

CloudEngine 16800 Series Switches

Hardware Installation and Maintenance Guide (V200)

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About This Document

Intended Audience

This document is intended for network engineers responsible for CloudEngine 16800 series data center switches (CE16800 series switches for short) installation and maintenance. You should have experience in network device installation and maintenance.

Symbol Conventions

The symbols that may be found in this document are defined as follows.

Symbol	Description
	Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
	Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
	Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results. NOTICE is used to address practices not related to personal injury.

Symbol	Description
 NOTE	Supplements the important information in the main text. NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.

Command Conventions

The command conventions that may be found in this document are defined as follows.

Convention	Description
Boldface	The keywords of a command line are in boldface .
<i>Italic</i>	Command arguments are in <i>italics</i> .
[]	Items (keywords or arguments) in brackets [] are optional.
{ x y ... }	Optional items are grouped in braces and separated by vertical bars. One item is selected.
[x y ...]	Optional items are grouped in brackets and separated by vertical bars. One item is selected or no item is selected.
{ x y ... }*	Optional items are grouped in braces and separated by vertical bars. A minimum of one item or a maximum of all items can be selected.
[x y ...]*	Optional items are grouped in brackets and separated by vertical bars. Several items or no item can be selected.
&<1-n>	The parameter before the & sign can be repeated 1 to n times.
#	A line starting with the # sign is comments.

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1 Hardware Installation and Usage Precautions

Following All Safety Precautions

- To ensure human and device security, comply with all the safety precautions marked on the device and instructed in this document before any operation. The CAUTION, WARNING, and NOTE items in this document do not cover all the safety precautions that must be obeyed. They are supplements to the safety precautions.
- When operating Huawei products and equipment, comply with safety precautions and special safety instructions relevant to the corresponding equipment provided by Huawei. The safety precautions in this document are only some that Huawei can predict. Huawei is not liable for any consequence that results from violation of universal regulations for safety operations and safety codes on design, production, and equipment use.

Complying with Local Rules and Regulations

When operating a device, comply with local laws and regulations.

Installation Personnel Requirement

Installation and maintenance personnel must be trained to perform operations correctly and safely.

Chassis

- If a CloudEngine 16800 chassis is not fully loaded with cards or power modules, cover vacant slots with filler panels to ensure efficient heat dissipation and EMC compliance.
- If the device is installed in a 600 mm wide cabinet or rack, do not install a PDU directly facing the device. Otherwise, the installation and removal of fan modules are affected. When installing a PDU, ensure that the PDU and the device are installed at different heights in the cabinet or rack.

Power Module

- A power module will enter the protection state upon input overvoltage, undervoltage, overtemperature, or output overcurrent. Note that when a power module enters the overtemperature protection state, take measures to lower the ambient temperature. The power module can automatically resume power supply when the temperature falls within the normal range. After a power module enters the protection state, the module will report a corresponding protection state alarm to the MPU and cannot properly supply power to the device. Note that a faulty fan module will also report fault information to the MPU. If the power module cannot automatically resume power supply after the triggering condition of the protection state is removed, remove the power module from the chassis and reinstall it at least 30s later. The power module then can work properly.

Card

- Before installing cards on a device, make sure that the device and cards are all free from damp.
- When installing a card, gently push the card along the guide rails, and be careful not to crash the card connector. Distorted card connector will cause pins on the corresponding card connector or backplane connector to bend. If the connector of a card has collided with the slot or other objects, ask Huawei professionals whether the card can still be installed. Installing a card with distorted connector may cause damage to the device.
- **Install two MPUs of the same type into the active and standby MPU slots on a device. For details about the MPU types supported by this version, see "MPU" in Cards in the *Hardware Description*.**
- **The LPUs are available in G, GK, A, P and SAN series, the SFUs are available in G, GK, A and P series. V200 version supports G, GK and A series LPUs, as well as G, GK and A series SFUs. It does not support P and SAN series LPUs or P series SFUs. For details about the mapping between LPUs and SFUs, the mapping between MPUs and LPUs/SFUs, and the mapping between SFUs and fan modules, see "Card Classification" in Card Introduction > Cards in the *Hardware Description*.**
- Some cards are attached with labels of different colors near the ejector levers to identify their types. The color of labels on SFUs and LPUs to be installed on one device must be the same. Otherwise, the card will be damaged.

Card type	LPUs	SFUs
Card type 1	No label	No label
Card type 2	Red label	Red label
Card type 3	Blue label	Blue label

- The reset button on an MPU is used to manually reset the MPU. Exercise caution when using this button.
 - If the device has only one MPU, pressing this button will cause the device to restart.

- If the device has two MPUs:
 - Pressing the reset button on the active MPU will trigger an active/standby switchover.
 - Pressing the reset button on the standby MPU will reset the standby MPU, which does not affect running of the system.
- To remove a Switch Fabric Unit (SFU), hold down the OFL button for 6s. You can remove the SFU until the OFL indicator is steady yellow.

Cable

- To protect personal safety, do not install power cables while the power is on. Before connecting power cables, make sure that the power switches of the external power supply system and the device are all in OFF position.
- Each device must have at least two independent power inputs for power redundancy. Do not connect all the AC power cables of a device to the PDUs controlled by the same circuit breaker.
- Before connecting signal cables, take ESD protection measures, for example, wear ESD gloves or an ESD wrist strap.
- Before connecting Ethernet cables, use an Ethernet cable tester to test cable connectivity.
- 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.
- Laser beams will cause eye damage. Do not look into bores of optical modules or optical fibers without eye protection.
- Cover idle optical ports and optical modules with dust plugs and cover idle optical fibers with dust caps.
- Optical fibers routed into a cabinet must be protected by a corrugated pipe. The bend radius of an optical fiber must be at least 20 times larger than its diameter. Generally, the bend radius of optical fibers should be no less than 40 mm.
- Bundle optical fibers with binding tape. Apply appropriate force to ensure that the optical fibers in a bundle can be moved easily.
- Fiber connectors must be tidy and clean to ensure normal communication. If a fiber connector is contaminated, clean it using a piece of fiber cleaning fabric.
- Both ends of an idle active optical cable (AOC) must be covered by an ESD cap.
- The bend radius of AOC cables must be no less than 30 mm. Overbending AOC cables may damage wires in the cables.
- Use the JG2 90° right angle terminals delivered with the device. To avoid short circuits and poor cable connections, do not make JG2 90° right angle terminals by yourself.

Optical Module

- CloudEngine 16800 series devices must use optical modules that are certified for Huawei data center switches. Optical modules that are not certified for

Huawei data center switches cannot ensure transmission reliability and may affect service stability. Huawei is not liable for any problems caused by the use of optical modules that are not certified for Huawei data center switches.

- The transmit power of a long-distance optical module is often larger than its overload power. Therefore, when using such optical modules, select optical fibers of an appropriate length to ensure that the actual receive power is smaller than the overload power. If the optical fibers connected to a long-distance optical module are too short, use an optical attenuator to reduce the receive power on the remote optical module. Otherwise, the remote optical module may be burnt.

2 Installation Procedure

NOTE

Although different chassis have different dimensions, their installation procedures and methods are basically the same.

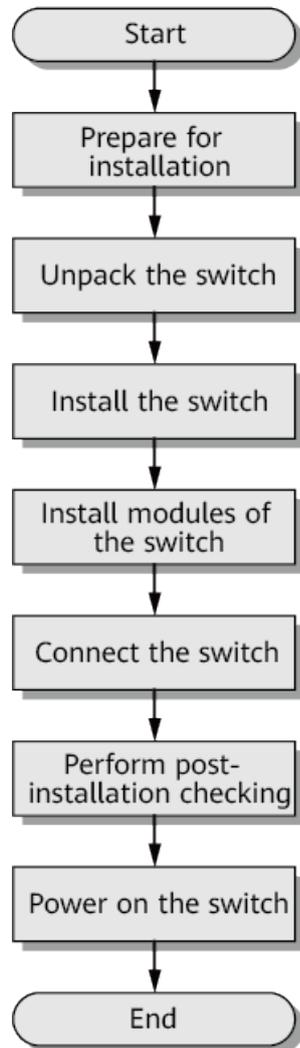
Install Switch Fabric Units (SFUs), fan modules, Main Processing Units (MPUs), and Line Processing Units (LPUs) in the following sequence. No sequence requirements are posed for installing other modules.

1. Install SFUs.
2. Install fan modules.
3. Install MPUs and LPUs.

Install the chassis door after the cabling is complete.

Figure 2-1 shows the procedure for installing a device for the first time.

Figure 2-1 Installation flowchart



3 Installation Preparation

- [3.1 Reading Carefully the Safety Precautions](#)
- [3.2 Checking the Installation Site](#)
- [3.3 Checking the Cabinet or Rack](#)
- [3.4 Checking the Power Distribution System](#)
- [3.5 Preparing Installation Tools and Accessories](#)

3.1 Reading Carefully the Safety Precautions

Before you start the installation procedure, read all safety precautions described in this document and observe all warning labels affixed to the device. Doing so ensures your safety and protects the device from damage.

Safety precautions provided in this document may not cover every eventuality, so remain mindful of safety at all times.

Huawei is not liable for any consequence that results from violation of regulations pertaining to safe operations or safety codes pertaining to design, production, and equipment use.

Only trained and qualified personnel are allowed to install, operate, and maintain the device. Familiarize yourself with all safety precautions before performing any operation on the device.

General Safety

CAUTION

- Always take precautions against electrostatic discharge (ESD) whenever you handle a device. For example, wear ESD gloves or an ESD wrist strap. To avoid electric shock or burn, remove conductive objects like jewelry and watch.
 - Connect the ground cable first after installing the device into a cabinet or rack. Do not remove the ground cable unless all the other cables and modules have been removed from the device.
-

NOTICE

- During device transport and installation, prevent the device from colliding with objects like doors, walls, or shelves.
 - Move an unpacked device upright gently to avoid damages to the device. Do not lay down the unpacked device and drag it.
 - Do not touch uncoated metal surfaces of the device with wet or contaminated gloves.
 - Do not open the ESD bags of cards and modules until they are delivered to the equipment room. When taking a card out of the ESD bag, do not use the connector to support the card's weight because this operation will distort the connector and make the pins on the backplane connector bend.
-

Environmental Safety

DANGER

Do not place or operate the device in an environment with flammable or explosive gases or smoke.

NOTICE

- Keep the device away from sources of water or damp to prevent damages to circuits.
 - The installation site must be well ventilated to prevent the device from overheating.
-

Electrical Safety

 DANGER

- Direct contact with a high-voltage power source or indirect contact through damp objects can be fatal. Misoperations on high-voltage facilities may result in fire, electric shock, or other accidents.
 - Never install or remove the device or power cables while the power is on. The electric arc or spark generated between a power cable and conductor may cause fire or eye damage.
 - To protect personal and equipment safety, ground the device before powering it on.
-

Laser Safety

 CAUTION

- Laser beams will cause eye damage. Do not look into bores of optical modules or optical fibers without eye protection.
 - Cover fiber connectors with dust caps when they are not connected.
-

Mechanical Safety

 CAUTION

- Wear protective gloves when you are moving the device.
 - Use safe lifting practices when moving the equipment. Never attempt to lift objects that are too heavy for one person to handle. Instead, seek help or use appropriate tools.
 - Before installing the chassis into or removing it from a cabinet, ensure there are no objects that could fall from the cabinet and cause injury.
 - If MPUs, LPUs, SFUs, and power modules have been installed on the chassis, you are advised to remove them before moving the chassis to prevent them from falling off and causing injury.
 - Do not drill unapproved holes into a cabinet, as doing so may impair its electromagnetic shielding and damage cables inside. In addition, drilling holes produces metal shavings that may enter the cabinet and cause short circuits on printed circuit boards (PCBs).
-

Condensation Prevention

- Before installing the equipment, ensure that no condensation is on the equipment. Otherwise, the equipment may fail to be powered on.
- If the indoor and outdoor temperature difference is 15°C or more, wait eight hours after moving devices to the equipment and then install them.

- Generally, when the outdoor humidity is greater than 80% and the indoor and outdoor temperature difference is greater than 5°C, condensation forms. In highly humid weather, before installing a device or board, you are advised to remove the package inside an equipment room and check whether condensation forms as follows: Touch the surface of the device or board with dry fingers or ESD gloves to check whether water marks exist. If they do, condensation forms, and the device or board must be kept in the equipment room for 8 hours before being powered on.

 **NOTE**

If the temperature difference is undetermined, wait one night before installing the equipment.

3.2 Checking the Installation Site

The CloudEngine 16800 must be used indoors. To ensure normal operations and long service life of the device, the installation site must meet the following requirements described in [Table 3-1](#).

Table 3-1 Requirements for the installation site

Item	Requirement
Cleanliness	The device must be installed in a clean, dry, and well ventilated standard equipment room with controllable temperature. The equipment room must be free from leaking or dripping water, heavy dew, and damp.
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 temperature and humidity in the installation site must be within specifications. For the operating temperature and relative humidity ranges required by the device, see Hardware Description . 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.
Heat dissipation space	There must be sufficient space around the device for heat dissipation: <ul style="list-style-type: none">• Leave at least 1000 mm of clearance for heat dissipation at the front and rear of the device.• Leave at least 1U (1U = 44.45 mm) of clearance above the device.

Item	Requirement
Maintenance space	Leave at least 1200 mm of clearance at the front and rear of the device.
Load bearing capacity of the equipment room	<p>Evaluate whether the load bearing capacity of the floor in the equipment room meets the deployment requirements based on the model and number of devices to be housed in each cabinet. If it is uncertain whether the load bearing capacity of the floor in the equipment room meets the device installation requirements, you are advised to contact a local professional architecture design institute for further evaluation and hardening solution formulation.</p> <ul style="list-style-type: none"> When one device is installed in each cabinet, the minimum load bearing capacity of the equipment room is 200 kg/m² (CloudEngine 16804), 450 kg/m² (CloudEngine 16816), and 300 kg/m² (CloudEngine 16808). When multiple devices are installed in each cabinet, the minimum load bearing capacity of the equipment room is 450 kg/m² (CloudEngine 16804) and 450 kg/m² (CloudEngine 16808).

3.3 Checking the Cabinet or Rack

A standard 19-inch four-post cabinet or rack is recommended for the CloudEngine 16800. To support the device in the cabinet or rack, you can use Huawei expandable guide rails (expandable between 500 mm and 850 mm) or separately purchased guide rails or tray with sufficient load bearing capacity. [Table 3-2](#) describes the requirements for the cabinet or rack.

Table 3-2 Requirements for the cabinet or rack

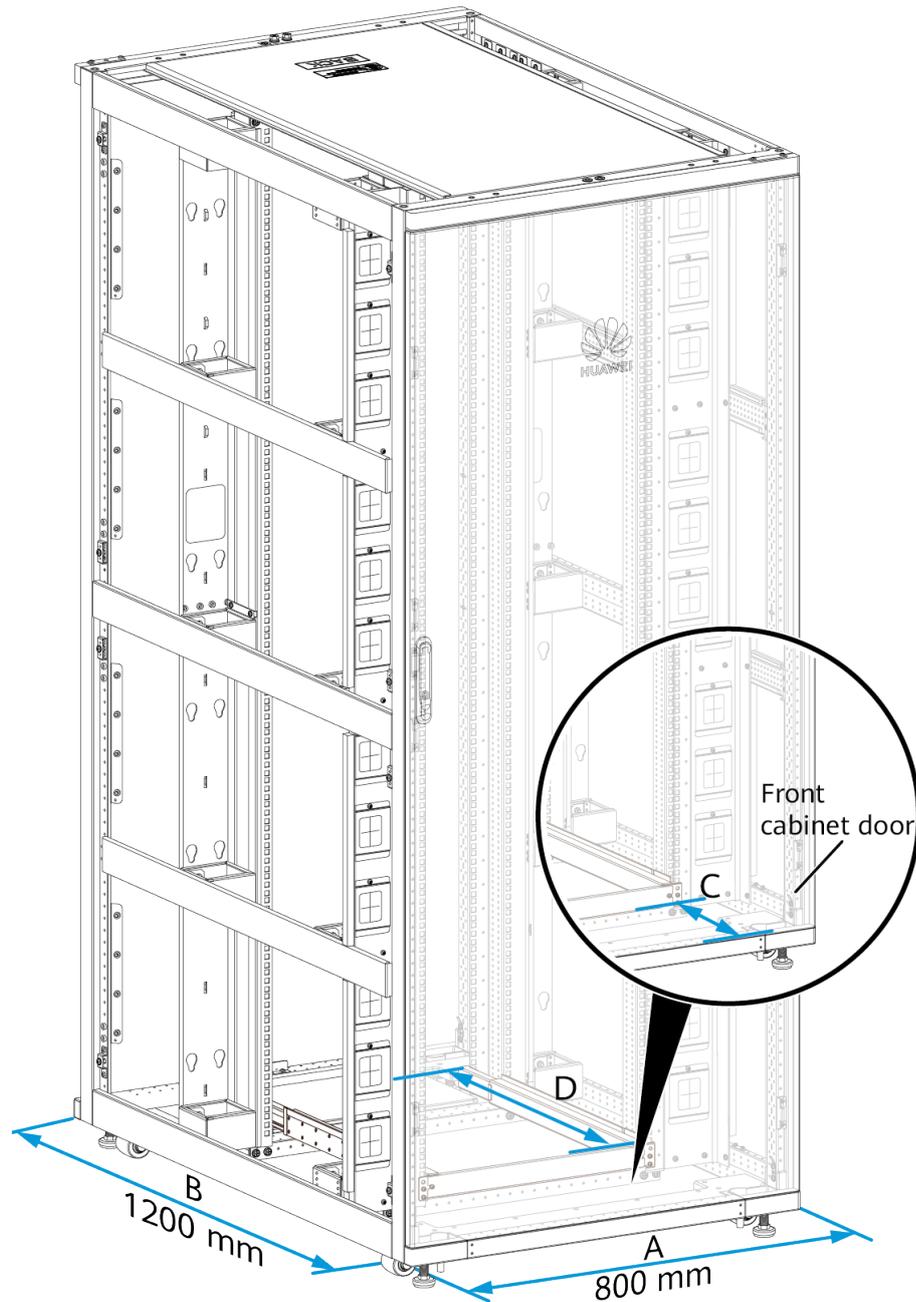
Item	Requirement
Width	For the CloudEngine 16800, a cabinet or rack with a width of 800 mm (distance A in Figure 3-1) is recommended.
Depth	<ul style="list-style-type: none"> When the CloudEngine 16804 and CloudEngine 16808 are installed, the depth of the cabinet or rack must be at least 1000 mm (distance B in Figure 3-1), and a cabinet or rack with a depth of at least 1200 mm is recommended. When a 1000 mm deep cabinet or rack is used, the front and rear doors must be single-swing doors. When the CloudEngine 16816 is installed, the depth of the cabinet or rack must be at least 1200 mm (distance B in Figure 3-1), and a cabinet or rack with a depth of 1200 mm is recommended.

Item	Requirement
Vertical space	<p>To facilitate power cable routing, the cabinet or rack must have sufficient vertical space for device installation. The vertical space requirements specific to different chassis are as follows:</p> <ul style="list-style-type: none"> ● CloudEngine 16804 DC chassis: ≥ 13U ● CloudEngine 16804 AC & high-voltage DC chassis: ≥ 12U ● CloudEngine 16808 DC chassis: ≥ 20U ● CloudEngine 16808 AC & high-voltage DC chassis: ≥ 18U ● CloudEngine 16816 DC chassis: ≥ 37U ● CloudEngine 16816 AC & high-voltage DC chassis: ≥ 35U <p>NOTE The height of the cabinet or rack is the sum of the chassis height, guide rails, and cabling space.</p>
Load bearing capacity	<p>Select a cabinet based on the number of devices to be installed and the load bearing capacity of the cabinet. When each cabinet accommodates only one device, the minimum load bearing capacity required for each cabinet is 246 kg for CloudEngine 16804, 859 kg for CloudEngine 16816, and 383 kg for CloudEngine 16808. To facilitate device movement and installation, each CloudEngine 16800 can be delivered with an optional flat cart and each CloudEngine 16816 is delivered with a flat cart.</p> <p>NOTICE If the cabinet or rack has a post inside, the guide rails delivered with the CloudEngine 16800 cannot be installed in the cabinet or rack. In this situation, use a tray that has sufficient load bearing capacity instead.</p>
Grounding	<p>The cabinet or rack must have reliable ground points for grounding the device.</p>
Air filter	<ul style="list-style-type: none"> ● If a rack or a cabinet without doors is used, you need to configure chassis doors. ● If a cabinet with a front door is used, the front door must be equipped with air filters. If the front door is not equipped with air filters, you need to configure Huawei air filter suites. For details, refer to <i>Air Filter Installation Instructions</i>. <p>CAUTION The front door of the cabinet must be equipped with an air filter, but the rear door of the cabinet cannot be equipped with any air filter. (If an air filter is installed on the rear door, uninstall it.)</p>

Item	Requirement
Distance between front and rear mounting rails	CloudEngine 16804 and CloudEngine 16808: If such a device is installed in a 1000 mm deep cabinet or rack, the distance (distance C in Figure 3-1) between the front mounting rail and the outer side of the front door is 150 mm, and the distance between the rear mounting rail and the outer side of the rear door is between 200 mm and 250 mm. If such a device is installed in a 1200 mm deep cabinet or rack, the distance (distance C in Figure 3-1) between the front mounting rail and the outer side of the front door is between 165 mm and 175 mm, and the distance between the rear mounting rail and the outer side of the rear door is between 200 mm and 300 mm.
Heat dissipation	The cabinet must meet the requirements for front-to-back airflow, and the front and rear doors must have a porosity rate of more than 55%.
Filler panel	For the CloudEngine 16804 and CloudEngine 16808, 1U and 2U filler panels are required. Part numbers of 1U and 2U filler panels are 21141166 and 21141167, respectively. Filler panels must be installed in vacant slots of a cabinet to isolate airflows; otherwise, heat dissipation of devices will be less effective. Huawei cabinets must be equipped with filler panels. If another vendor's cabinet with no filler panels is used, filler panels must also be prepared. Filler panels of Huawei cabinets are recommended.

Item	Requirement
Other requirements	<ul style="list-style-type: none">● If a vertical PDU is installed in a cabinet, the sockets need to be staggered with the chassis to prevent cables and sockets from affecting the installation and removal of fan modules and SFUs.● The PDUs in the cabinet must provide enough 16 A standard or C19 straight female power sockets. Specifically, power cables dedicated to Huawei PDUs will be delivered together with the PDUs. Huawei delivers power cables with matching connectors according to the type of the power sockets.● If AC power cables provided by Huawei are used, the cabling distance between the PDU and the device must be within 3000 mm and the cabling distance between each AC socket and the device must be within 2500 mm.● If necessary, use an earthquake-proof cabinet complying with GR63 Zone4 or Zone3 standard.● The cabinet must be installed (placed or fixed using expansion bolts) on a concrete or ESD floor.● If a third-party cabinet is used, you are advised to use the guide rails delivered with the device. If you want to use the tray delivered with the third-party cabinet, make sure the following requirements are met:<ol style="list-style-type: none">1. The front edge of the cabinet tray does not protrude from the front surface of the chassis or exceed the front mounting rail.2. The rear edge of the cabinet tray is at least 100 mm shorter than that of the chassis. 1U space (including the cabinet tray height) is reserved below the device to install a tool box for storing SFU wrenches.3. For details about the load-bearing capacity of the cabinet tray, see "Load bearing capacity".

Figure 3-1 Perspective view of a cabinet or rack



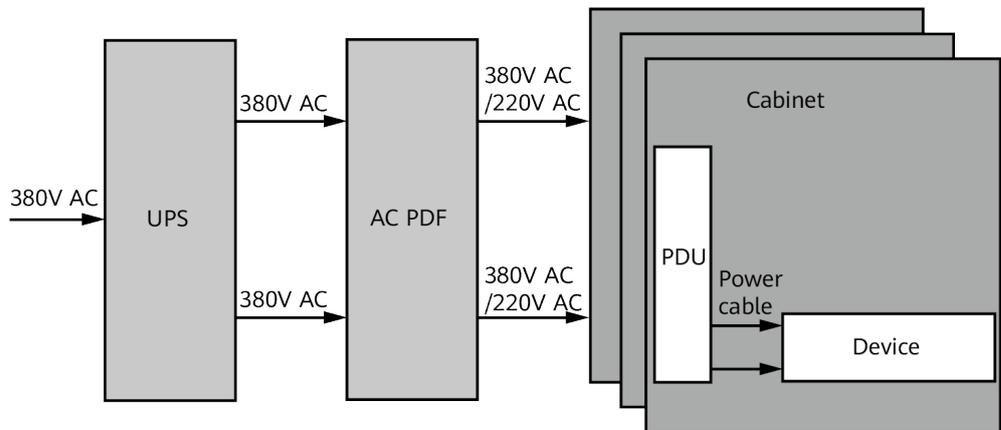
3.4 Checking the Power Distribution System

3.4.1 Introduction to the Power Distribution System

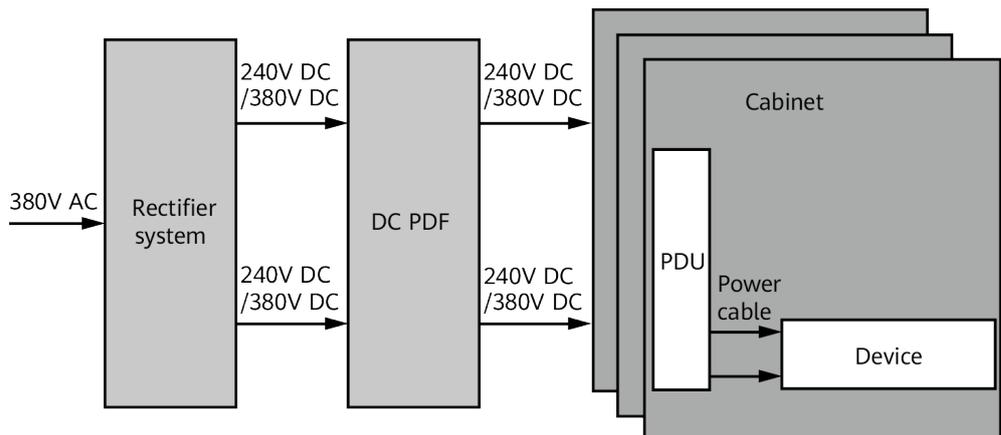
The CloudEngine 16800 supports AC, high-voltage DC (240 V DC/380 V DC), and DC power supply modes.

- AC power supply mode: Generally, an uninterruptible power supply (UPS) obtains three-phase 380 V AC power input from a mains power outlet and

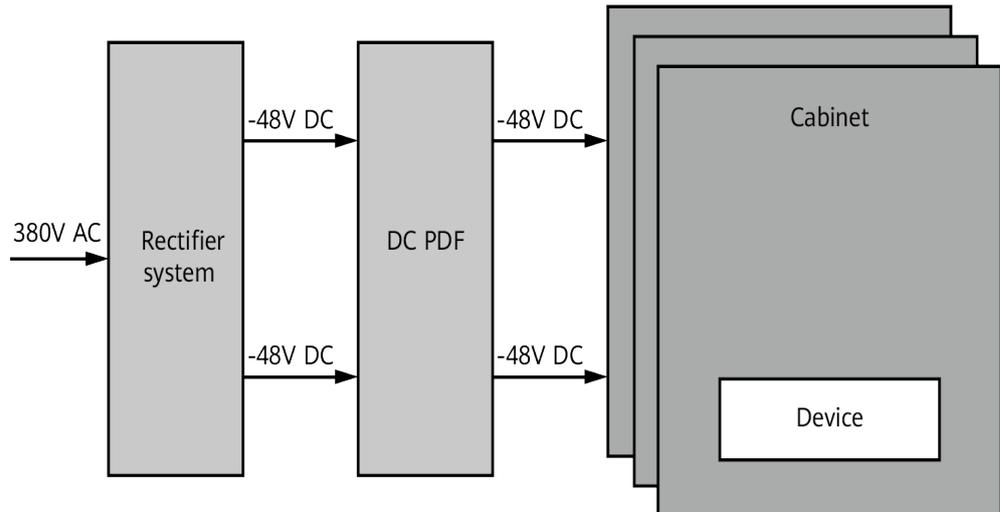
transmits 380 V AC power to an AC power distribution frame. A CloudEngine 16800 chassis receives power from the AC power distribution frame through the power distribution unit (PDU) installed in the cabinet.



- High-voltage DC (240 V DC/380 V DC) power supply mode: Generally, a rectifier system obtains three-phase 380 V AC power input from a mains power outlet and transmits 240 V DC/380 V DC power to a DC power distribution frame. A CloudEngine 16800 chassis receives power from the DC power distribution frame through the PDU installed in the cabinet.



- DC power supply mode: Generally, a rectifier system obtains three-phase 380 V AC power input from a mains power outlet and transmits -48 V DC power to a DC power distribution frame. The CloudEngine 16800 obtains power from the DC power distribution frame.



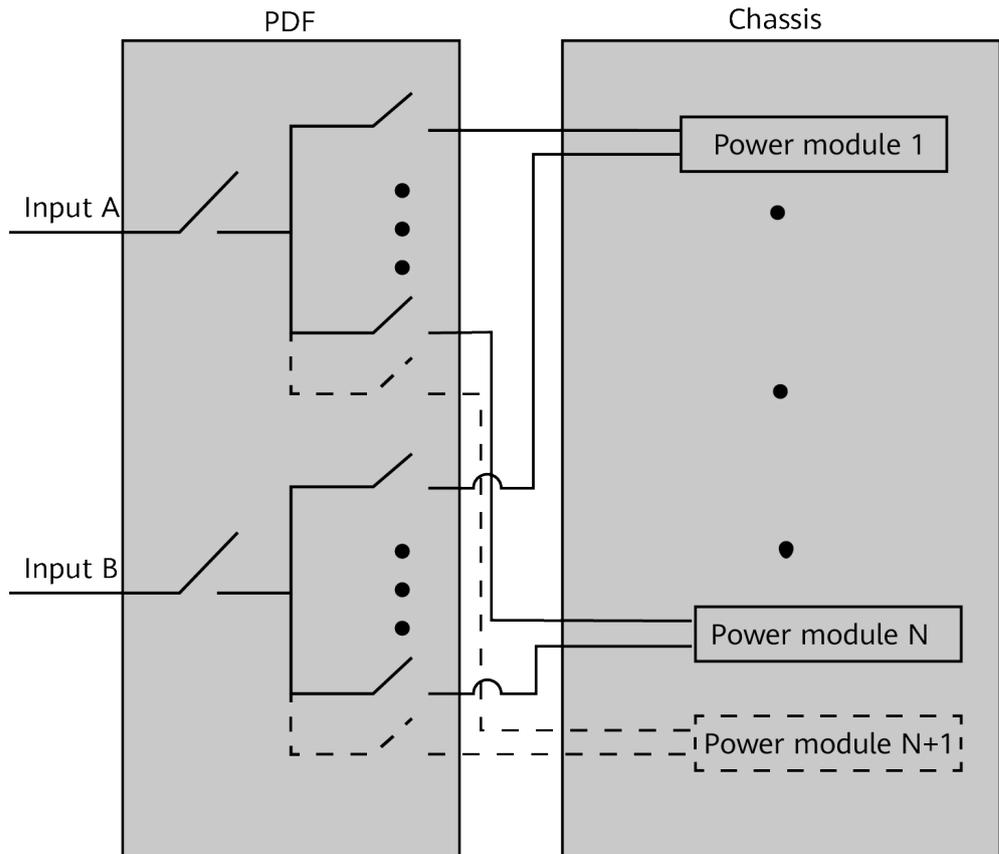
Power modules of the CloudEngine 16800 support N+1 redundancy configuration and N+0 configuration. Different configuration modes provide different reliability levels.

As data center core switches, CloudEngine 16800 series devices carry important services. Therefore, the N+1 mode is recommended to ensure high power reliability. This document provides power distribution instructions based on dual-system N+1 configuration of power modules.

