Ruijie Reyee RG-NBF6002M e-Lighten Core 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 below:

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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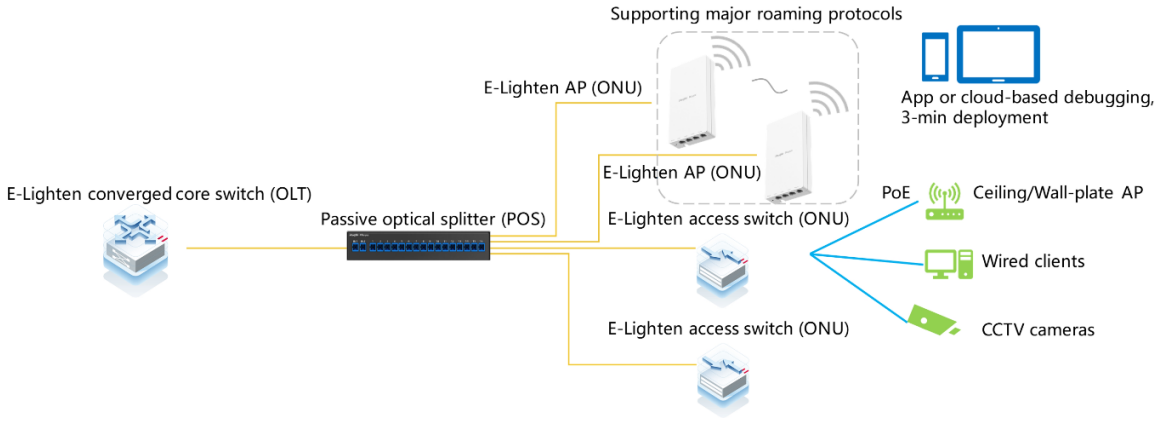
1 Overview

1.1 About the RG-NBF6002M

The Reyee e-Lighten Solution is a network product solution based on existing Ethernet technology integrating PON technology and passive optical splitting features. The components include:

- e-Lighten core switch (OLT): As a core switch, it has the Layer 3 data forwarding capability. It provides PON ports that can be connected to e-Lighten access switches and e-Lighten access points (APs) to achieve data interconnection.
- e-Lighten access switch (ONU): As an access device, the e-Lighten access switch is connected to the PON port in the uplink direction. It can send data to the core switch through the passive optical splitter.
- e-Lighten AP (ONU): An e-Lighten AP is connected to the PON port in the uplink direction, and can send wireless users' Internet access data to the core switch through the passive optical splitter.
- Passive optical distribution network (ODN): The ODN, consisting of passive optical splitters, is connected to the core switch in the uplink direction and to e-Lighten access switches or APs in the downlink direction.

Figure 1-1 Topology Diagram of Reyee e-Lighten Solution



The RG-NBF6002M switch, a core switch (OLT) launched by Ruijie Reyee, is designed for passive all-optical local area networks (LANs). It features an innovative management architecture and is compact, fitting two line cards within a 1U chassis. This switch is capable of supporting a hybrid setup, combining passive optical network (PON) line cards with traditional Ethernet line cards. Powered by Ruijie Reyee's proprietary operating system, the switch is versatile for various applications within small to medium-sized business settings. It is well-suited to meet the demands of ELV campus networks, office spaces, hotels, residential areas, and small to medium-sized enterprises.

Model	Description	Remarks
RG-NBF6002M	Chassis, purchased separately	Mandatory
MF6000M-24GT2XS	Line card, purchased separately	One or two line cards

Model	Description	Remarks
MF6000M-16GT8SFP2XS	Line card, purchased separately	can be configured on the switch.
MF6000M-16FS8GT2XS	Line card, purchased separately	
RG-PA150I-FS	Power module, purchased separately	Supports 1+1 redundancy

1.2 RG-NBF6002M

1.2.1 Package Contents

Note

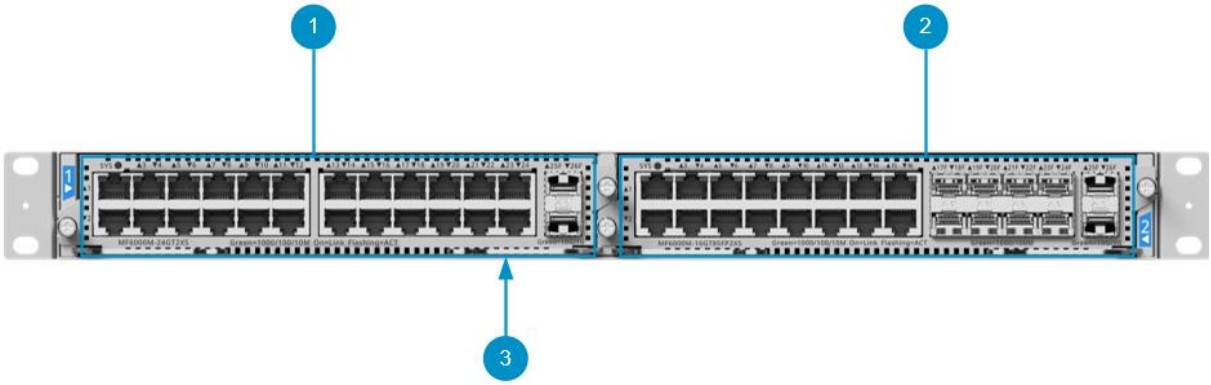
The package contents are subject to the purchase contract, and actual delivery may vary. Please check the items carefully against the package contents or purchase contract. If you have any questions, please contact your distributor.

Table 1-1 Package Contents of the RG-NBF6002M

Item	Quantity
RG-NBF6002M switch	1
Rack-mount bracket	2
Power supply slot faceplate	1
Line card slot faceplate	1
M4 x 10 mm cross recessed countersunk head screw	1
M4 x 8 mm cross recessed countersunk head screws	8
Rubber pad	4
Grounding cable	1
User Manual	1
Warranty Card	1

1.2.2 Product Appearance

Figure 1-2 Front Panel of the RG-NBF6002M (with MF6000M-24GT2XS and MF6000M-16GT8SFP2XS Line Cards)

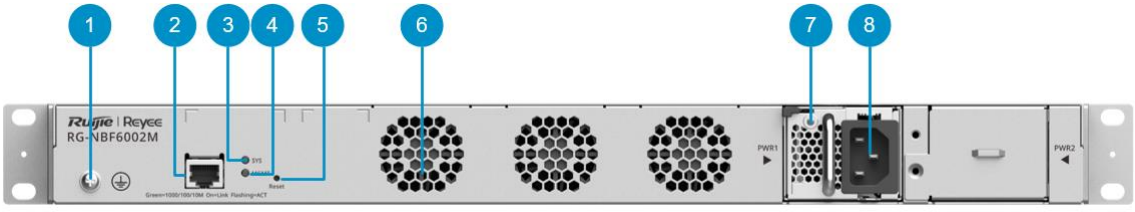


No.	Item	Description
1	Line card slot 1	For installing a line card.
2	Line card slot 1	For installing a line card.
3	Label	Located at the bottom of the device.

Warning

Before moving or transporting the chassis of the RG-NBF6002M series switches, remove the line cards and power modules from the chassis. Do not move or transport the chassis with the line cards and power modules installed.

Figure 1-3 Rear Panel of the RG-NBF6002M



No.	Item	Description
1	Grounding stud	Connects to the grounding cable.
2	Management port	A 10/100/1000BASE-T Ethernet port with an RJ45 connector. Network management port, for device configuration and firmware upgrade.
3	System LED	● Solid green: The device is running properly. ● Blinking green (fast blinking: on for 0.0625s and off for 0.0625s): The

No.	Item	Description
		device is starting up. ● Blinking green (fast blinking: on for 0.25s and off for 0.25s): The device is restored to factory settings. ● Blinking green (slow blinking: on for 2s and off for 0.25s): The device is not connected to Ruijie Cloud. ● Blinking yellow (on for 1s and off for 1s): The device temperature reaches the warning threshold; the temperature cannot be read; there is another non-critical problem; or performance has deteriorated. ● Blinking red (one long blink and one short blink: on for 1s, off for 1s, on for 0.25s, and off for 1.75s): The power supply is faulty; a line card is faulty; a line card conflict occurs; or the line card is hot-swapped. ● Blinking red (one long blink, three short blinks: on for 1s, off for 1s, on for 0.25s, off for 0.25s, on for 0.25s, off for 0.25s, on for 0.25s, off for 1.75s, repeated): The main program is lost or damaged; other hardware faulty has occurred; or a specific function is abnormal. ● Off: The device is not receiving power.
4	Management port LED	A 10/100/1000BASE-T port LED. ● Solid green: A link is set up on the port at a rate of 1000 Mbps. ● Blinking green: A link is set up on the port at a rate of 1000 Mbps, and data is transmitted on the link. ● Off: No link is set up on the port.
5	Reset button	● Press and hold for less than 2s: All modules will be reset. ● Press and hold for more than 5s: All modules will be reset, the initial password will be restored, and the supervisor module will be restored to factory settings and the configuration backup file will be saved. After the supervisor module is restarted, you can choose "**Delete backup**" or "**Restore backup** (with default password)" when logging in to the web interface of the device. If you do not log in to the web interface, the supervisor module is restored to factory settings. ● Press and hold for 2s to 5s: No action is triggered.
6	Fan module	Three fans for system cooling.
7	Power module status LED	PWR1 and PWR2 power module status LED ● Solid green: The power module is normal. ● Solid red: The power module is faulty. ● Off: The system has no power supply.
8	Power module	Two power supply slots: PWR1 and PWR2. ● Install the power modules before connecting the AC power cord. ● Power modules can work in 1+1 redundancy mode.

1.2.3 Hardware Specifications

Table 1-2 Hardware Specifications of the RG-NBF6002M

Parameter Type	Parameter Name	RG-NBF6002M
Product Information	Warranty	5 years
System Specifications	Flash memory	256 MB

	RAM	1 GB
Port Specifications	Total number of RJ45 ports	Determine the quantity based on the type and number of line cards.
	Total number of optical ports	Determine the quantity based on the type and number of line cards.
	Number of 1GE combo ports	Determine the quantity based on the type and number of line cards.
	Number of 10GE combo ports	Determine the quantity based on the type and number of line cards.
	Number of 10/100BASE-T ports	Determine the quantity based on the type and number of line cards.
	Number of 10/100/1000BASE-T ports	Determine the quantity based on the type and number of line cards.
	Number of 10/100/1000/2500BASE-T ports	Determine the quantity based on the type and number of line cards.
	Number of 100/1000/2.5G/5G/10GBASE-T ports	Determine the quantity based on the type and number of line cards.
	Number of 1GE SFP ports	Determine the quantity based on the type and number of line cards.
	Number of 10GE SFP+ ports	Determine the quantity based on the type and number of line cards.
	Number of 100GE SFP ports	Determine the quantity based on the type and number of line cards.
	Number of 2.5GE SFP ports	Determine the quantity based on the type and number of line cards.
	Number of 25GE SFP ports	Determine the quantity based on the type and number of line cards.
	Number of 40GE SFP ports	Determine the quantity based on the type and number of line cards.
	Number of 100M SC ports	Determine the quantity based on the type and number of line cards.
	Number of 1GE SC ports	Determine the quantity based on the type and number of line cards.

