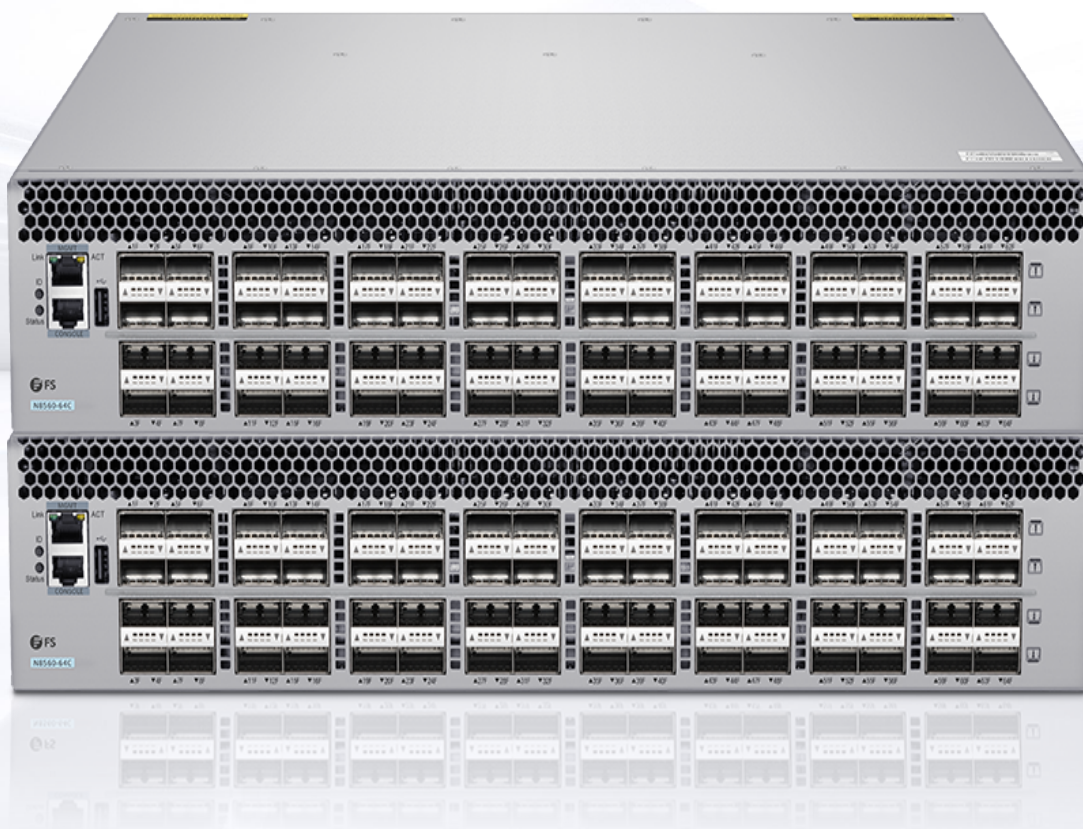# N8560-64C
Switch Hardware Installation and Maintenance Guide

V1.0.2306A

Preface

Audience：

This document is intended for network engineers responsible for N8560-64Cswitch installation and maintenance. You should have experience in network device installation and maintenance.

Feature Statement：

Please visit the FS.COM Technical Documents page to download the datasheet and obtain information on the specifications supported by the product.

Safety Statement：

- To avoid harm to people and equipment, please read the safety recommendations in the Safety Precautions for FS Switches before installing the FS Switch.
- Verify that the requirements described in the Safety Precautions for FS Switches have been met.

Contents

1. Hardware Installation and Parts Replacement

2. Troubleshooting After Installation

Hardware Installation and Parts Replacement

N8560-64C switch is a new generation of high-density 40G/100G port access switch developed by FS.COM for data centers, supporting 40G/100G access, low latency, and complete data center features. 64 100G ports is available on a single N8560 -64C switch.

1.1 Installation Procedure

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Installation Preparation  →  Installing a Switch  →  Installing Modules
                                                            ↓
End  ←  System Commissioning  ←  Post-Installation Checks  ←  Connecting a Switch
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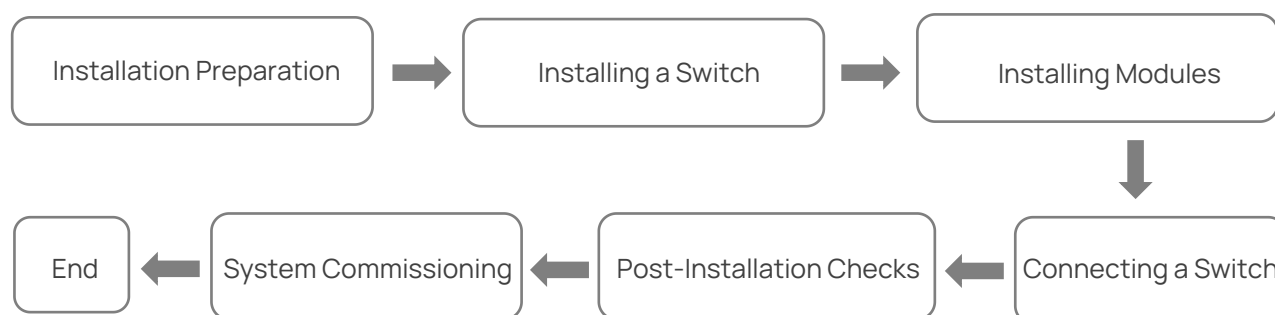
1.2 Installation Preparation

The N8560-64C switch is a relatively complex device, and the installation location, networking method, power supply and alignment of the device should be carefully planned and arranged before installation.

Confirm the following before installation:

- The installation site provides sufficient space for heat dissipation.
- The installation site meets the temperature and humidity requirements of the switch.
- The power supply and required current are available in the installation site.
- The Ethernet cables have been deployed in the installation site.

1.2.1 Checking the Installation Site

The N8560-64C switch must be used indoors. To ensure normal operations and long service life of the device, the installation site must meet the following requirements.

Item	Requirement
Cleanliness	The device must be installed in a clean, dry, and well ventilated standard equipment room with controllable temperature.
Dust proofing	Dustproof measures must be taken in the site. Dust will cause electrostatic discharges on the chassis and affect connections of metal connectors and joints. This shortens service life of the device and may cause failures of the device.
Temperature and humidity	The equipment room must be free from leaking or dripping water, heavy dew, and damp. The temperature and humidity in the installation site must be within specifications. For the operating temperature and relative humidity ranges required by the device, see the device specifications. If the relative humidity exceeds 70%, using dehumidifiers or dehumidifying air conditioners is recommended.
Corrosive gases avoidance	The installation site must be free from acidic, alkaline, or corrosive gases.

1.2.2 Mounting the Cabinet or Rack

When mounting the cabinet, please note the following:

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

- The installed cabinet is not movable after installation.

- The installed cabinet is vertical to the ground.

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

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

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

- Filler panels are installed in empty slots.

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

- The switch is securely installed, and the screws on the panel should be fastened tightly.

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

- An anti-static wrist strap should be provided in the cabinet.

Procedure:
1. Plan the available space before installing the cabinet. Maintain a clearance before the front and back doors for maintenance and operation.

2. Install and fasten the cabinet in the specified site as planned.

3. Install the cable troughs and cables.

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

1.2.3 Checking the Power Conditions

- Before use, please check whether there is obvious damage to the power supply shell and whether the power supply is defective such as abnormal noise.