The following compares the power reliability of different power module redundancy modes used on the CloudEngine 16800:

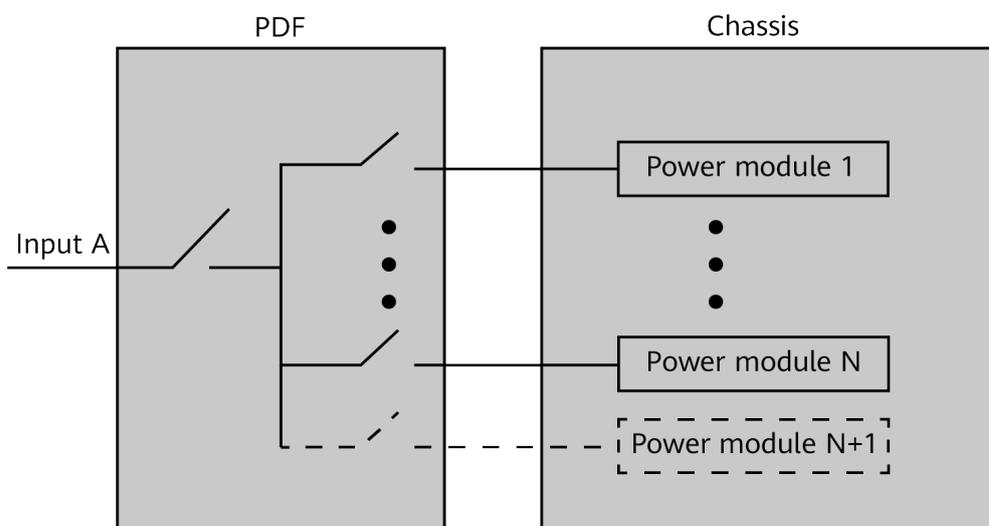
- Input redundancy and N+1 power module redundancy (shown in [Figure 3-2](#))
 - N power modules provide power for the device, and one power module works as a backup to provide power redundancy.
 - The two power inputs of the device are isolated and back up each other.
 - If any power module of the device fails, the device can still work normally.
 - The fault of any power supply system of input A or B does not affect the normal operation of the device.

Figure 3-2 Input redundancy and N+1 power module redundancy



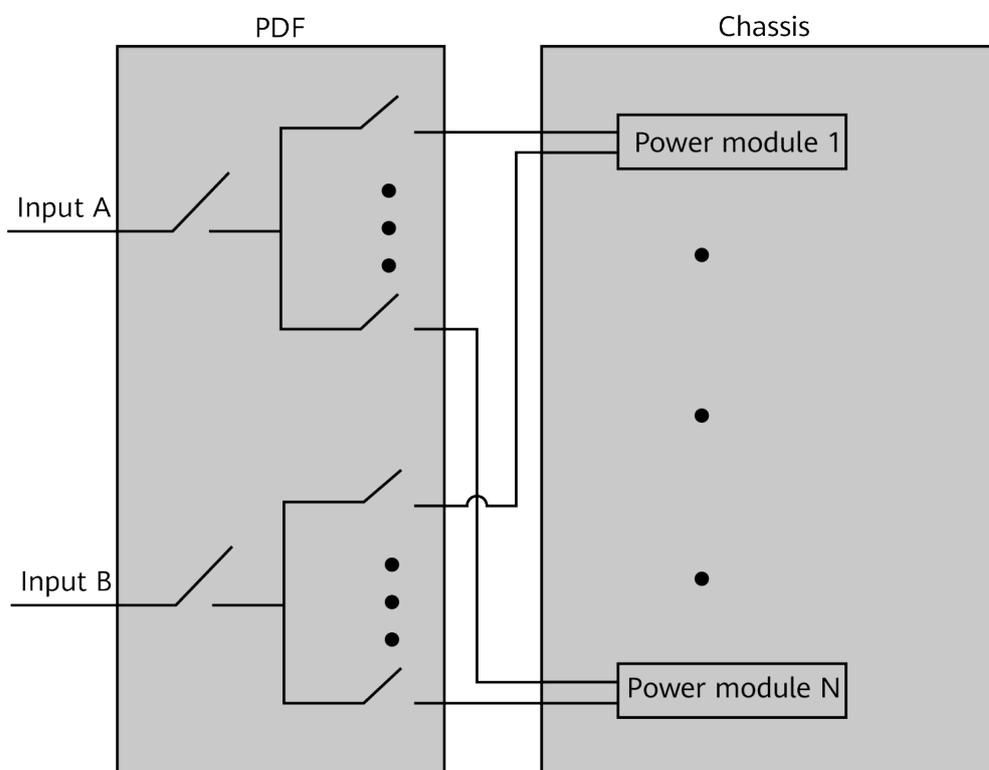
- N+1 redundancy (shown in [Figure 3-3](#))
 - N power modules provide power for the device, and one power module works as a backup to provide power redundancy.
 - The device is powered by one power input (no input redundancy).
 - If any power module of the device fails, the device can still work normally.
 - Any single-point failure in the power supply system (including a power supply failure caused by a faulty power module) will cause the device unable to work normally.

Figure 3-3 N+1 power module redundancy



- N+0 no redundancy (shown in [Figure 3-4](#))
 - All the N power modules provide power for the device.
 - The two power inputs of the device are isolated and back up each other.
 - If any power module of the device fails, the device cannot work normally.
 - The fault of any power supply system of input A or B does not affect the normal operation of the device.

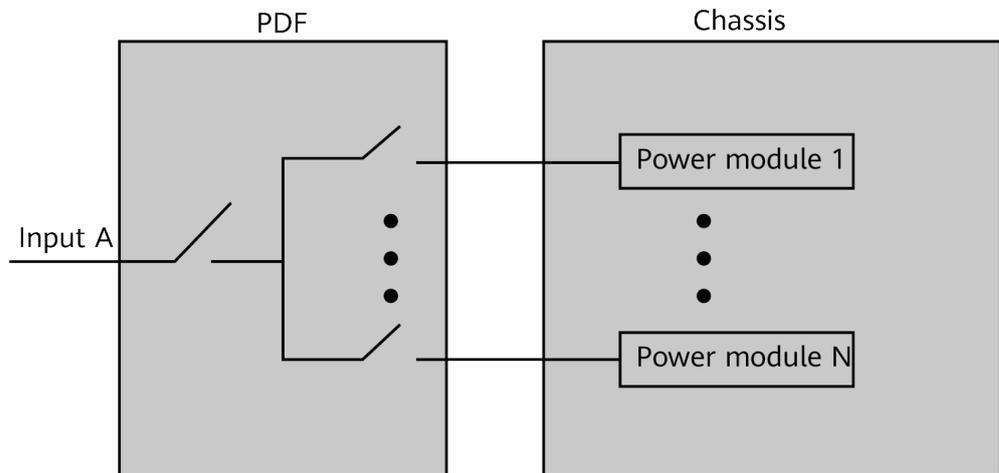
Figure 3-4 N+0 no redundancy



- N+0 no redundancy (shown in [Figure 3-5](#))
 - All the N power modules provide power for the device.

- The device is powered by one power input (no input redundancy).
- If any power module of the device fails, the device cannot work normally.
- Any single-point failure in the power supply system (including a power supply failure caused by a faulty power module) will cause the device unable to work normally.

Figure 3-5 N+0 no redundancy



3.4.2 CloudEngine 16804 Power Distribution Guide

3.4.2.1 Connecting the CloudEngine 16804 to a PDF Directly (AC)

Power Distribution Requirements

NOTE

- The power distribution frame (PDF) uses the 1+1 redundancy mode.
- If the chassis has a low power consumption, a small number of power modules in N+1 redundancy mode need to be configured. The vacant power module slots do not need to connect to the PDF.
- The CloudEngine 16800 must be reliably grounded. Circuit breakers with the current leakage protection function are not recommended for the devices.

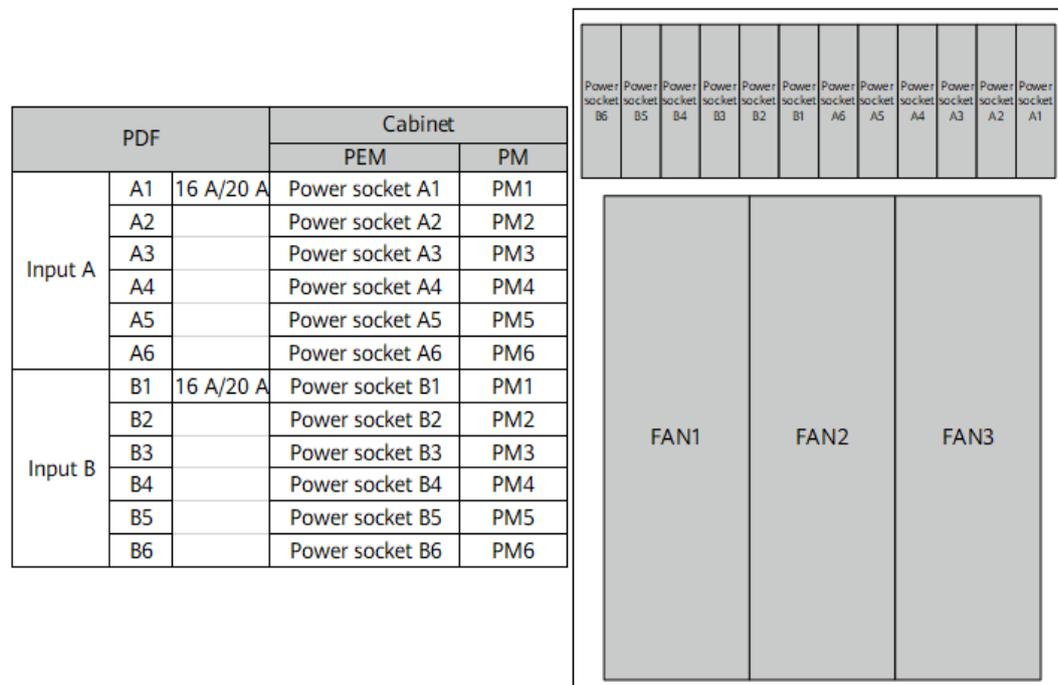
Table 3-3 Power distribution requirements (CloudEngine 16804 chassis)

Cabling Distance from the PDF to the Device's PEM	≤ 2.5 m (Determine this distance according to site survey results.)
Number of Power Inputs	6+6 input redundancy (outputs from the PDF)

Rated Current of Connected Circuit Breakers	<ul style="list-style-type: none"> • ≥ 16 A: The phase voltage is greater than or equal to 200 V AC, for example, the circuit breaker is connected to the uninterruptible power supply (UPS). • ≥ 20 A: The phase voltage is greater than or equal to 170 V AC, for example, the circuit breaker is connected to a public mains power outlet. <p>NOTE Circuit breakers with rated current of 16 A or 20 A are recommended for the PEM's power sockets A1 to A6 and B1 to B6.</p>
Output Terminal Type in the PDF	Power sockets complying with local standards

Power Distribution Schemes

Figure 3-6 CloudEngine 16804 chassis directly connected to the PDF



3.4.2.2 Connecting the CloudEngine 16804 to a PDF Directly (DC)

Power Distribution Requirements

NOTE

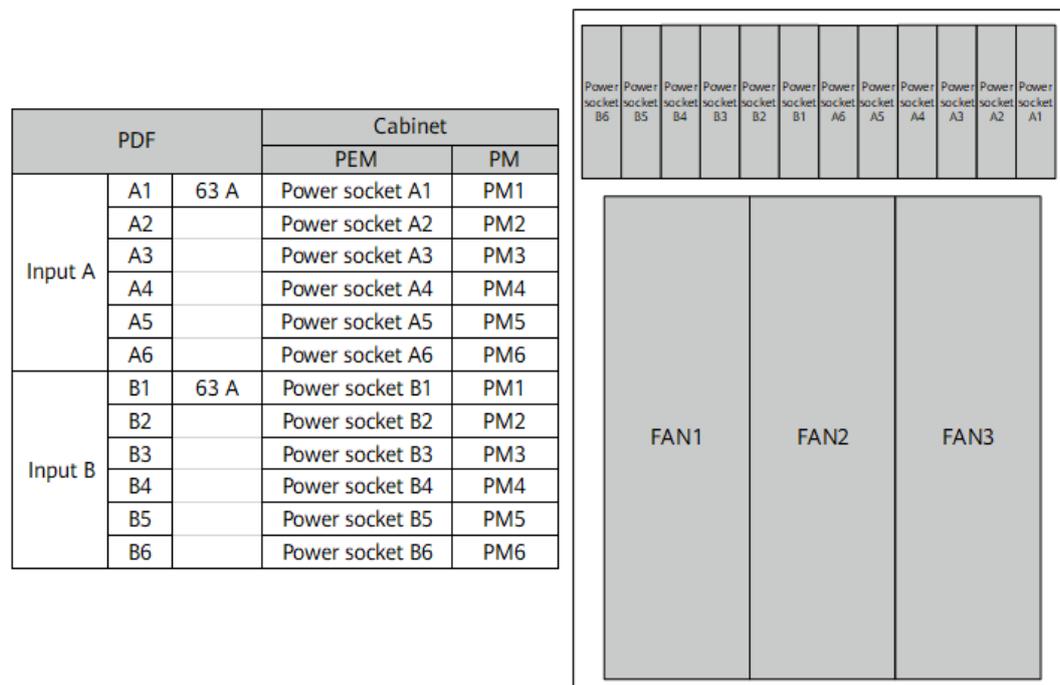
- The PDF uses power modules in 1+1 redundancy mode.
- If the chassis has a low power consumption, a small number of power modules in N+1 redundancy mode need to be configured. The vacant power module slots do not need to connect to the PDF.
- The CloudEngine 16800 must be reliably grounded. Circuit breakers with the current leakage protection function are not recommended for the devices.

Table 3-4 Power distribution requirements (CloudEngine 16804 chassis)

Cabling Distance from the PDF to the Device's PEM	Determine this distance according to site survey results.
Number of Power Inputs	6+6 input redundancy (outputs from the PDF)
Rated Current of Connected Circuit Breakers	≥ 63 A NOTE Circuit breakers with rated current of 63 A are recommended for the PEM's terminal blocks A1 to A6 and B1 to B6.
Output Terminal Type in the PDF	Naked Crimping Connector, JG2, 25mm ² /35mm ² , M6, 80A, Tin Plating, Right angle (cables are made onsite)

Power Distribution Schemes

Figure 3-7 CloudEngine 16804 chassis directly connected to the PDF



3.4.2.3 Connecting the CloudEngine 16804 to a PDF Directly (High-Voltage DC)

Power Distribution Requirements

 NOTE

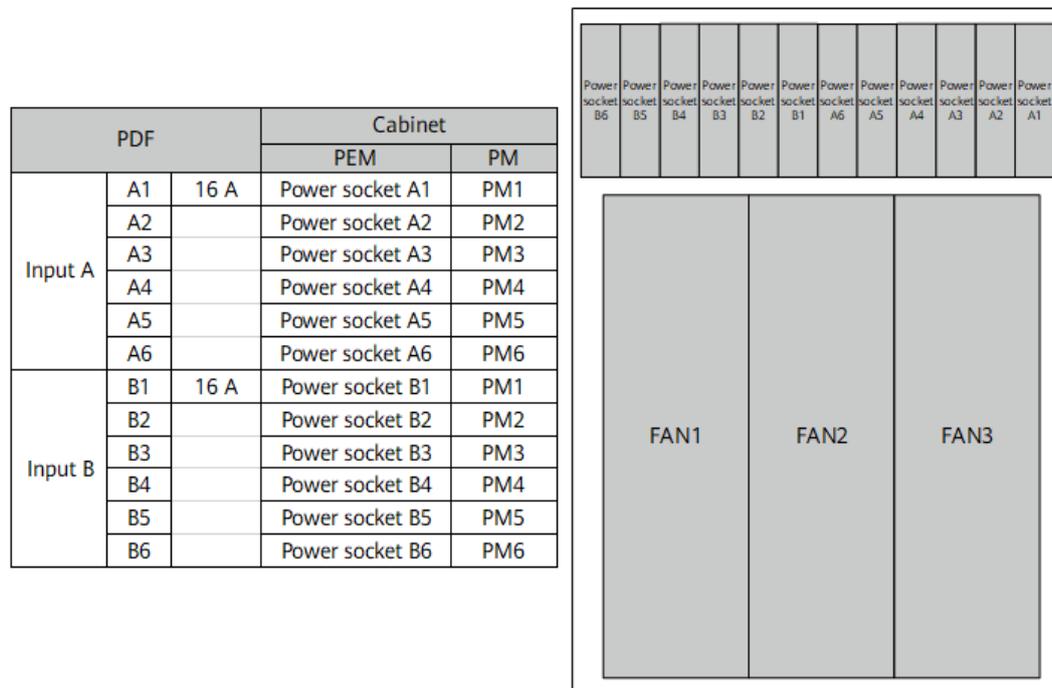
- The PDF uses power modules in 1+1 redundancy mode.
- If the chassis has a low power consumption, a small number of power modules in N+1 redundancy mode need to be configured. The vacant power module slots do not need to connect to the PDF.
- The CloudEngine 16800 must be reliably grounded. Circuit breakers with the current leakage protection function are not recommended for the devices.

Table 3-5 Power distribution requirements (CloudEngine 16804 chassis)

Cabling Distance from the PDF to the Device's PEM	Determine this distance according to site survey results.
Number of Power Inputs	6+6 input redundancy (outputs from the PDF)
Rated Current of Connected Circuit Breakers	≥ 16 A NOTE A circuit breaker with rated current 16 A is recommended for each channel of output A1 to A6 and B1 to B6.
Output Terminal Type in the PDF	Power sockets complying with local standards

Power Distribution Schemes

Figure 3-8 CloudEngine 16804 chassis directly connected to the PDF

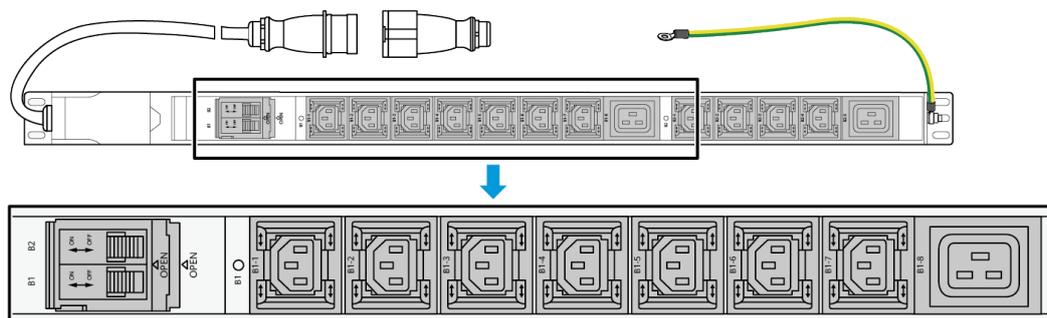


3.4.2.4 Connecting the CloudEngine 16804 to a PDF Through a Single-Phase PDU

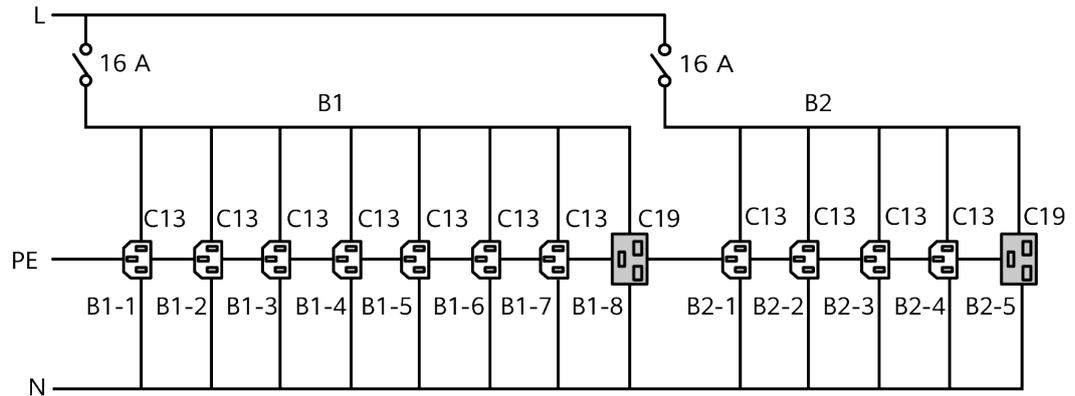
PDU Overview

Figure 3-9 shows the appearance of a 220 V single-phase PDU.

Figure 3-9 220 V single-phase PDU



A 220 V single-phase PDU supports single-phase 220 V to 240 V AC power input and provides two groups of power outputs B1 and B2. Group B1 includes seven C13 sockets and one C19 socket. Group B2 includes four C13 sockets and one C19 socket. Each group is controlled by a 16 A circuit breaker. When the groups are connected to a chassis, the total current of all sockets in each group cannot exceed 16 A.



Power Distribution Requirements

NOTE

- The PDF uses the 1+1 redundancy mode and three-phase 32 A or 40 A.
- If the chassis has a low power consumption, a small number of power modules in N+1 redundancy mode need to be configured. The vacant power module slots do not need to connect to the PDF.
- The CloudEngine 16800 must be reliably grounded. Circuit breakers with the current leakage protection function are not recommended for the devices.
- A maximum of eight PDUs can be installed in a Huawei A812-20 cabinet. When the 220 V single-phase PDUs are used, a maximum of eight power modules can be configured in a single cabinet or rack.

Table 3-6 Power distribution requirements (CloudEngine 16804 chassis)

Cabling Distance from the PDU to the Device's PEM	Determine this distance according to site survey results.
Number of Power Inputs	3+3 single-phase 32 A/40 A input redundancy (outputs from the PDF)
Rated Current of Connected Circuit Breakers	<ul style="list-style-type: none"> • ≥ 32 A: The phase voltage is greater than or equal to 200 V AC, for example, the circuit breaker is connected to the UPS. • ≥ 40 A: The phase voltage is greater than or equal to 170 V AC, for example, the circuit breaker is connected to a mains power outlet. <p>NOTE The rated current of 32 A or 40 A is the recommended specification for circuit breakers A1 to A3 and B1 to B3.</p>
Output Terminal Type in the PDU	IEC 309 industrial connectors

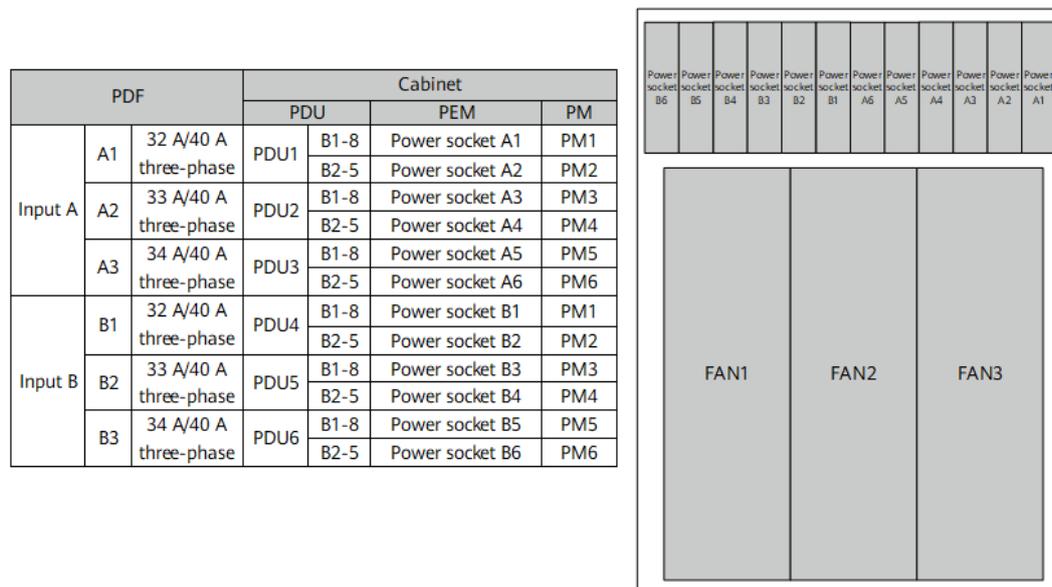
Power Distribution Schemes

When one CloudEngine 16804 is installed in the cabinet/rack, six power modules (full configuration) are configured for the device. In this case, six single-phase PDUs are required.

NOTE

When the CloudEngine 16804 is configured with more than eight power modules, a 220 V single-phase PDU cannot be used.

Figure 3-10 CloudEngine 16804 chassis connected to a PDF through a single-phase PDU

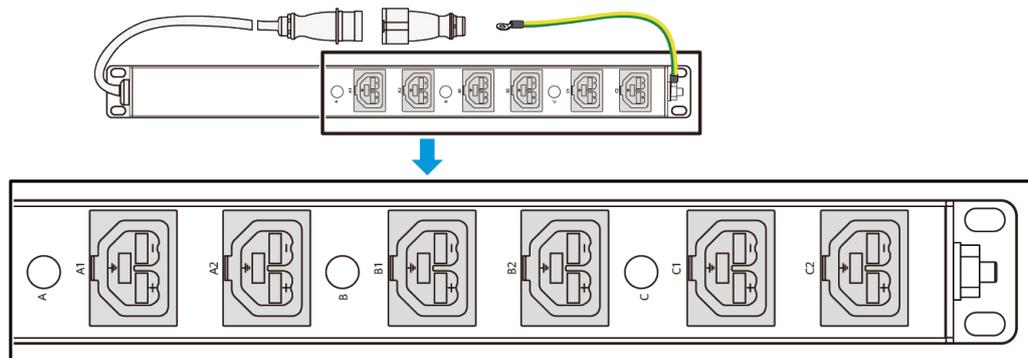


3.4.2.5 Connecting the CloudEngine 16804 to a PDF Through a Three-Phase AC PDU (PDU2000-32-3PH-6-B1)

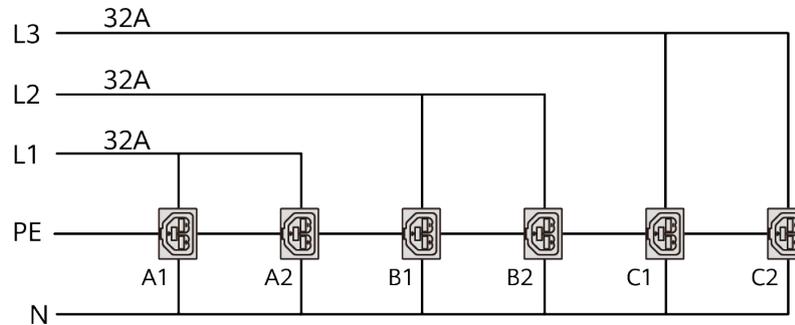
PDU Overview

Figure 3-11 shows the appearance of a 380 V three-phase PDU.

Figure 3-11 380 V three-phase PDU



A 380 V three-phase PDU supports three-phase (L1, L2, and L3) 346 V to 415 V AC power input, and provides three groups of outputs on each phase line, namely, A, B, and C. Groups A, B, and C each control two HVDC-3Z-03 sockets. When the groups are connected to a chassis, the total current of all sockets in each group cannot exceed 32 A.



Power Distribution Requirements

NOTE

- The PDF uses the 1+1 redundancy mode and three-phase 32 A or 40 A.
- If the chassis has a low power consumption, a small number of power modules in N+1 redundancy mode need to be configured. The vacant power module slots do not need to connect to the PDF.
- The CloudEngine 16800 must be reliably grounded. Circuit breakers with the current leakage protection function are not recommended for the devices.
- A maximum of eight PDUs can be installed in a Huawei A812-20 cabinet. When 380 V three-phase PDUs are used, a maximum of 24 power modules can be configured in a single cabinet or rack.

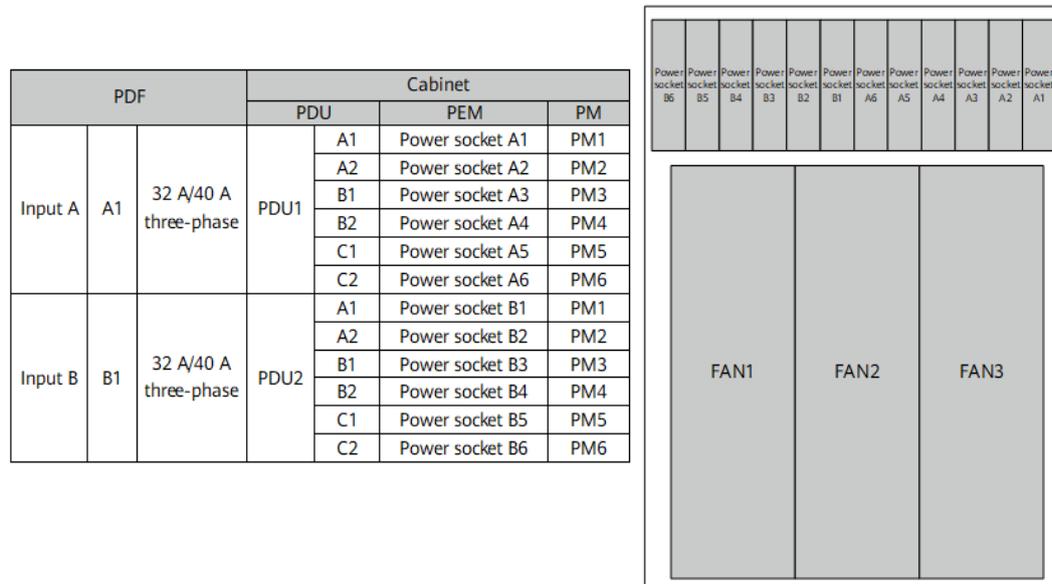
Table 3-7 Power distribution requirements (CloudEngine 16804 chassis)

Cabling Distance from the PDU to the Device's PEM	Determine this distance according to site survey results.
Number of Power Inputs	1+1 three-phase 32 A/40 A input redundancy (outputs from the PDF)
Rated Current of Connected Circuit Breakers	<ul style="list-style-type: none"> • ≥ 32 A: The phase voltage is greater than or equal to 200 V AC, for example, the circuit breaker is connected to the UPS. • ≥ 40 A: The phase voltage is greater than or equal to 170 V AC, for example, the circuit breaker is connected to a mains power outlet. <p>NOTE The rated current of 32 A or 40 A is the recommended specifications for circuit breakers of the three-phase outputs A1 and B1.</p>
Output Terminal Type in the PDU	HVDC-3Z-03 socket

Power Distribution Schemes

The CloudEngine 16804 is installed in the cabinet/rack. The device can house up to six power modules. Under full configuration of the six power modules, two three-phase PDUs are required.