	Number of 2.5GE SC ports	Determine the quantity based on the type and number of line cards.
	Maximum number of PON ports	Determine the quantity based on the type and number of line cards.
	Maximum number of PON ports per OLT	32
	Uplink port	Determine the quantity based on the type and number of line cards.
	Module slots	2 line card slots 2 system power module slots
	Ethernet cable type	CAT5e
	LEDs	1 x system status LED 1 x MGMT port LED
	Module slots	2 line card slots 2 system power module slots
	Line Cards	MF6000M-24GT2XS MF6000M -16GT8SFP2XS MF6000M-16FS8GT2XS
Power Supply and Consumption	Power supply	Power module
	Power input	RG-PA150I-FS (AC input): ● 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 (optional) ● Maximum input current: 3 A
	Power output	RG-PA150I-FS： 90 V AC to 264 V AC: 12 V DC (output voltage), 12.5 A (maximum output current)
	Maximum power consumption	126 W
Dimensions and Weight	Product dimensions (W x D x H)	442 mm x 460 mm x 44 mm (17.4 in. x 18.11 in. x 1.73 in.)
	Weight	5.4 kg (11.90 lbs.) (including the empty chassis, without packaging materials)

	Shipping weight	6.62 kg (14.59 lbs.) (including packaging materials and empty chassis)
Environment and Reliability	Fan	3 x fixed fans
	Cooling	Device: Air cooling, front-to-rear airflow Line card: Air cooling, front-to-rear airflow + left-to-rear airflow + right-to-rear airflow Power module: Air cooling, front-to-rear airflow + left-to-rear airflow + right-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	0 m to 5000 m (0 ft. to 16,404.2 ft.)
	Surge protection	Service port: ±6 kV for common mode Power connector: ±6 kV for both common mode and differential mode
	ESD protection	Air discharge: 8 kV Contact discharge: 6 kV
	Acoustic noise	25°C (77°F): 68 dB
	Temperature monitoring	Temperature monitoring
Certification and Regulatory Compliance	Certification	CE

Note

The weight refers exclusively to the chassis. The overall weight of the device varies depending on the installed line cards.

Warning

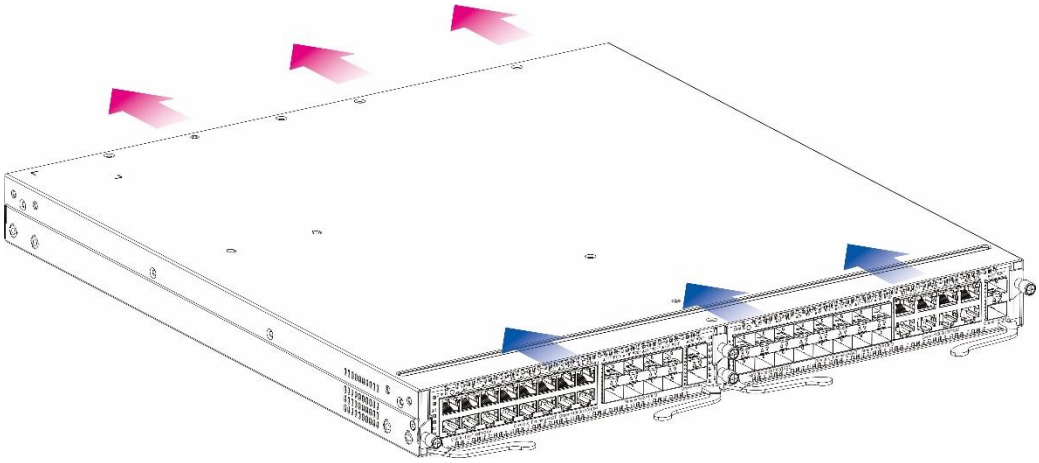
Operation of this equipment in a residential environment could cause radio interference.

Caution

- This equipment is not suitable for use in locations where children are likely to be present.
- The switch has a built-in lithium battery to keep the real-time clock running when external power source is unavailable. To replace the lithium battery, please contact Ruijie Networks Customer Service Technical Support to have it replaced with a lithium battery of the same specifications.
- Replacement of a battery with an incorrect type may cause fire and explosion, or compromise the safety features of the device. Replace the battery only with the same or equivalent type.
- A battery subjected to extremely high temperature and/or low air pressure may result in an explosion or the leakage of flammable liquid or gas.
- Disposal of a battery into a fire or by crushing or puncturing it can result in an explosion.

1.2.4 Cooling

The operating temperature range for the RG-NBF6002M switch is 0°C to 50°C (32°F to 122°F). Its heat dissipation design not only ensures the switch's reliability within this temperature range but also takes into account safety and ease of maintenance. The switch is equipped with fans for forced convection to maintain optimal performance and reliability in the specified operating conditions.



Note

- Blue arrows: The air inlet direction of the line card and the power module.
- Red arrows: The air outlet direction of the line card and the power module.

Line card/power module: The left, right, and front sides of the module are used for air intake, while the rear side is used for air exhaust. The fans draw air outward to create convection for heat dissipation.

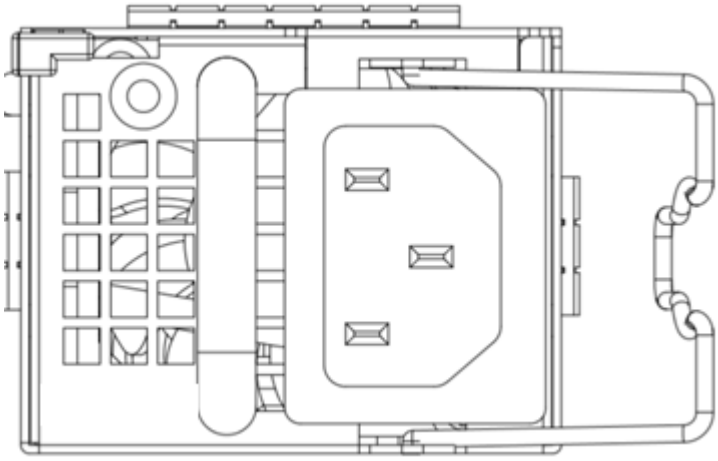
Caution

- Ensure sufficient space around the chassis for air circulation and space for the air intake vent and air exhaust (at least 10 cm). Ensure that there is adequate space around the chassis to allow for air circulation, as well as space for the air intake vent and air exhaust, with a minimum clearance of 10 cm (3.94 in.).
- If a line card slot is not used, install a line card faceplate to the slot. If a power module slot is not used, install a power module faceplate to the slot. Faceplates should be correctly installed to the chassis slots to ensure proper airflow.

1.3 Power Module

1.3.1 Product Appearance

Figure 1-4 Appearance of the RG-PA150I-FS



1.3.2 Hardware Specifications

Table 1-3 Hardware Specifications of the RG-PA150I-FS

Model	RG-PA150I-FS
Rated Voltage Range	100 V to 240 V AC; 50 Hz to 60 Hz
Maximum Voltage Range	90 V to 264 V AC; 47 Hz to 63 Hz
Maximum Output Power	100 V AC to 240 V AC: 150 W
Input Current	≤ 3A @90 V to 264 V AC at full load
Leakage Current	< 3.5 mA @110 V AC and 220 V AC, 50 Hz to 60 Hz
Net Weight	0.55 kg (1.21 lbs.)
Power Cord Specification	10 A

Caution

- When connecting the power cord, ensure to fasten the latch securely to prevent any looseness.
- The power cord should be connected to an output socket which connects to the ground.

- Maximum operating altitude: 5000 m (16404.19 ft.); Maximum storage altitude: 5000 m (16404.19 ft.)

1.4 Line Card

1.4.1 Package Contents

Note

- This package contents applies to all line cards.
- 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 your distributor.

Table 1-4 Package Contents of a Line Card

No.	Item	Quantity
1	Line card	1
2	User Manual	1

1.4.2 Product Appearance

1. Appearance of the MF6000M-24GT2XS

Figure 1-5 Front Panel of the MF6000M-24GT2XS

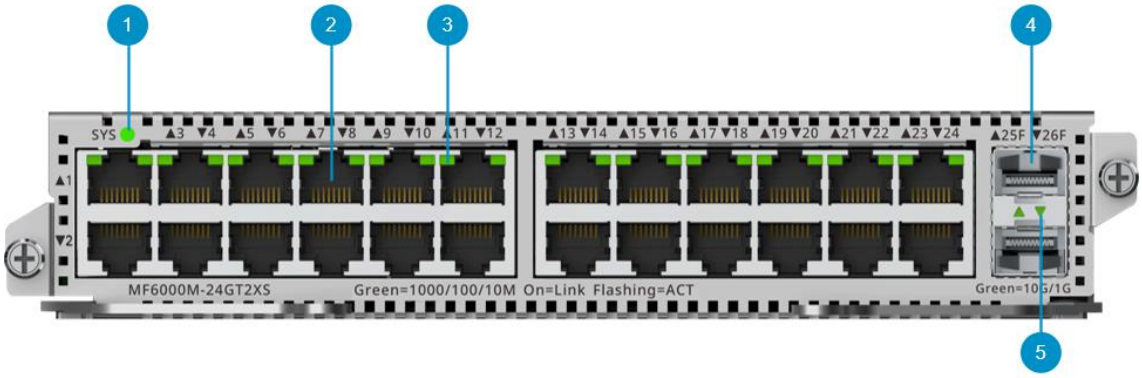


Table 1-5 Components on the Front Panel of the MF6000M-24GT2XS

No.	Component	Description
1	Line card status LED	● Solid green: The line card is running normally. ● Blinking green (high frequency: on for 0.0625s and off for 0.0625s, repeated): The line card is starting up. ● Blinking green (medium frequency: on for 0.25s and off for 0.25s, repeated): The line card is resetting. ● Blinking green (medium frequency: on for 0.0625s and off for 0.0625s, repeated) with red system LED: A line card conflict or hot swapping has

No.	Component	Description
		occurred. ● Off: The system is not receiving power, or is powered on but does not run properly.
2	RJ45 port	24 x 10/100/1000BASE-T ports, with RJ45 connectors.
3	RJ45 port LED	24 x 10/100/1000BASE-T port status LEDs. ● Solid green: A link is set up on the port at a rate of 1000 Mbps. ● Blinking green: A link is set up on the port at a rate of 1000 Mbps, and data is transmitted on the link. ● Off: No link is set up on the port.
4	SFP+ port	2 x SFP+ ports. For supported optical transceivers, see 6.2 SFP and SFP+ Transceiver Modules.
5	SFP+ port LED	2 x SFP+ port status LEDs. ● Solid green: A link is set up on the port. ● Blinking green: A link is set up on the port, and data is transmitted on the link. ● Off: No link is set up on the port.

2. Appearance of the MF6000M-16GT8SFP2XS

Figure 1-6 Front Panel of the MF6000M-16GT8SFP2XS

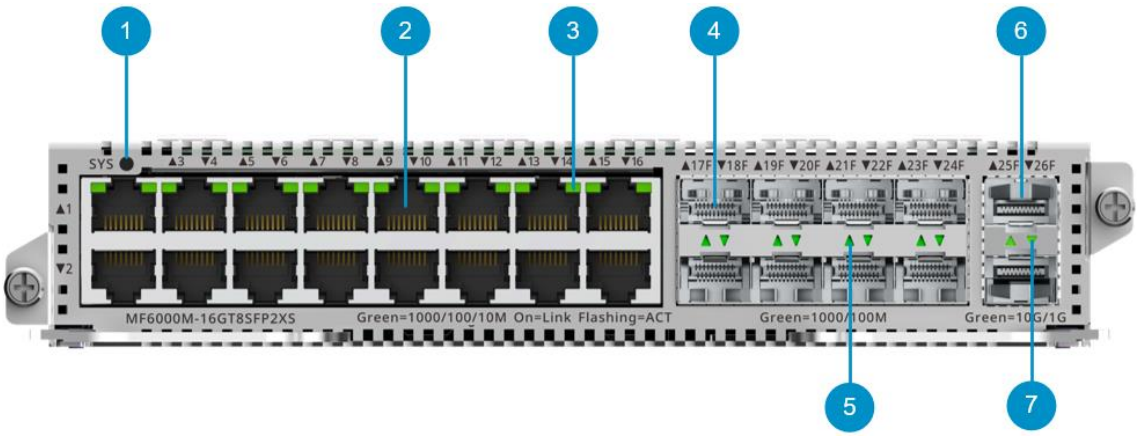


Table 1-6 Components on the Front Panel of the MF6000M-16GT8SFP2XS

No.	Component	Description
1	Line card status LED	● Solid green: The line card is running normally. ● Blinking green (high frequency: on for 0.0625s and off for 0.0625s, repeated): The line card is starting up. ● Blinking green (medium frequency: on for 0.25s and off for 0.25s, repeated): The line card is resetting. ● Blinking green (medium frequency: on for 0.0625s and off for 0.0625s, repeated) with red system LED: A line card conflict or hot swapping has occurred. ● Off: The system is not receiving power, or is powered on but does not

No.	Component	Description
		run properly.
2	RJ45 port	16 x 10/100/1000BASE-T ports, with RJ45 connectors.
3	RJ45 port LED	16 x 10/100/1000BASE-T port status LEDs. ● Solid green: A link is set up on the port at a rate of 1000 Mbps. ● Blinking green: A link is set up on the port at a rate of 1000 Mbps, and data is transmitted on the link. ● Off: No link is set up on the port.
4	SFP port	8 x SFP ports. For supported optical transceivers, see 6.2 SFP and SFP+ Transceiver Modules.
5	SFP port LED	8 x SFP port status LED. ● Solid green: A link is set up on the port. ● Blinking green: A link is set up on the port, and data is transmitted on the link. ● Off: No link is set up on the port.
6	SFP+ port	2 x SFP+ ports. For supported optical transceivers, see 6.2 SFP and SFP+ Transceiver Modules.
7	SFP+ port LED	2 x SFP+ port status LED. ● Solid green: A link is set up on the port. ● Blinking green: A link is set up on the port, and data is transmitted on the link. ● Off: No link is set up on the port.