- The device is only allowed to be plugged into the power module that accompanies the device, otherwise it may lead to unknown risks.

- Power module in 1+1 backup can be hot-swapped one of them, need to ensure that the other power module on the equipment is in the power supply state when replaced, otherwise unplugging the power module will cause the switch to lose power, resulting in business interruption.

- Prohibit the mixed use of power modules with different power and different cooling methods.

1.2.4 Preparing Installation Tools and Accessories

Common Tools	Phillips screwdriver, Ethernet and optical cables, cage nuts, diagonal pliers and cable ties
Special Tools	Anti-static gloves, wire stripper, crimping plier, RJ45 connector crimping plier, and wire cutter
Cleaning Tools	Dust-free paper and fiber end-face microscope
Meters	Multimeter, bit error rate tester (BERT), and optical power meter

- The N8560-64C switch is delivered without a tool kit. You need to prepare a tool kit by yourself.

1.3 Installing a Switch

Precautions:

Before installing the switch in a cabinet, please check whether the racks are properly positioned. If the racks are too close to the front door of the cabinet, you may not be able to close the front door after plugging in the Ethernet and fiber cables . The front panel of the switch should be at least 10mm (0.39 in.) away from the front door of the cabinet. Please confirm the following before installing the switch:

- The cabinet is secured.

- The modules in the cabinet are installed.

- There are no obstructions in and around the cabinet.

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

1.3.1 Mounting the Switch in a Cabinet or Rack

Mounting the Brackets：

1. Take out the two L-shaped brackets and eight M4 x 8 mm screws from the packing materials.

2. Attach a bracket to each side of the switch and secure the brackets with the provided screws.
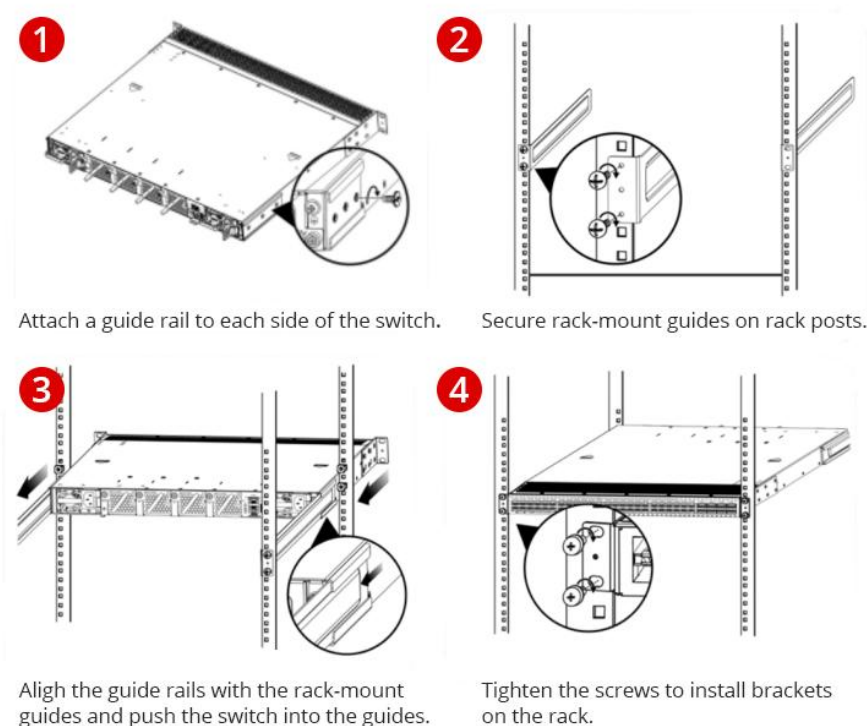
Figure 1: Mounting the Brackets

Right

Left
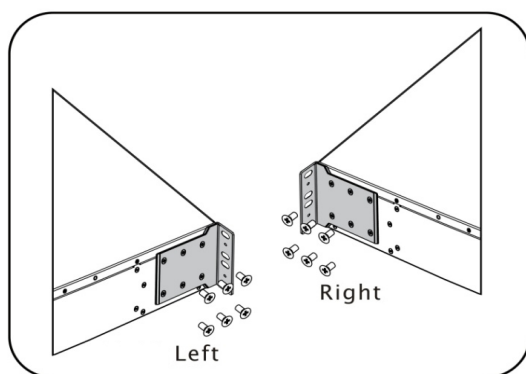
Mounting the Switch in a Rack：

The N8560-64C switch can be installed in a standard 19-inch four-post EIA rack. Mount the switch on the rack with the front panel facing forward. You are advised to use a tray to install the switch and secure the tray on the rack, or use the rack-mount guides to secure the switch.

Figure 2: Mounting the Switch in a Rack

① Attach a guide rail to each side of the switch.

② Secure rack-mount guides on rack posts.

③ Aligh the guide rails with the rack-mount guides and push the switch into the guides.

**④** Tighten the screws to install brackets on the rack.

- Install a mounting bracket by driving four screws into the four among the six screw holes on each side of the panel.

- Distinguish left and right rack-mount guides according to the marked orientation.

- The rack-mount guides are only applicable for a rack with a depth ranging from 800mm (31.50 in.) to 1200mm (47.24 in.).

1.3.2 Mounting the Switch on a Workbench

In most cases, users do not have a standard 19-inch rack. Therefore, the most common method is to place the switch on a clean workbench. This operation is relatively simple, and the specific installation process is as follows:

1. Attach four rubber pads to the four corners on the switch bottom.

2. Place the switch on the workbench to allow for adequate airflow.

Figure 3: Mounting the Switch on a Workbench

Attach four rubber pads to four corners on the switch bottom.

Place the switch on a workbench.
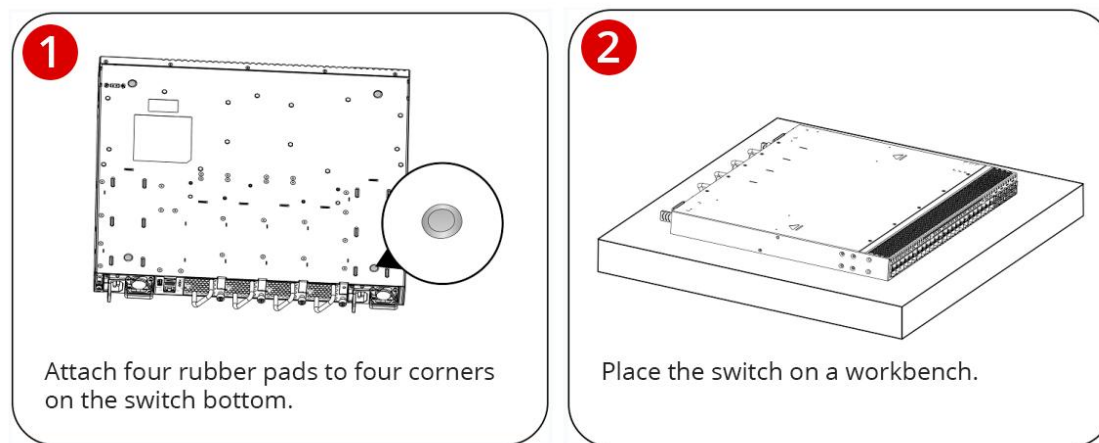
1.4 Installing Modules

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

1.4.1 Installing Fan Modules

1. Take a fan module from its packing materials.

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

3. Tighten the captive screws to secure the fan module in the chassis.

Figure 4: Installing a Fan Module
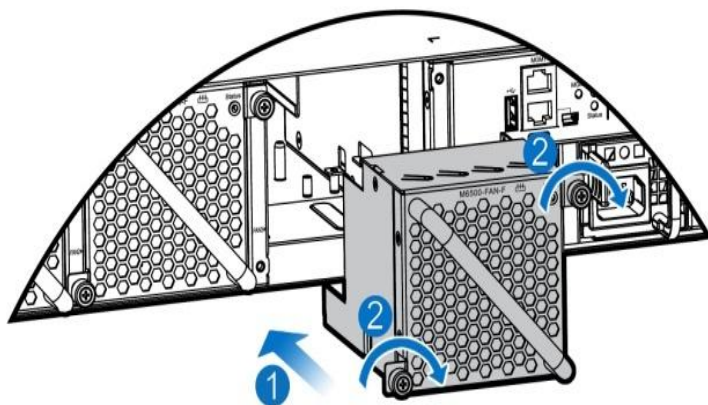
- Slide the fan module into the slot. Verify that the fan module is in the correct orientation.