Figure 3-12 CloudEngine 16804 chassis connected to a PDF through a three-phase PDU

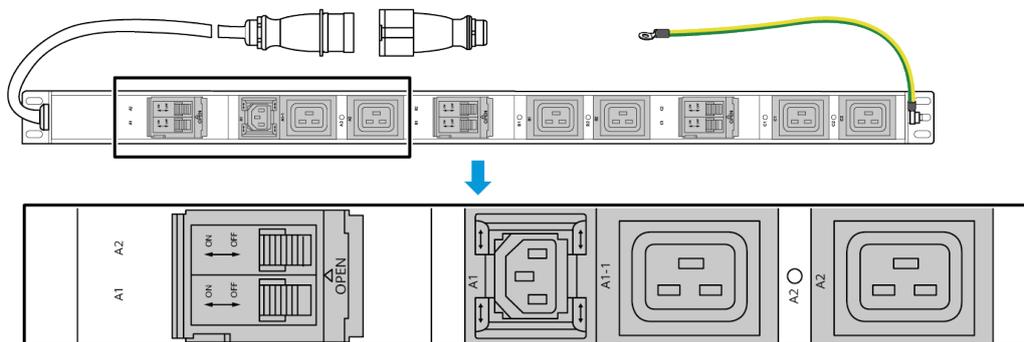


3.4.2.6 Connecting a CloudEngine 16804 to a PDF Through a Three-Phase PDU (PDU2000-32-3PH-1)

PDU Overview

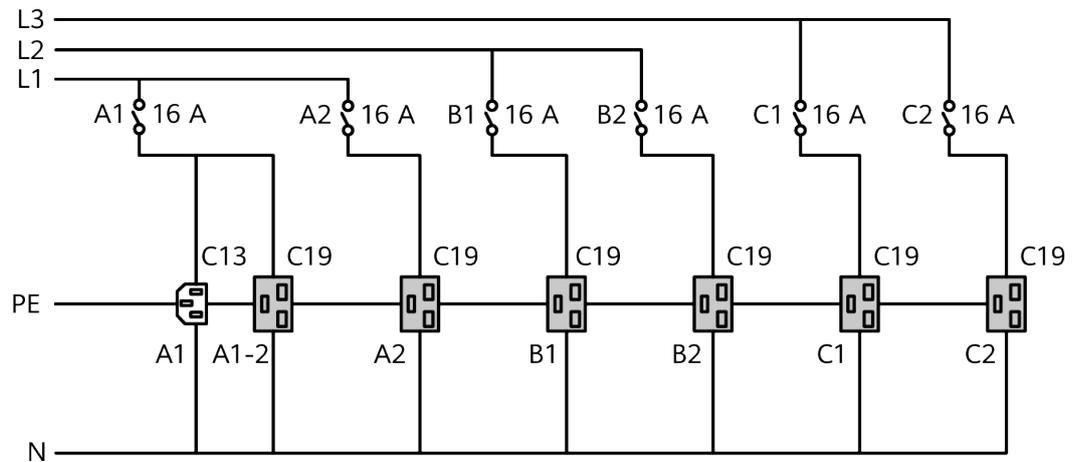
Figure 3-13 shows the appearance of a 380 V three-phase PDU.

Figure 3-13 380 V three-phase PDU



A 380 V three-phase PDU supports three-phase (L1, L2, and L3) 380 V to 415 V AC input, and provides two groups of outputs on each phase line. L1 provides outputs A1 and A2; L2 provides outputs B1 and B2; L3 provides outputs C1 and C2. A1 controls two C13 sockets and one C19 socket. A2, B1, B2, C1, and C2 control one C19 socket. Each group is controlled by a 16 A circuit breaker. When the groups

are connected to a chassis, the total current of all sockets in each group cannot exceed 16 A.



Power Distribution Requirements

NOTE

- The PDF uses the 1+1 redundancy mode and three-phase 32 A or 40 A.
- If the chassis has a low power consumption, a small number of power modules in N+1 redundancy mode need to be configured. The vacant power module slots do not need to connect to the PDF.
- The CloudEngine 16800 must be reliably grounded. Circuit breakers with the current leakage protection function are not recommended for the devices.
- A maximum of eight PDUs can be installed in a Huawei A812-20 cabinet. When 380 V three-phase PDUs are used, a maximum of 24 power modules can be configured in a single cabinet or rack.

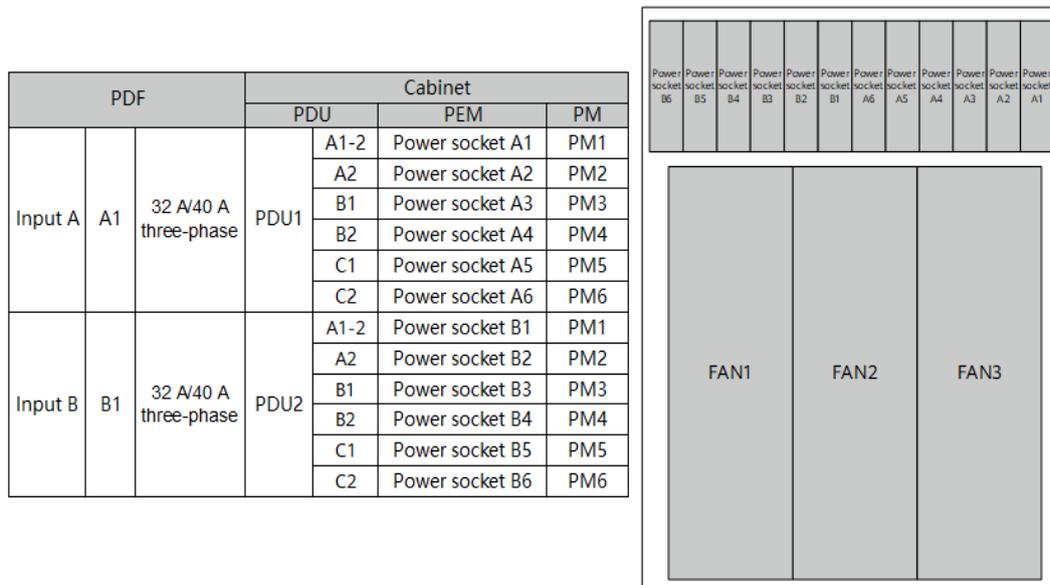
Table 3-8 Power distribution requirements (CloudEngine 16804 chassis)

Cabling Distance from the PDU to the Device's PEM	Determine this distance according to site survey results.
Number of Power Inputs	1+1 three-phase 32 A/40 A input redundancy (outputs from the PDF)
Rated Current of Connected Circuit Breakers	<ul style="list-style-type: none"> • ≥ 32 A: The phase voltage is greater than or equal to 200 V AC, for example, the circuit breaker is connected to the UPS. • ≥ 40 A: The phase voltage is greater than or equal to 170 V AC, for example, the circuit breaker is connected to a mains power outlet. <p>NOTE The rated current of 32 A or 40 A is the recommended specification for circuit breakers A1 and B1.</p>
Output Terminal Type in the PDU	IEC 309 industrial connectors

Power Distribution Schemes

A CloudEngine 16804 is installed in the cabinet/rack. The device can house up to six power modules. Under full configuration of the six power modules, two three-phase PDUs are required.

Figure 3-14 CloudEngine 16804 chassis connected to a PDF through a three-phase PDU

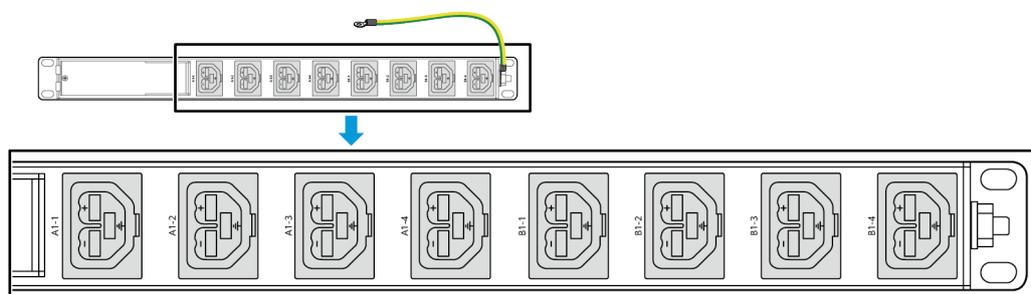


3.4.2.7 Connecting the CloudEngine 16804 to a PDF Through a High-Voltage DC PDU (PDU2000-63-380VDC-8-B1)

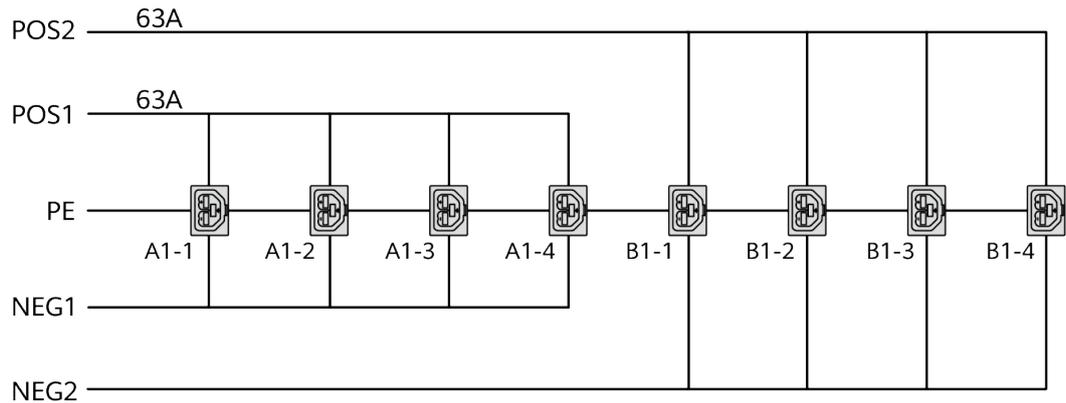
PDU Overview

A 380 V high-voltage DC PDU is used to supply power to a device through a 240 V or 380 V high-voltage DC power distribution system. [Figure 3-15](#) shows the appearance of a 380 V high-voltage DC PDU.

Figure 3-15 380 V high-voltage DC PDU



A 380 V high-voltage DC PDU supports 240 V/380V DC power input and provides two output groups A1 and B1. Each group controls four HVDC-3Z-03 sockets. When the groups are connected to a chassis, the total current of all sockets in each group cannot exceed 63 A.



Power Distribution Requirements

NOTE

- The PDF uses power modules in 1+1 redundancy mode.
- If the chassis has a low power consumption, a small number of power modules in N+1 redundancy mode need to be configured. The vacant power module slots do not need to connect to the PDF.
- The CloudEngine 16800 must be reliably grounded. Circuit breakers with the current leakage protection function are not recommended for the devices.
- A maximum of eight PDUs can be installed in a Huawei A812-20 cabinet. When the 380 V high-voltage DC PDUs are used, a maximum of 24 power modules can be configured in a single cabinet or rack.

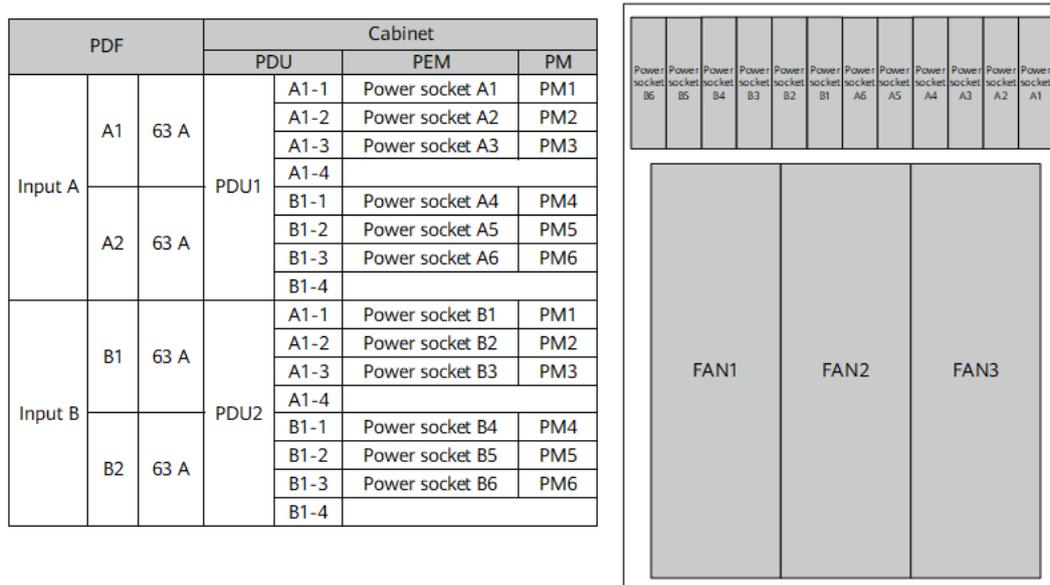
Table 3-9 Power distribution requirements (CloudEngine 16804 chassis)

Cabling Distance from the PDU to the Device's PEM	Determine this distance according to site survey results.
Number of Power Inputs	2+2 input redundancy (outputs from the PDF)
Rated Current of Connected Circuit Breakers	$\geq 63 \text{ A}$ NOTE The rated current of 63 A is the recommended specification for circuit breakers A1 and B1.
Output Terminal Type in the PDU	HVDC-3Z-03 socket

Power Distribution Schemes

A CloudEngine 16804 is installed in the cabinet/rack. The device can house up to six power modules. Under full configuration of the six power modules, two 380 V high-voltage DC PDUs are required, and the output terminals of the PDUs are partially used.

Figure 3-16 CloudEngine 16804 chassis connected to the PDF through a 380 V high-voltage DC PDU

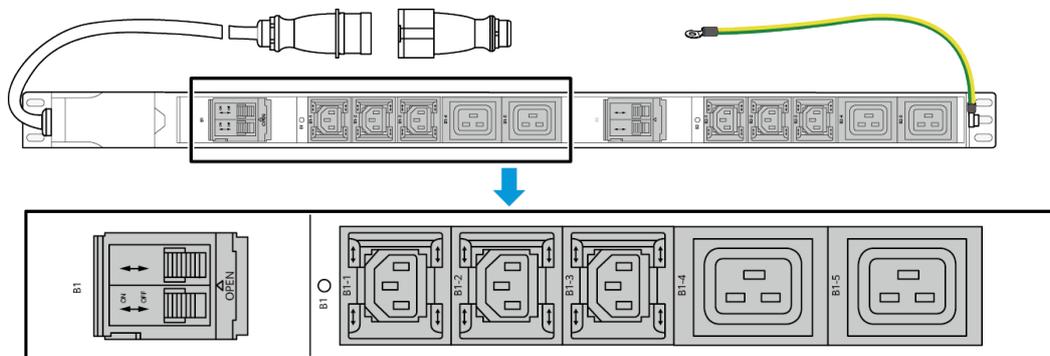


3.4.2.8 Connecting the CloudEngine 16804 to a PDF Through a 240 V DC PDU

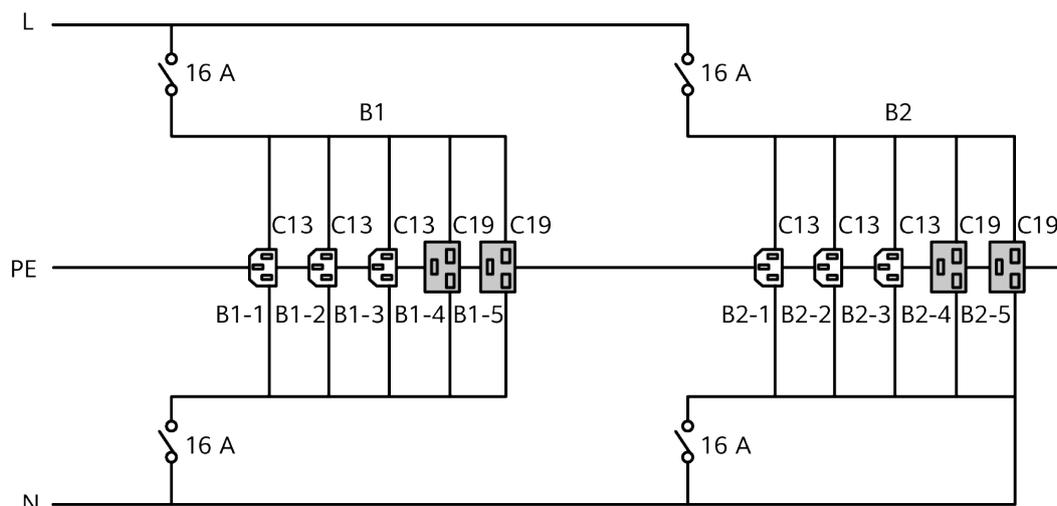
PDU Overview

A 240 V DC PDU is used to supply power to a device through a high-voltage DC power distribution system. [Figure 3-17](#) shows the appearance of a 240 V DC PDU.

Figure 3-17 240 V high-voltage DC PDU



A 240 V DC PDU provides two output groups B1 and B2. Each group includes three C13 sockets and two C19 sockets. Each group is controlled by a 16 A circuit breaker on the L line and a 16 A circuit breaker on the N line. The circuit breakers for the same group are closed or open at the same time. When the groups are connected to a chassis, the total current of all sockets in each group cannot exceed 16 A.



Power Distribution Requirements

NOTE

- The PDF uses power modules in 1+1 redundancy mode.
- If the chassis has a low power consumption, a small number of power modules in N+1 redundancy mode need to be configured. The vacant power module slots do not need to connect to the PDF.
- The CloudEngine 16800 must be reliably grounded. Circuit breakers with the current leakage protection function are not recommended for the devices.
- A maximum of eight PDUs can be installed in a Huawei A812-20 cabinet. When the 240 V DC PDUs are used, a maximum of eight power modules can be configured in a single cabinet or rack.

Table 3-10 Power distribution requirements (CloudEngine 16804 chassis)

Cabling Distance from the PDU to the Device's PEM	Determine this distance according to site survey results.
Number of Power Inputs	3+3 input redundancy (outputs from the PDF)
Rated Current of Connected Circuit Breakers	≥ 32 A NOTE The rated current of 32 A is the recommended specification for circuit breakers A1 to A3 and B1 to B3.
Output Terminal Type in the PDU	IEC 309 industrial connectors

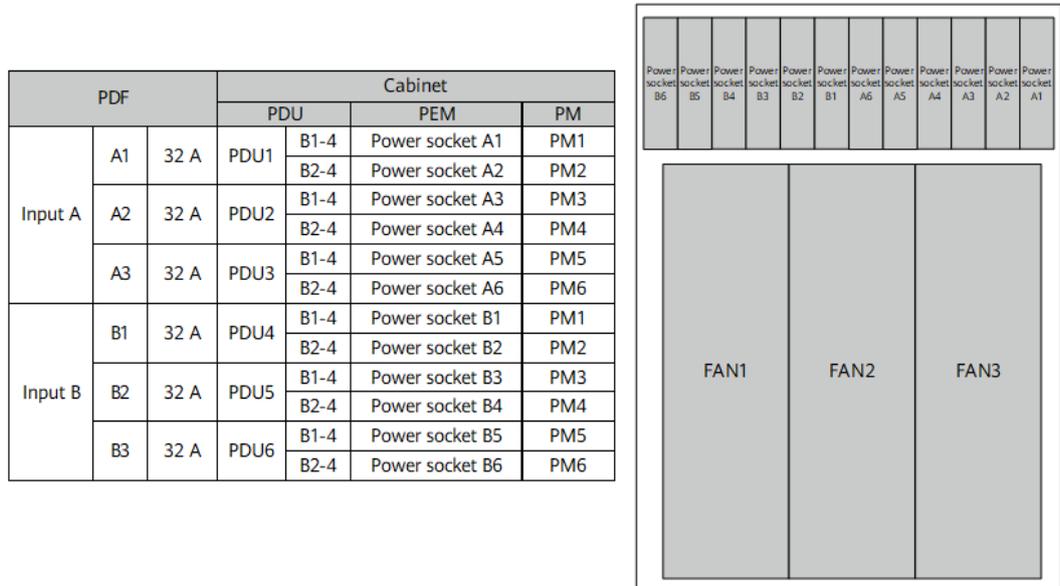
Power Distribution Schemes

When one CloudEngine 16804 is installed in the cabinet/rack, six power modules (full configuration) are configured for the device. In this case, six 240 V DC PDUs are required.

NOTE

When the CloudEngine 16804 is configured with more than eight power modules, the 240 V DC PDU cannot be used.

Figure 3-18 CloudEngine 16804 chassis connected to the PDF through a 240 V DC PDU



3.4.3 CloudEngine 16808 Power Distribution Guide

3.4.3.1 Connecting the CloudEngine 16808 to a PDF Directly (AC)

Power Distribution Requirements

NOTE

- The power distribution frame (PDF) uses the 1+1 redundancy mode.
- If the chassis has a low power consumption, a small number of power modules in N+1 redundancy mode need to be configured. The vacant power module slots do not need to connect to the PDF.
- The CloudEngine 16800 must be reliably grounded. Circuit breakers with the current leakage protection function are not recommended for the devices.

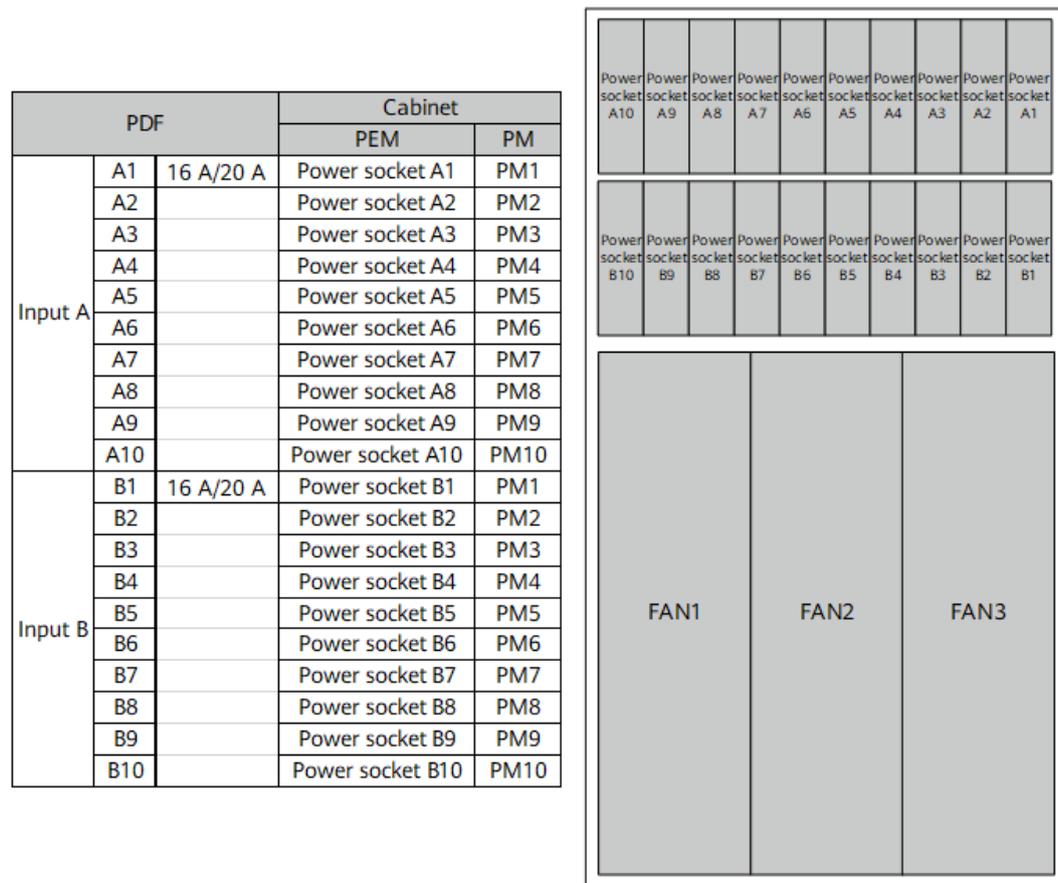
Table 3-11 Power distribution requirements (CloudEngine 16808 chassis)

Cabling Distance from the PDF to the Device's PEM	≤ 2.5 m (Determine this distance according to site survey results.)
Number of Power Inputs	10+10 input redundancy (outputs from the PDF)

Rated Current of Connected Circuit Breakers	<ul style="list-style-type: none"> • ≥ 16 A: The phase voltage is greater than or equal to 200 V AC, for example, the circuit breaker is connected to the uninterruptible power supply (UPS). • ≥ 20 A: The phase voltage is greater than or equal to 170 V AC, for example, the circuit breaker is connected to a public mains power outlet. <p>NOTE Circuit breakers with rated current of 16 A or 20 A are recommended for the PEM's power sockets A1 to A10 and B1 to B10.</p>
Output Terminal Type in the PDU	Power sockets complying with local standards

Power Distribution Schemes

Figure 3-19 CloudEngine 16808 chassis directly connected to the PDU



3.4.3.2 Connecting the CloudEngine 16808 to a PDF Directly (DC)

Power Distribution Requirements

 NOTE

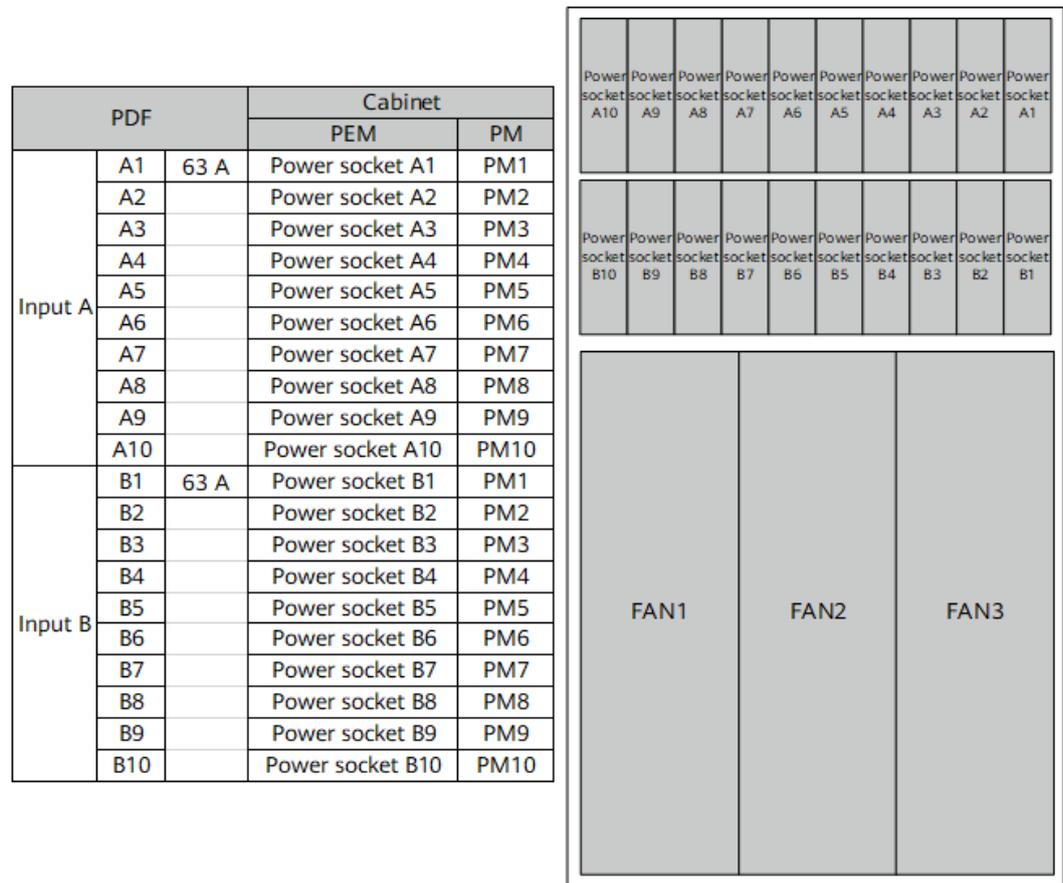
- The PDF uses power modules in 1+1 redundancy mode.
- If the chassis has a low power consumption, a small number of power modules in N+1 redundancy mode need to be configured. The vacant power module slots do not need to connect to the PDF.
- The CloudEngine 16800 must be reliably grounded. Circuit breakers with the current leakage protection function are not recommended for the devices.

Table 3-12 Power distribution requirements (CloudEngine 16808 chassis)

Cabling Distance from the PDF to the Device's PEM	Determine this distance according to site survey results.
Number of Power Inputs	10+10 input redundancy (outputs from the PDF)
Rated Current of Connected Circuit Breakers	≥ 63 A NOTE Circuit breakers with rated current of 63 A are recommended for the PEM's terminal blocks A1 to A10 and B1 to B10.
Output Terminal Type in the PDF	Naked Crimping Connector, JG2, 25mm ² /35mm ² , M6, 80A, Tin Plating, Right angle (cables are made onsite)

Power Distribution Schemes

Figure 3-20 CloudEngine 16808 chassis directly connected to the PDF



3.4.3.3 Connecting the CloudEngine 16808 to a PDF Directly (High-Voltage DC)

Power Distribution Requirements

NOTE

- The PDF uses power modules in 1+1 redundancy mode.
- If the chassis has a low power consumption, a small number of power modules in N+1 redundancy mode need to be configured. The vacant power module slots do not need to connect to the PDF.
- The CloudEngine 16800 must be reliably grounded. Circuit breakers with the current leakage protection function are not recommended for the devices.

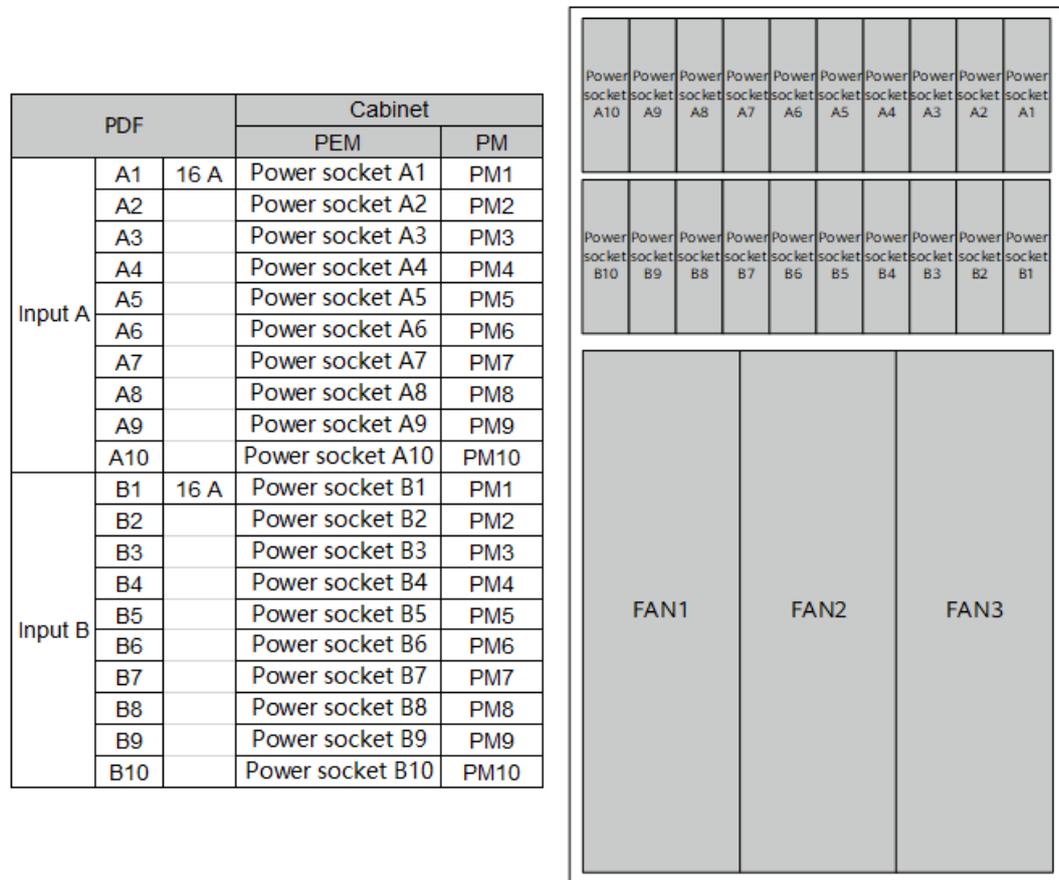
Table 3-13 Power distribution requirements (CloudEngine 16808 chassis)

Cabling Distance from the PDF to the Device's PEM	Determine this distance according to site survey results.
--	---

Number of Power Inputs	10+10 input redundancy (outputs from the PDF)
Rated Current of Connected Circuit Breakers	≥ 16 A NOTE Circuit breakers with rated current of 16 A are recommended for the PEM's power sockets A1 to A10 and B1 to B10.
Output Terminal Type in the PDF	Power sockets complying with local standards

Power Distribution Schemes

Figure 3-21 CloudEngine 16808 chassis directly connected to the PDF

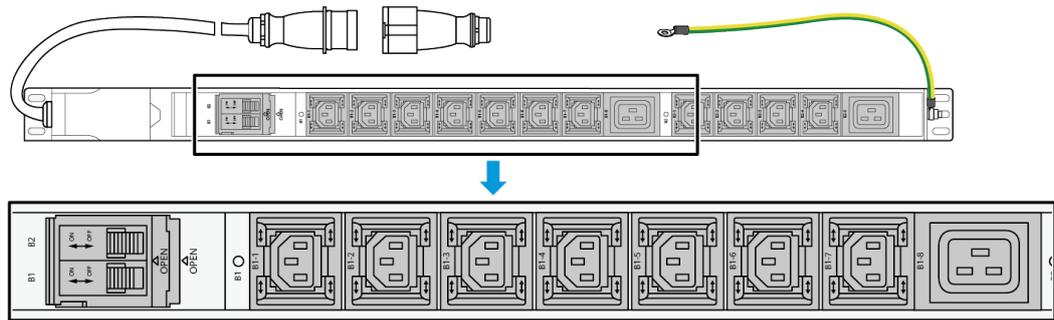


3.4.3.4 Connecting the CloudEngine 16808 to a PDF Through a Single-Phase PDU

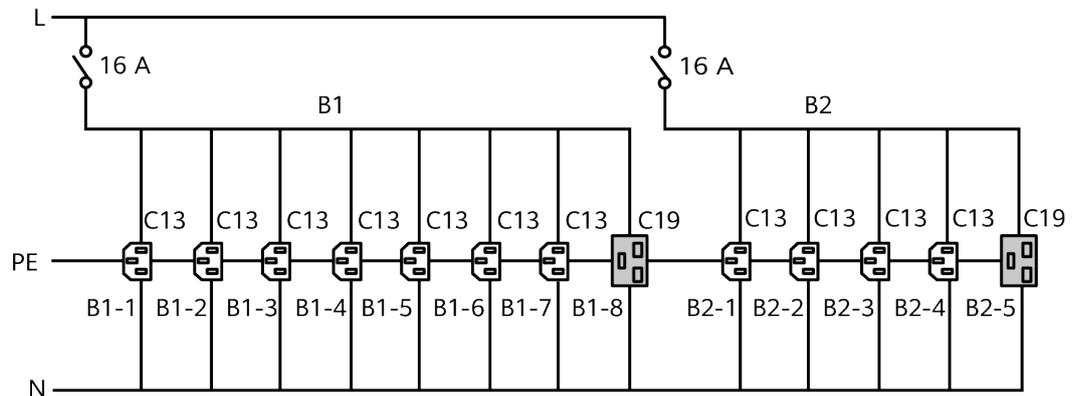
PDU Overview

Figure 3-22 shows the appearance of a 220 V single-phase PDU.

