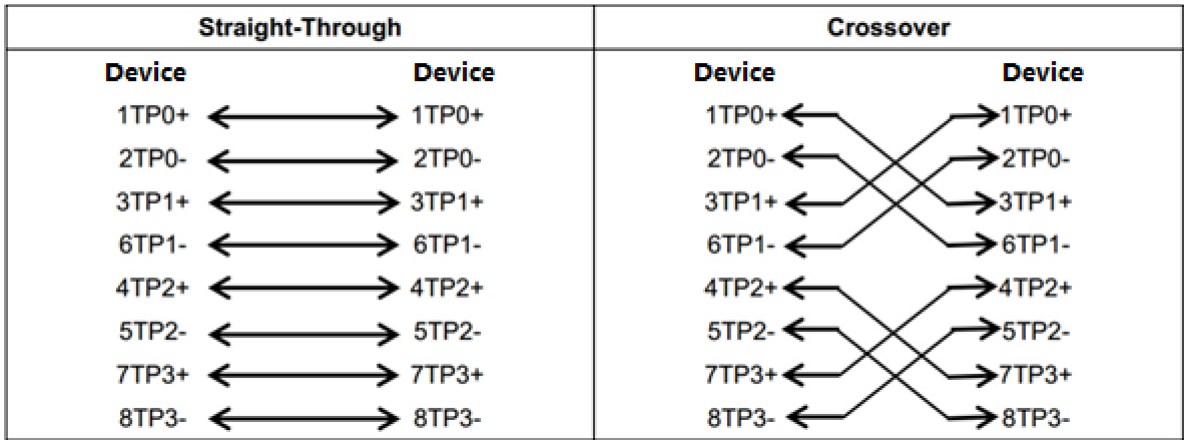
6.1.1 1000BASE-T/100BASE-TX/10BASE-T Ports

1000BASE-T/100BASE-TX/10BASE-T ports are Ethernet ports with auto-negotiation of three speeds: 10 Mbps, 100 Mbps, and 1000 Mbps. They supports auto MDI/MDIX Crossover, and use RJ 45 connectors.

Compliant with the IEEE 802.3ab standard, a 1000BASE-T port requires 100-ohm Category 5 or 5e unshielded twisted pair (UTP) or shielded twisted pair (STP) (recommended) cables, and supports a maximum distance of 100 meters (328 feet).

A 1000BASE-T port requires all four pairs of wires to be connected for data transmission. Figure 6-1 shows the four pairs of wires for the 1000BASE-T port.

Figure 6-1 1000BASE-T Twisted Pair Connections



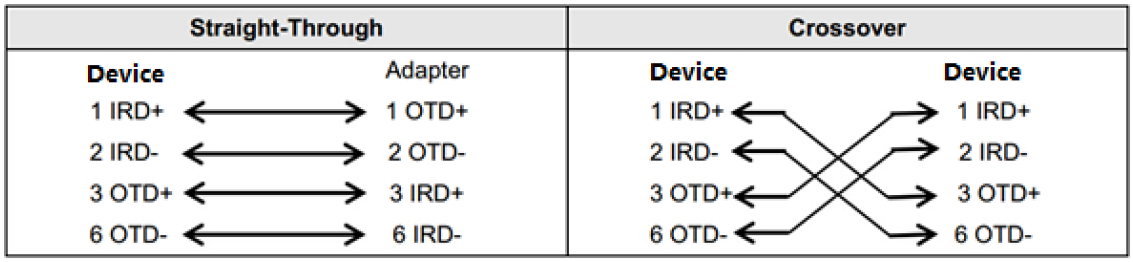
100BASE-TX/10BASE-T ports can be interconnected using cables of the preceding specifications. In addition, a 10BASE-T port can be connected using 100-ohm Category 3, Category 4, and Category 5 cables, while a 100BASE-TX port can be connected using 100-ohm Category 5 cables, and supports a maximum distance of 100 meters (328 feet). Table 6-1 shows 100BASE-TX/10BASE-T pin assignments.

Table 6-1 100BASE-TX/10BASE-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 the connection of straight-through and crossover cables for 100BASE-TX/10BASE-T ports.