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

- If you can not fully tighten the captive screws , it indicates that the fan module is not fully inserted into the fan slot.

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

1.4.2 Installing Power Modules

The N8560-64C switch supports the power supply model GW-CRPS550N2C.

The smart power modules support power management. The system can read output power, output current, and temperature in real time. The power modules support hot swapping.

- The N8560-64C switch supports 1+1 power supply redundancy. To improve the stability and reliability of the entire system, you are advised to configure 1+1 power supply redundancy. When both power modules are working, the switch is in the status of current sharing.

- At least one power module is required. If any slot is unoccupied, install a filler panel to enable proper airflow.

Power Module	GW-CRPS550N2C	
Power Supply Input	AC input	HVDC input
	Rated voltage range: 100V AC to 240V AC	Rated voltage range: 192V DC to 288V DC
	Maximum voltage range: 90V AC to 264V AC	Rated current: 4.5A
	Frequency: 50Hz to 60Hz	
	Rated current: 10A to 5A	

Procedure:

1. Remove the new power supply module from the power supply module box and confirm that the power supply module's input method and input indicators are the same as those required.

2. Remove the power supply bezel, take the plane with the power supply nameplate information as the upper panel of the power supply module, use one hand to grasp the pull handle of the power supply module, and use the other hand to hold the bottom of the power supply module to insert the power supply module along the rails in a straight and slow manner until the power supply module is completely inserted into the chassis, and then hear a "tapping" sound to make sure that the power supply module is in good contact with the power supply slot. Ensure that the power supply module is in good contact with the power supply slot.

Figure 6: Installing a Power Module
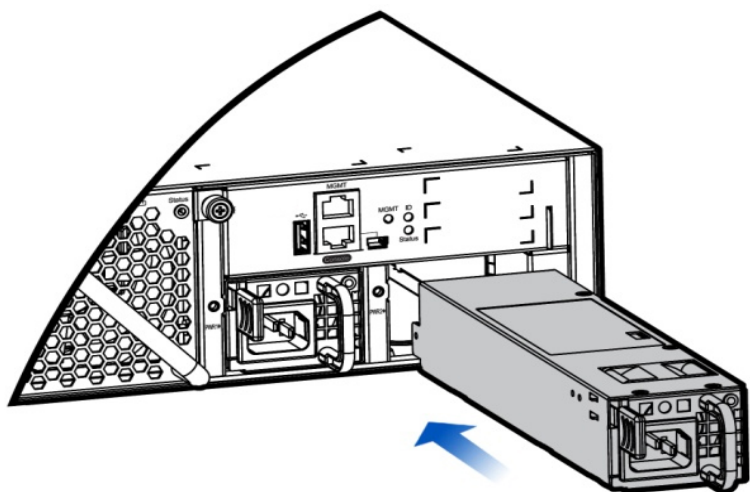
- Insert the power supply module only smoothly. When inserting, pay attention to the direction of the power panel and do not insert it incorrectly.

- During the insertion process, if the module can not be pushed in or is difficult to be pushed in, the inserted module must be backed up, and the power supply module must be proofread again to see if it matches the rail, and then re-inserted.

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

1.4.3 Installing an Optical Module

- Before the installation, take ESD protection measures, for example, wear an ESD wrist strap or ESD gloves.

- Do not touch the edge connector of an optical module during the installation.

- Install an optical module, and then connect optical fibers to the optical module. Do not insert an optical module with optical fibers to an optical port directly.

- Cover idle optical ports with dust plugs. All optical ports on a newly delivered switch are covered with dust plugs.

- When inserting an optical module to a port, hold the optical module horizontally. If the optical module cannot be completely inserted into the optical port, do not force it into the port. Turn the optical module 180 degrees over and try again.

Procedure:

1. Wear an ESD wrist strap or ESD gloves. Ensure that the ESD wrist strap is grounded and in close contact with your wrist.

2. Remove the dust plug from an optical port. Keep the dust plug for future use.

3. Install the optical module to the optical port. Gently push the optical module into the optical port Rntil you hear a click.

4. Check whether the optical module is securely seated in the optical port.

Figure 6: Installing an Optical Module
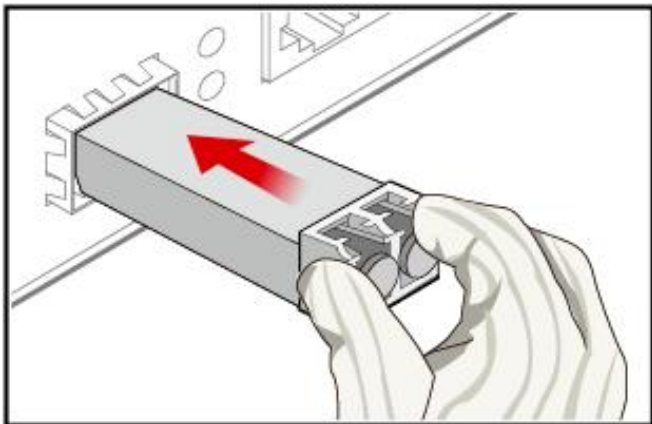
Keep the handle of the optical module closed, use your thumb and forefinger to hold two sides of the optical module, and gently pull the optical module.

• If the optical module is not pulled out, it has been correctly installed.

• If the optical module is pulled out, it is installed incorrectly. Install the optical module again.

1.5 Connecting a Switch

1.5.1 Connecting the Grounding Cable

There is one ground terminal on the back of the N8560-64C switch chassis, which should be connected to the grounding lug of the rack first, and then connect the grounding lug to the grounding bar of the equipment room.

Precautions:

• The sectional area of the grounding wire should be determined according to the possible maximum current. Cables of good conductors should be used.

• Do not have bare wires exposed.

• Grounding resistance: Less than 1Ω.

> • To guarantee the security of the person and the equipment, the switch must be grounded properly. The grounding resistance between the chassis and the ground should be less than 1Ω.
>
> • The maintenance personnel should check whether the AC socket is reliably connected to the protective ground of the building. If not, the maintenance personnel should use a protective ground conductor from the AC outlet protective ground terminal to the building protective ground.
>
> • The power socket should be installed near the equipment and easily accessible.
>
> • When installing the switch, connect the grounding first and disconnect it last.
>
> • The cross-sectional area of the protection ground wire should be at least 2.5mm² (12AWG).

1.5.2 Connecting Power Cables

There is one ground terminal on the back of the N8560-64C switch chassis, which should be connected to the grounding lug of the rack first, and then connect the grounding lug to the grounding bar of the equipment room.