Figure 3-22 220 V single-phase PDU



A 220 V single-phase PDU supports single-phase 220 V to 240 V AC power input and provides two groups of power outputs B1 and B2. Group B1 includes seven C13 sockets and one C19 socket. Group B2 includes four C13 sockets and one C19 socket. Each group is controlled by a 16 A circuit breaker. When the groups are connected to a chassis, the total current of all sockets in each group cannot exceed 16 A.



Power Distribution Requirements

NOTE

- The PDF uses the 1+1 redundancy mode and three-phase 32 A or 40 A.
- If the chassis has a low power consumption, a small number of power modules in N+1 redundancy mode need to be configured. The vacant power module slots do not need to connect to the PDF.
- The CloudEngine 16800 must be reliably grounded. Circuit breakers with the current leakage protection function are not recommended for the devices.
- A maximum of eight PDUs can be installed in a Huawei A812-20 cabinet. When the 220 V single-phase PDUs are used, a maximum of eight power modules can be configured in a single cabinet or rack.

Table 3-14 Power distribution requirements (CloudEngine 16808 chassis)

Cabling Distance from the PDU to the Device's PEM	Determine this distance according to site survey results.
Number of Power Inputs	<ul style="list-style-type: none">• The single-phase PDU input is not recommended. If the single-phase PDU input is used, ensure that a maximum of eight power modules are configured in a cabinet or rack.• 4+4 single-phase 32 A/40 A input redundancy (outputs from the PDF)
Rated Current of Connected Circuit Breakers	<ul style="list-style-type: none">• ≥ 32 A: The phase voltage is greater than or equal to 200 V AC, for example, the circuit breaker is connected to the UPS.• ≥ 40 A: The phase voltage is greater than or equal to 170 V AC, for example, the circuit breaker is connected to a mains power outlet. <p>NOTE The rated current of 32 A or 40 A is the recommended specification for circuit breakers A1, A2, B1, and B2.</p>
Output Terminal Type in the PDU	IEC 309 industrial connectors

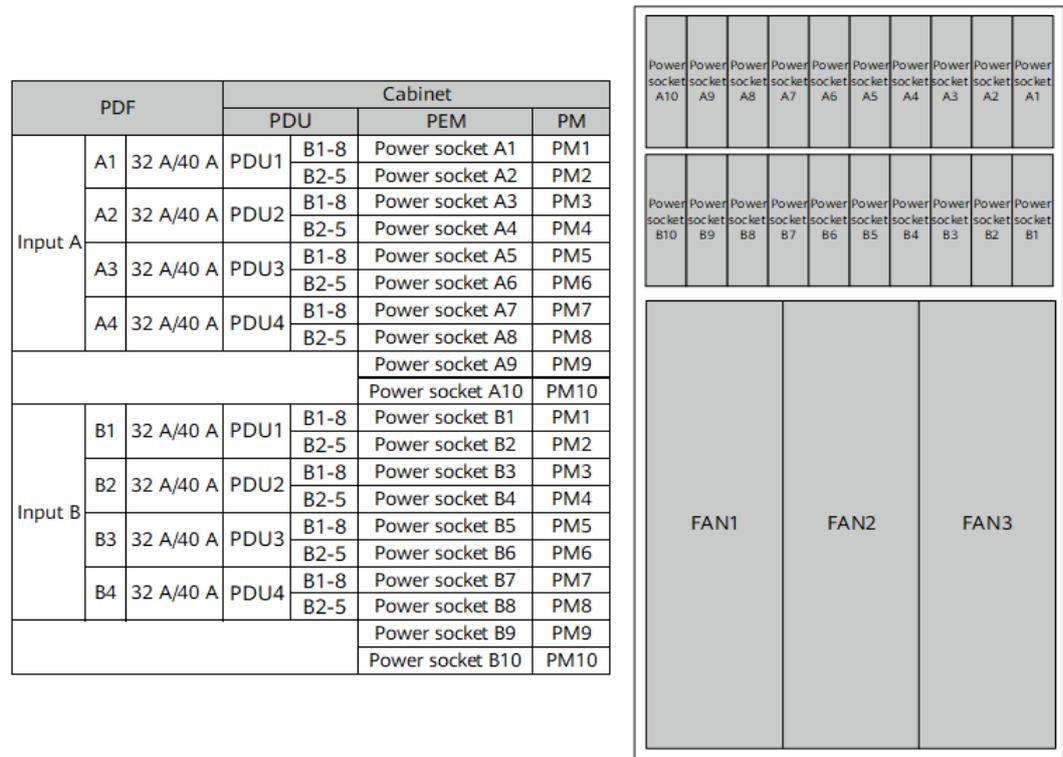
Power Distribution Schemes

When the single-phase PDUs are used and one CloudEngine 16808 is installed in the cabinet or rack, only eight power modules can be used and eight 220 V single-phase PDUs are required.

 **NOTE**

When the CloudEngine 16808 is configured with more than eight power modules, a 220 V single-phase PDU cannot be used.

Figure 3-23 CloudEngine 16808 chassis connected to a PDF through a single-phase PDU

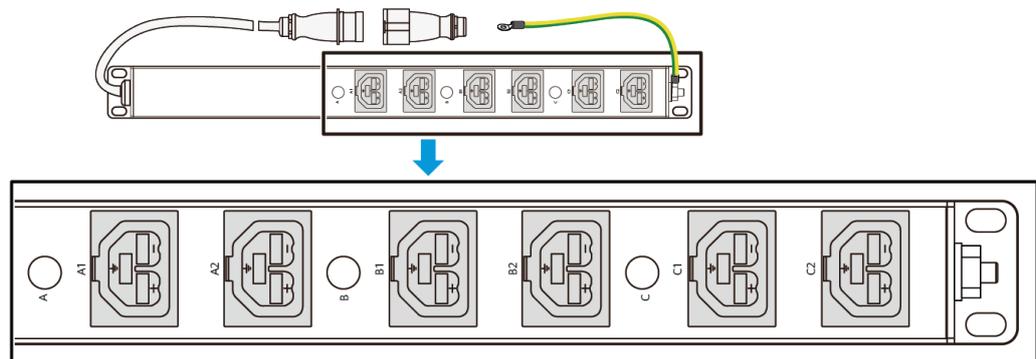


3.4.3.5 Connecting the CloudEngine 16808 to a PDF Through a Three-Phase PDU (PDU2000-32-3PH-6-B1)

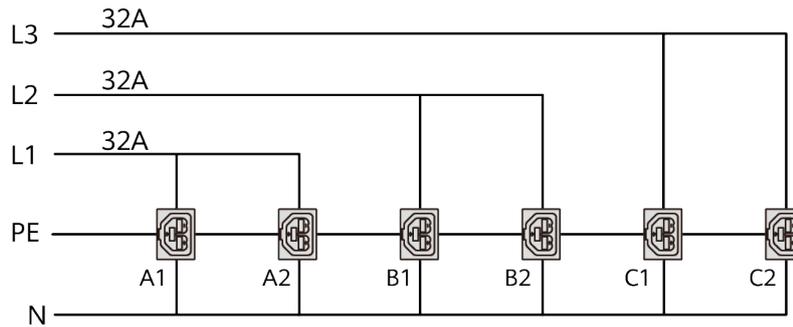
PDU Overview

Figure 3-24 shows the appearance of a 380 V three-phase PDU.

Figure 3-24 380 V three-phase PDU



A 380 V three-phase PDU supports three-phase (L1, L2, and L3) 346 V to 415 V AC power input, and provides three groups of outputs on each phase line, namely, A, B, and C. Groups A, B, and C each control two HVDC-3Z-03 sockets. When the groups are connected to a chassis, the total current of all sockets in each group cannot exceed 32 A.



Power Distribution Requirements

NOTE

- The PDF uses the 1+1 redundancy mode and three-phase 32 A or 40 A.
- If the chassis has a low power consumption, a small number of power modules in N+1 redundancy mode need to be configured. The vacant power module slots do not need to connect to the PDF.
- The CloudEngine 16800 must be reliably grounded. Circuit breakers with the current leakage protection function are not recommended for the devices.
- A maximum of eight PDUs can be installed in a Huawei A812-20 cabinet. When 380 V three-phase PDUs are used, a maximum of 24 power modules can be configured in a single cabinet or rack.

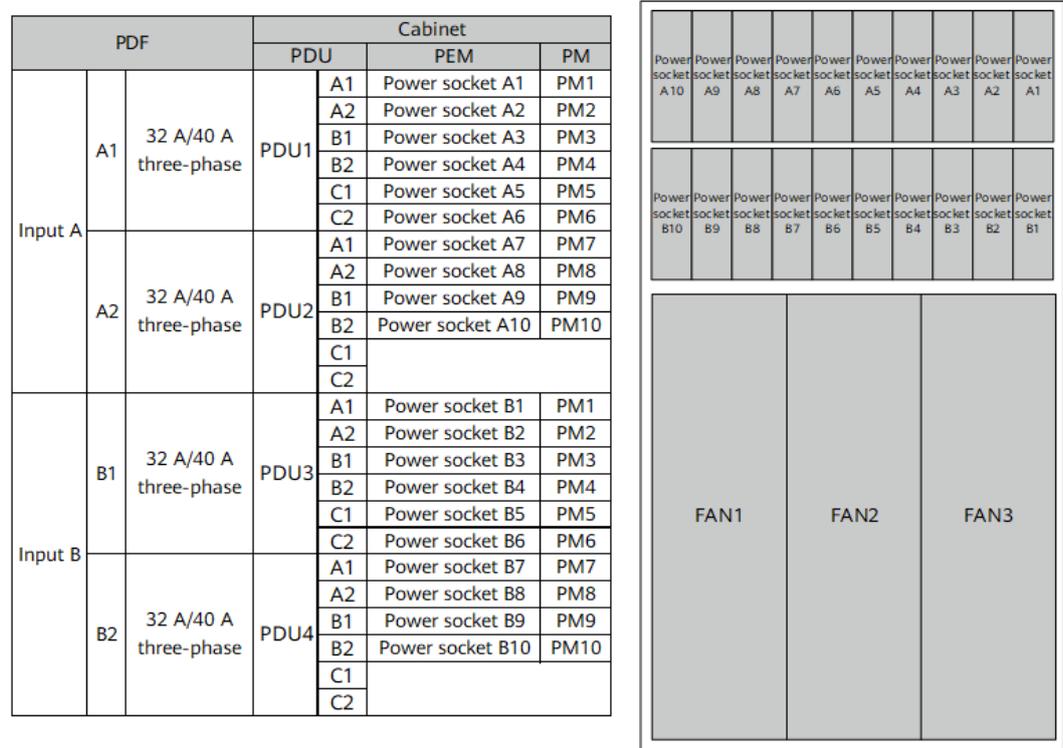
Table 3-15 Power distribution requirements (CloudEngine 16808 chassis)

Cabling Distance from the PDU to the Device's PEM	Determine this distance according to site survey results.
Number of Power Inputs	2+2 three-phase 32 A/40 A input redundancy (outputs from the PDF)
Rated Current of Connected Circuit Breakers	<ul style="list-style-type: none"> • ≥ 32 A: The phase voltage is greater than or equal to 200 V AC, for example, the circuit breaker is connected to the UPS. • ≥ 40 A: The phase voltage is greater than or equal to 170 V AC, for example, the circuit breaker is connected to a mains power outlet. <p>NOTE The rated current of 32 A or 40 A is the recommended specifications for circuit breakers of the three-phase outputs A1, A2, B1, and B2.</p>
Output Terminal Type in the PDU	HVDC-3Z-03 socket

Power Distribution Schemes

A CloudEngine 16808 is installed in the cabinet/rack. The device can house up to 10 power modules. Under full configuration of the 10 power modules, four three-phase PDUs are required, and the output terminals of two PDUs are partially used.

Figure 3-25 CloudEngine 16808 chassis connected to a PDF through a three-phase PDU

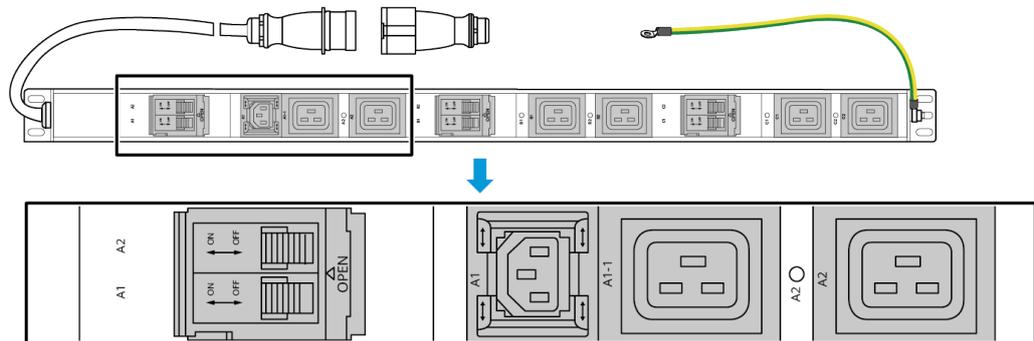


3.4.3.6 Connecting a CloudEngine 16808 to a PDF Through a Three-Phase PDU (PDU2000-32-3PH-1)

PDU Overview

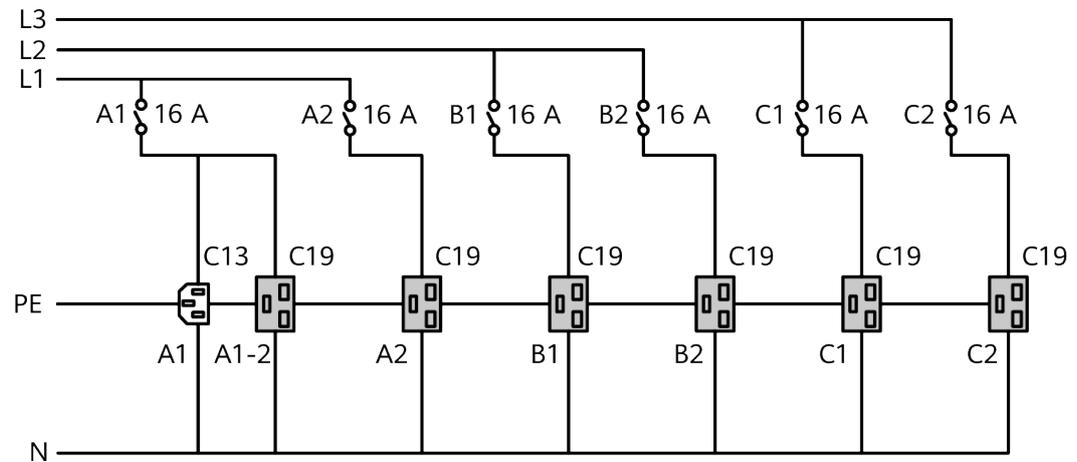
Figure 3-26 shows the appearance of a 380 V three-phase PDU.

Figure 3-26 380 V three-phase PDU



A 380 V three-phase PDU supports three-phase (L1, L2, and L3) 380 V to 415 V AC input, and provides two groups of outputs on each phase line. L1 provides outputs A1 and A2; L2 provides outputs B1 and B2; L3 provides outputs C1 and C2. A1 controls two C13 sockets and one C19 socket. A2, B1, B2, C1, and C2 control one C19 socket. Each group is controlled by a 16 A circuit breaker. When the groups

are connected to a chassis, the total current of all sockets in each group cannot exceed 16 A.



Power Distribution Requirements

NOTE

- The PDF uses the 1+1 redundancy mode and three-phase 32 A or 40 A.
- If the chassis has a low power consumption, a small number of power modules in N+1 redundancy mode need to be configured. The vacant power module slots do not need to connect to the PDF.
- The CloudEngine 16800 must be reliably grounded. Circuit breakers with the current leakage protection function are not recommended for the devices.
- A maximum of eight PDUs can be installed in a Huawei A812-20 cabinet. When 380 V three-phase PDUs are used, a maximum of 24 power modules can be configured in a single cabinet or rack.

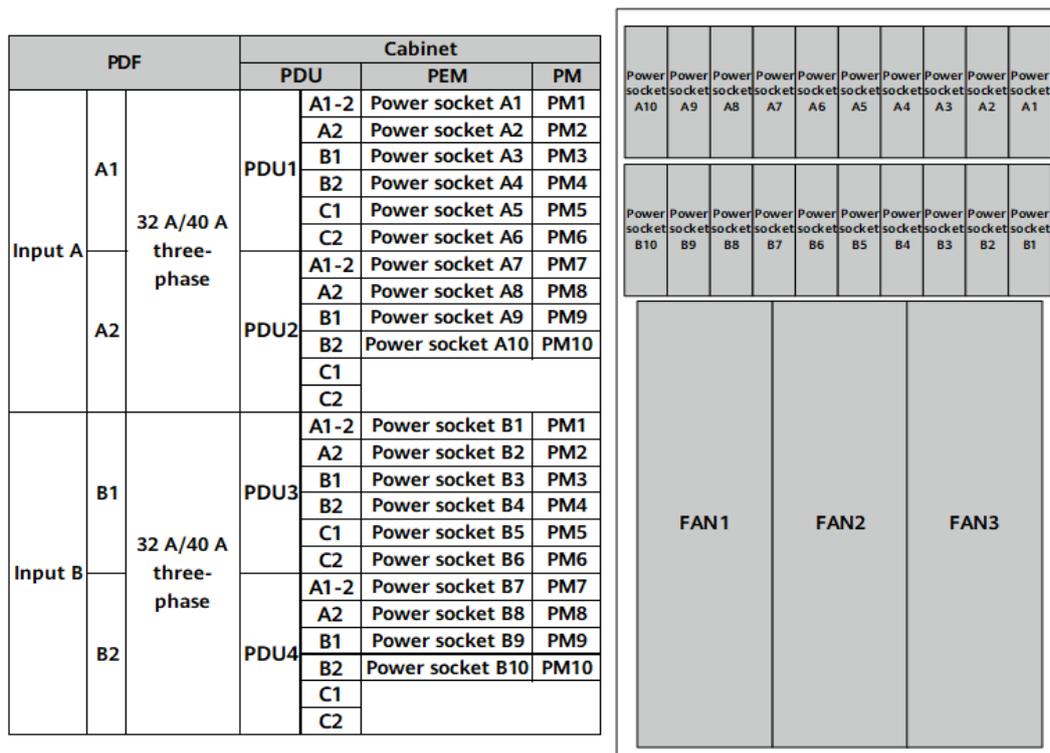
Table 3-16 Power distribution requirements (CloudEngine 16808 chassis)

Cabling Distance from the PDU to the Device's PEM	Determine this distance according to site survey results.
Number of Power Inputs	2+2 three-phase 32 A/40 A input redundancy (outputs from the PDF)
Rated Current of Connected Circuit Breakers	<ul style="list-style-type: none"> • ≥ 32 A: The phase voltage is greater than or equal to 200 V AC, for example, the circuit breaker is connected to the UPS. • ≥ 40 A: The phase voltage is greater than or equal to 170 V AC, for example, the circuit breaker is connected to a mains power outlet. <p>NOTE The rated current of 32 A or 40 A is the recommended specification for circuit breakers A1, A2, B1, and B2.</p>
Output Terminal Type in the PDU	IEC 309 industrial connectors

Power Distribution Schemes

A CloudEngine 16808 is installed in the cabinet/rack. The device can house up to 10 power modules. Under full configuration of the 10 power modules, four three-phase PDUs are required, and the output terminals of two PDUs are partially used.

Figure 3-27 CloudEngine 16808 chassis connected to a PDF through a three-phase PDU

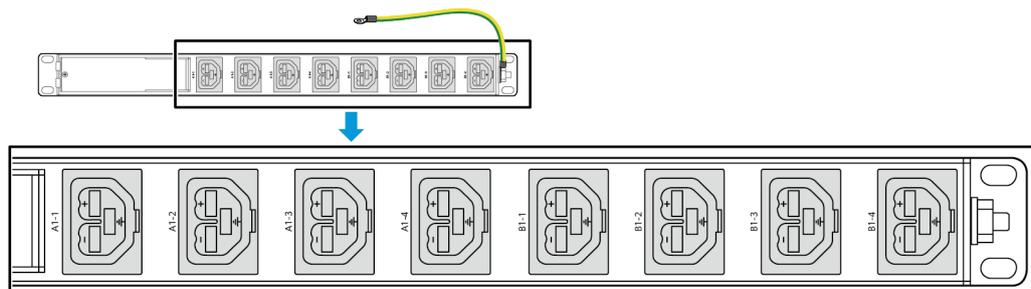


3.4.3.7 Connecting the CloudEngine 16808 to a PDF Through a High-Voltage DC PDU

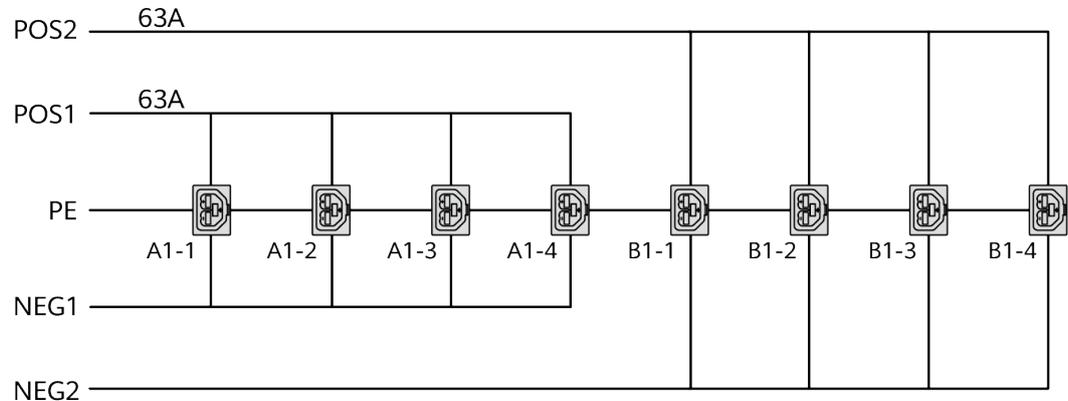
PDU Overview

A 380 V high-voltage DC PDU is used to supply power to a device through a 240 V or 380 V high-voltage DC power distribution system. [Figure 3-28](#) shows the appearance of a 380 V high-voltage DC PDU.

Figure 3-28 380 V high-voltage DC PDU



A 380 V high-voltage DC PDU supports 240 V/380V DC power input and provides two output groups A1 and B1. Each group controls four HVDC-3Z-03 sockets. When the groups are connected to a chassis, the total current of all sockets in each group cannot exceed 63 A.



Power Distribution Requirements

NOTE

- The PDF uses power modules in 1+1 redundancy mode.
- If the chassis has a low power consumption, a small number of power modules in N+1 redundancy mode need to be configured. The vacant power module slots do not need to connect to the PDF.
- The CloudEngine 16800 must be reliably grounded. Circuit breakers with the current leakage protection function are not recommended for the devices.
- A maximum of eight PDUs can be installed in a Huawei A812-20 cabinet. When the 380 V high-voltage DC PDUs are used, a maximum of 24 power modules can be configured in a single cabinet or rack.

Table 3-17 Power distribution requirements (CloudEngine 16808 chassis)

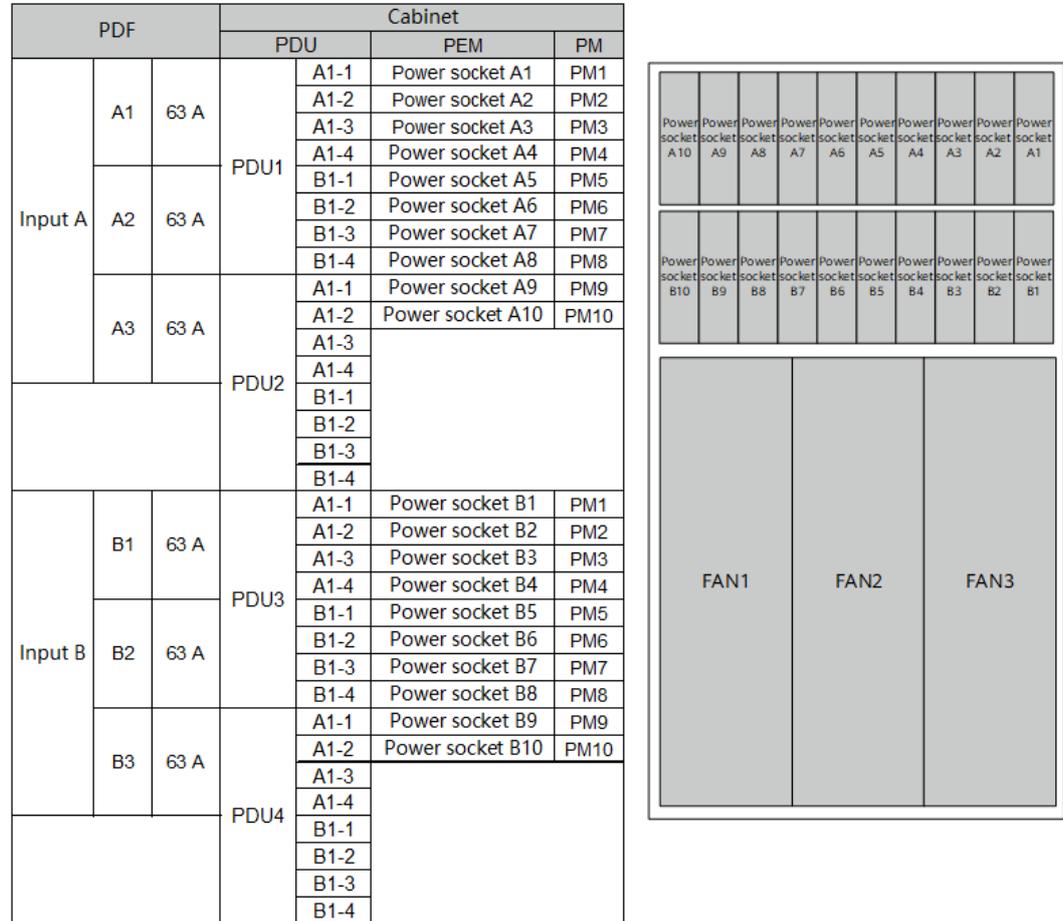
Cabling Distance from the PDU to the Device's PEM	Determine this distance according to site survey results.
Number of Power Inputs	3+3 input redundancy (outputs from the PDF)
Rated Current of Connected Circuit Breakers	≥ 63 A NOTE The rated current of 63 A is the recommended specifications for circuit breakers A1, A2, B1, and B2.
Output Terminal Type in the PDU	HVDC-3Z-03 socket

Power Distribution Schemes

A CloudEngine 16808 is installed in the cabinet/rack. The device can house up to 10 power modules. Under full configuration of the 10 power modules, three 380 V

high-voltage DC PDUs are required. For reliability purposes, you are advised to use four PDUs. In this case, the output terminals of two PDUs are partially used.

Figure 3-29 CloudEngine 16808 chassis connected to the PDF through a 380 V high-voltage DC PDU

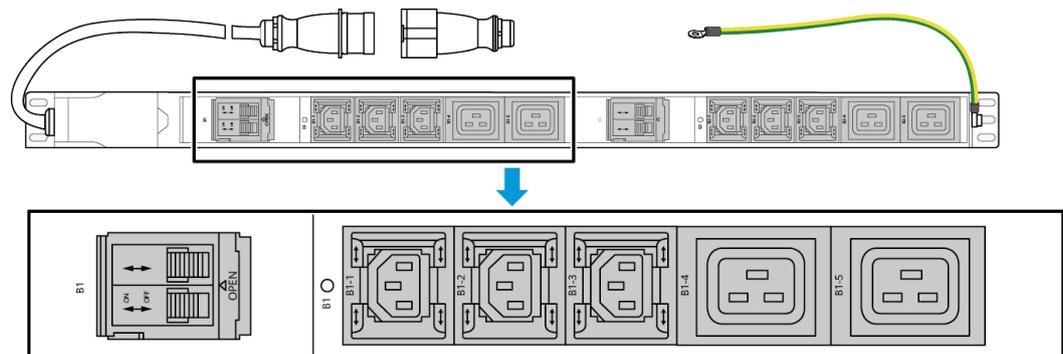


3.4.3.8 Connecting the CloudEngine 16808 to a PDF Through a 240 V DC PDU

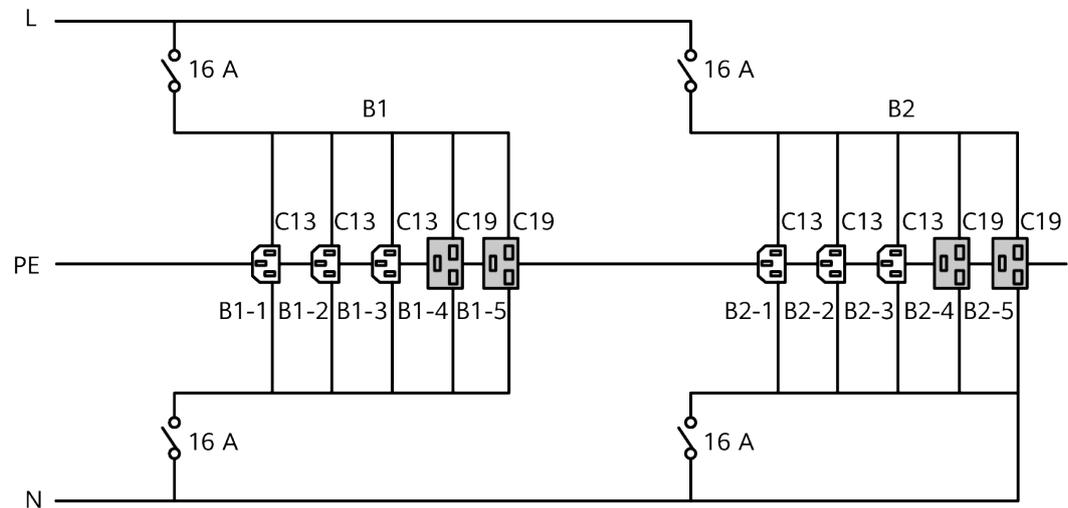
PDU Overview

A 240 V DC PDU is used to supply power to a device through a high-voltage DC power distribution system. **Figure 3-30** shows the appearance of a 240 V DC PDU.