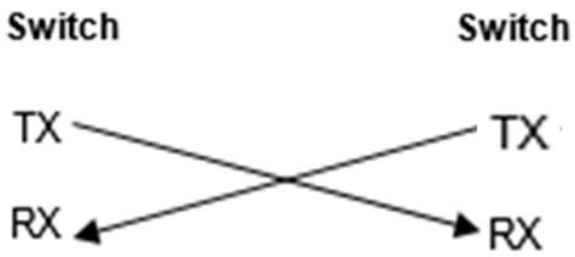
Figure 6-2 100BASE-TX/10BASE-T Twisted Pair Connections



6.1.2 Optical Cable Connection

You can choose SMF or MMF optical cables based on the type of optical transceiver connected to the optical port. Figure 6-3 shows the connection.

Figure 6-3 Connecting the Optical Cables



6.2 SFP Transceivers

Ruijie provides SFP transceivers based on port types. You can choose the one that best suits your needs. In addition to the following SFP optical transceivers, the MINI-GBIC-GT for photoelectric conversion is also supported. The following models and technical specifications of some SFP transceivers are listed for your reference. For details about the technical specifications, see *Ruijie Optical (Copper) Transceiver Installation and Reference Guide*.

Table 6-2 Technical Specifications of SFP Optical Transceivers

Model	Wavelength (nm)	Fiber Type	Operating Temperature	DDM Supported (Yes/No)	Transmit Power (dBm)		Receive Power (dBm)	
					Min.	Max.	Min.	Max.
MINI-GBIC-SX-MM850	850	MMF	0°C to 70°C (32°F to 158°F)	Yes	–9.5	–3	–17	0

Model	Wavelength (nm)	Fiber Type	Operating Temperature	DDM Supported (Yes/No)	Transmit Power (dBm)		Receive Power (dBm)	
					Min.	Max.	Min.	Max.
MINI-GBIC-LX-SM1310	1310	SMF	0°C to 70°C (32°F to 158°F)	Yes	–9.5	–3	–20	–3
MINI-GBIC-LH40-SM1310	1310nm	SMF	0°C to 70°C (32°F to 158°F)	Yes	–2	3	–22	–3
GE-SFP-LX20-SM1310-BIDI	1310TX/1550RX	SMF	0°C to 70°C (32°F to 158°F)	Yes	–9	–3	–20	–3
GE-SFP-LX20-SM1550-BIDI	1550TX/1310RX	SMF	0°C to 70°C (32°F to 158°F)	Yes	–9	–3	–20	–3
GE-SFP-LH40-SM1310-BIDI	1310TX/1550RX	SMF	0°C to 70°C (32°F to 158°F)	Yes	–5	0	–24	–1
GE-SFP-LH40-SM1550-BIDI	1550TX/1310RX	SMF	0°C to 70°C (32°F to 158°F)	Yes	–5	0	–24	–1
MINI-GBIC-ZX80-SM1550	1550	SMF	0°C to 70°C (32°F to 158°F)	Yes	0	4.7	–22	–3
SFP-MM850	850	MMF	0°C to 70°C (32°F to 158°F)	Yes	–9.5	–3	–17	0
SFP-SM1310	1310	SMF	0°C to 70°C (32°F to 158°F)	Yes	–9.5	–3	–20	–3
GE-SFP-LX03-SM1310-BIDI-I	1310TX/1550RX	SMF	–5°C to +75°C (23°F to 167°F)	Yes	-9	-3	-22	-3
GE-SFP-LX03-SM1550-BIDI-I	1550TX/1310RX	SMF	–5°C to +75°C (23°F to 167°F)	Yes	-9	-3	-22	-3

Table 6-3 1000BASE-T SFP Media Converter

Standard	Model	DDM Supported (Yes/No)
1000BASE-T	Mini-GBIC-GT	No
1000BASE-T	SFP-GT(A)	No