Precautions:

• To avoid electric shock, do not connect the power cable while the power is on.

• Before connecting cables, take ESD protection measures, for example, wear ESD gloves or an ESD wrist strap.

• Power cables must be buried underground or routed indoors and cannot be led into the equipment room aerially.

• Do not power on a switch before you finish installing the switch and connecting cables.

Procedure:

1. Wear an ESD wrist strap or ESD gloves. Ensure that the ESD wrist strap is grounded and in close contact with your wrist.

2. Turn off the power module and the external power supply system for the switch.

3. Connect the power cable to the power module.

- Perform the following steps to connect the AC power cable:

1. Insert the plug of the AC power cable into the power socket in the AC power module.

Figure 7: Connect the AC Power Cable
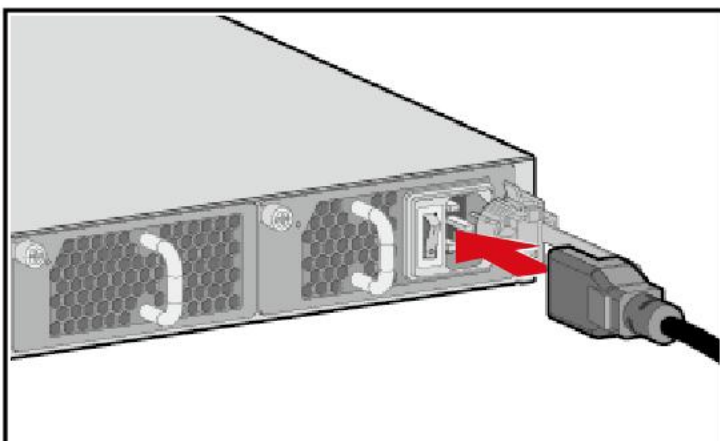
2. Connect the other end of the AC power cable to the external AC power supply system.

- Perform the following steps to connect the DC power cables:

1. Insert the DC power cable plug to the power socket in the DC power module. Ensure that the positive pole of the plug is connected to the positive socket and the negative pole is connected to the negative socket on the power module.

Figure 8: Connect the DC Power Cable
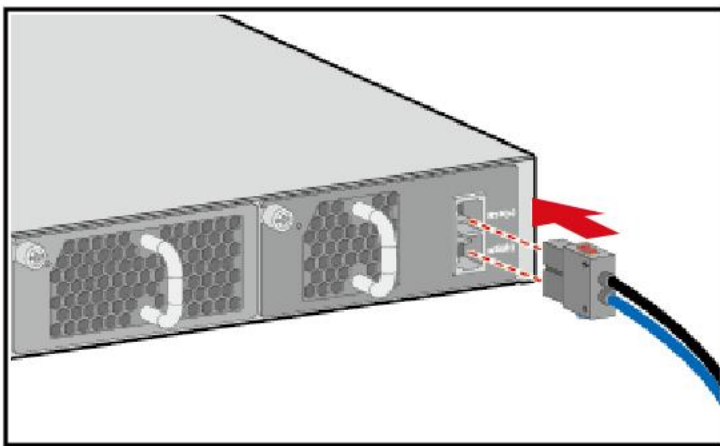
2. Connect the cold-voltage terminal end of the DC power cable to the external DC power system. Note that the positive and negative terminals should be aligned with the equipment end.

1.5.3 Connecting Ethernet Cables

Connect the RJ45 connector of an Ethernet cable to Ethernet MGMT interface of the device board, and the other end to a network management switch or terminal.

1.5.4 Connecting Optical Fibers

Insert the single-mode or multi-mode fiber into the corresponding interface according to the panel identification, and distinguish the transmit and receive ends of a fiber cable.
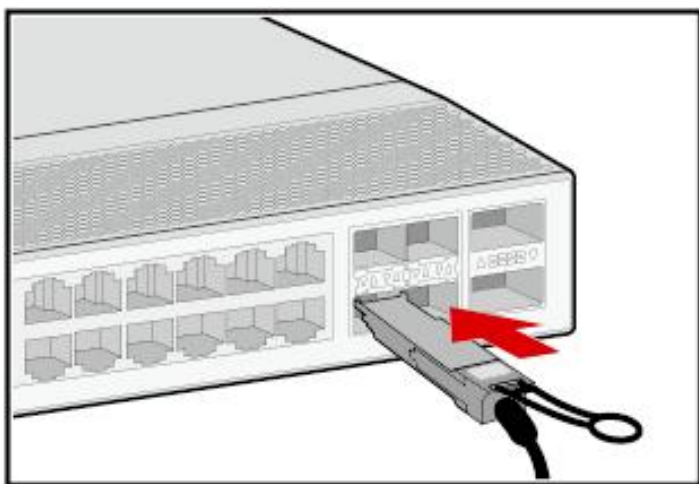
1.5.5 Connecting High-speed Cables

- Before connecting cables, take ESD protection measures, for example, wear ESD gloves or an ESD wrist strap.

- Both ends of an idle high-speed cable must be covered by an ESD cap.

- The bend radius of high-speed cables must be larger than the minimum bend radius. Overbending high-speed cables may damage wires in the cables.

Procedure:

1. Determine the number and type of ports to be connected and plan the cabling routes.

2. Select high-speed cables of appropriate quantity and lengths according to the number of ports and measured cabling distances.

3. Wear an ESD wrist strap or ESD gloves. Ensure that the ESD wrist strap is grounded and in close contact with your wrist.

4. Attach temporary labels to both ends of each high-speed cable and write numbers on the labels to identify the high-speed cables.

5. Connect high-speed cables to ports of the switch.

-   Find the ports matching the numbers on the high-speed cables and plug cable connectors to the ports. After verifying that all high-speed cables are correctly connected, go to 6.

-   Hold a high-speed cable connector in a correct direction when inserting it into a port. When you hear a click, the high-speed cable is securely connected to the port. See Figure 8.

Figure 9: Connecting a High-speed Cable

To remove a high-speed cable, gently push the cable connector and then pull the handle of the connector. Do not directly pull the cable connector with force. See Figure 9.

Figure 10: Removing a High-speed Cable
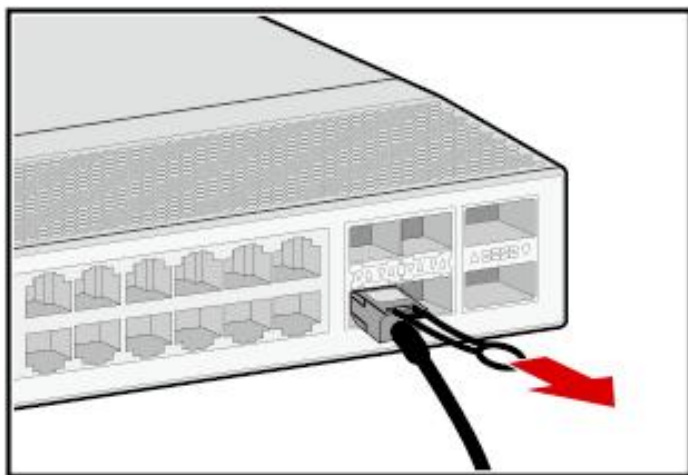
6. Bundle high-speed cables. Arrange the high-speed cables to make them parallel, and then bundle them with cable ties at an interval of 150mm to 300mm. Use diagonal pliers to cut off redundant cable ties.