3. Appearance of the MF6000M-16FS8GT2XS

Figure 1-7 Front Panel of the MF6000M-16FS8GT2XS

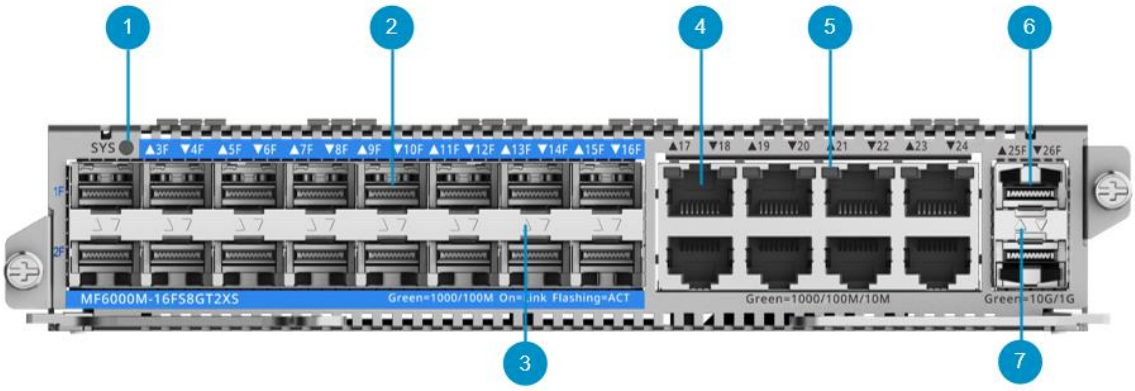


Table 1-7 Components on the Front Panel of the MF6000M-16FS8GT2XS

No.	Component	Description
1	Line card status LED	● Solid green: The line card is running normally. ● Blinking green (high frequency: on for 0.0625s and off for 0.0625s, repeated): The line card is starting up. ● Blinking green (medium frequency: on for 0.25s and off for 0.25s, repeated): The line card is resetting. ● Blinking green (medium frequency: on for 0.0625s and off for 0.0625s, repeated) with red system LED: A line card conflict or hot swapping has occurred. ● Off: The system is not receiving power, or is powered on but does not run properly.
2	SFP/PON port	16 x SFP/PON ports. For supported optical transceivers, see 6.2 SFP and SFP+ Transceiver Modules.
3	SFP/PON port LED	16 x SFP/PON port status LEDs. ● Solid green: A link is set up on the port. ● Blinking green: A link is set up on the port, and data is transmitted on the link. ● Off: No link is set up on the port.
4	RJ45 port	8 x 10/100/1000BASE-T ports, with RJ45 connectors.
5	RJ45 port LED	8 x 10/100/1000BASE-T port status LED. ● Solid green: A link is set up on the port at a rate of 1000 Mbps. ● Blinking green: A link is set up on the port at a rate of 1000 Mbps, and data is transmitted on the link. ● Off: No link is set up on the port.
6	SFP+ port	2 x SFP+ ports. For supported optical transceivers, see 6.2 SFP and SFP+ Transceiver Modules.
7	SFP+ port LED	2 x SFP+ port status LED. ● Solid green: A link is set up on the port. ● Blinking green: A link is set up on the port, and data is transmitted on the link. ● Off: No link is set up on the port.

1.4.3 Hardware Specifications

1. Hardware Specifications of the MF6000M-24GT2XS

Table 1-8 Hardware Specifications of the MF6000M-24GT2XS

Parameter Type	Parameter Name	MF6000M-24GT2XS
Product Information	Warranty	5 years
System Specifications	Flash memory	256 MB
Port Specifications	Total number of RJ45 ports	24

	Total number of optical ports	2
	Number of 10/100/1000BASE-T ports	24
	Number of 10GE SFP+ ports	2
	Uplink port	2 x 10G SFP+ ports
	Ethernet cable type	CAT5e
	LEDs	1 x line card status LED 24 x Ethernet port LEDs 2 x SFP+ port LEDs
	Supported Optical Transceiver and Cable Types	● See. 6.2 SFP and SFP+ Transceiver Modules Copper cables are not supported. ● The supported optical transceiver types may update without prior notification. Please contact Ruijie Networks for details.
Power Supply and Consumption	Module power consumption	20.544 W
Dimensions and Weight	Product dimensions (W x D x H)	224 mm x 172.7 mm x 40.9 mm (8.82 in. x 6.80 in. x 1.61 in.)
	Weight	0.9 kg (1.98 lbs.)
	Shipping weight	1.28 kg (2.82 lbs.) (without packaging materials)
Environment and Reliability	Cooling	See the RG-NBF6002M.
	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	0 m to 5000 m (0 ft. to 16,404.2 ft.)
	Surge protection	Service port: ±6 kV for common mode Power
	ESD protection	Air discharge: 8 kV Contact discharge: 6 kV
	Acoustic noise	25°C (77°F): 68 dB

2. Hardware Specifications of the MF6000M-16GT8SFP2XS

Table 1-9 Hardware Specifications of the MF6000M-16GT8SFP2XS

Parameter Type	Parameter Name	MF6000M-16GT8SFP2XS
Product Information	Warranty	5 years
System Specifications	Flash memory	256 MB

Port Specifications	Total number of RJ45 ports	16
	Total number of optical ports	10
	Number of 10/100/1000BASE-T ports	16
	Number of 1GE SFP ports	8
	Number of 10GE SFP+ ports	2
	Uplink port	2 x 10G SFP+ ports
	Ethernet cable type	CAT5e
	LEDs	1 x line card status LED 16 x Ethernet port LEDs 8 x SFP port LEDs 2 x SFP+ port LEDs
	Supported Optical Transceiver and Cable Types	● See 6.2 SFP and SFP+ Transceiver Modules. Copper cables are not supported. ● The supported module types may update without prior notification. Please contact Ruijie Networks for details.
Power Supply and Consumption	Module power consumption	28.42 W
Dimensions and Weight	Product dimensions (W x D x H)	224 mm x 172.7 mm x 40.9 mm (8.82 in. x 6.80 in. x 1.61 in.)
	Weight	0.9 kg (1.98 lbs.)
	Shipping weight	1.35 kg (2.98 lbs.) (without packaging materials)
Environment and Reliability	Cooling	See the RG-NBF6002M.
	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	0 m to 5000 m (0 ft. to 16,404.2 ft.)
	Surge protection	Service port: ±6 kV for common mode Power
	ESD protection	Air discharge: 8 kV Contact discharge: 6 kV
	Acoustic noise	25°C (77°F): 68 dB

3. Hardware Specifications of the MF6000M-16FS8GT2XS

Table 1-10 Hardware Specifications of the MF6000M-16FS8GT2XS

Parameter Type	Parameter Name	MF6000M-16FS8GT2XS
Product Information	**Warranty**	5 years
System Specifications	**Flash memory**	256 MB
Port Specifications	**Total number of RJ45 ports**	8
	Total number of optical ports	18
	Number of 10/100/1000BASE-T ports	8
	Number of 1GE SFP ports	16
	Number of 10GE SFP+ ports	2
	Maximum number of PON ports	16
	Maximum number of PON ports per OLT	16
	Uplink port	2 x 10G SFP+ ports
	Ethernet cable type	CAT5e
	LEDs	1 x line card status LED 8 x Ethernet port LEDs 16 x SFP/PON port LEDs 2 x SFP+ port LEDs
	Supported Optical Transceiver and Cable Types	● See 6.2 SFP and SFP+ Transceiver Modules. Copper cables are not supported. ● The supported module types may update without prior notification. Please contact Ruijie Networks for details.
Specifications of Applicable Optical Transceivers	**Tx power of the 1G OLT optical transceiver**	3 dBm to 7 dBm
	Rx power of the 1G OLT optical transceiver	–32 dBm to –12 dBm
Power Supply and Consumption	**Module power consumption**	36.42 W
Dimensions and Weight	**Product dimensions (W x D x H)**	224 mm x 172.7 mm x 40.9 mm (8.82 in. x 6.80 in. x 1.61 in.)
	Weight	0.95 kg (2.09 lbs.)
	Shipping weight	1.33 kg (2.93 lbs.) (without packaging materials)
Environment and Reliability	**Cooling**	See the RG-NBF6002M.
	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	0 m to 5000 m (0 ft. to 16,404.2 ft.)
	Surge protection	Service port: ±6 kV for common mode Power
	ESD protection	Air discharge: 8 kV Contact discharge: 6 kV
	Acoustic noise	25°C (77°F): 68 dB

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

- Do not place the equipment in a wet area, and keep it away from liquid. Keep the chassis clean and dust-free.
- Keep the equipment away from heat sources.
- For the equipment that is installed in a cabinet, ensure that the cabinet and power distribution system are properly grounded.
- Do not place the equipment in walking areas.
- During installation and maintenance, do not wear loose clothing, jewelry, or any other objects that may hook onto the chassis.
- Do not place tools and accessories in walking areas.

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.
- Two or more people are required to lift the chassis. Keep balance and prevent personal injuries when lifting or moving the equipment.

2.1.3 Electricity Safety

CAUTION：DOUBLE POLE/NEUTRAL FUSING

Electric shock hazard！The fuse may be in the neutral, and that the mains shall be disconnected to de-energize the phase conductors.

- Observe local regulations and specifications when performing electrical operations. Only qualified personnel should handle these tasks.
- Any improper electrical operation can lead to accidents such as fires or electric shocks, causing severe, or even fatal damage to the human body and the equipment.
- Carefully check the work area for potential hazards, including ungrounded power system, insufficient grounding, and damp or wet ground.
- Direct or indirect touch through a wet object on high-voltage and mains supply can bring a fatal danger.

- Locate the emergency power supply switch in the room before installation. In the case of an accident, cut off the power supply immediately.
- Carefully inspect the equipment and the environment before powering on or off the equipment.
- 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 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, 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 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 products. For the leakage current value of each product model, see the product technical specifications.

2.1.4 Preventing ESD Damage

- Properly ground both the equipment and the installation site.
- Keep the site as dust free as possible.
- Maintain appropriate humidity conditions.
- Before installing or maintaining the equipment, wear an anti-ESD wrist strap and make sure that it is properly grounded.
- Avoid contact between the printed circuit boards and clothing. The anti-ESD wrist strap only protects the printed circuit boards from ESD voltages on the body. ESD voltages on clothing can still cause damage.

2.1.5 Laser Safety

An equipment with an optical port usually supports multiple types of optical transceivers, all of which are Class I laser products. Pay attention to the following during the use of optical transceivers:

- When an optical transceiver is in operation, ensure that its port is connected to an optical fiber or covered by

a dust cap to keep out dust and prevent it from burning your eyes.

- When an optical transceiver is in operation, do not look into its port after removing the optical fiber. Doing so may result in eye injury.

Caution

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

Figure 2-1 Laser Product Warning



2.2 Site Requirements

To ensure the normal operation and prolonged service life of the equipment, it is essential to install it indoors in a location that meets the following requirements.

2.2.1 Floor Loading

Assess the combined weight of the equipment and its accessories, including the cabinet, chassis, and power supply, and verify that the installation site meets the necessary specifications.