Figure 3-30 240 V high-voltage DC PDU



A 240 V DC PDU provides two output groups B1 and B2. Each group includes three C13 sockets and two C19 sockets. Each group is controlled by a 16 A circuit breaker on the L line and a 16 A circuit breaker on the N line. The circuit breakers for the same group are closed or open at the same time. When the groups are connected to a chassis, the total current of all sockets in each group cannot exceed 16 A.



Power Distribution Requirements

NOTE

- The PDF uses power modules in 1+1 redundancy mode.
- If the chassis has a low power consumption, a small number of power modules in N+1 redundancy mode need to be configured. The vacant power module slots do not need to connect to the PDF.
- The CloudEngine 16800 must be reliably grounded. Circuit breakers with the current leakage protection function are not recommended for the devices.
- A maximum of eight PDUs can be installed in a Huawei A812-20 cabinet. When the 240 V DC PDUs are used, a maximum of eight power modules can be configured in a single cabinet or rack.

Table 3-18 Power distribution requirements (CloudEngine 16808 chassis)

Cabling Distance from the PDU to the Device's PEM	Determine this distance according to site survey results.
Number of Power Inputs	The 4+4 redundancy input (PDC output) is supported. Ensure that a maximum of eight power modules are configured in a cabinet or rack.
Rated Current of Connected Circuit Breakers	<p>≥ 32 A</p> <p>NOTE The rated current of 32 A is the recommended specification for circuit breakers A1 to A4 and B1 to B4.</p>
Output Terminal Type in the PDU	IEC 309 industrial connectors

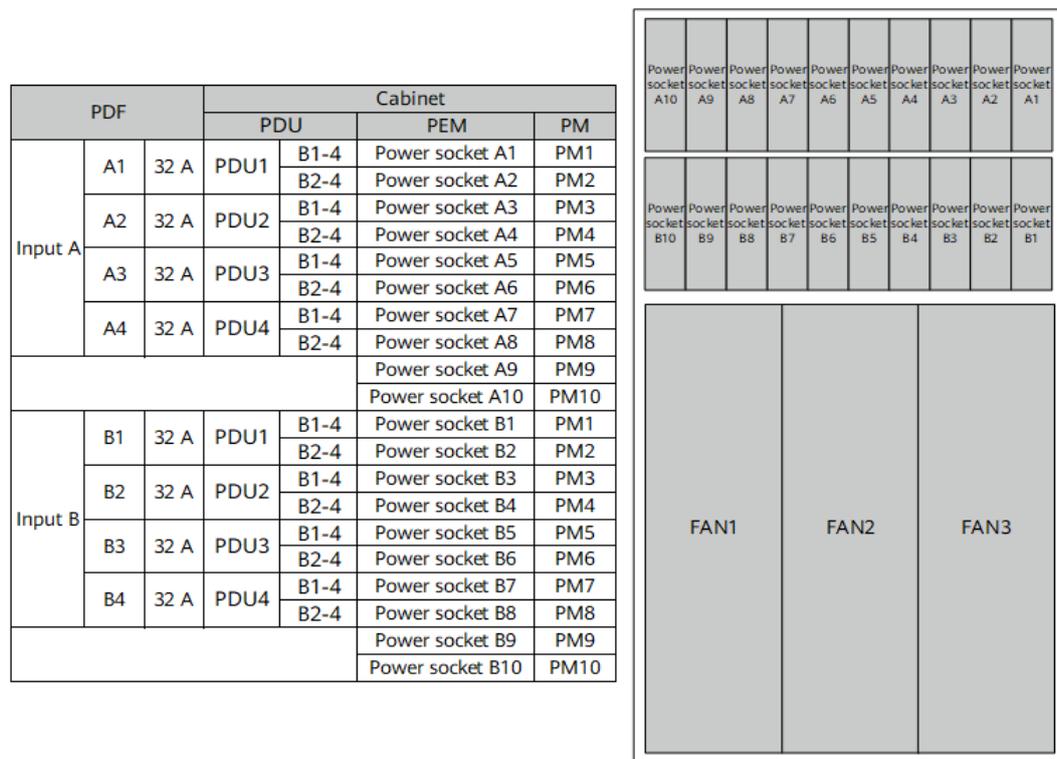
Power Distribution Schemes

When the 240 V DC PDUs are used and one CloudEngine 16808 is installed in the cabinet or rack, only eight power modules can be used and eight 240 V DC PDUs are required.

 **NOTE**

When the CloudEngine 16808 is configured with more than eight power modules, the 240 V DC PDU cannot be used.

Figure 3-31 CloudEngine 16808 chassis connected to the PDF through a 240 V DC PDU



3.4.4 CloudEngine 16816 Power Distribution Guide

3.4.4.1 Connecting the CloudEngine 16816 to a PDF Directly (AC)

Power Distribution Requirements

 NOTE

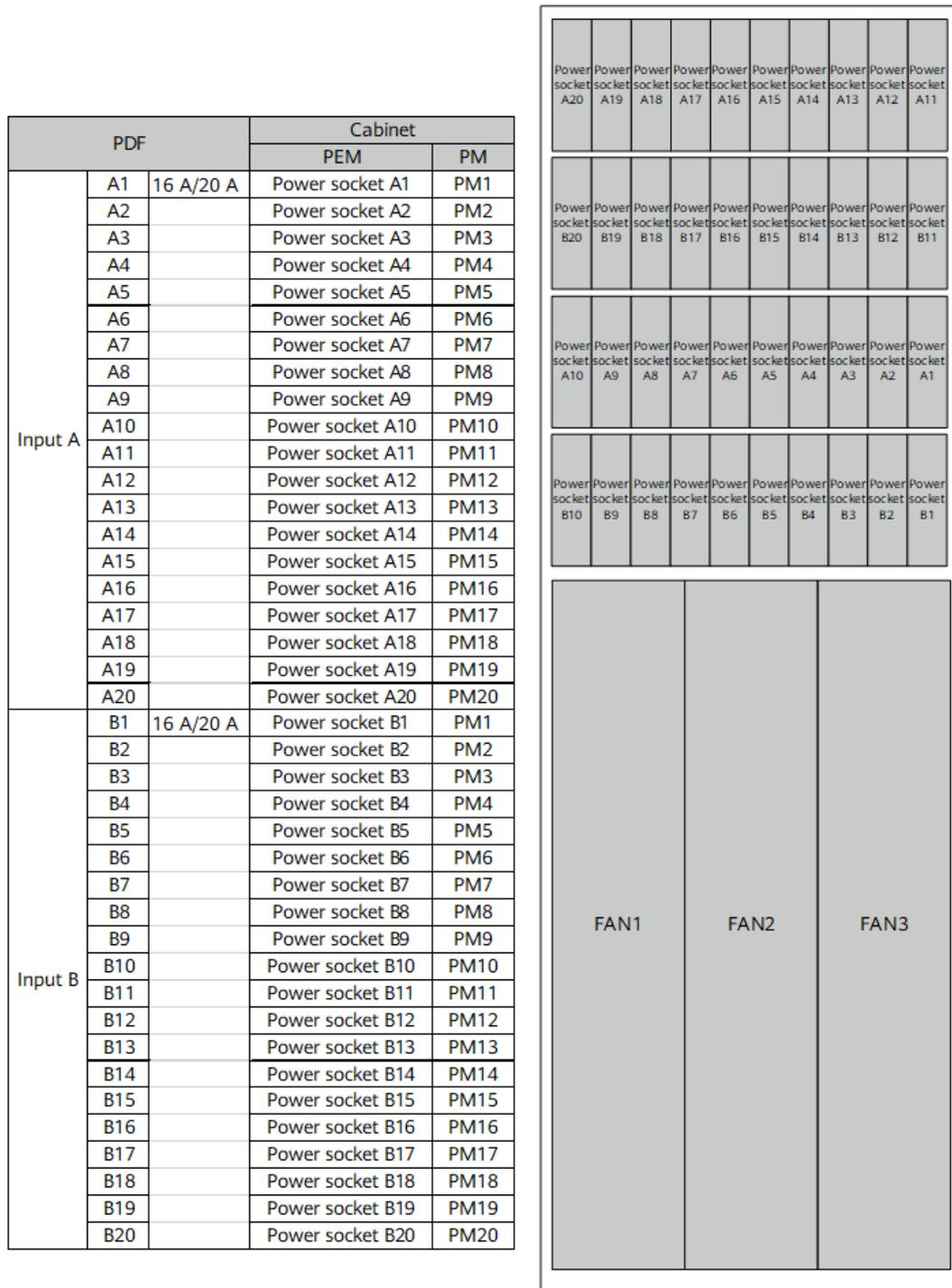
- The power distribution frame (PDF) uses the 1+1 redundancy mode.
- If the chassis has a low power consumption, a small number of power modules in N+1 redundancy mode need to be configured. The vacant power module slots do not need to connect to the PDF.
- The CloudEngine 16800 must be reliably grounded. Circuit breakers with the current leakage protection function are not recommended for the devices.

Table 3-19 Power distribution requirements (CloudEngine 16816 chassis)

Cabling Distance from the PDF to the Device's PEM	≤ 2.5 m (Determine this distance according to site survey results.)
Number of Power Inputs	20+20 input redundancy (outputs from the PDF)
Rated Current of Connected Circuit Breakers	<ul style="list-style-type: none">• ≥ 16 A: The phase voltage is greater than or equal to 200 V AC, for example, the circuit breaker is connected to the uninterruptible power supply (UPS).• ≥ 20 A: The phase voltage is greater than or equal to 170 V AC, for example, the circuit breaker is connected to a public mains power outlet. <p>NOTE The rated current of 16 A or 20 A is the recommended specification for circuit breakers A1 to A20 and B1 to B20.</p>
Output Terminal Type in the PDU	Power sockets complying with local standards

Power Distribution Schemes

Figure 3-32 CloudEngine 16816 chassis directly connected to the PDF



3.4.4.2 Connecting a CloudEngine 16816 to a PDF Directly (DC)

Power Distribution Requirements

 NOTE

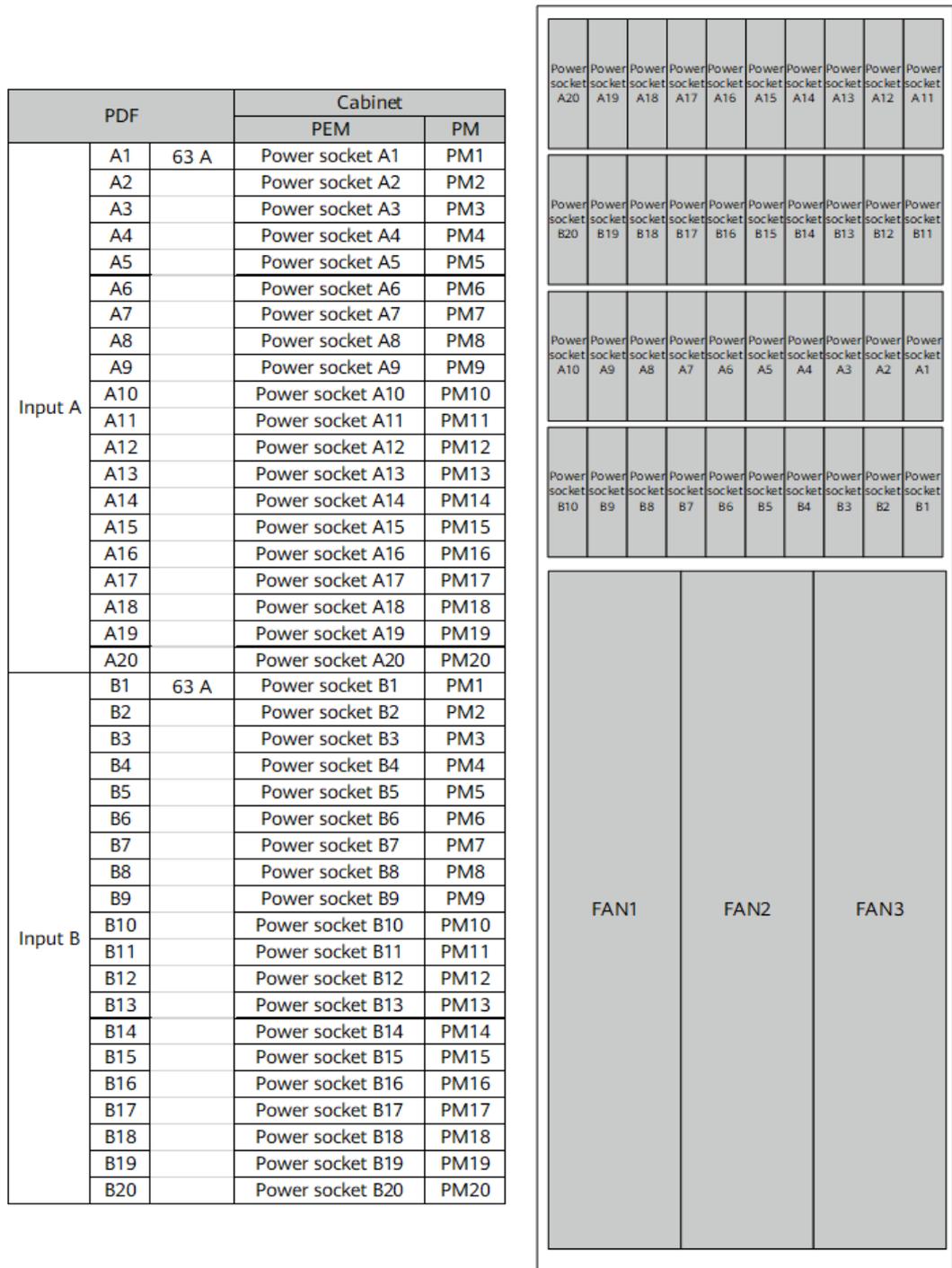
- The PDF uses power modules in 1+1 redundancy mode.
- If the chassis has a low power consumption, a small number of power modules in N+1 redundancy mode need to be configured. The vacant power module slots do not need to connect to the PDF.
- The CloudEngine 16800 must be reliably grounded. Circuit breakers with the current leakage protection function are not recommended for the devices.

Table 3-20 Power distribution requirements (CloudEngine 16816 chassis)

Cabling Distance from the PDF to the Device's PEM	Determine this distance according to site survey results.
Number of Power Inputs	20+20 input redundancy (outputs from the PDF)
Rated Current of Connected Circuit Breakers	≥ 63 A NOTE The rated current of 63 A is the recommended specification for circuit breakers A1 to A20 and B1 to B20.
Output Terminal Type in the PDF	Naked Crimping Connector, JG2, 25mm ² /35mm ² , M6, 80A, Tin Plating, Right angle (cables are made onsite)

Power Distribution Schemes

Figure 3-33 CloudEngine 16816 chassis directly connected to the PDF



3.4.4.3 Connecting a CloudEngine 16816 to a PDF Directly (HVDC)

Power Distribution Requirements

 NOTE

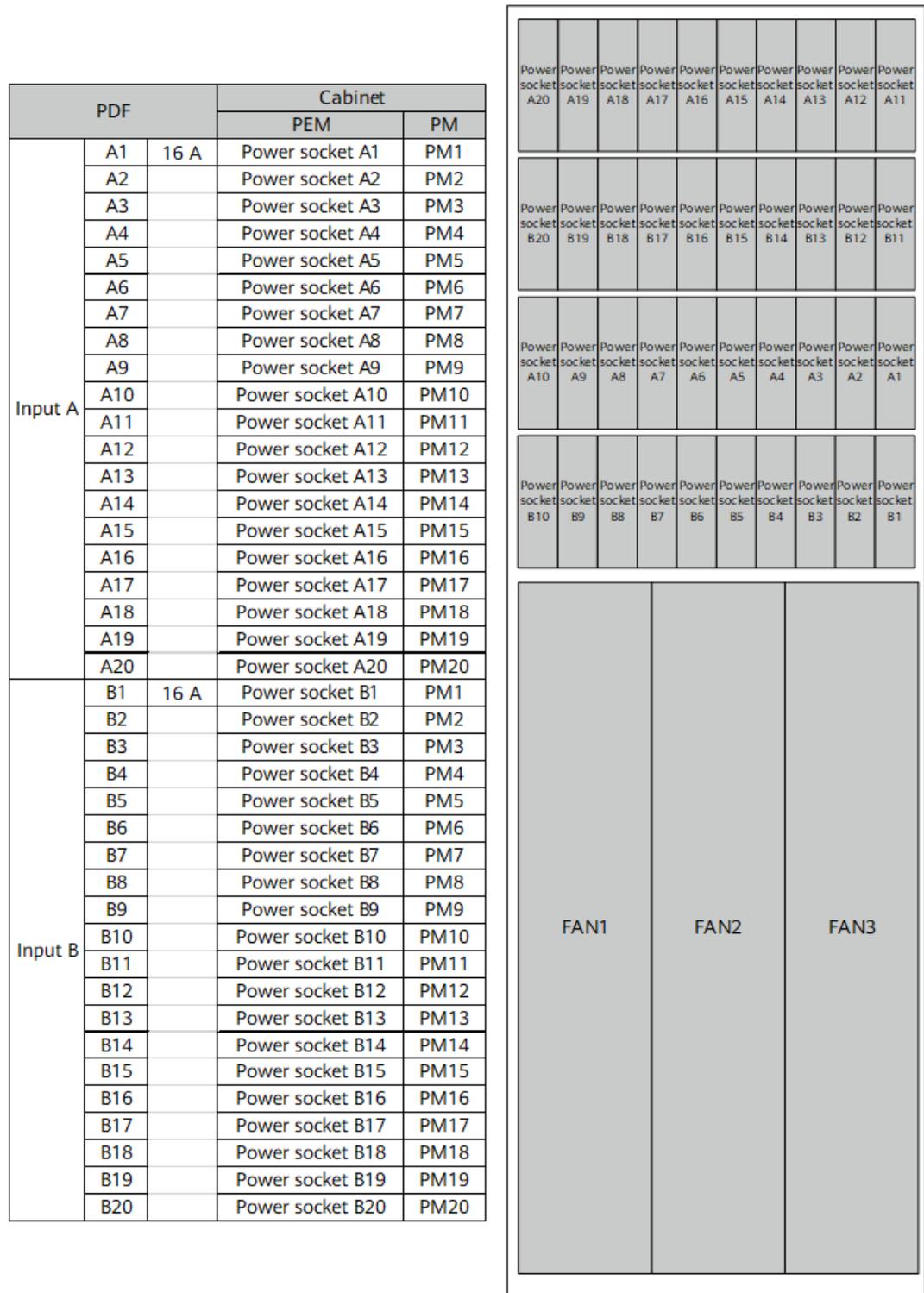
- The PDF uses power modules in 1+1 redundancy mode.
- If the chassis has a low power consumption, a small number of power modules in N+1 redundancy mode need to be configured. The vacant power module slots do not need to connect to the PDF.
- The CloudEngine 16800 must be reliably grounded. Circuit breakers with the current leakage protection function are not recommended for the devices.

Table 3-21 Power distribution requirements (CloudEngine 16816 chassis)

Cabling Distance from the PDF to the Device's PEM	Determine this distance according to site survey results.
Number of Power Inputs	20+20 input redundancy (outputs from the PDF)
Rated Current of Connected Circuit Breakers	≥ 16 A NOTE The rated current of 16 A is the recommended specification for circuit breakers A1 to A20 and B1 to B20.
Output Terminal Type in the PDF	Power sockets complying with local standards

Power Distribution Schemes

Figure 3-34 CloudEngine 16816 chassis directly connected to the PDF

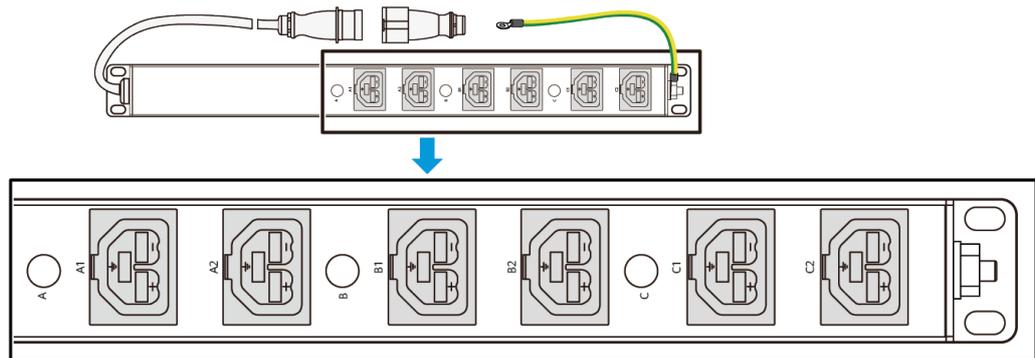


3.4.4.4 Connecting a CloudEngine 16816 to a PDF Through a Three-Phase PDU (PDU2000-32-3PH-6-B1)

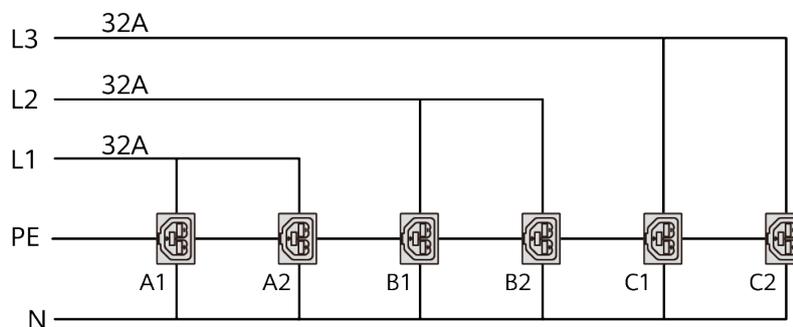
PDU Overview

Figure 3-35 shows the appearance of a 380 V three-phase PDU.

Figure 3-35 380 V three-phase PDU



A 380 V three-phase PDU supports three-phase (L1, L2, and L3) 346 V to 415 V AC power input, and provides three groups of outputs on each phase line, namely, A, B, and C. Groups A, B, and C each control two HVDC-3Z-03 sockets. When the groups are connected to a chassis, the total current of all sockets in each group cannot exceed 32 A.



Power Distribution Requirements

NOTE

- The PDF uses the 1+1 redundancy mode and three-phase 32 A or 40 A.
- If the chassis has a low power consumption, a small number of power modules in N+1 redundancy mode need to be configured. The vacant power module slots do not need to connect to the PDF.
- The CloudEngine 16800 must be reliably grounded. Circuit breakers with the current leakage protection function are not recommended for the devices.
- A maximum of eight PDUs can be installed in a Huawei A812-20 cabinet. When 380 V three-phase PDUs are used, a maximum of 24 power modules can be configured in a single cabinet or rack.

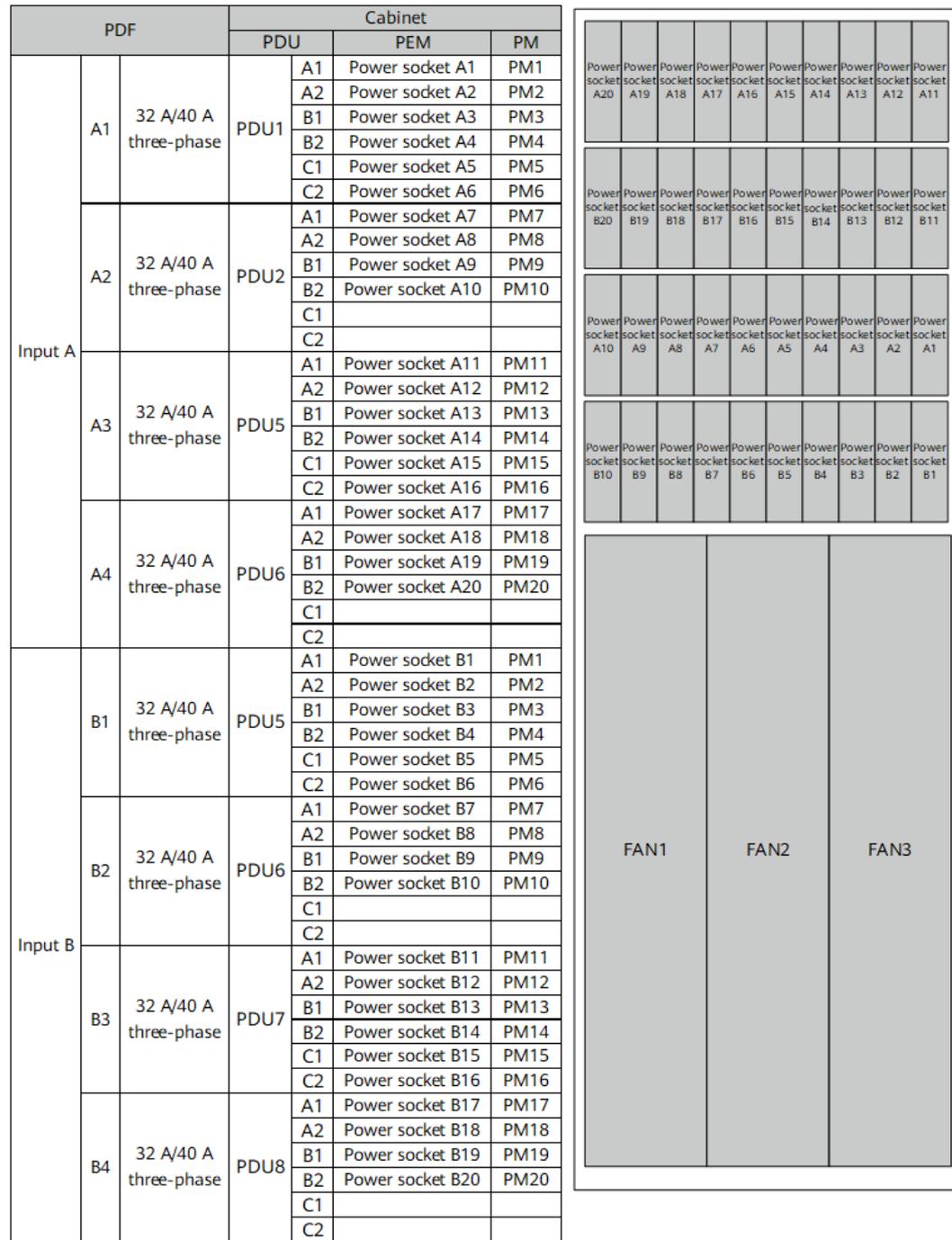
Table 3-22 Power distribution requirements (CloudEngine 16816 chassis)

Cabling Distance from the PDU to the Device's PEM	Determine this distance according to site survey results.
Number of Power Inputs	4+4 three-phase 32 A/40 A input redundancy (outputs from the PDF)
Rated Current of Connected Circuit Breakers	<ul style="list-style-type: none">• ≥ 32 A: The phase voltage is greater than or equal to 200 V AC, for example, the circuit breaker is connected to the UPS.• ≥ 40 A: The phase voltage is greater than or equal to 170 V AC, for example, the circuit breaker is connected to a mains power outlet. <p>NOTE The rated current of 32 A or 40 A is the recommended specification for circuit breakers A1 to A4 and B1 to B4.</p>
Output Terminal Type in the PDU	HVDC-3Z-03 socket

Power Distribution Schemes

A CloudEngine 16816 is installed in the cabinet/rack. The device can house up to 20 power modules. Under full configuration of the 20 power modules, seven three-phase PDUs are required. For reliability purposes, you are advised to use eight PDUs. In this case, the output terminals of four PDUs are partially used.

Figure 3-36 CloudEngine 16816 chassis connected to a PDF through a three-phase PDU

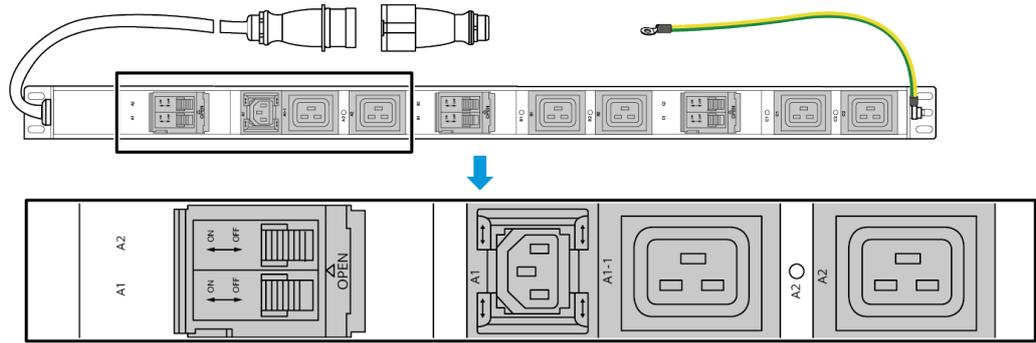


3.4.4.5 Connecting a CloudEngine 16816 to a PDF Through a Three-Phase PDU (PDU2000-32-3PH-1)

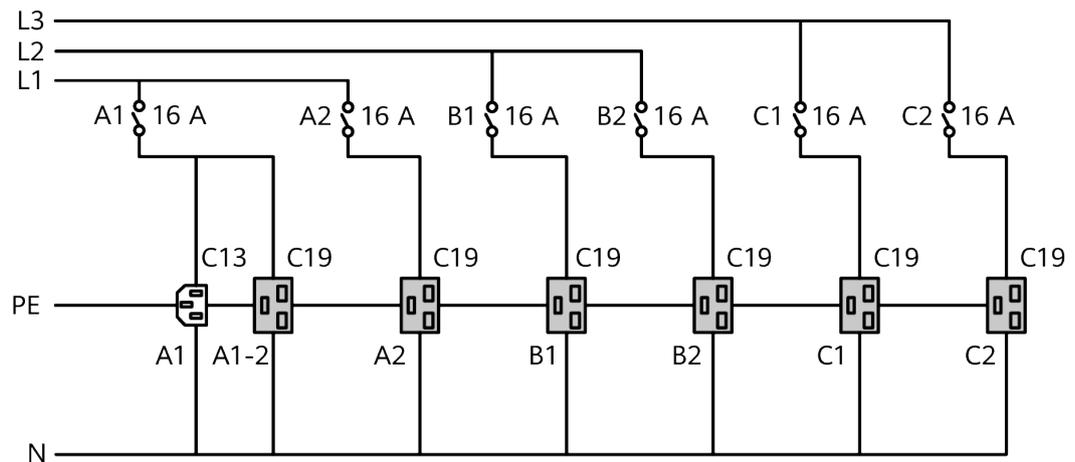
PDU Overview

Figure 3-37 shows the appearance of a 380 V three-phase PDU.

Figure 3-37 380 V three-phase PDU



A 380 V three-phase PDU supports three-phase (L1, L2, and L3) 380 V to 415 V AC input, and provides two groups of outputs on each phase line. L1 provides outputs A1 and A2; L2 provides outputs B1 and B2; L3 provides outputs C1 and C2. A1 controls two C13 sockets and one C19 socket. A2, B1, B2, C1, and C2 control one C19 socket. Each group is controlled by a 16 A circuit breaker. When the groups are connected to a chassis, the total current of all sockets in each group cannot exceed 16 A.



Power Distribution Requirements

NOTE

- The PDF uses the 1+1 redundancy mode and three-phase 32 A or 40 A.
- If the chassis has a low power consumption, a small number of power modules in N+1 redundancy mode need to be configured. The vacant power module slots do not need to connect to the PDF.
- The CloudEngine 16800 must be reliably grounded. Circuit breakers with the current leakage protection function are not recommended for the devices.
- A maximum of eight PDUs can be installed in a Huawei A812-20 cabinet. When 380 V three-phase PDUs are used, a maximum of 24 power modules can be configured in a single cabinet or rack.