7. Replace all the temporary labels with permanent labels on the high-speed cables.

1.5.6 Connecting the Console Port

Connection Steps:

Connect the RJ45 connector of an Ethernet cable to the console port of the switch, and connect the DB9 connector to a network management switch or terminal.

- By default, the baud rate is 9600, data bit 8, parity check none, stop bit 1, and flow control none.

1.6 Post-Installation Checks

1.6.1 Verifying Cabinet

- External power supply matches the distribution panel of the cabinet.
- The front and back doors can be closed after the switch is installed in the cabinet.

- The cabinet and all cables are securely fastened.

- The switch has been installed in the cabinet.

- Maintain a minimum clearance of 200mm (7.87 in.) around the switch for air circulation.

1.6.2 Verifying Cable Connection

- The UTP and STP cables match with the interface type.

- Cables are properly bundled.

- Grounding cables are connected properly and observe the requirement.

- All cables are routed indoors. If not, check whether the power supply and interfaces are protected from lightning strikes.

1.6.3 Verifying Power Supply

The power cord is properly connected and compliant with safety requirements.

- Cut off the power supply to avoid personal injury and damage to components caused by incorrect connection.

1.7 System Commissioning

1.7.1 Setting Up the Configuration Environment

Connect the PC to the console port of the switch through the Ethernet cable, as shown in the figure below.

Figure 11: Configuration Environment

Switch

Connect to the Console port of the switch.

Connect to the serial port of the PC.
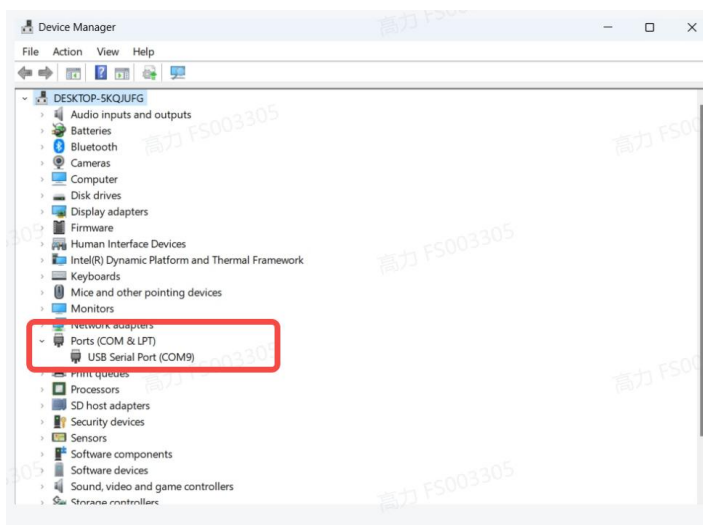
PC
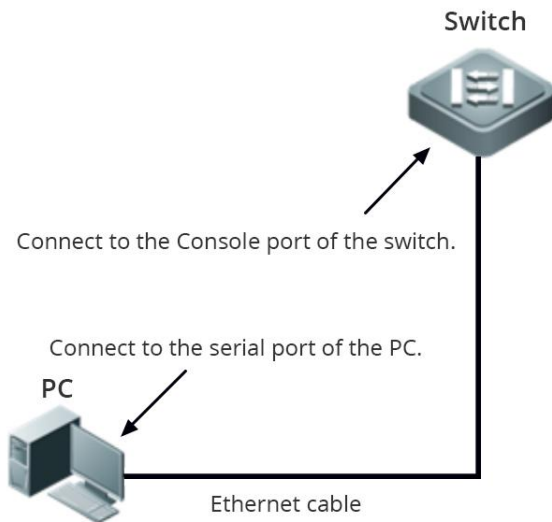
Ethernet cable

Step 1: Connecting the Ethernet Cable

1. Plug the DB-9 connector of the Ethernet cable into the serial port of the PC.

2. Connect RJ45 connector of the Ethernet cable to the console port of the switch.

Step 2: Check the Serial Port Number

Open Device Manager on the computer and check the serial port number.

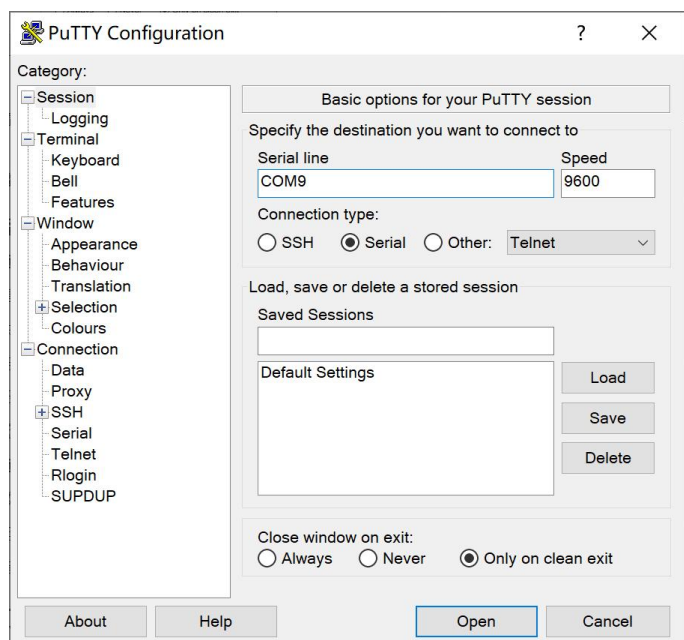## Step 3: Start Terminal Emulation Software on the Computer (Such as PUTTY)
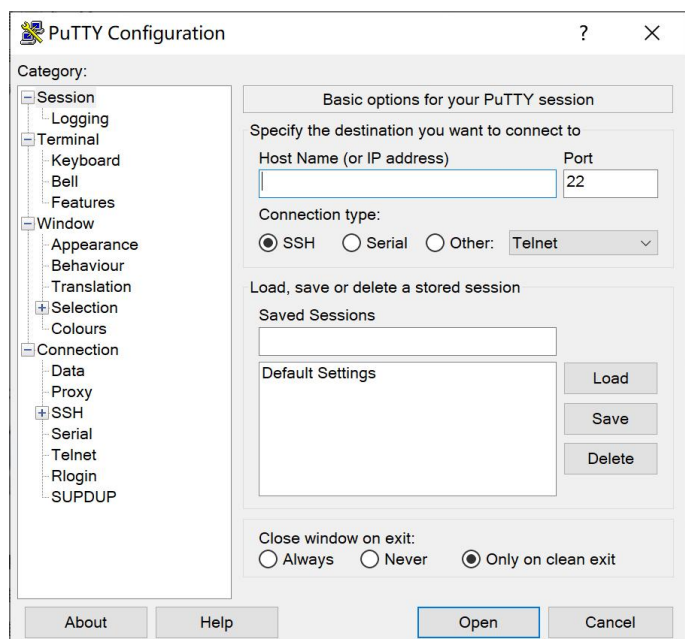
Step 4: Setting Terminal Parameters

Parameter requirements:

Baud rate is 9600, connection type is Serial, fill in COM port number according to the actual situation. The specific diagram is as follows.