2.2.2 Airflow

To ensure that the equipment works properly in the specified environment, a minimum clearance of 100 mm (3.94 in.) must be maintained around the equipment to ensure proper ventilation. Manage the Ethernet cables and power cords using cable ties or cable management brackets to avoid blocking air intakes. You are advised to dust the equipment at an interval of three months to avoid blocking the ventilation openings.

2.2.3 Space

Ensure that indoor pathways are at least 0.8m (31.50 in.) wide to allow for proper chassis handling and module swapping.

Maintain a minimum clearance of 0.4m (15.75 in.) around the equipment for heat dissipation and equipment maintenance.

2.2.4 Temperature and Humidity

For optimal equipment performance and extended service life, it is essential to maintain ambient temperature and humidity conditions. Prolonged exposure to excessively high or low temperature and humidity can potentially cause damage to the equipment.

- When exposed to high relative humidity, insulating materials may exhibit poor insulation capabilities, increasing the risk of electrical leakage. Furthermore, high humidity can cause mechanical changes in materials and corrosion of metallic components.
- When exposed to low relative humidity, the insulating strip may dry out and shrink, increasing the risk of static

electricity generation. This static electricity can pose a danger to the circuits inside the equipment.

- In a dry environment, static electricity is prone to occur and damage the internal circuits of the equipment.
- High temperature environments can be detrimental to the equipment, leading to reduced performance and a shorter service life. Prolonged exposure to elevated temperatures can expedite the equipment's aging process.

Note

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

2.2.5 Cleanliness

Dust poses a major threat to the running of the equipment. The buildup of dust on the equipment can result in static electricity, causing poor contact between the metallic joints. Dust buildup is more likely to occur in environments with low relative humidity, which not only impacts the service life of the equipment but also increases the likelihood of communication failure. The following table shows the specifications for dust concentration and particle size in the equipment room.

Table 2-1 Requirements for Dust

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

Apart from dust, the salt, acid, and sulfide in the air of the machine room must also meet strict requirements. These harmful substances will accelerate metal corrosion and component aging. Therefore, the machine 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 limits 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" indicates the typical level of exposure over a one-week period. "Maximum" refers to the highest allowable exposure level within a week, with this level being sustainable for no more than 30 minutes per day.

2.2.6 Grounding

A proper grounding system is crucial for ensuring stable and reliable operation of the equipment, as well as preventing lightning strikes and interference. To ensure proper grounding, carefully check the grounding conditions at the installation site according to the grounding specifications, and complete grounding properly based on the actual situation.

- Safety Grounding

Ensure that the installation site and power distribution system are securely grounded if the equipment uses the AC power supply. Failure to do so may result in an increased risk of electric shock, particularly when the insulation resistance between the power module and the chassis decreases.

⚠ Caution

- Adopt grounding protection connections in buildings so that the equipment can be connected to the protective grounding system.
- Verify that the AC socket is reliably connected to the protective grounding system of the building. If not, a protective grounding wire should be used to connect the protective grounding lug of the AC socket to the protective grounding system of the building.
- The cross-sectional area of the protective grounding wire should be at least 0.75 mm^2 (18 AWG).

- Lightning Grounding

The lightning protection system of facilities is standalone, and is composed of a lightning rod, a down conductor, and a connector connected to the grounding system. The grounding system is usually used for power reference grounding and safety grounding of the installation site. Lightning grounding is required only for facilities and is not required for the equipment.

- EMC Grounding

Grounding required for electromagnetic compatibility 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, and the grounding terminals of the rack should be grounded before the running of the equipment.

2.2.7 Anti-Electromagnetic Interference

- Take effective measures to prevent interference from power grid to the power supply system.
- Keep the equipment 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 high-power radio transmitting stations and radar launchers.
- Take electromagnetic shielding measures when necessary.

2.2.8 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 equipment, the AC power port must be connected to an external lightning protection power strip to protect the equipment against lightning strokes. Connect the mains supply AC power cord to the lightning protection

power strip, and then connect the equipment to the lightning protection power strip. This prevents high-voltage lightning from directly passing through the equipment over the mains supply AC power cord.

Note

- The lightning protection power strip is not delivered with the equipment. Purchase it as required.
- For details on how to use the lightning protection power strip, see the related user guide.

2.2.9 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 electromagnetic radiation or conduction, 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. Conduction 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 sensitive component. Conduction 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.

- Take interference prevention measures for the power supply system.
- Keep the equipment 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 high-power radio transmitting stations and radar launchers.
- Take electromagnetic shielding measures when necessary.

2.2.10 Installation Site

Regardless of whether the equipment is installed in a rack, on a workbench or on a wall, the following conditions must be met:

- Maintain a proper clearance around air vents for heat dissipation.
- The equipment is equipped with fans to draw air from front and left and right sides to rear. Maintain a minimum clearance of 150 mm (5.91 in.) around the ventilation openings for heat dissipation. Install the equipment in a standard 19-inch rack, or place it on a clean workbench. In hot areas, air-conditioning is recommended.
- The installation site has good cooling and ventilation.
- The installation site is sturdy enough to support the weight of the equipment and its accessories.
- The installation site is properly grounded.

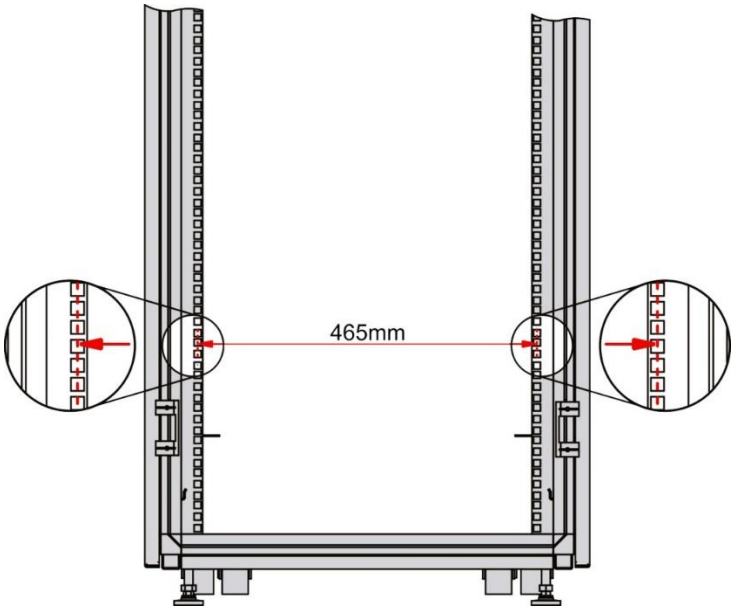
2.3 Rack Requirements

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

(1) Use a four-post 19-inch cabinet.

(2) The left and right square-hole rack posts are 465 mm (18.31 in.) apart.

Figure 2-2 19-Inch Rack



(3) 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.).

(4) The guide rails can bear the weight of the equipment and its accessories.

(5) The cabinet has a reliable grounding terminal for the chassis to connect to earth ground.

(6) The cabinet 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, and cable ties
Special Tools	Anti-ESD gloves, wire stripper, crimping plier, RJ45 crimping plier, and wire cutter
Meters	Multimeter

Note

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

3 Installing the Device

> **Caution**
>
> Before installing the device, ensure that guidelines and requirements in Chapter 2 have been met.

3.1 Installation Precautions

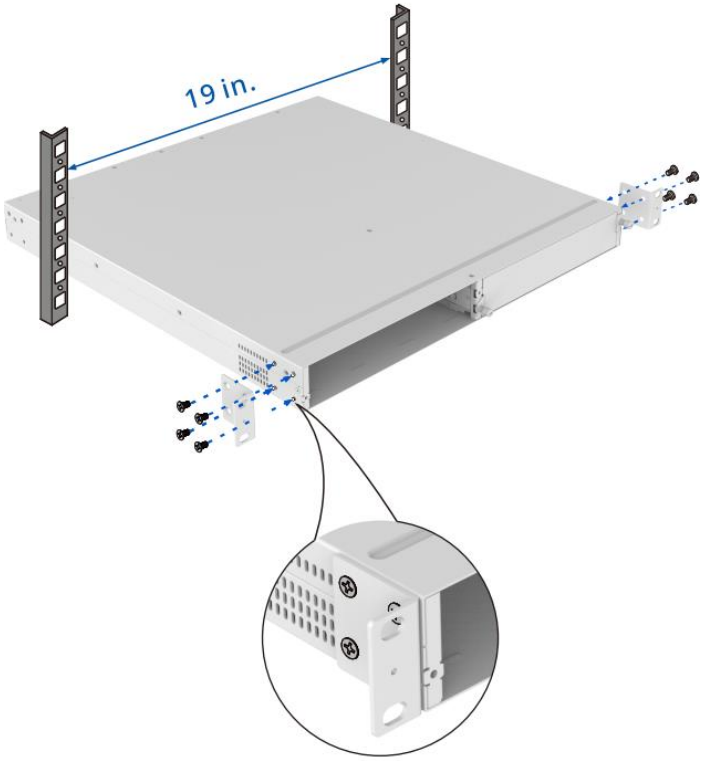
- Pay attention to the following points during installation:
- Connect the power cords of different colors to the corresponding cable terminals.
- Ensure that the connector of the power cord is properly seated in the power port of the device.
- Do not place any objects on the device.
- Maintain a minimum clearance of 100 mm (3.94 in.) around the device to ensure proper airflow. Do not stack switches.
- Keep the device away from high-power radio transmitting stations, radar transmitting stations, and high-frequency high-current devices. If necessary, use electromagnetic shielding methods, such as electromagnetic shielding for interface cables.
- Manage Ethernet cables with a distance of 100 meters (328.08 feet) indoors. Take lightning protection measures if they need to be routed outdoors.

3.2 Installing the Device

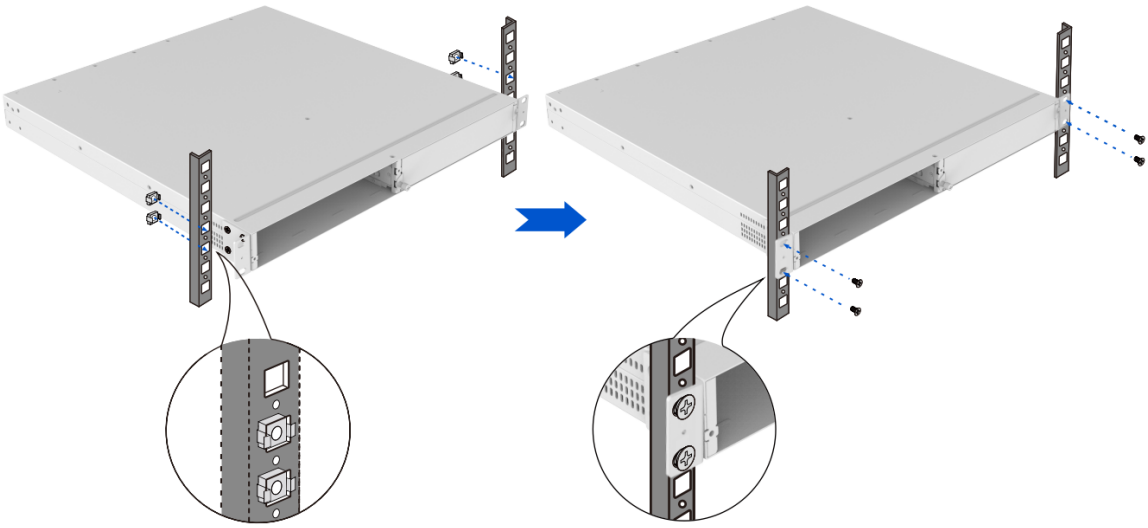
3.2.1 Install the Device in the Rack

The device meets the EIA standard, and can be installed in a standard 19-inch rack.

(1) Use eight M4 x 8 mm screws to fix the mounting brackets to the left and right sides of the device.



(2) Place the device horizontally in the rack, and secure it to the rack using the M6 screws and cage nuts (customer supplied).