Table 6-4 Cabling Specifications of SFP Optical Transceivers

Model	Port Type	Fiber Type	Core Size (μm)	Max. Cabling Distance
MINI-GBIC-SX-MM850	LC	MMF	62.5/125	275 m (0.17 mi.)
			50/125	550 m (0.34 mi.)
SFP-MM850	LC	MMF	62.5/125	275 m (0.17 mi.)
			50/125	550 m (0.34 mi.)
MINI-GBIC-LX-SM1310	LC	SMF	9/125	10 km (6.21 mi.)
MINI-GBIC-LH40-SM1310	LC	SMF	9/125	40 km (24.85 mi.)
GE-SFP-LX20-SM1310-BIDI	LC	SMF	9/125	20 km (12.43 mi.)
GE-SFP-LX20-SM1550-BIDI	LC	SMF	9/125	20 km (12.43 mi.)
GE-SFP-LH40-SM1310-BIDI	LC	SMF	9/125	40 km (24.85 mi.)
GE-SFP-LH40-SM1550-BIDI	LC	SMF	9/125	40 km (24.85 mi.)
MINI-GBIC-ZX80-SM1550	LC	SMF	9/125	80 km (49.71 mi.)
SFP-SM1310	LC	SMF	9/125	10 km (6.21 mi.)
GE-SFP-LX03-SM1310-BIDI-I	LC	SMF	9/125	3 km (1.86 mi.)
GE-SFP-LX03-SM1550-BIDI-I	LC	SMF	9/125	3 km (1.86 mi.)
Mini-GBIC-GT	RJ45	Category 5 (or higher) UTP or STP cable		100 m (0.06 mi.)
SFP-GT(A)	RJ45	Category 5 (or higher) UTP or STP cable		100 m (0.06 mi.)

Caution

- For SFP transceivers with a cabling distance of 40 km (24.85 mi.) or longer, install an inline optical attenuator to avoid overload when using short SMF cables.
- An optical transceiver is a laser transmitter. Do not look into the optical source to prevent it from burning your eyes.
- To keep an optical transceiver clean, ensure that unused ports remain capped.

Table 6-5 Pairing of BiDi Optical Transceivers

Rate/Distance	Pairing Model
1000 Mbps/3 km (1.86 mi.)	● GE-SFP-LX03-SM1310-BIDI-I ● GE-SFP-LX03-SM1550-BIDI-I
1000 Mbps/20 km (12.43 mi.)	● GE-SFP-LX20-SM1310-BIDI ● GE-SFP-LX20-SM1550-BIDI
1000 Mbps/40 km (24.85 mi.)	● GE-SFP-LH40-SM1310-BIDI ● GE-SFP-LH40-SM1550-BIDI

Note

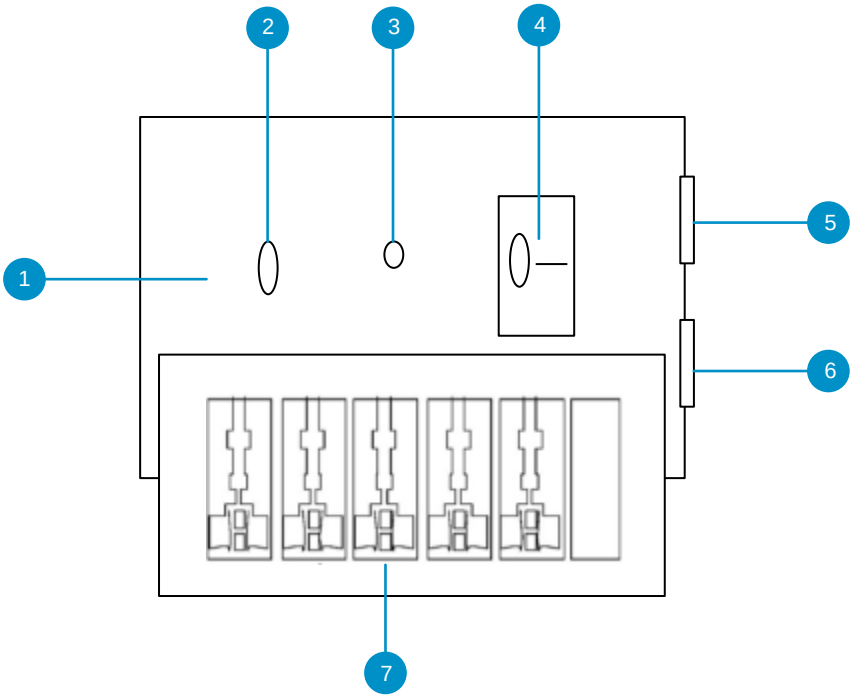
BiDi optical transceivers must be used in pairs. For example, if GE-SFP-LX20-SM1310-BIDI is used at one end, then GE-SFP-LX20-SM1550-BIDI must be used at the other end.