Figure 12: Setting Terminal Parameters

Step 5: Once the serial port parameters are set, click ‹Open› to enter the
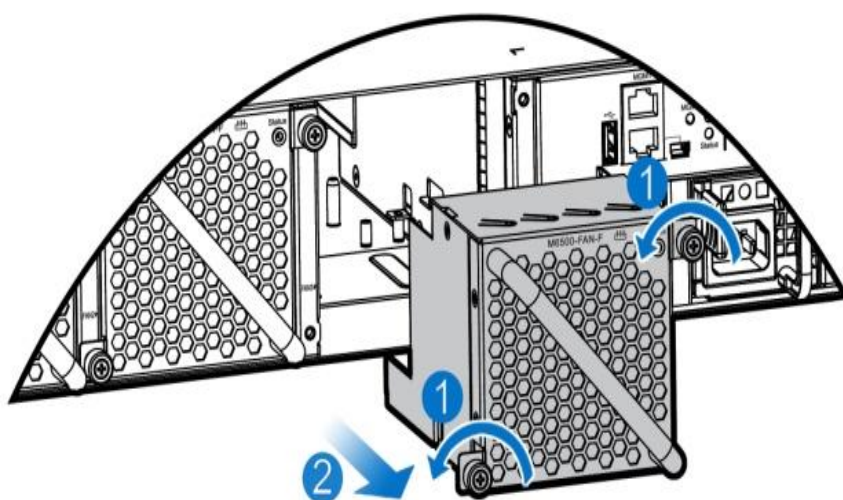CLI interface

1.8 Parts Replacement

1.8.1 Removing a Power Module and Fan Module

Removing a Fan Module:

1.   Loosen the captive screws of the fan module.

2.   Grasp the handle and pull the fan module out of the slot gently.

3.   Install the filler panel in the unoccupied slot and put the removed fan module back into its packaging
      materials.

Figure 13: Removing a Fan Module

- Pull the fan module out of the slot gently.

- Install a filler panel in the unoccupied slot to ensure adequate airflow and avoid dust in the chassis.

Removing a Power Module:

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

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

Figure 14: Removing a Power Module
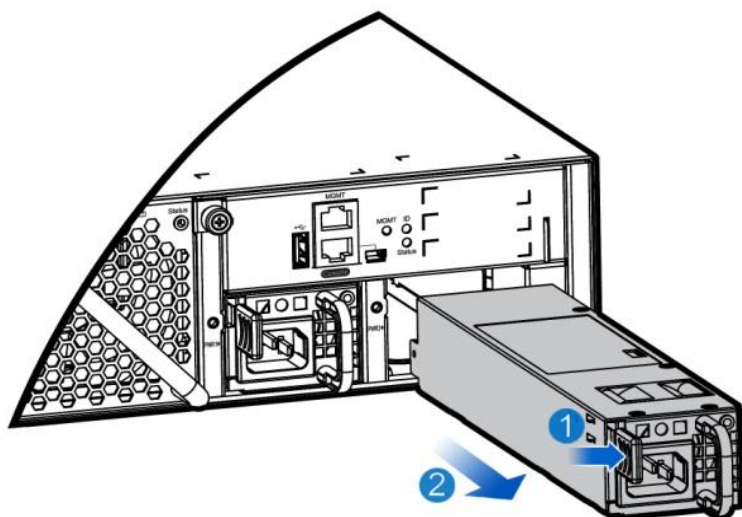
- Pull the power module out of the slot gently.

- Install the filler panel in the empty slot to allow for adequate airflow and keep out dust.

1.8.2 Replacing a Optical Module

When replacing the optical module, pay attention to the following requirements:

- Anti-static preparations must be made before replacement.

- Laser beams will cause eye damage. Do not look into bores of optical modules or optical fibers without eye protection.

- Ensure that the new optical module has the same center wavelength and complies with the same standards as the old one.

- After removing the optical fibers from an optical module, cover the fiber connectors with dust caps.

- When replacing an optical module, ensure that no optical fiber is connected to the optical module. Install or remove optical fibers carefully to avoid damages to fiber connectors. Exercise caution when installing or removing optical fibers to prevent damage to the optical module.

Procedure:

1. Wear an ESD wrist strap or ESD gloves. When wearing an ESD wrist strap, ensure that the ESD wrist strap is in close contact with your wrist, and insert the other end into the ESD jack of the device or cabinet/rack.

2. Before replacing an optical module, determine in which cabinet and chassis the optical module is installed, find the optical module in the chassis, and attach a label to the optical module. Record optical fiber locations on the optical module to be replaced and check whether the labels on the optical fibers are correct and clear. If any label is unclear, make and attach a new label to the optical fiber to ensure correct connection.

3. Rotate the handle of the optical module down, gently push the optical module, and then pull out the optical module by the handle. Remove the optical fibers from the optical module and cover them with dust caps.

- Two types of latches on fiber optic connectors:

• LC/PC connector, opened by pressing the buckle, as shown in Figure 14.

• MPO connector, opening automatically when the buckle is pulled, as shown in Figure 15.

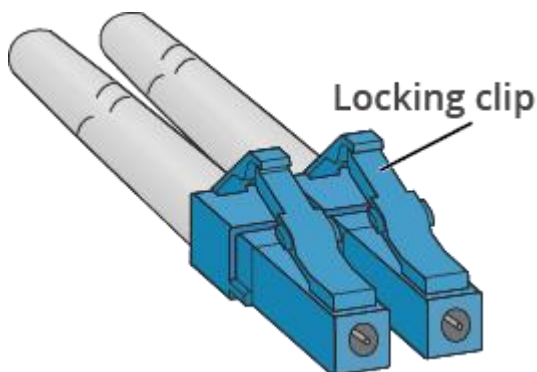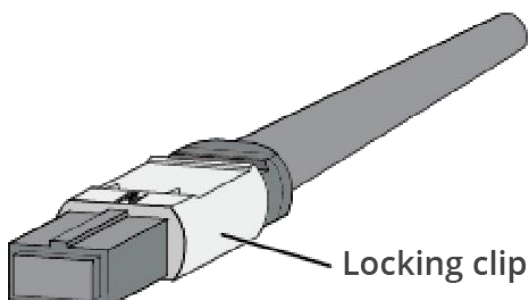Figure 15: LC/PC Connector

Figure 16: MPO Connector

4. Pull out the optical module, plug the dustproof plug and dispose of it.

- There are two types of buckles on the optical module. A pull-rod handle that needs to be turned over to open, as shown in Figure 16. The other is a handle-type handle, which is automatically opened during the process of pulling the handle, as shown in Figure 17.
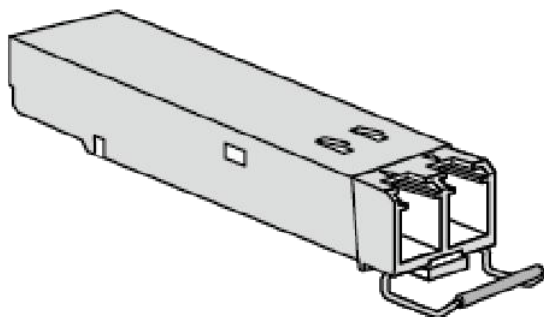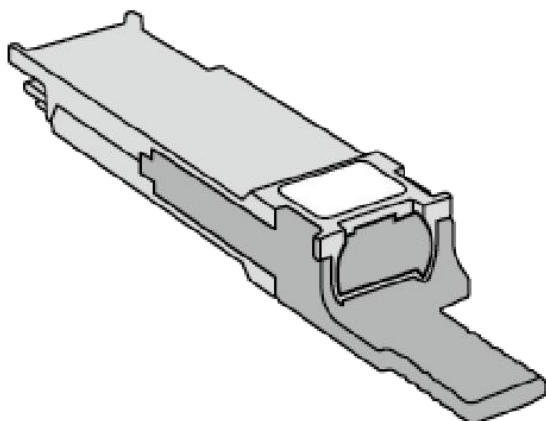
Figure 17: Pull-rod Handle

Figure 18: Handle-type Handle

5. Take out the new optical module from the package, and slowly insert it into the interface until you hear a "pop" sound, indicating that it has been installed in place.