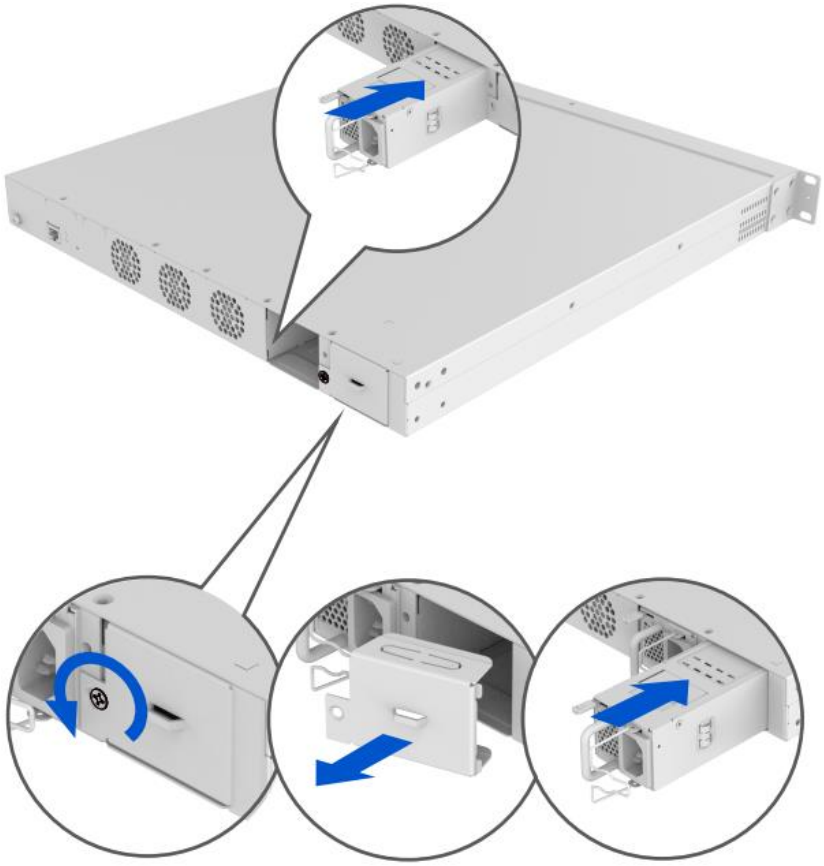
3.3 Installing and Removing a Power Module

3.3.1 Installing a Power Module

(1) Unpack the power module, and verify that the power input specifications meet requirements.

(2) Remove the power supply slot faceplate. The plane with the power module label is the top side. Hold the handle of the power module with one hand and hold the bottom of the power module with the other hand. Slowly insert the power module along the guide rail until it is fully inserted into the chassis and you hear a click. Ensure that the power module is in good contact with the power module slot.

Figure 3-1 Installing the RG-PA150I-FS Power Module



Warning

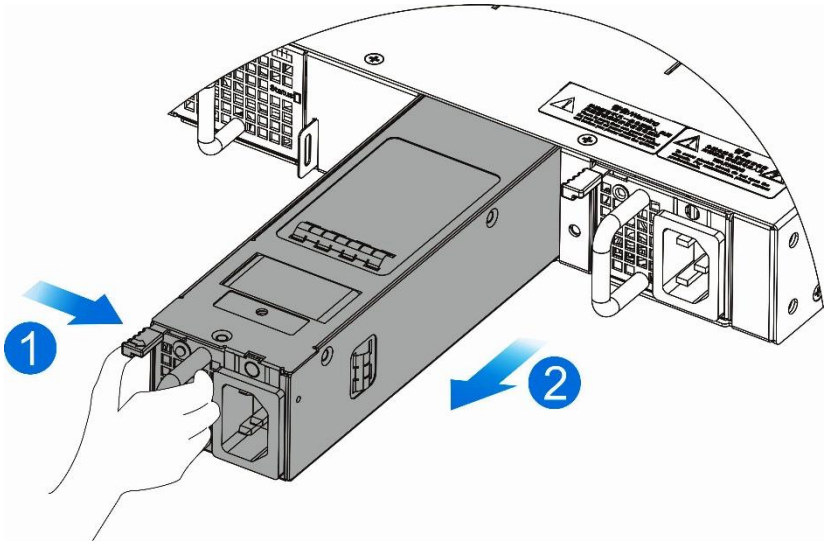
- Before installing a power module, ensure that the power switch of the power module is off, and the power cord is not connected to the power socket of the power module. Otherwise, it may cause electric shock to the operator or damage the device.
- When inserting the power module, apply a gentle force and insert it smoothly. If it is difficult to insert the power module in place, do not apply too much force. Instead, remove the power module, align it with the opening on the rear panel of the device, and then insert it again. Otherwise, the power module may be damaged.

3.3.2 Removing a Power Module

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

(2) Install the power supply slot faceplate in the power module slot and put the removed power module into its package.

Figure 3-2 Removing the RG-PA150I-FS Power Module



Warning

- Before removing the power module, make sure that the power cord of the corresponding power module is not connected to the power outlet of the power module. Otherwise, it may cause electric shock to the operator or damage the device.
- When removing the power module, apply a gentle force and ensure that the power module is smoothly removed. If it is difficult to remove the power module, do not apply too much force. Check whether the power module is aligned with the opening edge on the rear panel of the device. Otherwise, the power module may be damaged.
- Install a faceplate or a power module in the unused power supply slot.

3.4 Installing and Removing a Line Card

For the list of supported line cards, see Line Card.

Note

In this section, the line card is installed without power supply.

3.4.1 Installing a Line Card

When installing a line card, wear an ESD wrist strap. The metal part of the ESD wrist strap should be in full contact with your skin. For safety reasons, do not touch any components on the line card.

Caution

- Do not hold the edges of the printed circuit board or touch any components on the board.
- When inserting or removing a line card, use the ejector levers on both sides of the faceplate.

1. Select a Line Card Slot

Line cards can be installed in any line card slot of the device. If you want to replace a line card or install an existing line card in another line card slot, you need to reset the device first. Before installing a line card, remove the faceplate of the corresponding slot.

2. Installing a Line Card

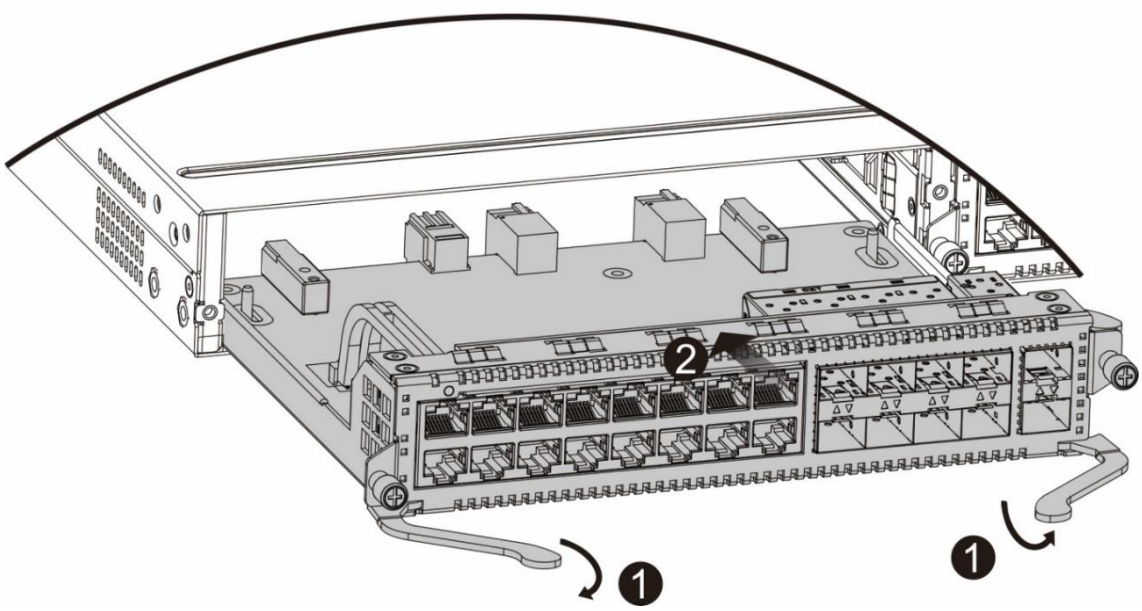
Procedure:

(1) (Optional) Remove the faceplate.

(2) Open the ejector lever of the line card to be installed (as marked by 1 in the following figure).

(3) Align the line card with the guide rail in the slot, and gently push the line card into the slot horizontally (as marked by 2 in the following figure).

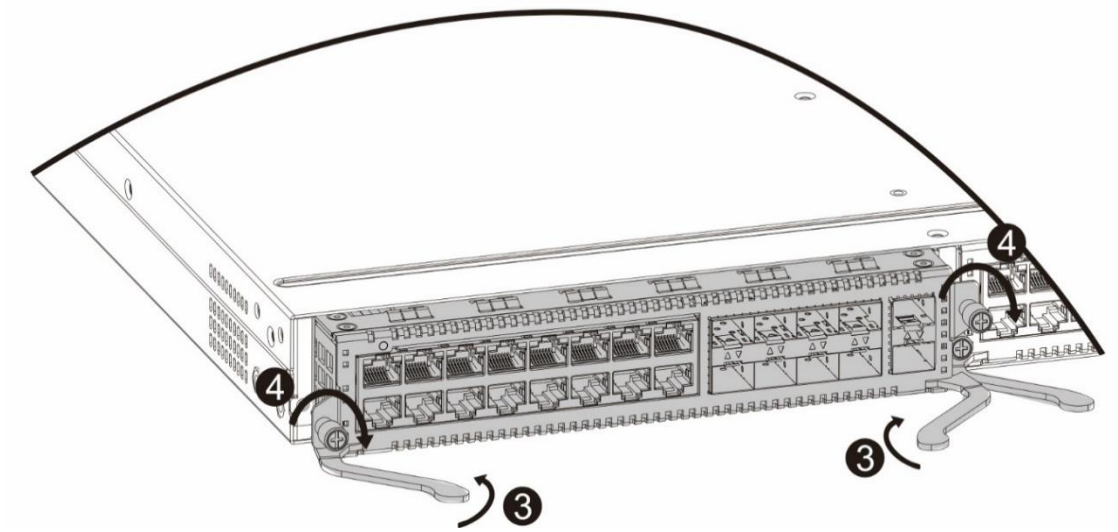
Figure 3-3 Installing the RG-NBF6002M Line Card — 1



(4) Push the ejector levers inward (as marked by 3 in the following figure);

(5) Tighten the captive screws at both ends of the faceplate (as marked by 4 in the following figure);

Figure 3-4 Installing the RG-NBF6002M Line Card — 2



Warning

When performing steps (2), (3), and (4), apply a gentle force and insert the line card smoothly. If it is difficult to push the line card, do not apply too much force. Instead, remove the line card and check whether the line card is aligned with the opening edge of the line card slot on the front panel of the device before proceeding. Otherwise, the line card may be damaged.

3.4.2 Removing a Line Card

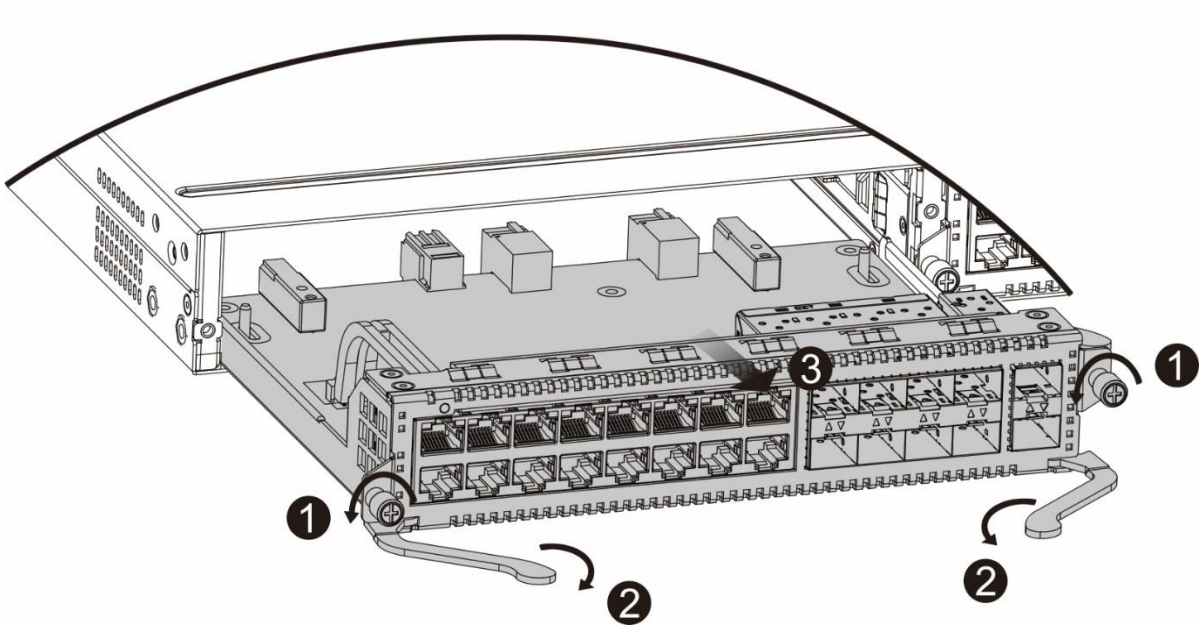
Procedure:

(1) Use a screwdriver to loosen the captive screws (as marked by 1 in the following figure) of the line card.