6.3 Surge Protection

6.3.1 Installing an AC Power Lightning Arrester

When an AC power cord from outdoors is directly plugged into the power port of the equipment, the AC power connector must be connected to an external surge protector power strip to protect the equipment against lightning strikes. The surge protector power strip can be fixed on the rack, workbench, or wall in the equipment room by using cable ties and screws. AC power enters the equipment through the surge protector power strip.

Figure 6-4 Installing an AC Power Lightning Arrester



No.	Description
1	Installed electronic circuit board
2	Normally running indicator: When the indicator is green, the circuit is working properly. Otherwise, the protective circuit is damaged.
3	Grounding and polarity detection indicator: If the indicator is red, cable connection is incorrect (the ground cable is not connected, or the N and L lines are reversely connected). Check your power supply line.
4	Power switch
5	IEC standard socket, which is connected to the power supply in the equipment room through the power cable
6	Overload auto-protector, which can be reset manually
7	Multi-purpose sockets (connected to the power supply of the switch)

Note

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

Precautions:

- Make sure that the PE terminal of the power arrester is well grounded.
- After the AC power plug of the equipment is connected to the socket of the power arrester (lightning resistance socket), the surge protection function is implemented only if the RUN indicator is green and the ALARM indicator is OFF.
- If the indicator on the power arrester is red, check whether it is caused by poor grounding connection or by the reversed connection of the Null and Live lines. The detection method is as follows: 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 is not grounded.

6.3.2 Installing an Ethernet Port Lightning Arrester

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

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

Procedure:

(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 enclosure. The paste position for the Ethernet port arrester should be as close to the grounding terminal of the equipment as possible.

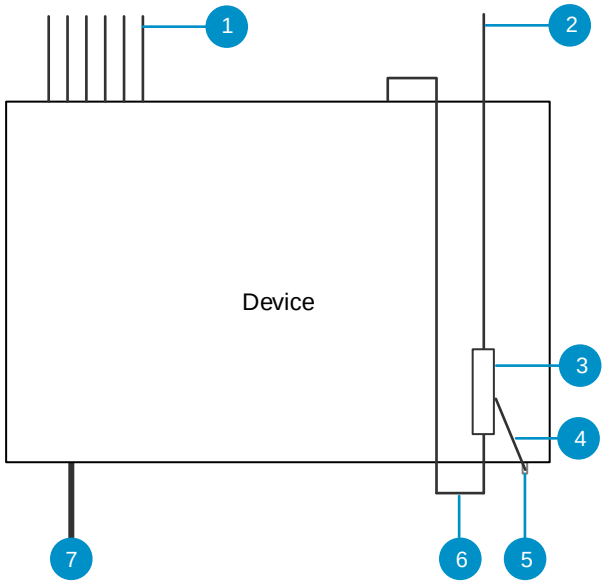
(3) According to the distance between the equipment grounding terminal and the Ethernet port arrester, cut the grounding cable for the Ethernet port arrester and firmly crimp the grounding cable to the grounding terminal of the equipment.

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

(5) 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 equipment is connected to the OUT end) and check whether the service module LED is normal.

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

Figure 6-5 Installing an Ethernet Port Lightning Arrester



No.	Description
1	Ethernet cable for indoor connection
2	Ethernet cable connected to the outdoor
3	RJ45 port arrester (pasted on the enclosure)
4	Ground cable of the arrester
5	Grounding lug of the equipment
6	RJ45 port adapter cable
7	Power input

Note

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

- Pay attention to the following situations during the installation to avoid influencing the performance of the Ethernet port arrester:
- Reversed installation direction of the arrester. Connect the external network cable to the “IN” end and connect the Ethernet port of the equipment to the “OUT” end.
- Poor grounding of the arrester. The grounding cable of the arrester should be as short as possible to ensure that it is in good contact with the grounding terminal of the equipment. Use a multimeter to confirm the contact condition after grounding.
- Incomplete arrester installation. If there is more than one port connected to external power cords, arresters need to be installed on all connection ports for the purpose of surge protection.

6.4 Recommended Cabling

6.4.1 Requirements for the Minimum Bend Radius of an Ethernet Cable

- The bend radius of a fixed power cord, Ethernet 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 bend radius of a fixed high-speed cable (such as SFP+ cable) should be over five times greater than its diameter. The bend radius of the fixed high-speed cable that is often bent or plugged should be over 10 times greater than its diameter.