6. Find the fiber to be connected, find the interface corresponding to the fiber through the label on the fiber, remove the dust cap and connect the fiber to the interface.

1.8.3 Replacing a Switch

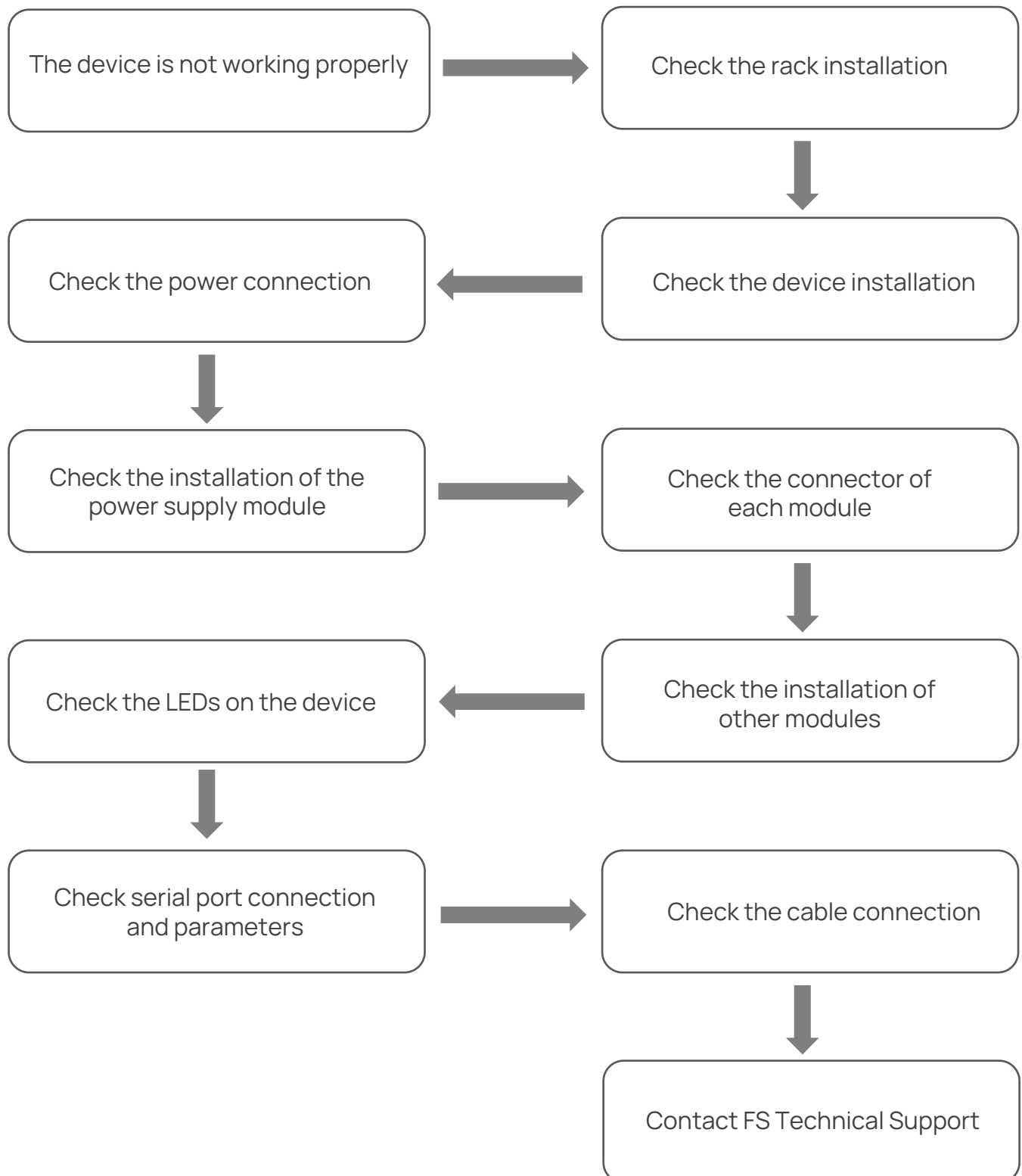When replacing a faulty switch, pay attention to the following requirements:

• Anti-static preparations must be made before replacement.

• Laser beams will cause eye damage. Do not look into bores of optical modules or optical fibers without eye protection.

Procedures:

1. Before replacing the faulty switch, be sure to clearly mark the corresponding relationship between the network cable and the port.

2. Check whether the business is ready for power-off, and save relevant business information.

3. Disconnect the power cord and ground wire of the faulty device.

4. Pull out all the network cables and optical fibers of the faulty device.

5. Loosen the fixing screws of the faulty device and remove the faulty device.

6. Install the new equipment, the sequence is the reverse of dismantling the faulty equipment. Fix the screws first, then connect the network cable, optical fiber, and finally connect the power cord and ground wire of the device. Be careful not to touch the power lines, network cables, and optical fibers of other equipment during the replacement process to avoid greater losses.

Troubleshooting After Installation

2.1 Troubleshooting Flowchart

The device is not working properly → Check the rack installation

Check the rack installation ↓

Check the power connection ← Check the device installation

Check the power connection ↓

Check the installation of the power supply module → Check the connector of each module

Check the connector of each module ↓

Check the LEDs on the device ← Check the installation of other modules

Check the LEDs on the device ↓

Check serial port connection and parameters → Check the cable connection

Check the cable connection ↓

Contact FS Technical Support

2.2 Guide to Using Switches

Fault 1: The login password is forgotten

Fault Symptom

The login password is forgotten.

Handling Method

Contact FS technical support.

Fault 2: The AC power module does not work

Fault Symptom

All LEDs on the front panel are off. The fan status LED is off, and the fan does not rotate. The power supply status LED is off. The fan does not rotate.

Handling Method

1. Unplug the power cord from the power module.

2. Check whether the power cord is securely connected to the power socket.

3. Check whether the power cord is securely connected to the power module.

4. Check whether the power module is securely seated. If necessary, pull out the power module and check its connector.

Fault 3: The fan tray does not work

Fault Symptom

After the system starts, the fan does not rotate or the Status LED is off.

Handling Method

Check if the connection between the fan module and the chassis is secure and if the connector gets loose. If the connection is secure, replace the fan tray.

Fault 4: The serial port console has no output

Fault Symptom

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

Handling Method

1. Check the serial cable: Make sure the serial port is properly connected to the console port of the switch. Check for loose or damaged connections and reseat the connections.

2. Check whether the connected serial port is consistent with what is configured on the HyperTerminal.

3. Check whether the configuration of the serial port on the HyperTerminal is consistent with that in Configuration Guide (such as SSH, Telnet) log in to the switch to check the working status of the serial port. It may be necessary to view and configure the serial port through the command line interface or web interface of the switch.

4. Replace the serial cable or serial adapter: If none of the above methods solve the problem, try to replace the serial cable or use a different serial adapter. Sometimes glitches can appear on these hardware.

5. Contact Vendor Support: If there is still no output on the serial port, please contact FS technical support.

Fault 5: The serial port console output is garbled

Fault Symptom

The serial port console output is garbled.