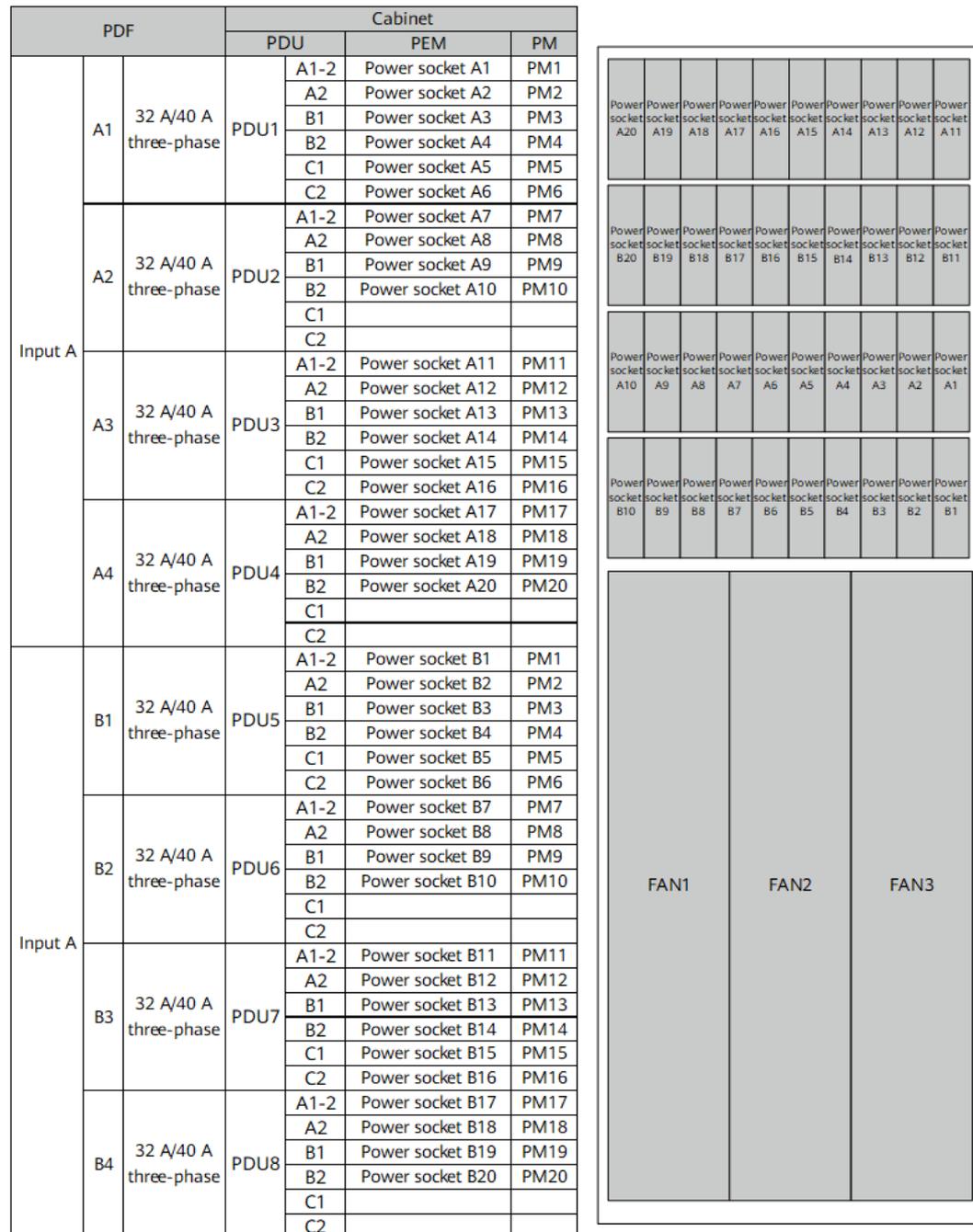
Table 3-23 Power distribution requirements (CloudEngine 16816 chassis)

Cabling Distance from the PDU to the Device's PEM	Determine this distance according to site survey results.
Number of Power Inputs	4+4 three-phase 32 A/40 A input redundancy (outputs from the PDF)
Rated Current of Connected Circuit Breakers	<ul style="list-style-type: none">• ≥ 32 A: The phase voltage is greater than or equal to 200 V AC, for example, the circuit breaker is connected to the UPS.• ≥ 40 A: The phase voltage is greater than or equal to 170 V AC, for example, the circuit breaker is connected to a mains power outlet. <p>NOTE The rated current of 32 A or 40 A is the recommended specification for circuit breakers A1 to A4 and B1 to B4.</p>
Output Terminal Type in the PDU	IEC 309 industrial connectors

Power Distribution Schemes

A CloudEngine 16816 is installed in the cabinet/rack. The device can house up to 20 power modules. Under full configuration of the 20 power modules, seven three-phase PDUs are required. For reliability purposes, you are advised to use eight PDUs. In this case, the output terminals of four PDUs are partially used.

Figure 3-38 CloudEngine 16816 chassis connected to a PDF through a three-phase PDU

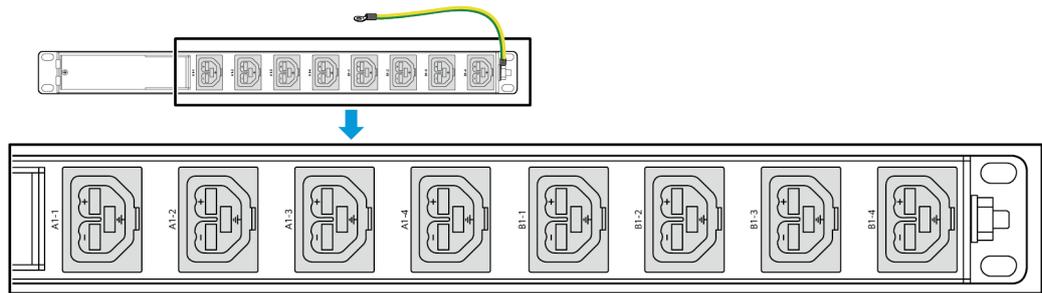


3.4.4.6 Connecting the CloudEngine 16816 to a PDF Through a High-Voltage DC PDU

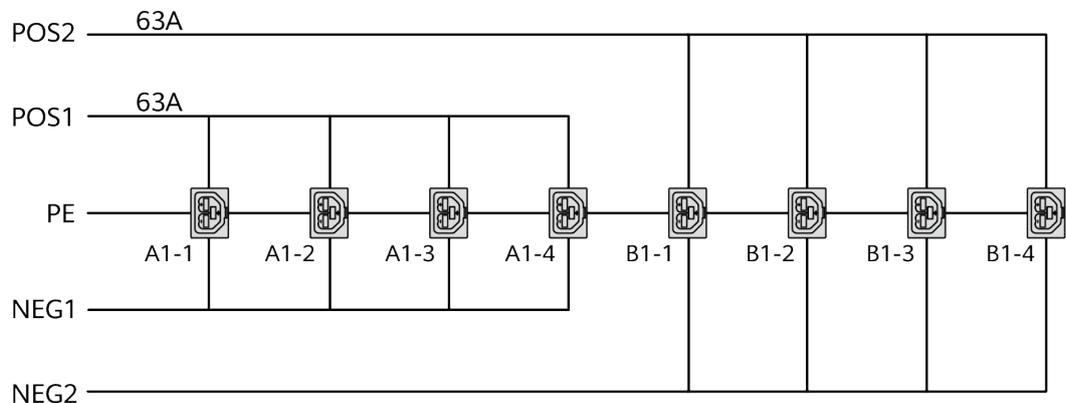
PDU Overview

A 380 V high-voltage DC PDU is used to supply power to a device through a 240 V or 380 V high-voltage DC power distribution system. [Figure 3-39](#) shows the appearance of a 380 V high-voltage DC PDU.

Figure 3-39 380 V high-voltage DC PDU



A 380 V high-voltage DC PDU supports 240 V/380V DC power input and provides two output groups A1 and B1. Each group controls four HVDC-3Z-03 sockets. When the groups are connected to a chassis, the total current of all sockets in each group cannot exceed 63 A.



Power Distribution Requirements

NOTE

- The PDF uses power modules in 1+1 redundancy mode.
- If the chassis has a low power consumption, a small number of power modules in N+1 redundancy mode need to be configured. The vacant power module slots do not need to connect to the PDF.
- The CloudEngine 16800 must be reliably grounded. Circuit breakers with the current leakage protection function are not recommended for the devices.
- A maximum of eight PDUs can be installed in a Huawei A812-20 cabinet. When the 380 V high-voltage DC PDUs are used, a maximum of 24 power modules can be configured in a single cabinet or rack.

Table 3-24 Power distribution requirements (CloudEngine 16816 chassis)

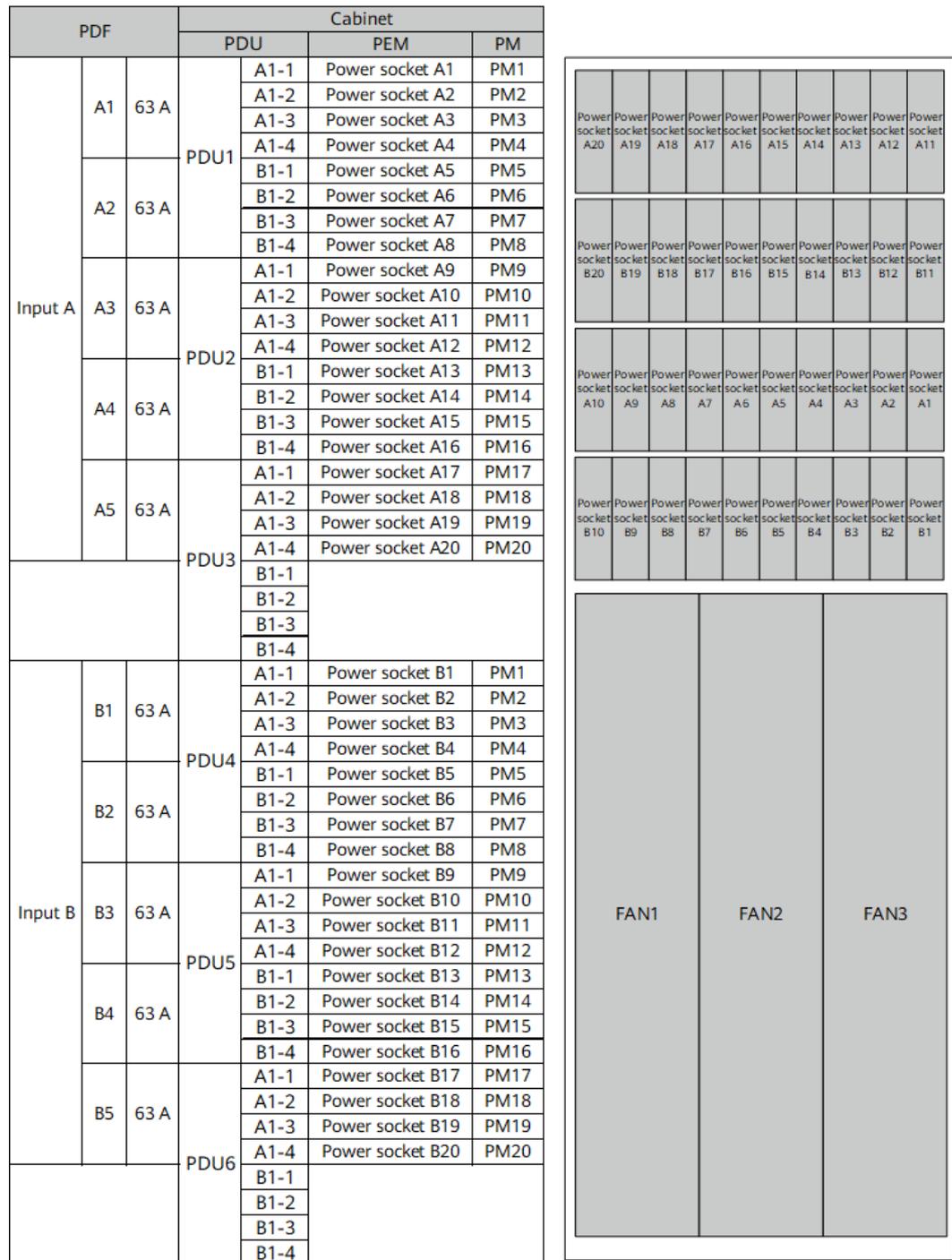
Cabling Distance from the PDU to the Device's PEM	Determine this distance according to site survey results.
Number of Power Inputs	5+5 input redundancy (outputs from the PDF)

Rated Current of Connected Circuit Breakers	≥ 63 A NOTE The rated current of 63 A is the recommended specification for circuit breakers A1 to A4 and B1 to B4.
Output Terminal Type in the PDU	HVDC-3Z-03 socket

Power Distribution Schemes

When one CloudEngine 16816 is installed in the cabinet/rack, 20 power modules (full configuration) are configured for the device. In this case, five 380 V high-voltage DC PDUs are required. For reliability purposes, you are advised to use six PDUs. Here, the output terminals of two PDUs are partially used.

Figure 3-40 CloudEngine 16816 chassis connected to the PDF through a 380 V high-voltage DC PDU

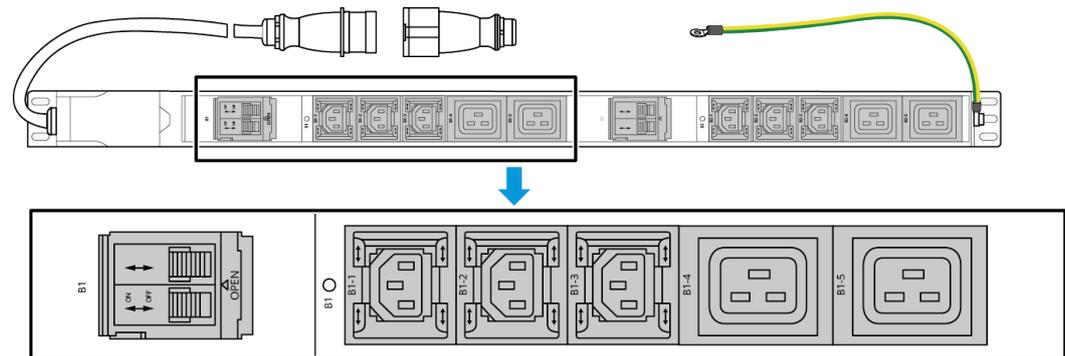


3.4.4.7 Connecting the CloudEngine 16816 to a PDF Through a 240 V DC PDU

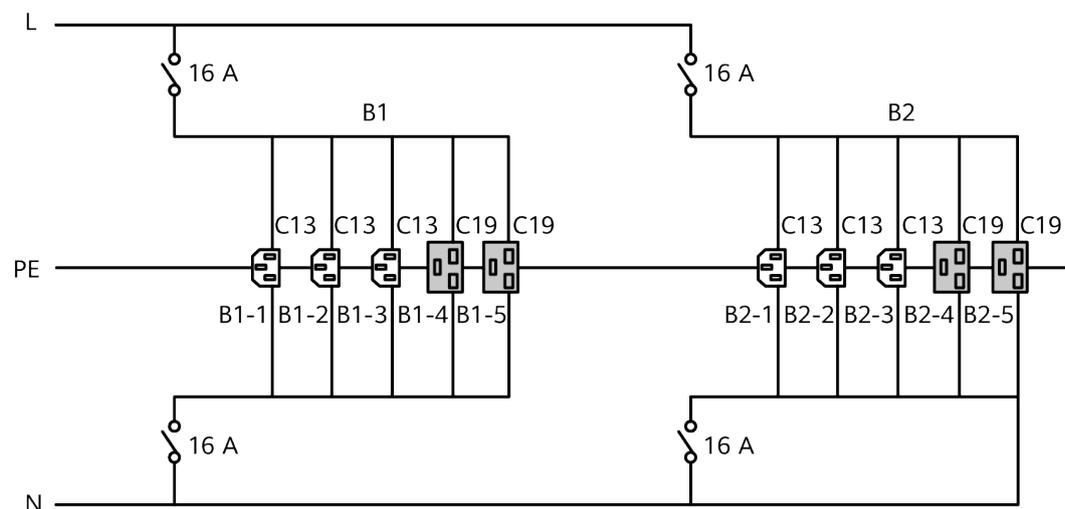
PDU Overview

A 240 V DC PDU is used to supply power to a device through a high-voltage DC power distribution system. [Figure 3-41](#) shows the appearance of a 240 V DC PDU.

Figure 3-41 240 V high-voltage DC PDU



A 240 V DC PDU provides two output groups B1 and B2. Each group includes three C13 sockets and two C19 sockets. Each group is controlled by a 16 A circuit breaker on the L line and a 16 A circuit breaker on the N line. The circuit breakers for the same group are closed or open at the same time. When the groups are connected to a chassis, the total current of all sockets in each group cannot exceed 16 A.



Power Distribution Requirements

NOTE

- The PDF uses power modules in 1+1 redundancy mode.
- If the chassis has a low power consumption, a small number of power modules in N+1 redundancy mode need to be configured. The vacant power module slots do not need to connect to the PDF.
- The CloudEngine 16800 must be reliably grounded. Circuit breakers with the current leakage protection function are not recommended for the devices.
- A maximum of eight PDUs can be installed in a Huawei A812-20 cabinet. When the 240 V DC PDUs are used, a maximum of eight power modules can be configured in a single cabinet or rack.

Table 3-25 Power distribution requirements (CloudEngine 16816 chassis)

Cabling Distance from the PDU to the Device's PEM	Determine this distance according to site survey results.
Number of Power Inputs	The 4+4 redundancy input (PDC output) is supported. Ensure that a maximum of eight power modules are configured in a cabinet or rack.
Rated Current of Connected Circuit Breakers	≥ 32 A NOTE The rated current of 32 A is the recommended specification for circuit breakers A1 to A4 and B1 to B4.
Output Terminal Type in the PDU	IEC 309 industrial connectors

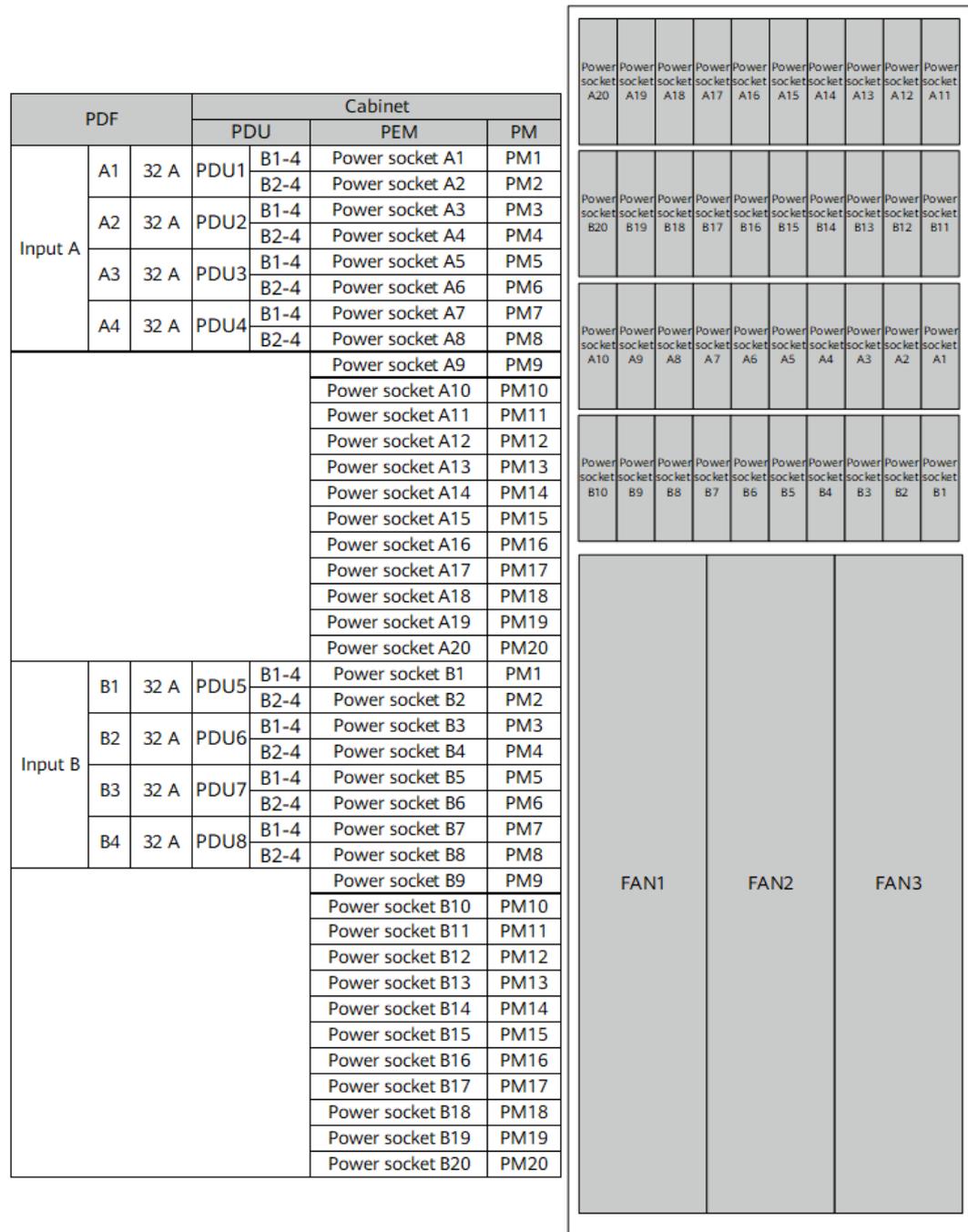
Power Distribution Schemes

When the 240 V DC PDUs are used and one CloudEngine 16816 is installed in the cabinet or rack, only eight power modules can be used and eight 240 V DC PDUs are required.

 **NOTE**

When the CloudEngine 16816 is configured with more than eight power modules, the 240 V DC PDU cannot be used.

Figure 3-42 CloudEngine 16816 chassis connected to the PDF through a 240 V DC PDU



3.5 Preparing Installation Tools and Accessories

Table 3-26 lists the tools required for installing a device.

Table 3-26 Installation tools

Tool	Description	Picture
Electrostatic discharge (ESD) gloves	Used to prevent ESD damage. They are included in the mandatory accessory package of the chassis.	
Protective gloves	Used to protect hands during operation.	
ESD wrist strap	Used to prevent ESD damage. Wear the strap on your wrist and insert the other end into the ESD jack on the cabinet. It is included in the mandatory accessory package of the chassis.	
Utility knife	Used to cut cartons or paper.	
Scissors	Used to cut the <i>Quick Installation Guide</i> .	

Tool	Description	Picture
Tweezers	Used to unplug Ethernet cables and optical fibers.	
Measuring tape	Used to measure distances.	
Marker	Used to mark component installation positions.	
Flat-head screwdriver	Used to turn slotted-head screws and bolts.	
Phillips screwdriver	Used to turn cross-head screws and bolts.	
Torque screwdriver	Used to turn slotted-head or cross-head screws and bolts. It allows for torque adjustment to avoid over-torque.	

Tool	Description	Picture
Combination pliers	Used to clamp or bend metal sheets, cut metal wires, strip off coating of cables, and unplug nails.	
Diagonal pliers	Used to cut insulation tubes and cable ties.	
Wire stripper	Used to strip off the insulation coating and shields of communication cables with small cross-sectional areas.	
RJ45 crimping tool	Used to crimp Ethernet cables.	
COAX crimping tool	Used to crimp the metal shield at the end of a coaxial cable.	

Tool	Description	Picture
Ethernet cable tester	Used to test Ethernet cable connectivity.	
Multimeter	Used to test cabinet insulation, cable connectivity, and device electrical performance indicators, including voltage, current, and resistance.	
Adjustable wrench	Used to tighten or loosen hex or square bolts and nuts. The span can be adjusted to suit bolts or nuts in different sizes.	

Table 3-27 lists the accessories required for installing a device.

Table 3-27 Installation accessories

Tool	Description	Picture
Insulation tape	Used to insulate electrical wires and other conductors.	
Corrugated pipe	Used to protect optical fibers.	

Table 3-28 lists the installation accessories delivered with the device.

Table 3-28 Installation accessories (applicable to the CloudEngine 16800)

Accessory	Quantity	Description	Part Number
Expandable guide rail	1 pair	Expandable in the range of 600 mm to 850 mm.	21242246
Quick Installation Guide	1	Used to guide device installation.	<ul style="list-style-type: none"> CloudEngine 16804 and CloudEngine 16808: 31500BEW CloudEngine 16816: 31500BEX

Accessory	Quantity	Description	Part Number
Serial cable	1 pair	Used to connect the console port of the device to a serial port of a maintenance terminal for local commissioning or maintenance of the device.	04040838
Ground cable	1	Used to ground the device.	04152748
Panel screw (M6x12)	10	Used to fix expandable guide rails and the device.	26020141
Floating nut (M6)	10	Installed on mounting rails of a cabinet or rack and used with M6 screws to secure the expandable guide rails and the device in the cabinet or rack.	26020075
Floating nut mounting bar	1	Used to install floating nuts.	63120191

Accessory	Quantity	Description	Part Number
ESD wrist strap	1	Used to prevent ESD damage when you touch or operate the device or components.	28050001
ESD gloves	2 pairs	Used to prevent ESD damage when you touch or operate the device or components.	02210177
Die-casting tweezers	1	Used to install or remove optical fibers on optical ports.	21123221
Fiber binding tape	2 m	Used to bundle optical fibers.	21101258
Cable tie (100 x 2.5 mm)	100	Used to bundle cables.	21100041
Cable tie (300 x 3.6 mm)	200	Used to bundle cables.	21100144

Accessory	Quantity	Description	Part Number
Label cable tie	100	Used to bundle cables and attach the power cable label (29041061) to the cables.	21200708
Signal cable label	30	Used to identify locations of signal cables.	29041060
Power cable label	2	Used to identify locations of power cables.	29041061
Bare crimp terminal (M8)	1	Used to replace an M6 bare crimp terminal when M8 screws are used to connect the ground cable to the ground point on the cabinet.	14170024
Heat shrink tubing	5 cm	Used to provide insulation protection for power cables.	28040011
Switch Fabric Unit (SFU) wrench	1 pair	Used to install SFUs in the chassis or remove SFUs from the chassis.	<ul style="list-style-type: none"> ● CloudEngine 16804: 21125663 ● CloudEngine 16808 and CloudEngine 16816: 21125452

Accessory	Quantity	Description	Part Number
Tool box for storing SFU wrenches	1	Used to store SFU wrenches.	<ul style="list-style-type: none">• CloudEngine 16804: 21244421• CloudEngine 16808 and CloudEngine 16816: 21244354
Cable management frame	1 pair	Used to route cables connected to Line Processing Units (LPUs).	<ul style="list-style-type: none">• CloudEngine 16804: 21125468• CloudEngine 16808: 21125470• CloudEngine 16816: 21125472

4 Unpacking a Device

[4.1 Unpacking a Carton](#)

[4.2 Unpacking a Card](#)

4.1 Unpacking a Carton

Context

Cartons are used to pack CloudEngine 16800, power cables, cards, power modules, and other modules. When a device is delivered, unpack the carton and check the device and accessories in the carton.

NOTICE

- Do not turn a carton upside down; otherwise, the device in the carton will be damaged.
- Wear protective gloves or take other protection measures to prevent hand injuries when unpacking a carton.
- Move the carton into or near the equipment room before unpacking (if space is sufficient). Moving an unpacked device over a long distance may damage the device.

NOTE

If the device is found eroded or damped, stop unpacking, check for the reason, and contact the equipment supplier.

Tools

- Flat-head screwdriver
- Phillips screwdriver
- Diagonal pliers

- Adjustable wrench
- Protective gloves

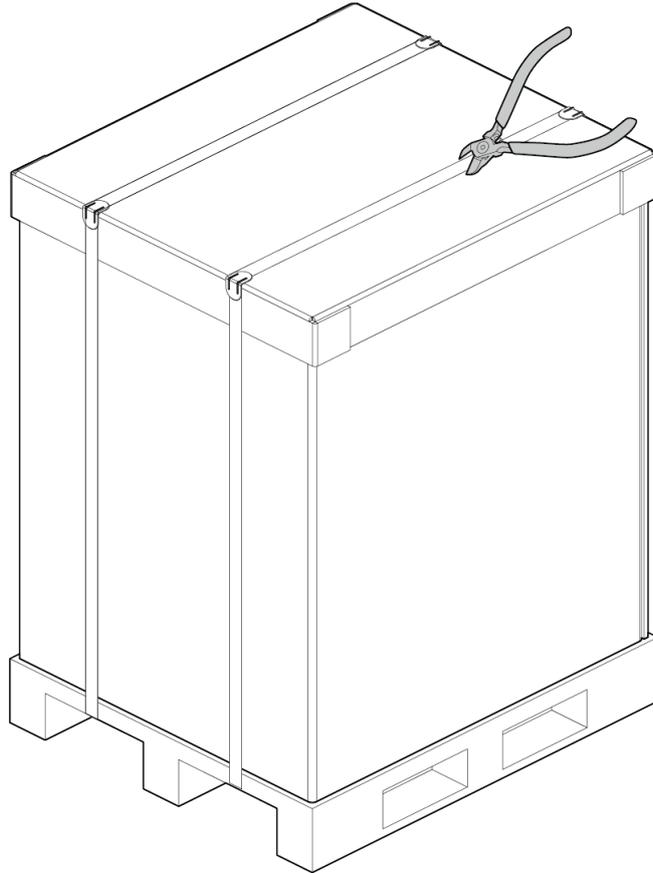
Procedure

- Step 1** Inspect the carton. If the tilt indicator label on the carton is red (see [Figure 4-1](#)), the carton is damp, or the seals on the carton are damaged, check for the reason and contact the equipment supplier immediately. If no exception is found, start the unpacking.