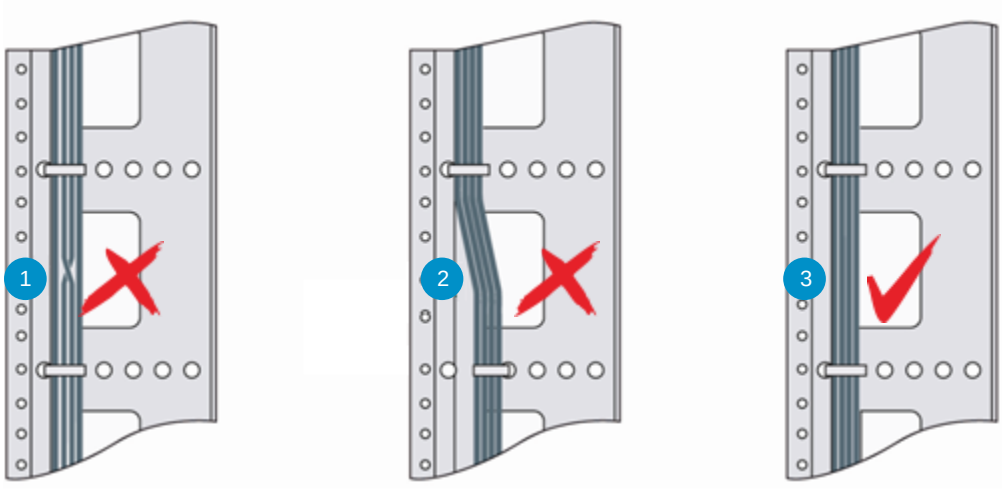
6.4.2 Requirement for the Minimum Bend Radius of an Optical Cable

- When an optical cable is coiled, the diameter of a fiber tray should be over 25 times greater than the diameter 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.
- When an optical cable is laid, the bend radius of the optical cable should be over 10 times greater than the diameter of the optical cable.

6.4.3 Precautions for Bundling up Cables

- 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.

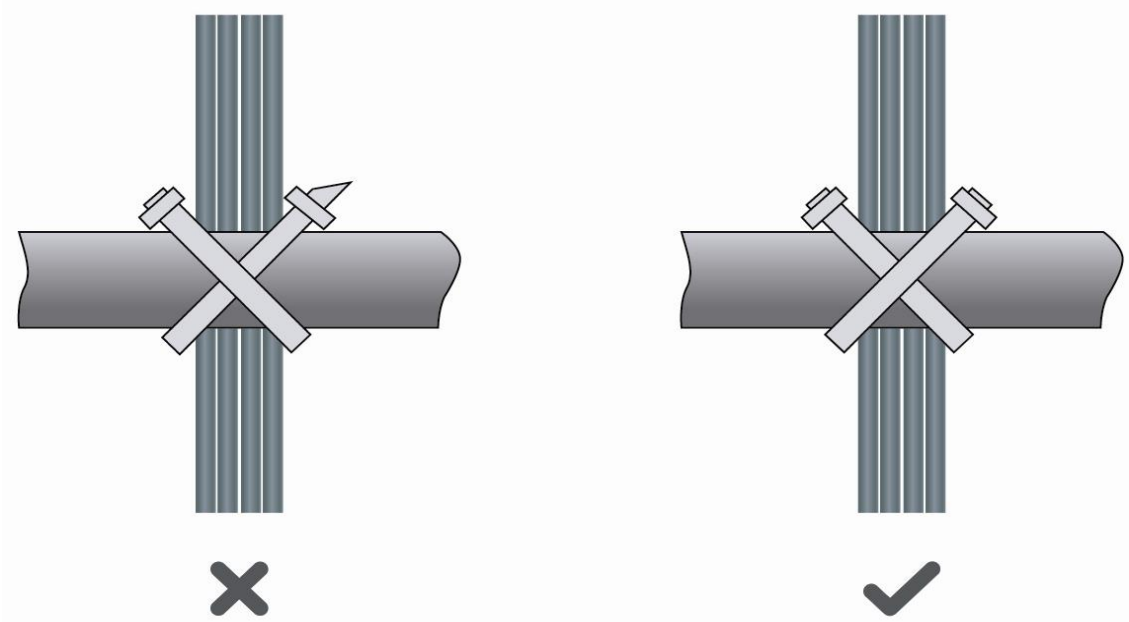
Figure 6-6 Binding Cables (I)



No.	Description
1	In the rack, cables should not be wound up after being bundled.
2	In the rack, cables should not bend after being bundled.
3	In the rack, cables should be neatly and straightly bundled.