(2) Push the ejector levers on both sides of the line card outward (as marked by 2 in the following figure).

(3) Remove the line card horizontally (as marked by 3 in the figure below) and place it in the line card package.

Figure 3-5 Removing the RG-NBF6002M Line Card



Caution

- Line cards do not support hot swapping. Before removing a line card, power off the device first.
- After the line card is removed, if you do not need to install a new line card, install a faceplate to prevent dust from entering and to ensure normal ventilation of the device.

Warning

When removing the line card, keep a certain distance from the aisle of the work room to prevent passers-by from knocking off the removed line card or to avoid accidents due to the collision during the removal process.

3.4.3 Troubleshooting a Line Card

If the installed line card does not work properly, check the following points:

- Check whether Ethernet cables of the line card are correct.
- Observe each port LED of the line card to check whether the line card is working properly.
- Connect your PC to the MGMT port of the switch, and check whether the line card is configured correctly and works properly.

3.4.4 Connecting the Grounding Cable

Warning

- To avoid personal injury and device damage, connect the switch to earth ground properly.
- The resistance between the switch chassis and the ground must be less than 1 Ω.
- The O&M personnel should check whether the AC outlet is properly connected to the protective ground of the building. If not, the O&M personnel should use a protective earth conductor from the AC outlet protective earth lug to the building protective earth.
- The power socket should be installed near the device and should be easily accessible.

- During device installation, connect the grounding cable first and disconnect it last.
- The cross-sectional area of a protective grounding cable should be at least 2.5 mm^2 (12 AWG).

A proper grounding system is crucial for ensuring stable and reliable operation, as well as preventing lightning strikes and interference.

- The grounding wire must be a good conductor with a cross-sectional area determined by the maximum current load.
- Do not use bare wire.
- To ensure personal and device safety, the switch must be properly grounded. The resistance between the switch chassis and the ground must be less than 1 Ω.

Procedure:

(1) Remove the grounding lug at the back of the device.

(2) Use the removed grounding lug to secure one end of the grounding cable to the chassis. Similarly, connect the other end of the grounding cable to the rack grounding cable or the equipment room grounding bar.

3.5 Connecting the Power Cable

Warning

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

Procedure:

(1) Ensure that the circuit breaker switch on the power supply side is off. Plug one end of the power cord that comes with the device into the power outlet on the rear panel of the chassis and the other end into the AC power outlet.

(2) Turn on the circuit breaker on the power supply side.

(3) Check whether the power LED on the front panel of the device is on. If the LED is on, the power supply is connected correctly.

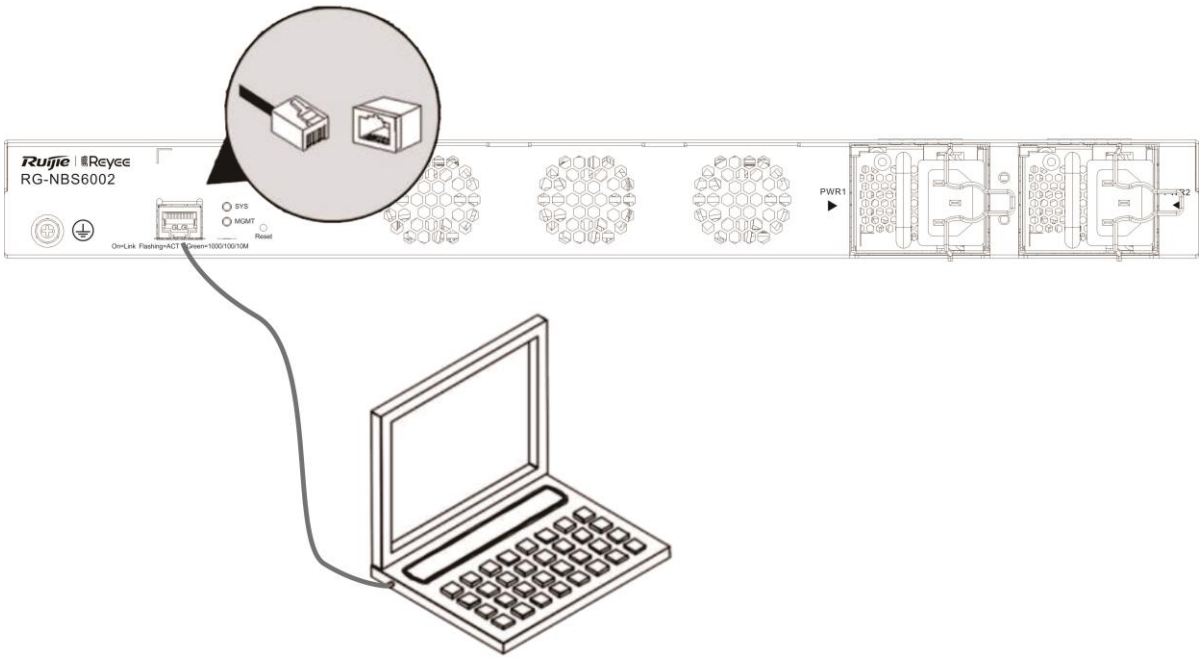
3.6 Checklist After Installation

- The device is securely installed.
- The power cord meets the requirements.
- The rack is properly grounded.
- The device is correctly connected to the terminal or other equipment.
- The power cord is long enough to avoid over-extension.

4 Log In to the Web Interface

(1) Connect your PC to the MGMT port of the device using an Ethernet cable, as shown in the following figure.

Figure 4-1 Setting Up the Configuration Environment



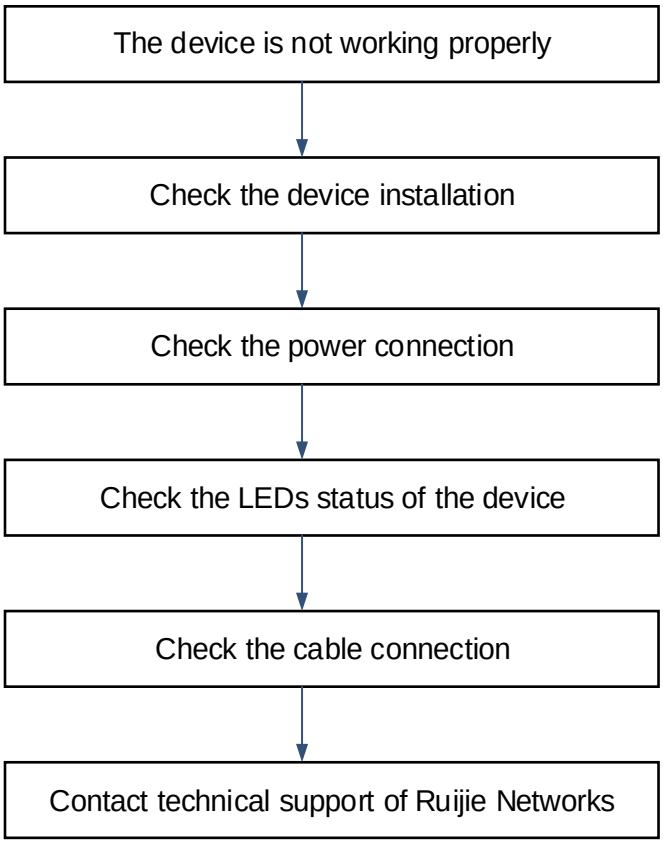
(2) Configure your PC with an IP address on the network of 10.44.77.XXX (Range: 1 to 254, excluding 200).

(3) Open a browser on the PC and enter 10.44.77.200 to log in to the system configuration page. (The default password is **admin** when you log in to the device for the first time. To ensure security, you are advised to change the password after login, and update the password regularly.)

(4) Perform device debugging based on service requirements.

5 Troubleshooting

5.1 Troubleshooting Flowchart



5.1 Common Faults

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 sending/receiving error occurs.	The twisted pair cable is not connected properly. The cable length exceeds 100 m (328.08 feet). 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 switch.

	and does not use the same work mode as the interconnected switch.	
An optical port cannot be connected.	The receiving and transmitting ends are connected incorrectly. The types of the interconnected optical transceivers do not match. The optical cable type does not meet requirements. The length of the optical cable length is beyond the allowed length marked on the optical transceiver. The optical cable or optical connector is contaminated.	Exchange the transmitting and receiving ends of the optical cable. Replace the optical transceiver with another one of the same type. Replace the optical cable with a qualified one. Use an optical cable with the required length. Use a clean cloth or a cleaning pen to clean the end face.

6 Appendix

6.1 Ports, Connectors, and Media

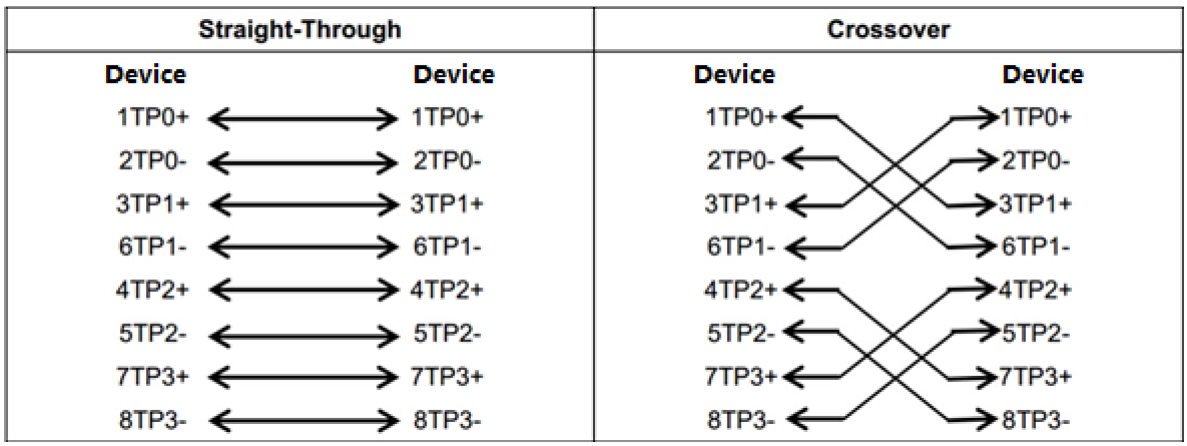
6.1.1 1000BASE-T/100BASE-TX/10BASE-T Ports

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



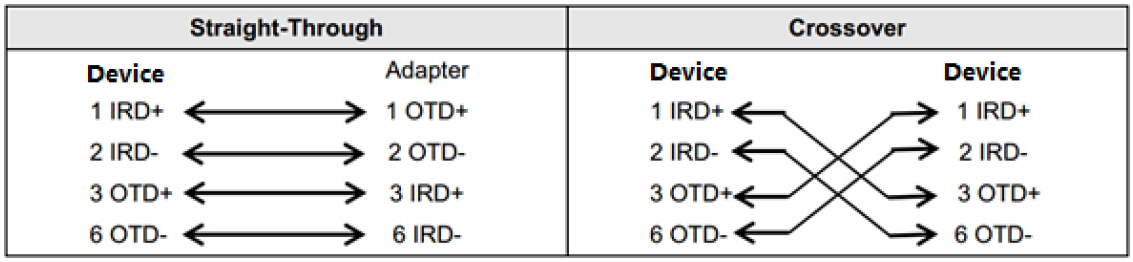
100BASE-TX/10BASE-T ports can be interconnected using cables of the preceding specifications. In addition, a 10BASE-T port can be connected using 100-ohm Category 3, Category 4, and Category 5 cables, while a 100BASE-TX port can be connected using 100-ohm Category 5 cables, and supports a maximum distance 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



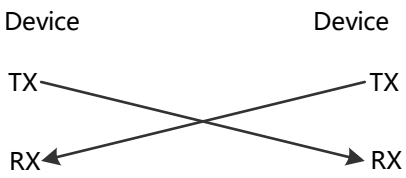
6.1.2 SFP Ports and SFP+ Ports

SFP ports and SFP+ ports require optical transceivers or Ethernet transceivers.