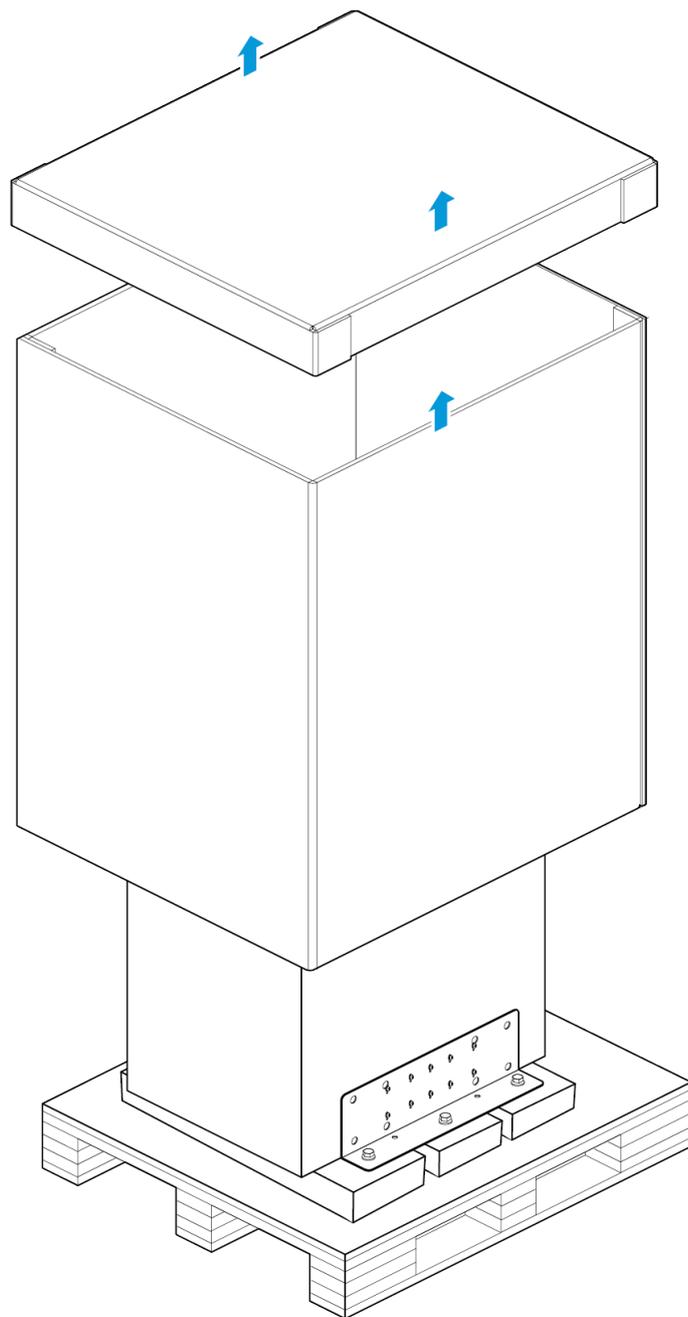
Figure 4-1 Tilt indicator label



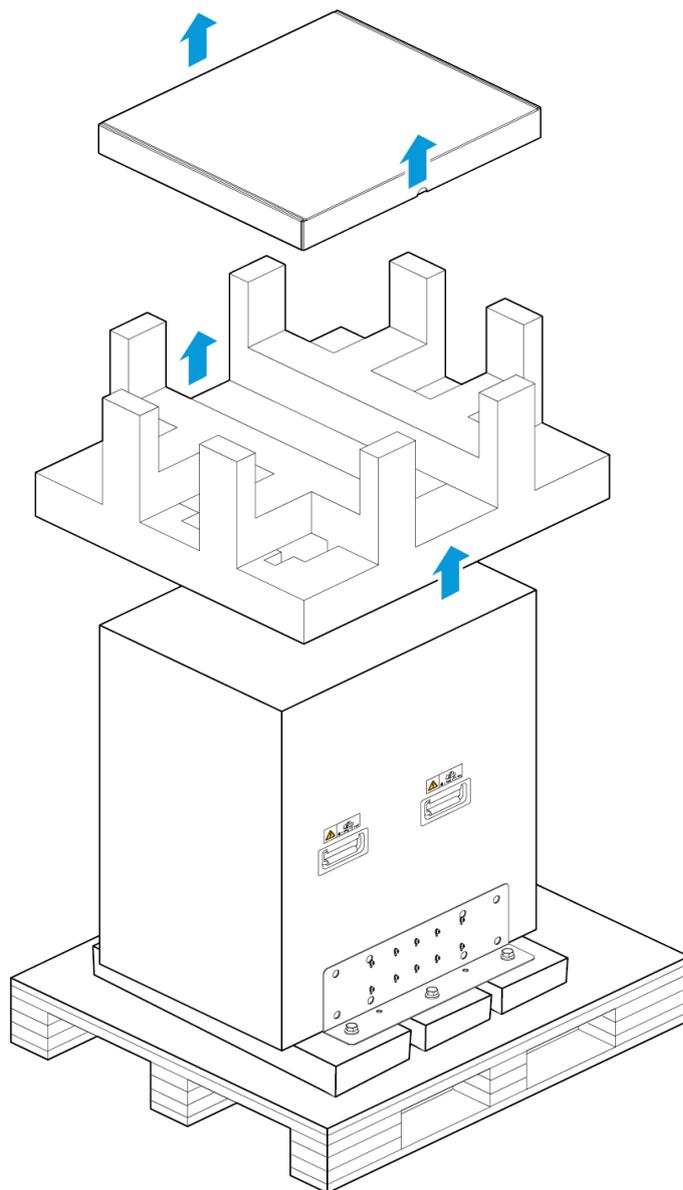
- Step 2** Use a pair of diagonal pliers to cut the strapping band on the carton.



Step 3 Remove the top cover of the carton and then the side panels.



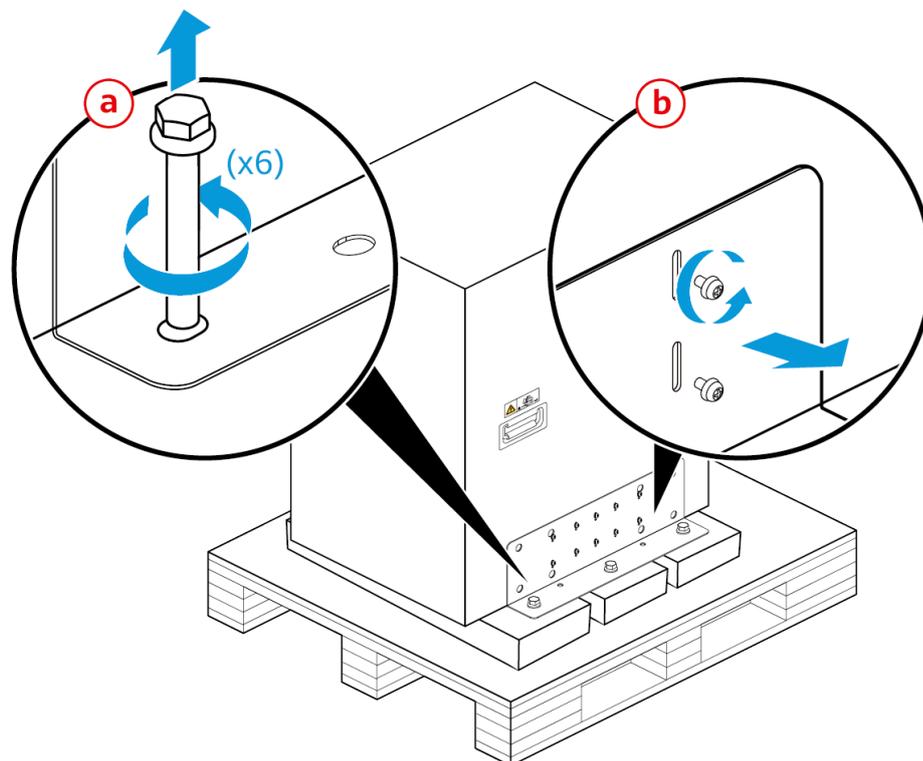
Step 4 Remove the box of accessories and packaging.



Step 5 Remove the fixtures at both sides of the device. Use an adjustable wrench to remove the bolts joining the fixtures and the base (a), and then use a Phillips screwdriver to remove the bolts joining the fixtures and sides of the device (b). After removing all the bolts, remove the fixtures.

NOTE

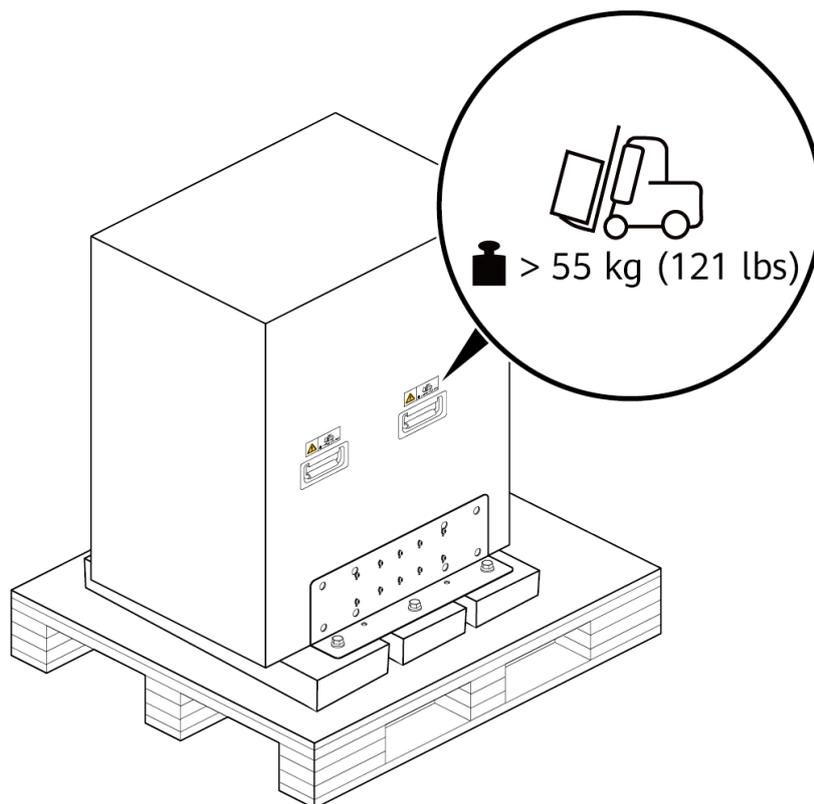
For the CloudEngine 16816, you only need to use an adjustable wrench to remove the bolts joining the fixtures and the base (a).



Step 6 For the CloudEngine 16804 and CloudEngine 16808, use a pallet truck, lifter, or flat cart to move the device near the cabinet or rack where it will be installed.

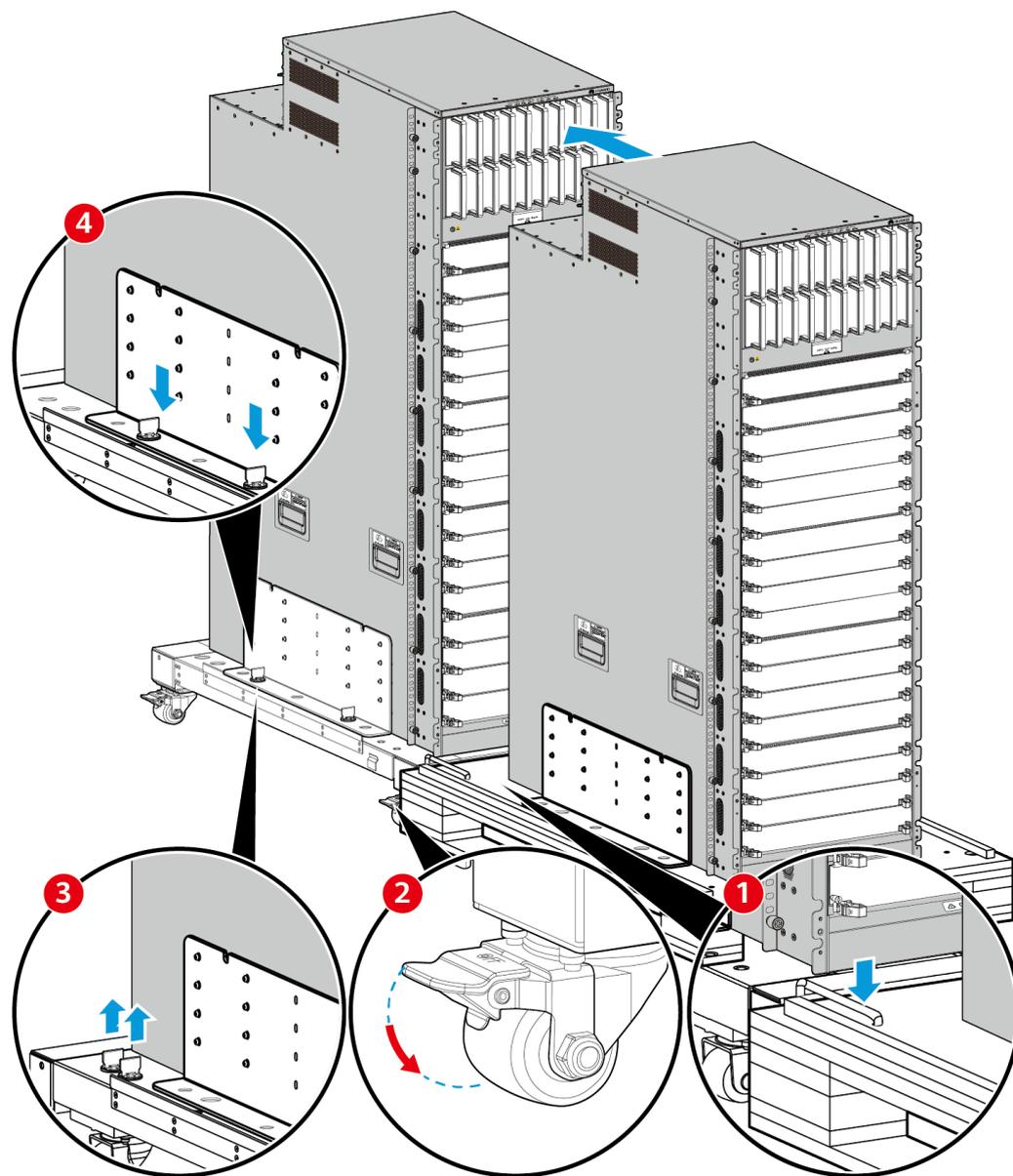
The CloudEngine 16804 and CloudEngine 16808 have an optional flat cart (whose part number is 21244111 from Huawei). If you have purchased a flat cart, perform the following steps to move the device onto the flat cart.

1. Move the flat cart near the device, and step on the brakes of all the casters of the flat cart to prevent the flat cart from moving.
2. At least four persons are required to move the device onto the flat cart. Move the device by only the load bearing handles at both sides of the device. Do not lift or drag the device by the handles of any modules on the device; otherwise, the device and modules will be damaged.



Step 7 For the CloudEngine 16816, move the device onto the flat cart.

1. Move the flat cart to the rear of the device, and hang the hooks on both sides of the flat cart to the pallet. See callout 1 in the figure.
2. Step on the brakes of all the casters of the flat cart to prevent the flat cart from moving. See callout 2 in the figure.
3. One person pulls the metal handles at the rear of the device to pull the device and adjust the device direction, and at least two persons push the device horizontally in the front of the device, until the device cannot move forward.
4. Loosen the bolts on the flat cart. See callout 3 in the figure. Secure the bolts to fix the device. See callout 4 in the figure.



----End

4.2 Unpacking a Card

Context

A card is packed in an ESD bag, which is placed in a carton with foam packaging. You are advised to open the ESD bag only when the card needs to be installed in a chassis.

NOTICE

- Electronic components are vulnerable to electrostatic discharge (ESD). Before touching a card, wear ESD gloves or an ESD wrist strap (with the other end inserted into an ESD jack). Do not touch electronic components on the card.
- If a card is moved from a cold, dry place to a warm, humid place, wait more than 30 minutes before unpacking the card. Otherwise, the humidity will damage the card.

Tools

- ESD gloves or ESD wrist strap
- Utility knife

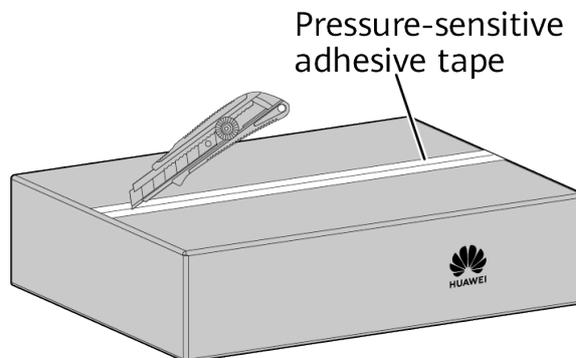
Procedure

Step 1 Inspect the carton. If the carton or the seals on the carton are damaged, contact the equipment supplier immediately. If the carton is intact, go to the next step.

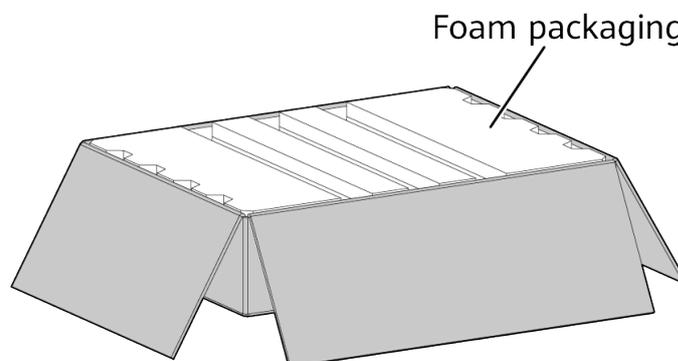
Step 2 Wear ESD gloves or an ESD wrist strap. When wearing an ESD wrist strap, ensure that the ESD wrist strap is in close contact with your wrist, and insert the other end into the ESD jack of the cabinet or rack.

Step 3 Unpack the carton.

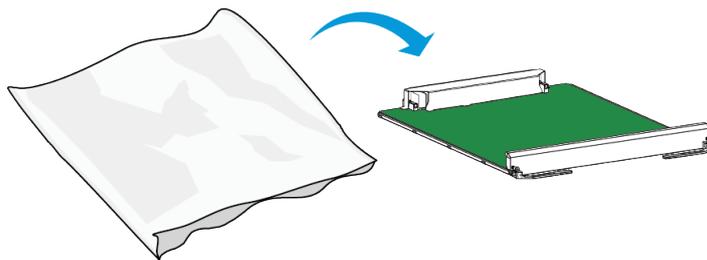
1. Cut the pressure-sensitive adhesive tape on the carton with a utility knife.



2. Open the carton, remove the foam packaging, and take out the ESD bag.



3. Open the ESD bag and take out the card.



Step 4 Inspect the card. If any damage is found on the card, analyze the cause and contact the equipment supplier immediately.

----End

5 Installing a Switch

[5.1 \(Optional\) Adjusting Mounting Brackets](#)

[5.2 Installing the CloudEngine 16804](#)

[5.3 Installing the CloudEngine 16808](#)

[5.4 Installing the CloudEngine 16816](#)

5.1 (Optional) Adjusting Mounting Brackets

Context

The procedures and methods for adjusting mounting brackets on the CloudEngine 16800 are the same. This section uses the mounting brackets on the CloudEngine 16808 as an example.

Tools

- Phillips screwdriver

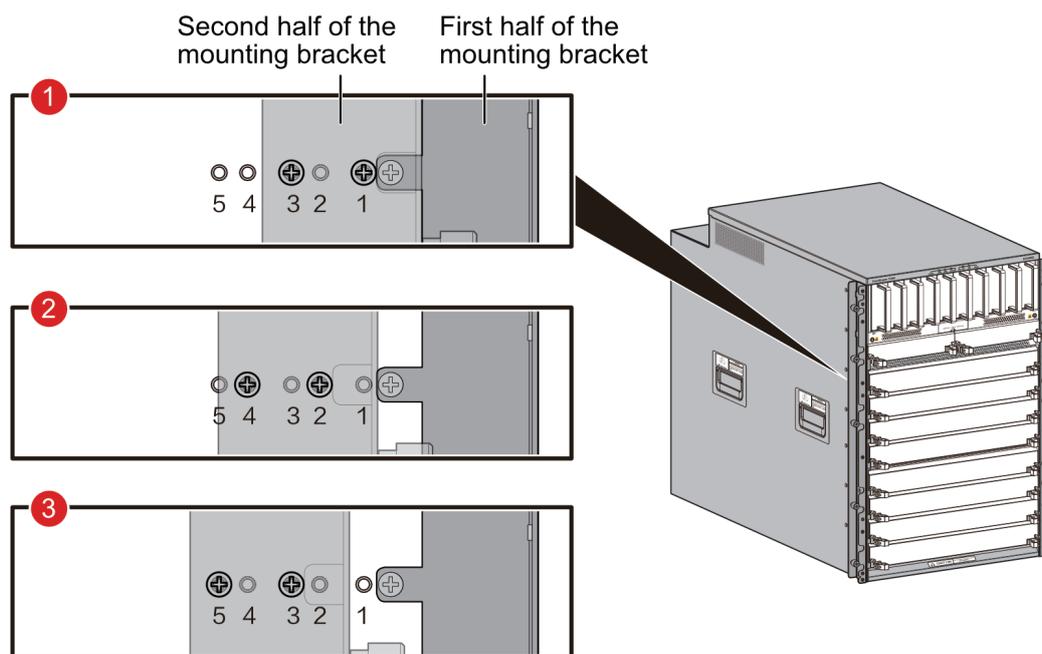
Procedure

1. Measure the distance (A) between the front mounting rail and the outer side of the front door, and adjust the mounting brackets to proper positions according to the mapping between distance A and mounting bracket installation positions. (The first half of the mounting bracket is connected to a cable management frame and cannot be adjusted.)

Table 5-1 Mapping between distance A and mounting bracket installation positions

Distance A (1000 mm deep cabinet)	Distance A (1100 mm to 1200 mm deep cabinet)	Mounting Bracket Installation Position
150 mm	165 mm to 175 mm	Default position (callout 1 in the figure)
165 mm	180 mm to 190 mm	Position shown in callout 2 in the figure
175 mm (recommended)	190 mm to 200 mm	Position shown in callout 3 in the figure

Figure 5-1 Mapping between distance A and mounting bracket installation positions



5.2 Installing the CloudEngine 16804

Context

NOTE

- Move the device near the cabinet or rack before the installation.
- For convenient maintenance, leave at least 1000 mm of clearance at the front and rear of the device. Do not install the device against a wall.
- Keep the tweezers and wrenches delivered with the device for future use.
- If the device is delivered with main control boards, interface boards, SFUs, and power modules installed, you are advised to remove them before installing the device into a cabinet or rack.
- For the CloudEngine 16804, reserve sufficient space on the top of the CloudEngine 16804 for power cable routing.
 - CloudEngine 16804 DC chassis: reserved space $\geq 2U$
 - CloudEngine 16804 AC & high-voltage DC chassis: reserved space $\geq 1U$
- A maximum of three CloudEngine 16804 devices can be installed in each cabinet.

Tools and Accessories

- Scissors
- Flat-head screwdriver
- Phillips screwdriver
- Marker
- CloudEngine 16804 installation template (*CloudEngine 16804 and 16808 Quick Installation Guide*)
- Floating nuts and matching screws
- Floating nut mounting bar
- Expandable guide rails and matching screws

Procedure

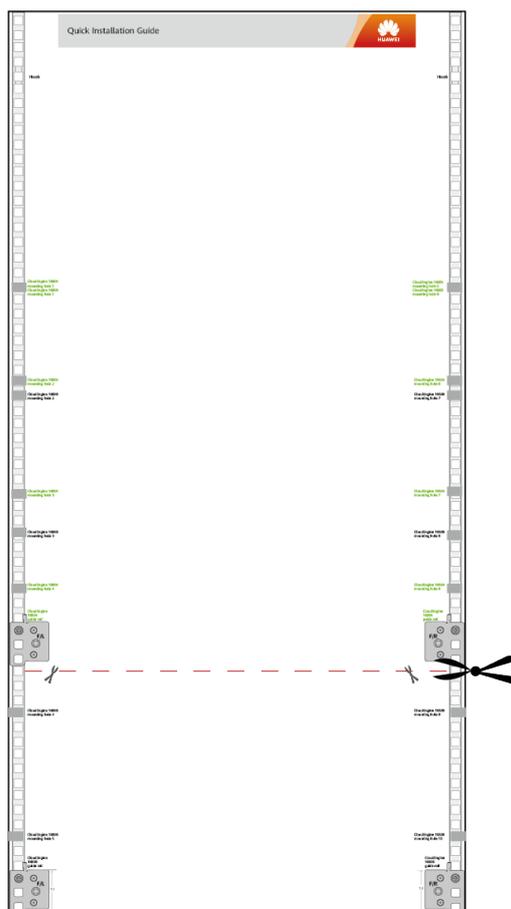
- Step 1** Mark the mounting holes for the expandable guide rails and mounting brackets on the guide rails.

NOTE

Positions of mounting brackets only need to be marked on the front mounting rails, whereas positions of expandable guide rails must be marked on both the front and rear mounting rails. Keep the mounting holes on the front and rear mounting rails on the same horizontal plane.

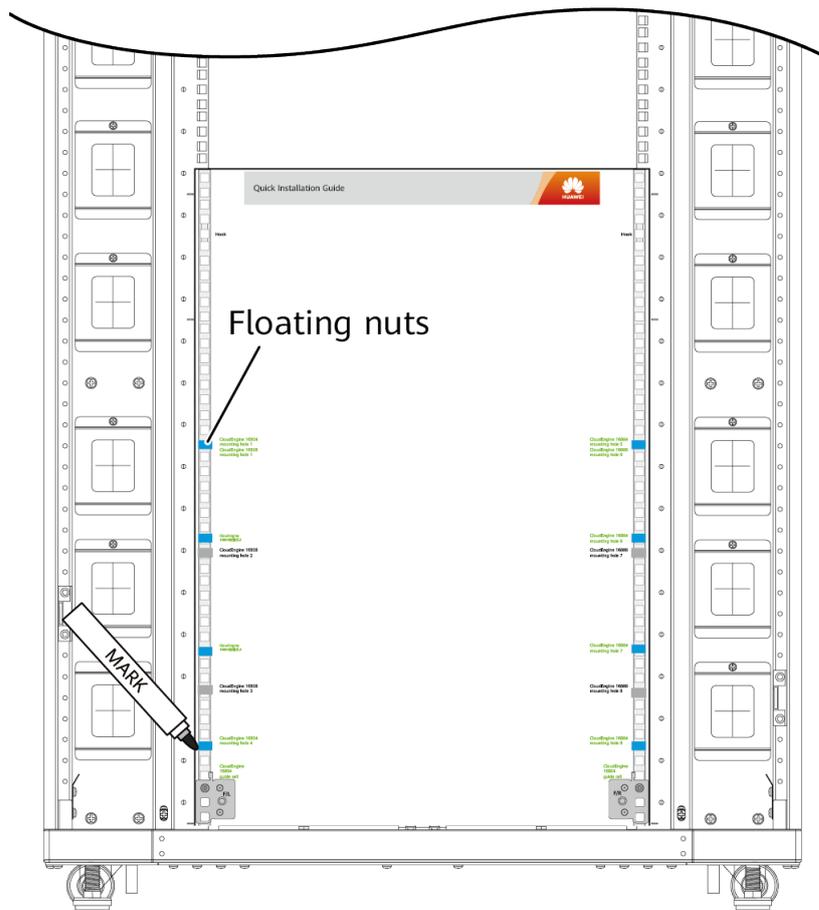
1. Use a pair of scissors to cut the installation template along the CloudEngine 16804 cutting line.

Figure 5-2 Cutting the installation template



2. Determine the device installation position in the cabinet or rack. Two persons hold the installation template, align the mounting holes on the installation template with those on the mounting rails of the cabinet or rack, and fix the installation template on the mounting rails. Mark the mounting holes for the mounting brackets and expandable guide rails, and then remove the installation template.

Figure 5-3 Marking the mounting holes for floating nuts

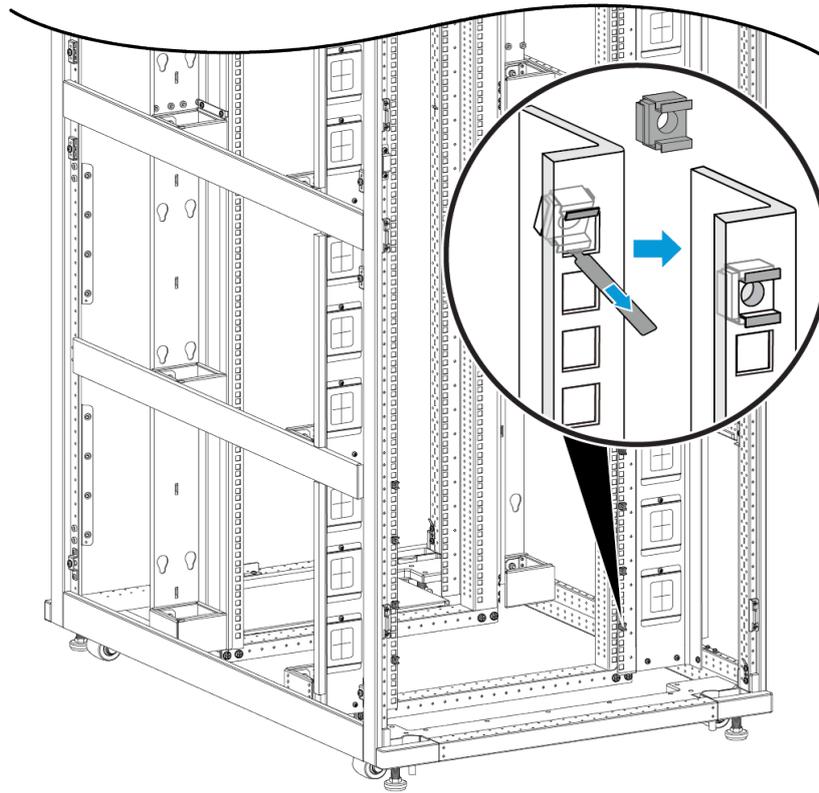


Step 2 Install floating nuts in the marked mounting holes.

NOTE

- You can use a floating nut mounting bar to facilitate installation of floating nuts.
- When installing the CloudEngine 16804, eight floating nuts are used to secure the mounting brackets, and 10 floating nuts are used to secure the guide rails (two for the front end and three for the rear end of each guide rail).

Figure 5-4 Installing floating nuts

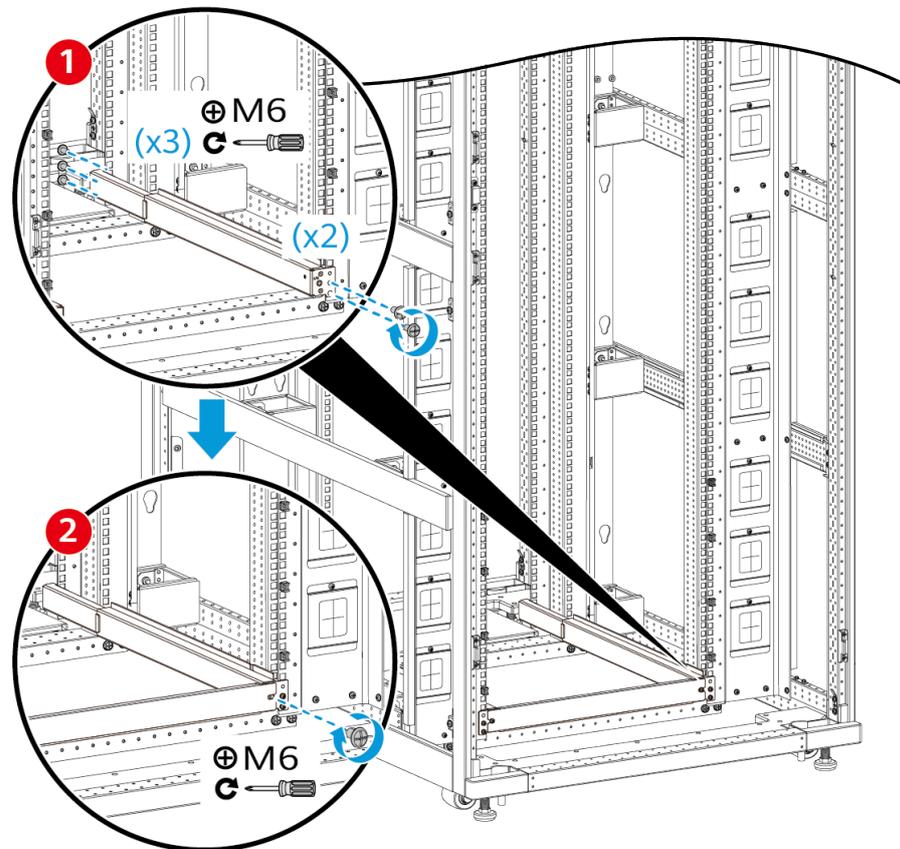


Step 3 Install expandable guide rails.

NOTE

- When installing expandable guide rails, ensure that the front and rear ends of each guide rail are on the same horizontal plane.
 - For a third-party cabinet or rack, if you do not use the expandable guide rails delivered with the device, use a tray (with a minimum load bearing capacity of 324 kg) instead.
1. Adjust the length of the guide rails and place them in marked positions on the mounting rails by the plate at the front end and hook at the rear end. The bottom edges of the guide rails must be aligned with scale lines on the mounting rails. Then secure the guide rails with M6 screws. See callout 1 in [Figure 5-5](#). Tighten the M6 screws with a torque of 1.96 N m.
 2. Use M6 screws to secure the air baffle to the guide rails. See callout 2 in [Figure 5-5](#). Tighten the M6 screws with a torque of 1.96 N m.

Figure 5-5 Installing expandable guide rails



Step 4 Install the device in the cabinet or rack.