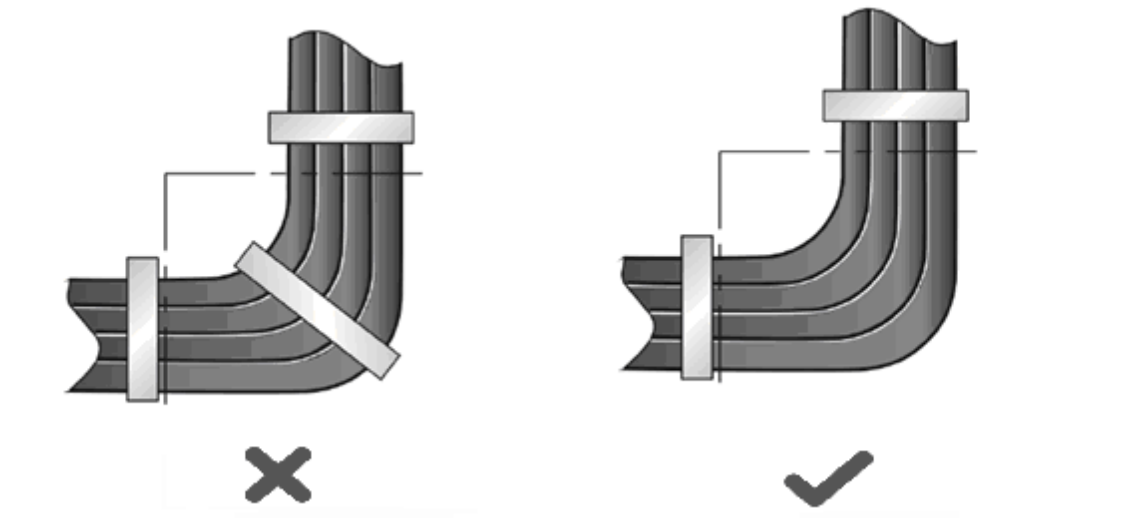
- Cables of different types (such as power cords, signal cables, and ground cables) should be separated in cabling and bundling. Mixed bundling is disallowed. When they are close to each other, you are advised to adopt crossover cabling. In the case of parallel cabling, maintain a minimum distance of 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 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, as shown in Figure 6-7.

Figure 6-7 Binding Cables (II)



- When cables need to be bent, please bundle them up but do not tie them where the cables will be bent, as shown in Figure 6-8.

Figure 6-8 Binding Cables (III)

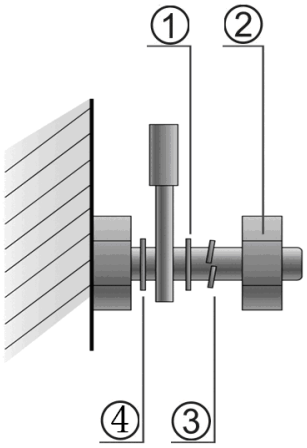


- Cables not to be assembled or remaining parts of cables should be folded and placed in a proper position of the rack or cable trough. The proper position refers to a position that does not affect device running or damage the device or cable.
- Do not bind power cords to the guide rails of moving parts.
- The power cords connecting moving parts such as door grounding cables should be reserved with a margin after being assembled to avoid suffering tension or stress. When 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.

- When screw threads are used to fasten cable terminals, the anchor or screw must be tightly fastened, as shown in Figure 6-9.

Figure 6-9 Cable Fastening



① Flat washer ③ Spring washer

② Screw nut ④ Flat washer

- Hard power cords should be fastened in the terminal connection area to prevent stress on terminal connection 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.
- Bundle up cables by using cable ties.

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.)

- Do not tie cables or bundles in a knot.
- For wiring terminal sockets (such as circuit breakers) with cord end terminals, the metal part of the cord end terminal should not be exposed outside the terminal socket when assembled.

6.5 Site Selection

- The equipment room should be at least 5 km (3.11 miles) 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 (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 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.
- This is a Class A product. The equipment room should be located away from residential areas. Equipment rooms near residential areas should meet construction specifications to avoid noise and radio interference.
- 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 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. Otherwise, the equipment room floor should be 600 mm (23.62 in.) higher than the highest flood level ever recorded.
- Make sure 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 should be up to the standard for 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.