- Optical transceivers for SFP and SFP+ ports use LC connectors and connect to the peer end via an optical cable.
- SFP Ethernet transceivers use RJ45 connectors and connect to the remote end via an Ethernet cable.

Select either single-mode or multi-mode optical cables depending on the optical transceiver type. Figure 6-3 shows the optical cable connection. Note that the TX on the local end should connect to the RX on the peer end, and the RX on the local end should connect to the TX on the peer end.

Figure 6-3 Optical Cable Connections

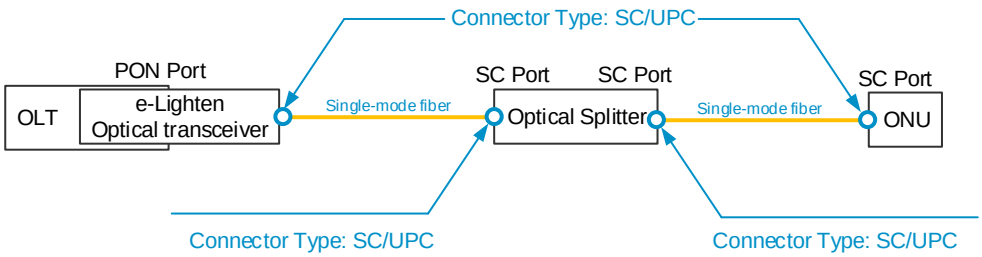


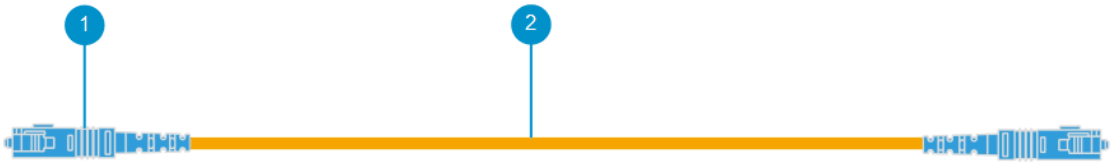
6.1.3 PON Ports and SC Ports

Figure 6-4 shows the PON ports and SC ports on equipment in Ruijie Reyee e-Lighten Optical Solution.

- PON ports on the OLT require e-Lighten optical transceivers with SC/UPC connectors, which are connected to an optical splitter using single-mode fiber.
- SC ports on optical splitters and ONUs use SC/UPC connectors, and are interconnected using single-mode fiber.

Figure 6-4 PON Port and SC Port Connections





No	Description
1	SC/UPC connector
2	Single-mode fiber

6.2 SFP and SFP+ Transceiver Modules

We provide SFP and SFP+ transceiver modules according to the port types. You can select the module to suit your specific needs. An SFP transceiver module can be a 1GE optical transceiver or Ethernet transceiver (Mini-GBIC-GT), while an SFP+ transceiver module is a 10GE optical transceiver. The following models and technical specifications of some SFP and SFP+ transceiver modules are listed for your reference.

6.2.1 SFP Transceiver Modules

Table 6-2 Models and Specifications of SFP Optical Transceiver Modules

Model	Wavelength (nm)	Optical Cable Type	DDM (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
SFP-MM850	850	MMF	No	–9.5	–3	–17	0

Model	Wavelength (nm)	Optical Cable Type	DDM (Yes/No)	Transmit Power (dBm)		Receive Power (dBm)	
				Min.	Max.	Min.	Max.
SFP-SM1310	1310	SMF	No	–9.5	–3	–20	–3
GE-SFP-ZX	850	MMF	Yes	–9.5	–3	–17	0
GE-SX-MM850	850	MMF	Yes	–9.5	–3	–17	0
GE-LX-SM1310	1310	SMF	Yes	–9	–3	–20	–3
SFP-S4-R1000P1 v1	1310	SMF	Yes	–9	–3	–20	–3

Table 6-3 SFP Ethernet Transceiver Modules

Standard	SFP Media Converter	DDM (Yes/No)
1000BASE-T	Mini-GBIC-GT	No

Table 6-4 SFP Module Cabling Specifications

Model	Connector Type	Optical Cable Type	Core Specifications (μm)	Max. Cabling Distance
MINI-GBIC-SX-MM850	LC	MMF	62.5/125	275 m (902.23 ft.)
			50/125	550 m (1804.46 ft.)
MINI-GBIC-LX-SM1310	LC	SMF	9/125	10 km (32,808.4 ft.)
MINI-GBIC-LH40-SM1310	LC	SMF	9/125	40 km (131,233.6 ft.)
GE-SFP-LX20-SM1310-BIDI	LC	SMF	9/125	20 km (65,616.8 ft.)
GE-SFP-LX20-SM1550-BIDI	LC	SMF	9/125	20 km (65,616.8 ft.)
GE-SFP-LH40-SM1310-BIDI	LC	SMF	9/125	40 km (131,233.6 ft.)
GE-SFP-LH40-SM1550-BIDI	LC	SMF	9/125	40 km (131,233.6 ft.)
MINI-GBIC-ZX80-SM1550	LC	SMF	9/125	80 km (262,467.2 ft.)
SFP-MM850	LC	MMF	50/125	500 m (1640.42 ft.)
SFP-SM1310	LC	SMF	9/125	10 km (32,808.4 ft.)
GE-SFP-ZX	LC	MMF	50/125	550 m (1804.46 ft.)
GE-SX-MM850	LC	MMF	50/125	550 m (1804.46 ft.)

Model	Connector Type	Optical Cable Type	Core Specifications (μm)	Max. Cabling Distance
GE-LX-SM1310	LC	SMF	9/125	10 km (32,808.4 ft.)
SFP-S4-R1000P1 v1	LC	SMF	9/125	10 km (32,808.4 ft.)
Mini-GBIC-GT	RJ45 Ethernet cable	Cat 5 (or higher) UTP or STP		100 m (328.08 ft.)
GE-SFP-GT	RJ45 Ethernet cable	Cat 5 (or higher) UTP or STP		100 m (328.08 ft.)
SFP-GT	RJ45 Ethernet cable	Cat 5 (or higher) UTP or STP		100 m (328.08 ft.)

Caution

- For optical transceivers with a cabling distance equal to or greater than 40 km (131,233.6 ft.), install an optical attenuator to avoid overload on the optical receiver when using short-distance SMF optical cables.
- An optical transceiver is a laser transmitter. Do not look directly into the optical transceiver to prevent it from burning your eyes.
- To keep the optical transceiver clean, ensure that the unused ports remain capped.

Figure 6-5 BIDI Module Pairing Models

Rate/Distance	Pairing Model
1000 Mbps/20 km (65616.80 ft.)	GE-SFP-LX20-SM1310-BIDI GE-SFP-LX20-SM1550-BIDI
1000 Mbps/40 km (131233.60 ft.)	GE-SFP-LH40-SM1310-BIDI GE-SFP-LH40-SM1550-BIDI

Caution

The BIDI modules must be used in pairs. For example, if you install the GE-SFP-LX20-SM1310-BIDI on one end, you must install the GE-SFP-LX20-SM1550-BIDI on the other end.

6.2.2 SFP+ Transceiver Modules

Table 6-5 Models and Specifications of SFP+ Optical Transceiver Modules

Model	Wavelength (nm)	Optical Cable Type	DDM (Yes/No)	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
SFP+SM1310	1310	Yes	SMF	–8.2	0.5	–14.4	0.5
XG-SFP-LR-SM1310	1310	Yes	SMF	–8.2	0.5	–14.4	0.5
XG-eSFP-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
SFP-S4-R1000P1 v2	1310	Yes	SMF	–8.2	0.5	–14.4	0.5
SFP-S1-R1000P1	1310	Yes	SMF	–8.2	0.5	–14.4	0.5
SFP+1310	1310	Yes	SMF	–8.2	0.5	–14.4	0.5
SFP-M3-R1000P1	850	Yes	MMF	–7.3	–1	–11.1	–1
HSFP-XG-SFP-LR-SM1310	1310	Yes	SMF	–8.2	0.5	–14.4	0.5
XG-SFP-SR-MM850-I	850	Yes	MMF	–7.3	–1	–9.9	–1
XG-SFP-LR-SM1310-I	1310	Yes	SMF	–8.2	0.5	–14.4	0.5

Table 6-6 Models of SFP+ Active Optical Cable Modules

Model	Module Type	Connector Type	Copper Cable Length	Conductor Diameter (AWG)	Rate (Gbps)	DDM (Yes/No)
XG-SFP-AOC1M	Active	SFP+	1 m (3.28 ft.)	N/A	10.3125	Yes
XG-SFP-AOC3M	Active	SFP+	3 m (9.84 ft.)	N/A	10.3125	Yes
XG-SFP-AOC5M	Active	SFP+	5 m (16.40 ft.)	N/A	10.3125	Yes
XG-SFP-AOC10M	Active	SFP+	10 m (32.81 ft.)	N/A	10.3125	Yes

Note

- SFP+ module types and models are subject to change without prior notice. For any updates about the optical transceivers, contact Ruijie Networks marketing or technical support personnel.
- The DDM function of AOC cables does not report the transmit power. The transmit power is displayed as N/A.

Table 6-7 SFP+ Module Cabling Specifications

Model	Connector Type	Optical Cable Type	Core Specifications (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 (32,808.4 ft.)
SFP+SM1310	LC	SMF	9/125	N/A	10 km (32,808.4 ft.)
XG-SFP-ER-SM1550	LC	SMF	9/125	N/A	40 km (131,233.6 ft.)
XG-SFP-ZR-SM1550	LC	SMF	9/125	N/A	80 km (262,467.2 ft.)

Model	Connector Type	Optical Cable Type	Core Specifications (μm)	Modal Bandwidth (MHz•km)	Max. Cabling Distance
SFP-S4-R1000P1 v2	LC	SMF	9/125	N/A	10 km (32,808.4 ft.)
SFP-S1-R1000P1	LC	SMF	9/125	N/A	10 km (32,808.4 ft.)
SFP+1310 SFP-M3-R1000P1	LC LC	SMF MMF	9/125	N/A	10 km (32,808.4 ft.)
			50/125	2000 (OM3)	300 m (984.25 ft.)
HSFP-XG-SFP-LR-SM1310	LC	SMF	9/125	N/A	10 km (32,808.4 ft.)
XG-SFP-SR-MM850-I	LC	MMF	50/125	2000 (OM3)	300 m (984.25 ft.)
XG-SFP-LR-SM1310-I	LC	SMF	9/125	N/A	10 km (32,808.4 ft.)