Handling Method

1. Check the serial port settings: Make sure the serial port settings used match the console settings of the switch. Check whether the settings of baud rate, data bits, stop bits and parity bits are correct. If the settings do not match, it will cause data transmission errors, resulting in garbled characters.

2. Check the terminal software encoding setting: In the terminal software, check whether the character encoding setting is correct. Make sure that the character encoding used is consistent with the character encoding of the switch, usually ASCII encoding is used.

3. Contact Vendor Support: If there is still no output on the serial port, please contact FS technical support.

Fault 6: The newly inserted expansion module can not be powered on

Fault Symptom

The system runs normally, the indicators on the panel of the newly inserted expansion module are all off, and the ports can not work normally.

Handling Method

First confirm whether the module is inserted in place. If everything is normal, but the newly inserted module still can not be powered on and works, please contact FS technical support.

Fault 7: The link can not be set up between optical ports

Fault Symptom

The system runs normally. After you insert an optical transceiver into an optical port and plug in a fiber cable, the link cannot be set up.

Handling Method

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

2. Check whether wavelengths of optical transceivers on both sides are consistent. For example, an optical transceiver with a wavelength of 1310nm cannot be connected to an optical transceiver of 1550nm.

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

4. Check whether the speeds of two sides are consistent and whether the fiber cable type meets requirements. For ports supporting different speeds, check their duplex mode settings.

2.3 Guide to Using Optical Modules

2.3.1 Common Faults of an Optical Module

1. An optical module is not completely installed in position.

If the optical module is not completely installed in position and the latch boss is not secured, the device cannot identify the optical module. After the optical module works for a long time, it will be ejected under external stress.

2. The optical receptacle on an optical module is contaminated.

If an optical module is not cleaned or protected properly, contaminants may accumulate on the fiber pin in the optical module. As a result, the coupling efficiency is reduced, optical signals are cut off, or even worse, the surface of the fiber pin is damaged permanently.

3. An optical module is burnt.

If high-power optical signals (caused by an optical time domain reflectometer or self-loop test) are transmitted through an optical module that is used for long-distance transmission but no optical attenuator is used, the optical power will exceed the overload power of the avalanche photodiode (APD). Then the optical module is burnt.

The preceding faults lead to temporary or long-term cut-off of optical signals; or even cause permanent damages to the optical module, affecting communication services.
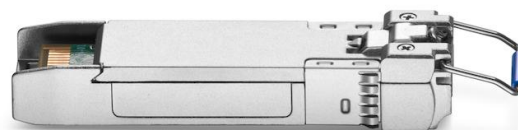
2.3.2 Measures to Prevent a Loosened Optical Module

1. When installing an optical module, insert it in position. If you hear a click or feel a slight shake, it indicates that the latch boss is secured.

1. If the latch boss is not secured, the gold finger of the optical module is not in good contact with the connector on the board. In this case, the link may be connected but optical signals will be cut off or the optical module will be loosened when the optical module is shaken or hit.

2. Figure 18 shows the release handle on an optical module when it is open and closed. When inserting the optical module, make sure that the release handle is closed. At this time, the latch boss locks the optical module. After the optical module is inserted, try pulling it out to see if it is installed in position. If the optical module cannot be pulled out, it is secured.

Figure 19: State of the Release Handle

Close the release handle   Open the release handle

2.3.3 Measures to Prevent Receptacle Contamination

1. Cleaning tissues must be prepared on site. You need to clean the optical connector before inserting it in the receptacle. This protects the receptacle against contamination on the surface of the optical connector.

Figure 20: Cleaning Optical Fibers with Special Cleaning Tissues

- Place at least three cleaning tissues on the work bench. As shown in Figure 19, wipe the end of an optical connector from left to right or from right to left on a cleaning tissue, and then move the connector end to the unused part of the cleaning tissue to continue.
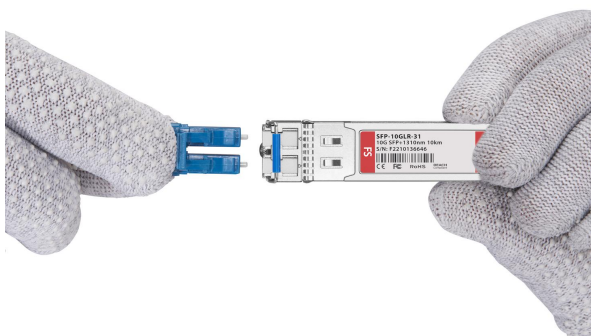
2. Cover an unused optical module with a protective cap to prevent dust, as shown in Figure 20.

Figure 21: Installing a Protective Cap

If no protective cap is available, use fibers to protect the optical module, as shown in Figure 21.

Figure 22: Using Fibers to Protect an Optical Module

3. Cover unused optical connectors with protective caps, as shown in Figure 22, and then lay out fibers on the fiber rack or coil them in a fiber management tray to prevent fibers from being squeezed.
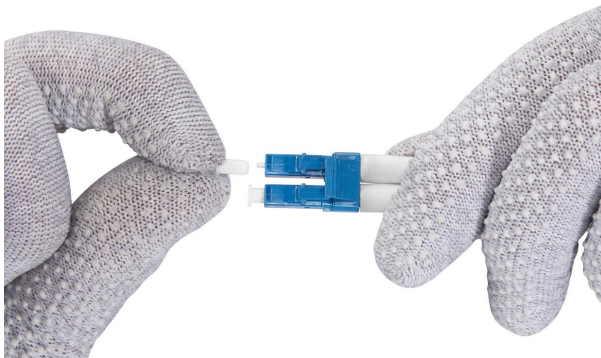
4. If a receptacle or an optical connector has not been used for a long time and is not covered with a protective cap, you need to clean it before using it. Clean a receptacle with a cotton swab, as shown in Figure 23. Clean an optical connector with cleaning tissues.

Figure 24: Cleaning a Receptacle with a Cotton Swab
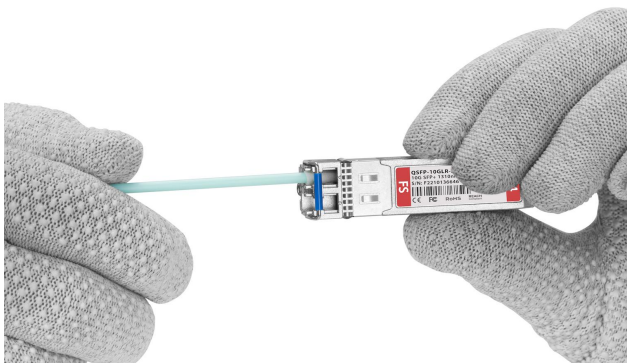
- When cleaning a receptacle, insert the cotton swab and turn it slowly in the receptacle. Do not use too much strength because the receptacle may be damaged.

5. If optical signals are lost during the operation of a device, use the preceding method to clean the receptacle or the optical connector. In this manner, the possibility of contamination can be excluded.

2.3.4 Measures to Prevent an Optical Module from Being Burnt

1. Before using an optical time-domain reflectometer (OTDR) to test the connectivity or the attenuation of optical signals, disconnect the optical fibers from the optical module. Otherwise, the optical module will be burnt.

2. When performing a self-loop test, use an optical attenuator. Do not loosen the optical connector instead of the optical attenuator.

2.3.5 Precautions

1. The optical connector should be vertically inserted in the receptacle to avoid damages to the receptacle.

2. Fibers must be inserted into multimode optical modules, and single mode fibers must be inserted into single mode optical modules. If a fiber is inserted into an optical module of a different mode, faults may occur. For example, optical signals will be lost.

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