Table 6-8 Models and Specifications of e-Lighten Optical Transceivers

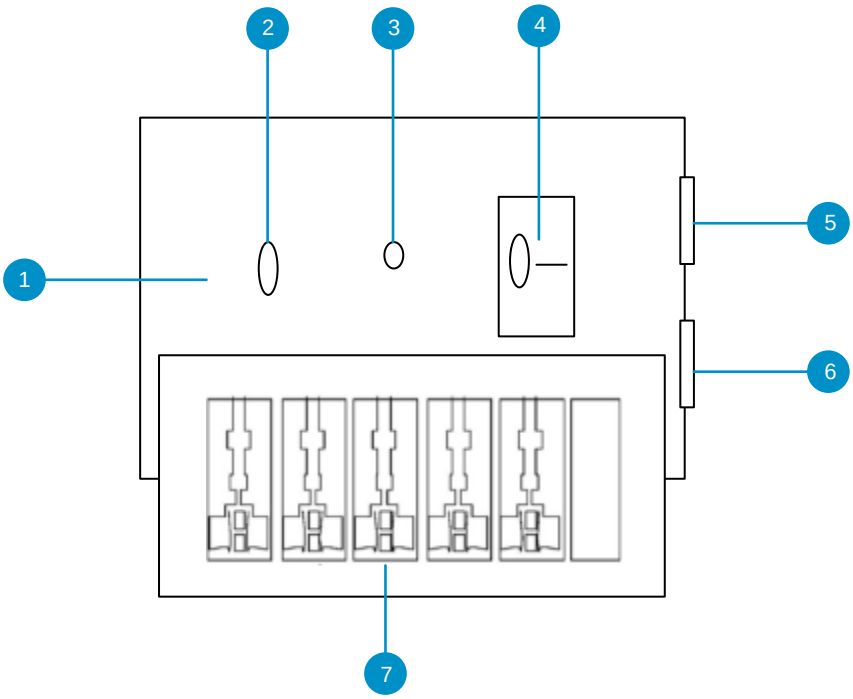
Model	Wavelength (nm)	Optical Cable Type	DDM (Yes/No)	Transmit Power (dBm)		Receive Power (dBm)	
				Min	Max	Min	Max
OM-GE-SFP-10KM-SM1490	1490/1310	Yes	SMF	3	7	–32	–12

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 6-6 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.

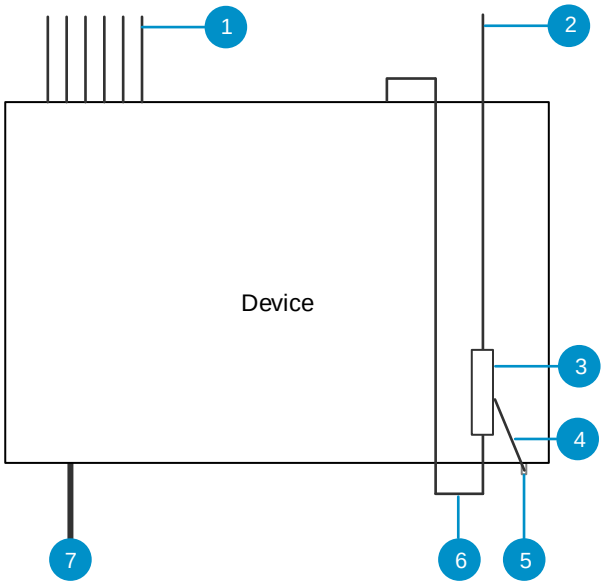
(3) According to the distance between the equipment grounding terminal and the Ethernet port arrester, cut the grounding cable for the Ethernet port arrester and firmly crimp the grounding cable to the grounding terminal of the equipment.

(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 6-7 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

When the device is installed in a standard 19-inch rack, route the cables through the cable management brackets. Top cabling or bottom cabling is adopted according to the actual situation in the equipment room. All conversion connectors should be placed at the bottom of the rack instead of outside the rack that is easily accessible. Power cords are routed beside the cabinet, and top cabling or bottom cabling is adopted according to the actual situation in the equipment room, such as the locations of the DC power distribution box, AC power socket, or surge protection box.

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.

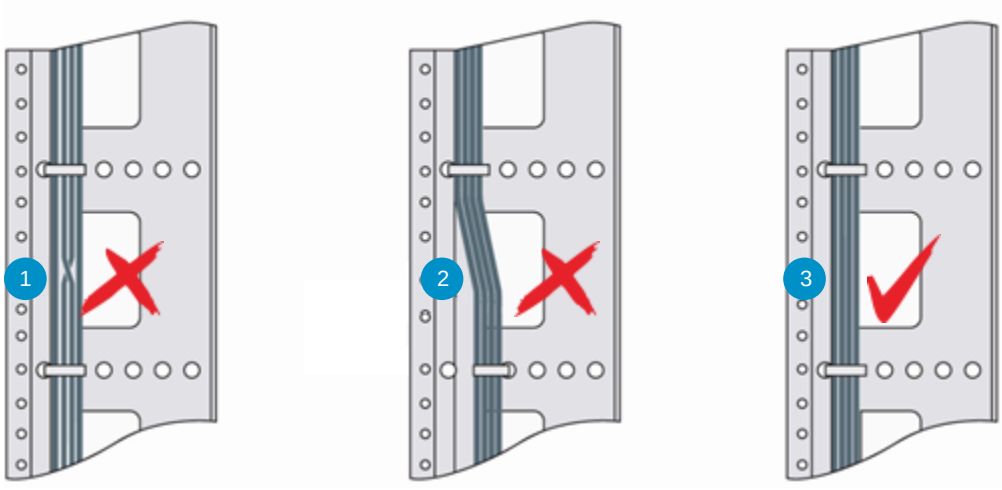
6.4.2 Requirement for the Minimum Bend Radius of an Optical Cable

- 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 6-8.

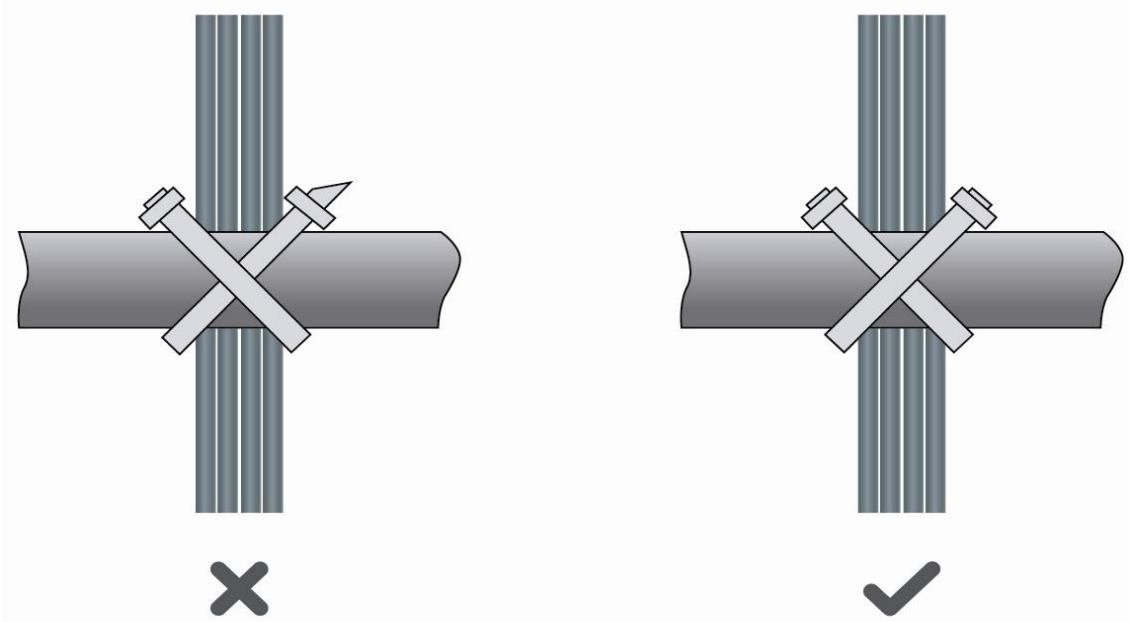
Figure 6-8 Binding Cables (I)



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.

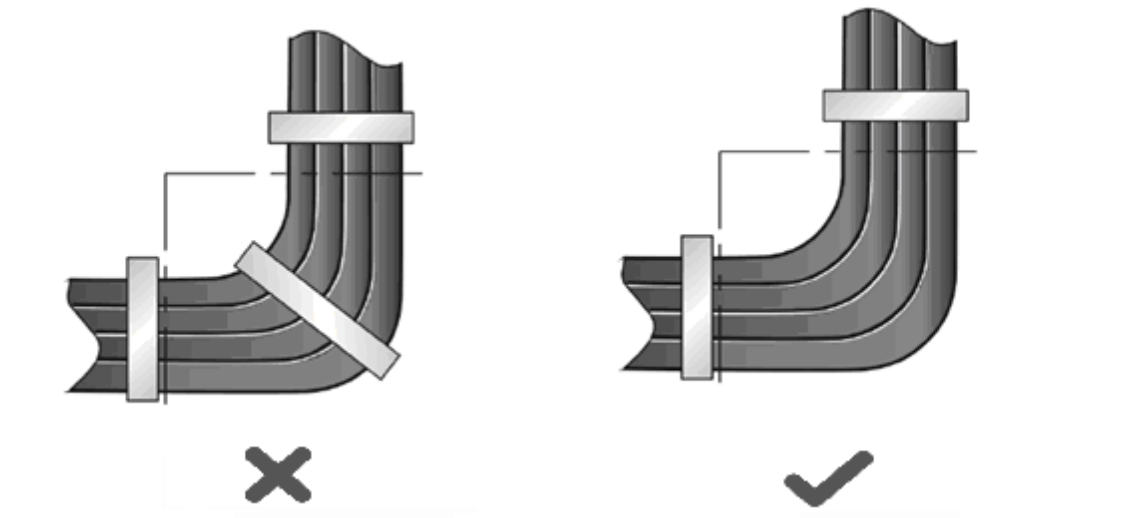
- Cables of different types (such as power cords, signal cables, and ground cables) should be separated in cabling and bundling. Mixed bundling is disallowed. When they are close to each other, you are advised to adopt crossover cabling. In the case of parallel cabling, maintain a minimum distance of 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 6-9.

Figure 6-9 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 6-10.

Figure 6-10 Binding Cables (III)

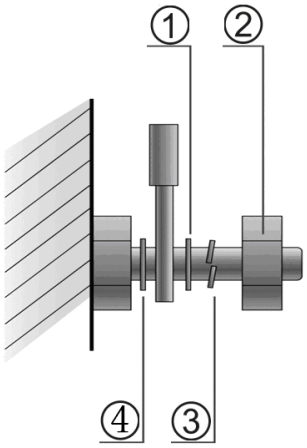


- Cables not to be assembled or remaining parts of cables should be folded and placed in a proper position of the rack or cable trough. The proper position refers to a position that does not affect device running or damage the device or cable.
- Do not bind power cords to the guide rails of moving parts.
- 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 6-11.

Figure 6-11 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.
- The equipment room should be firm enough to withstand severe weather conditions such as windstorm and heavy rain as well as away from dust. If the dust is unavoidable, keep the door and window away from the pollution source.
- The equipment room should be away from the residential area. Otherwise, the equipment room should meet the construction standard in terms of noise.
- Make sure 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.

6.6 Cleaning the Connectors and End Faces of Optical Cables

To ensure a good connection between a patch cable and an optical cable coupler, the cleanliness of the end face is a quite important factor, as it directly affects the communication quality of the optical network. In the daily construction of optical networks, however, improper operations or other reasons can easily contaminate the end face. When the end face accumulates dust, oil stains, and other dirt, if it is not detected and cleaned before connection, it will cause increased optical attenuation, leading to optical network failures. What's worse, it may even result in the collapse of the entire optical signal system. The following are common methods for cleaning connectors and end faces:

- Using fiber-optic cleaning pens

Fiber-optic cleaning pens, also known as one-click fiber-optic cleaners, typically use anti-static resin materials, lint-free cleaning tip, and cleaning solution to ensure the product remains free from dust contamination. Available in 1.25 mm and 2.5 mm sizes, these pens are suitable for cleaning SC, FC, LC connectors, and more. Select an appropriate cleaning pen for the connector to be cleaned, and gently insert the pen into the connector. To prevent ferrule damage, avoid excessive pressure when you insert the cleaning pen. Press inward gently until you hear a "click", indicating the end face has been cleaned. If necessary, repeat the process 2 to 3 times for thorough cleaning. Finally, remove the pen to complete the cleaning process.

- Using fiber-optic cleaning boxes or lint-free cloths
  - Made from high-density textile fibers, fiber-optic cleaning boxes do not need alcohol, do not produce static electricity, and are lint-free. In addition, fiber-optic cleaning boxes offer a convenient way for cleaning various optical cable connectors, including SC, FC, LC, and ST connectors.
  - To use the cleaning box, grip it with one hand and press it to reveal the clean cleaning belt core. Gently swipe the optical cable ferrule to be cleaned across the cleaning belt several times to remove dirt from the end face. To prevent ferrule damage, avoid excessive pressure when you swipe the optical cable ferrule.