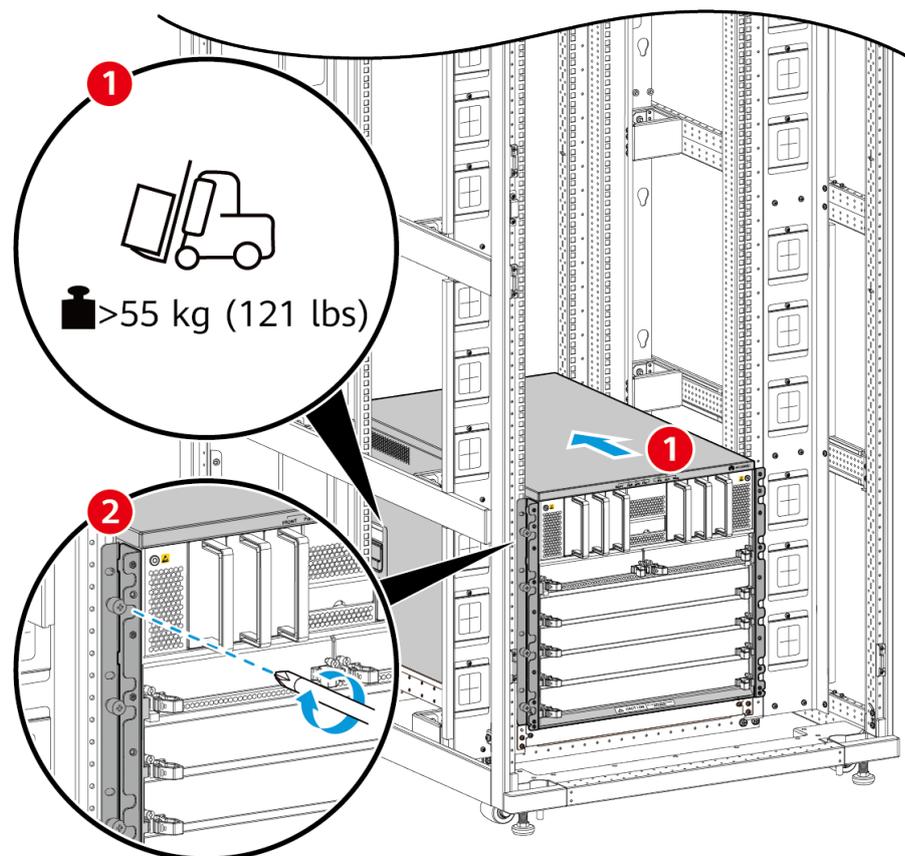
1. Move the device into the cabinet. See callout 1 in [Figure 5-6](#).

NOTICE

When moving the device into the cabinet, move the device by the load bearing handles at both sides of the device. Do not lift or drag the chassis by the handles of any modules in the chassis; otherwise, the device and modules will be damaged. Place the rear bottom of the device on the guide rails, and then horizontally push the chassis in a gentle and smooth manner until the mounting brackets on the chassis are completely attached to the front mounting rails. When pushing the chassis, prevent the chassis from colliding with the captive screws on the mounting brackets.

2. Tighten the captive screws on mounting brackets. See callout 2 in [Figure 5-6](#). Tighten the captive screws with a torque of 1.76 N·m.

Figure 5-6 Installing the device in the cabinet or rack



----End

5.3 Installing the CloudEngine 16808

Context

NOTE

- Move the device near the cabinet or rack before the installation.
- For convenient maintenance, leave at least 1000 mm of clearance at the front and rear of the device. Do not install the device against a wall.
- Keep the tweezers and wrenches delivered with the device for future use.
- If the device is delivered with main control boards, interface boards, SFUs, and power modules installed, you are advised to remove them before installing the device into a cabinet or rack.
- For the CloudEngine 16808, reserve sufficient space on the top of the CloudEngine 16808 for power cable routing.
 - CloudEngine 16808 DC chassis: reserved space $\geq 3U$
 - CloudEngine 16808 AC & high-voltage DC chassis: reserved space $\geq 1U$
- A maximum of two CloudEngine 16808 devices can be installed in each cabinet.

Tools and Accessories

- Flat-head screwdriver
- Phillips screwdriver
- Marker
- CloudEngine 16808 installation template (*CloudEngine 16804 and 16808 Quick Installation Guide*)
- Floating nuts and matching screws
- Floating nut mounting bar
- Expandable guide rails and matching screws

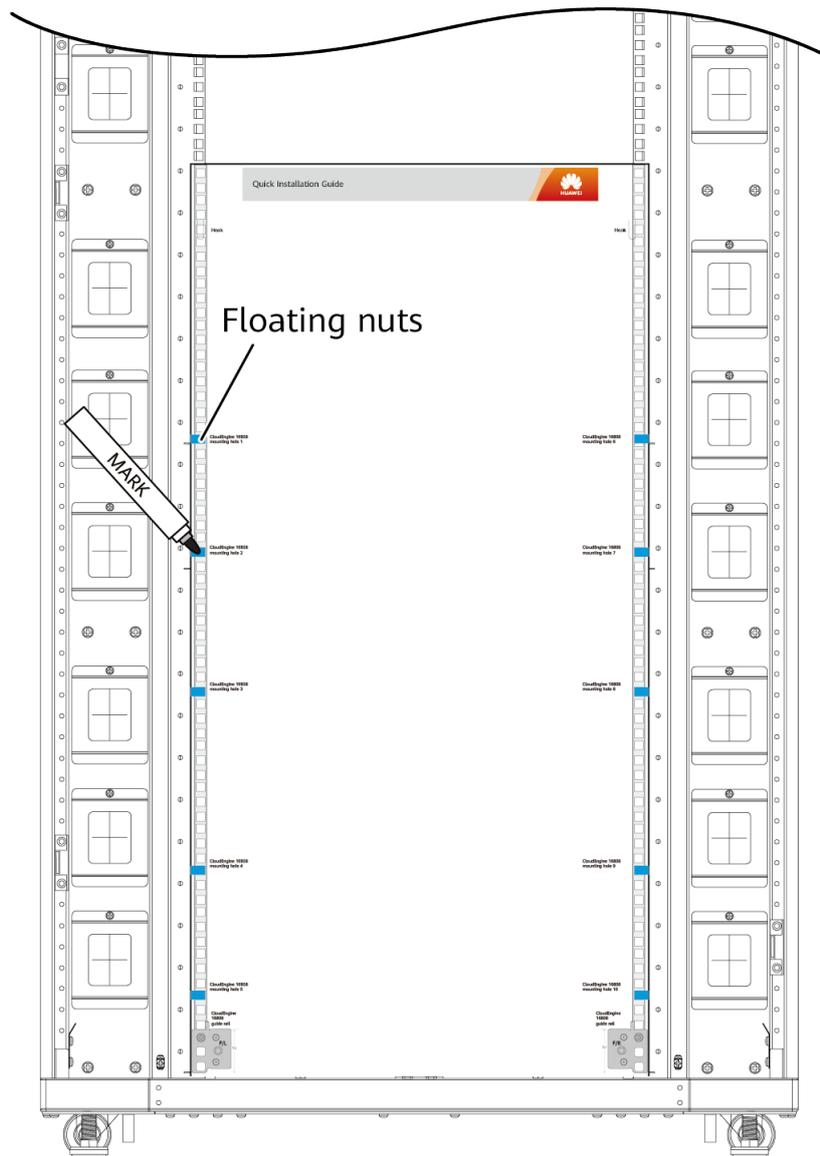
Procedure

- Step 1** Determine the device installation position in the cabinet or rack. Two persons hold the installation template, align the mounting holes on the installation template with those on the mounting rails of the cabinet or rack, and fix the installation template on the mounting rails. Mark the mounting holes for the mounting brackets and expandable guide rails, and then remove the installation template.

NOTE

Positions of mounting brackets only need to be marked on the front mounting rails, whereas positions of expandable guide rails must be marked on both the front and rear mounting rails. Keep the mounting holes on the front and rear mounting rails on the same horizontal plane.

Figure 5-7 Marking the mounting holes for floating nuts

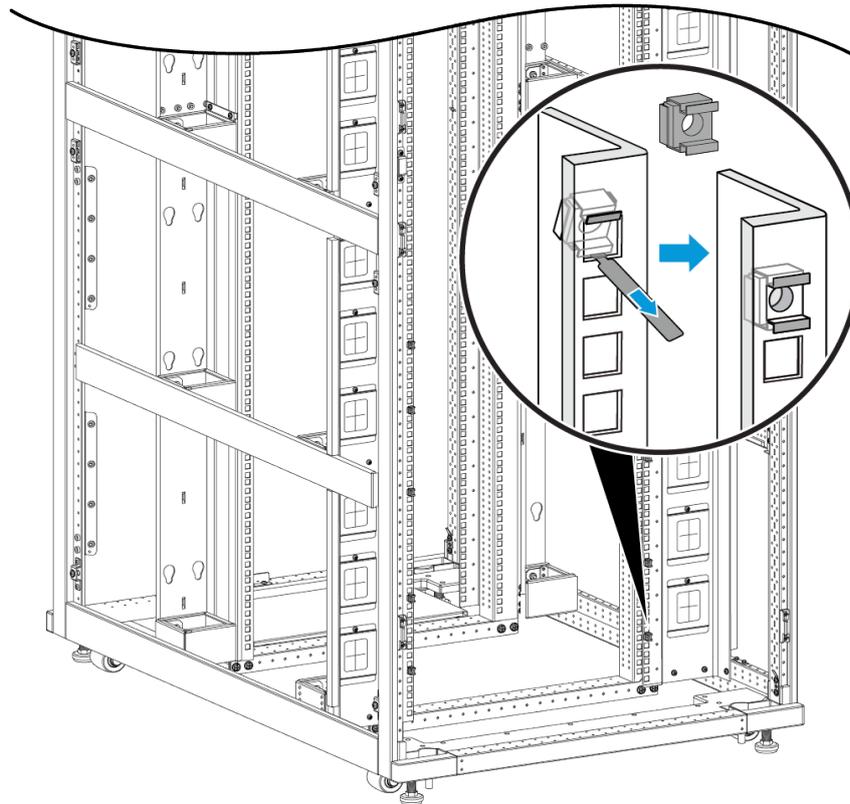


Step 2 Install floating nuts in the marked mounting holes.

NOTE

- You can use a floating nut mounting bar to facilitate installation of floating nuts.
- When installing the CloudEngine 16808, 10 floating nuts are used to secure the mounting brackets, and 10 floating nuts are used to secure the guide rails (two for the front end and three for the rear end of each guide rail).

Figure 5-8 Installing floating nuts

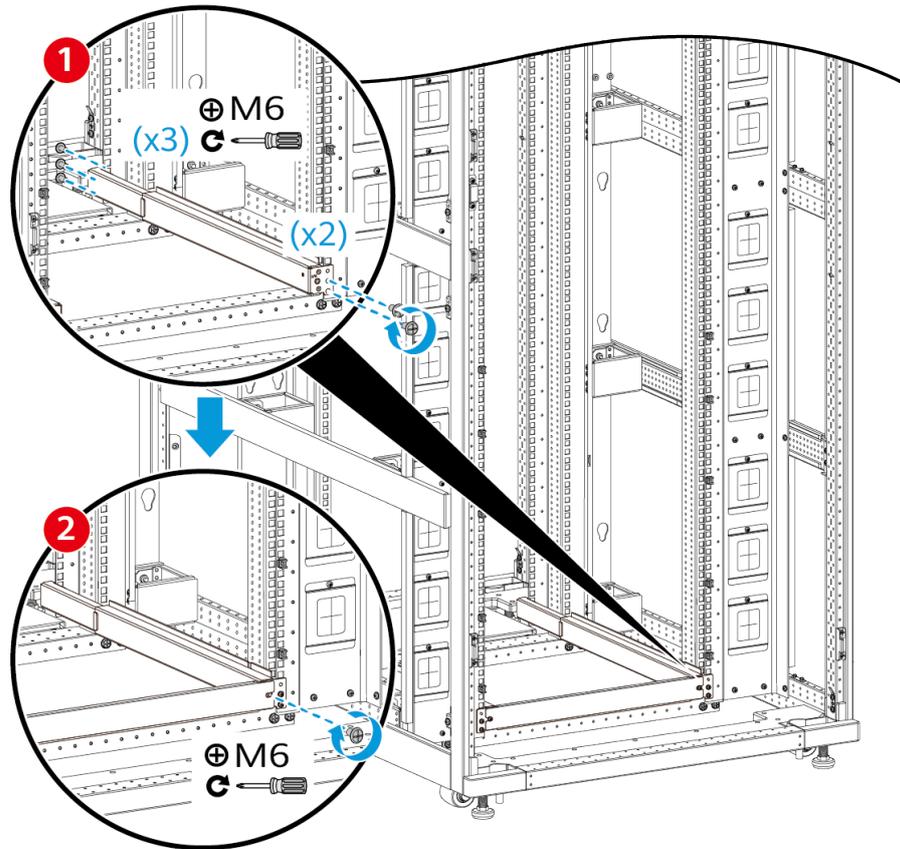


Step 3 Install expandable guide rails.

NOTE

- When installing expandable guide rails, ensure that the front and rear ends of each guide rail are on the same horizontal plane.
 - For a third-party cabinet or rack, if you do not use the expandable guide rails delivered with the device, use a tray (with a minimum load bearing capacity of 504 kg) instead.
1. Adjust the length of the guide rails and place them in marked positions on the mounting rails by the plate at the front end and hook at the rear end. The bottom edges of the guide rails must be aligned with scale lines on the mounting rails. Then secure the guide rails with M6 screws. See callout 1 in [Figure 5-9](#). Tighten the M6 screws with a torque of 1.96 N m.
 2. Use M6 screws to secure the air baffle to the guide rails. See callout 2 in [Figure 5-9](#). Tighten the M6 screws with a torque of 1.96 N m.

Figure 5-9 Installing expandable guide rails



Step 4 Install the device in the cabinet or rack.

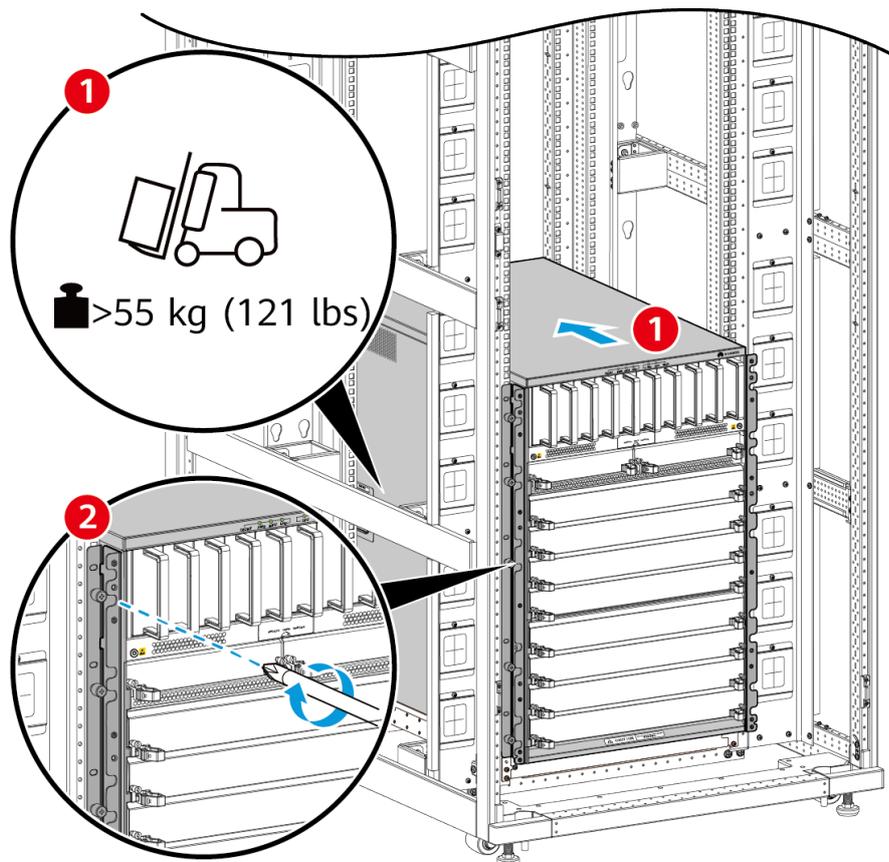
1. Use a pallet truck or lifter to move the device into the cabinet or rack. See callout 1 in [Figure 5-10](#).

NOTICE

- The CloudEngine 16808 chassis is heavy, so lifting it manually is not recommended.
- If no pallet truck or lifter is available and the chassis has to be moved into the cabinet or rack manually, move the chassis by the load bearing handles at both sides of it. Do not lift or drag the chassis by the handles of any modules in the chassis; otherwise, the chassis and modules will be damaged. Place the rear bottom of the chassis on the guide rails, and then push the chassis horizontally and gently until the mounting brackets on the chassis are completely attached to the front mounting rails. When pushing the chassis, prevent it from colliding with the captive screws on the mounting brackets.

2. Tighten the captive screws on mounting brackets. See callout 2 in [Figure 5-10](#). Tighten the captive screws with a torque of 1.76 N·m.

Figure 5-10 Installing the device in the cabinet or rack



----End

5.4 Installing the CloudEngine 16816

Context

NOTE

- Move the device near the cabinet or rack before the installation.
- For convenient maintenance, leave at least 1000 mm of clearance at the front and rear of the device. Do not install the device against a wall.
- If the device is delivered with MPUs, LPUs, SFUs, and power modules installed, you are advised to remove them before installing the device into a cabinet or rack.
- When installing the CloudEngine 16816, reserve sufficient space for power cabling routing above the CloudEngine 16816.
 - CloudEngine 16816 DC chassis: reserved space \geq 3U
 - CloudEngine 16816 AC & high-voltage DC chassis: reserved space \geq 1U

Tools and Accessories

- Flat-head screwdriver
- Phillips screwdriver

- Adjustable wrench
- Floating nut mounting bar
- Marker
- CloudEngine 16816 installation template (*CloudEngine 16816 Switch Quick Installation Guide*, delivered with the chassis)
- Floating nuts and matching screws
- Expandable guide rails and matching screws

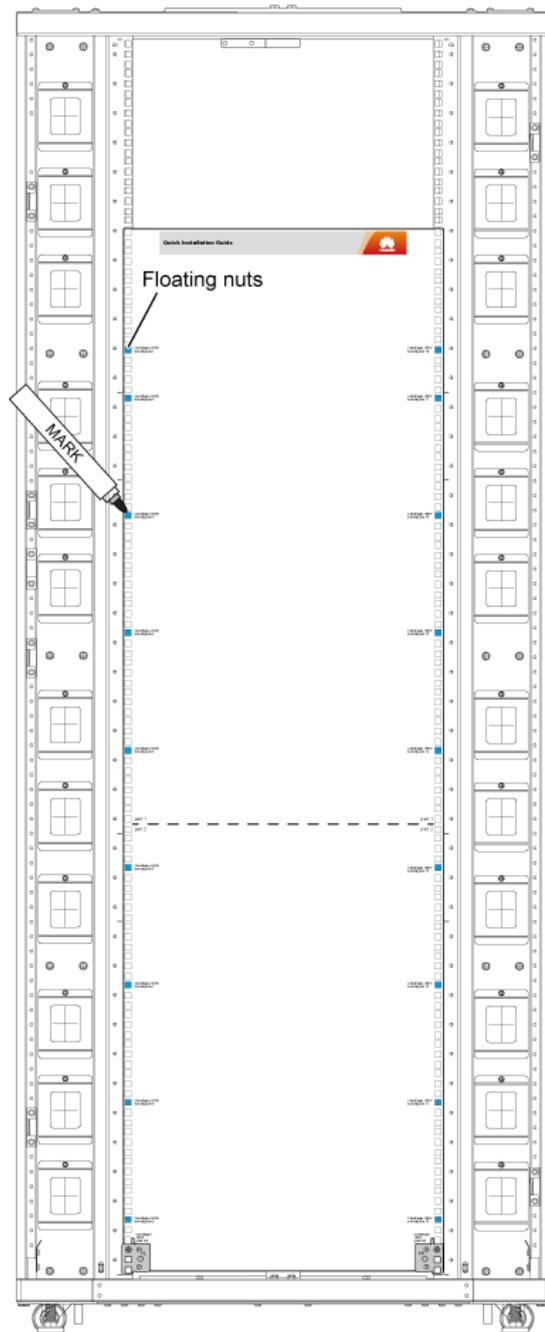
Procedure

- Step 1** Determine the device installation position in the cabinet or rack. Two persons hold the installation template, align the mounting holes on the installation template with those on the mounting rails of the cabinet or rack, and fix the installation template on the mounting rails (with the bottom edge of the template at the bottom of the cabinet or rack). Mark the mounting holes for the mounting brackets and expandable guide rails, and then remove the installation template.

NOTE

Positions of mounting brackets only need to be marked on the front mounting rails, whereas positions of expandable guide rails must be marked on both the front and rear mounting rails. Keep the mounting holes on the front and rear mounting rails on the same horizontal plane.

Figure 5-11 Marking the mounting holes for floating nuts

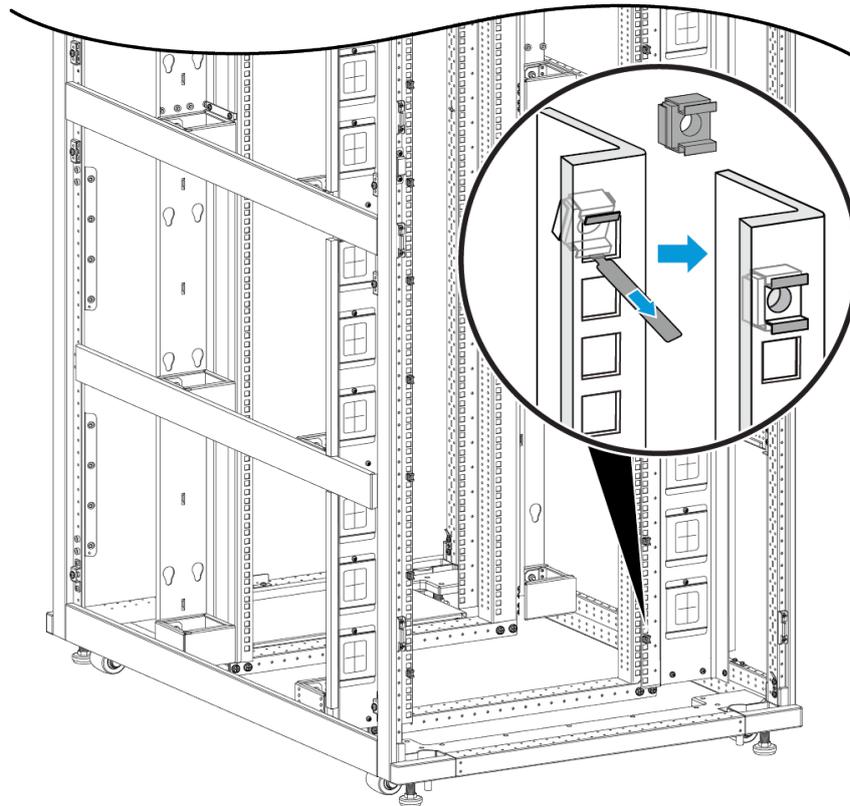


Step 2 Install floating nuts in the marked mounting holes.

NOTE

- You can use a floating nut mounting bar to facilitate installation of floating nuts.
- When installing the CloudEngine 16816, 18 floating nuts are used to secure the mounting brackets, and 10 floating nuts are used to secure the guide rails (two for the front end and three for the rear end of each guide rail).

Figure 5-12 Installing floating nuts

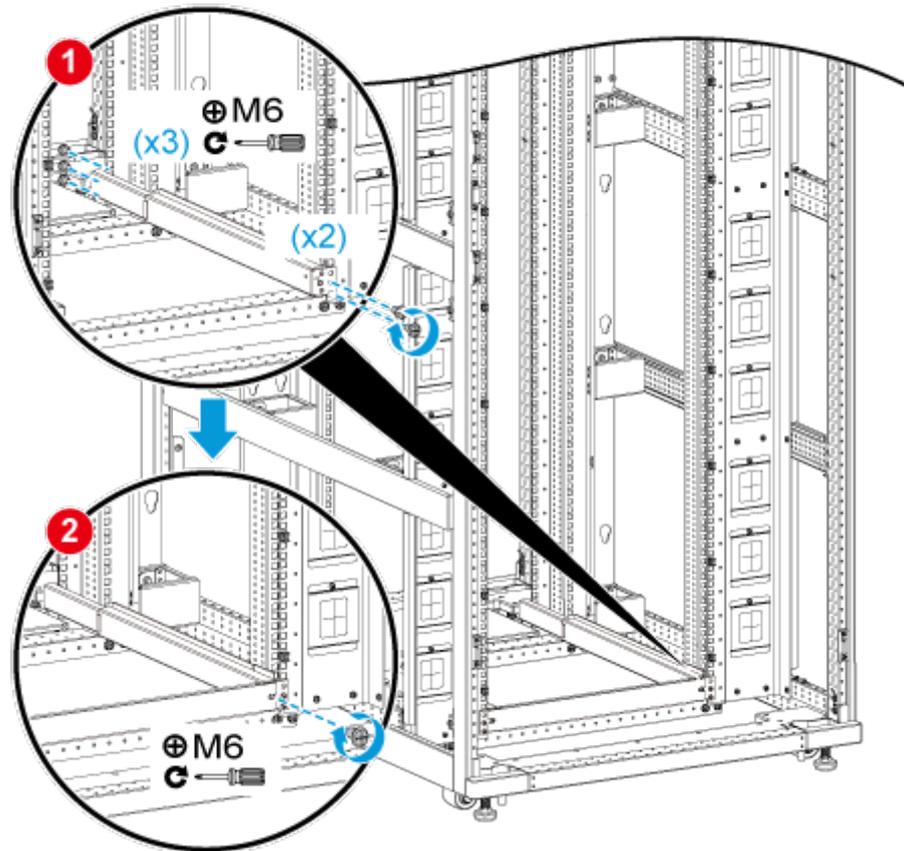


Step 3 Install expandable guide rails.

NOTE

- When installing expandable guide rails, ensure that the front and rear ends of each guide rail are on the same horizontal plane.
 - For a third-party cabinet or rack, if you do not use the expandable guide rails delivered with the device, use a tray (with a minimum load bearing capacity of 1177 kg) instead.
1. Adjust the length of the guide rails and place them in marked positions on the mounting rails by the plate at the front end and hook at the rear end. The bottom edges of the guide rails must be aligned with scale lines on the mounting rails. Then secure the guide rails with M6 screws. See callout 1 in [Figure 5-13](#). Tighten the M6 screws with a torque of 1.96 N m.
 2. Use M6 screws to secure the air baffle to the guide rails. See callout 2 in [Figure 5-13](#). Tighten the M6 screws with a torque of 1.96 N m.

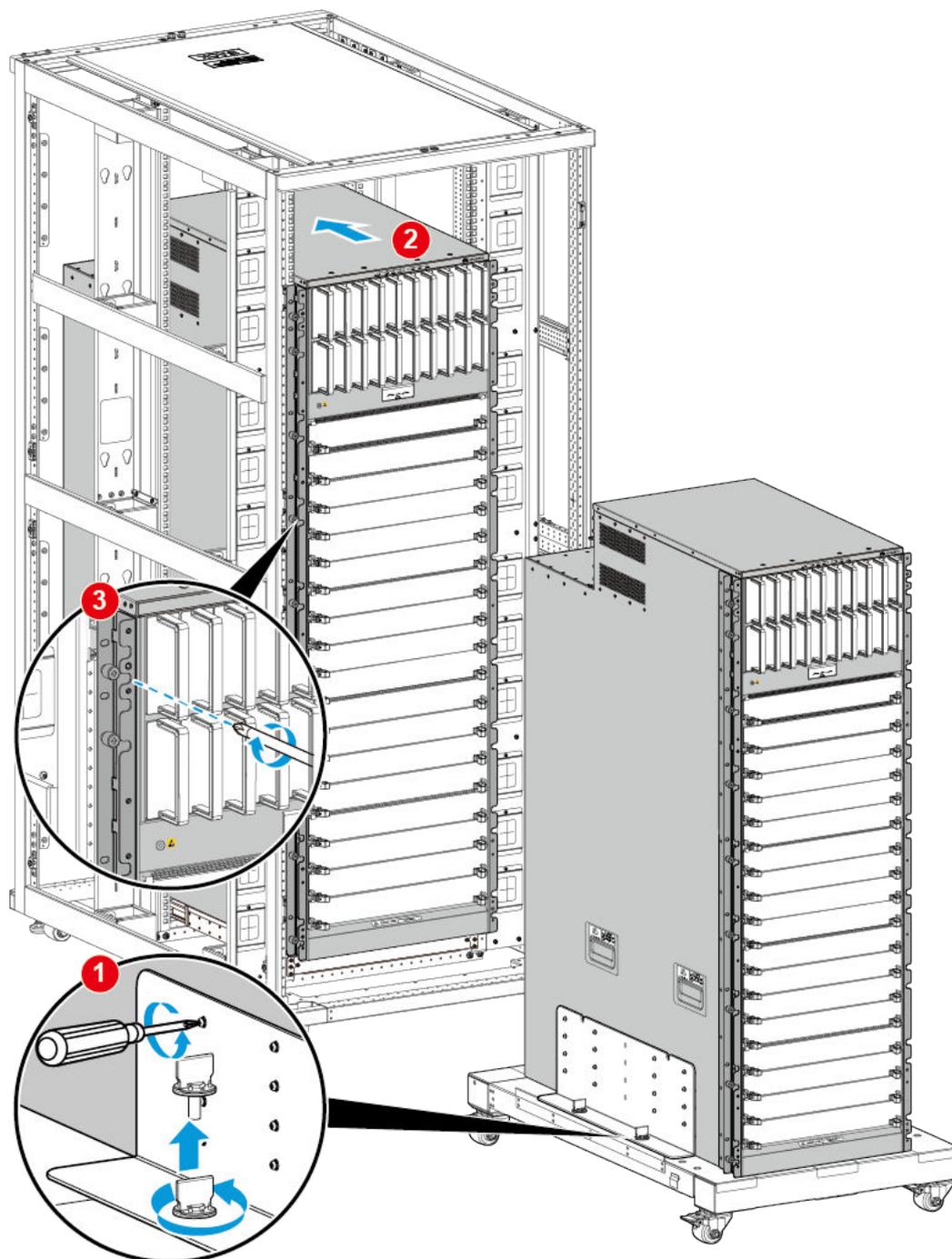
Figure 5-13 Installing expandable guide rails



Step 4 Install the device in the cabinet or rack.

1. Push the flat cart with the device to the front of the cabinet or rack (with the rear of the device facing the cabinet or rack). Remove the screws and bolts that fix the device on the flat cart. See callout 1 in [Figure 5-14](#).
2. Place the bottom edge of the device on the guide rails. One person pulls the metal handles at the rear of the device to pull the device and adjust the device direction, and at least two persons push the device horizontally and gently in the front of the device, until the mounting brackets on the device are completely attached to the front mounting rails. When pushing the device, prevent the device from colliding with the captive screws on mounting brackets. See callout 2 in [Figure 5-14](#).
3. Tighten the captive screws on mounting brackets. See callout 3 in [Figure 5-14](#). Tighten the captive screws with a torque of 1.76 N·m.

Figure 5-14 Installing the device in the cabinet or rack



CAUTION

Be careful to ensure personal safety when you are pulling the metal handles at the rear of the device.

----End

6 Installing Modules

- [6.1 Installing Cable Management Frames](#)
- [6.2 Installing Power Modules](#)
- [6.3 Installing Filler Panels in a Cabinet or Rack](#)
- [6.4 Installing SFUs](#)
- [6.5 Installing Fan Modules](#)
- [6.6 Installing MPUs and LPUs](#)
- [6.7 Installing an Optical Module](#)
- [6.8 \(Optional\) Installing a Chassis Door](#)

6.1 Installing Cable Management Frames

Context

The procedures and methods for installing cable management frames of all the CloudEngine 16800 models are the same. The following figure shows the installation of cable management frames on the CloudEngine 16808 as an example.

Tools and Accessories

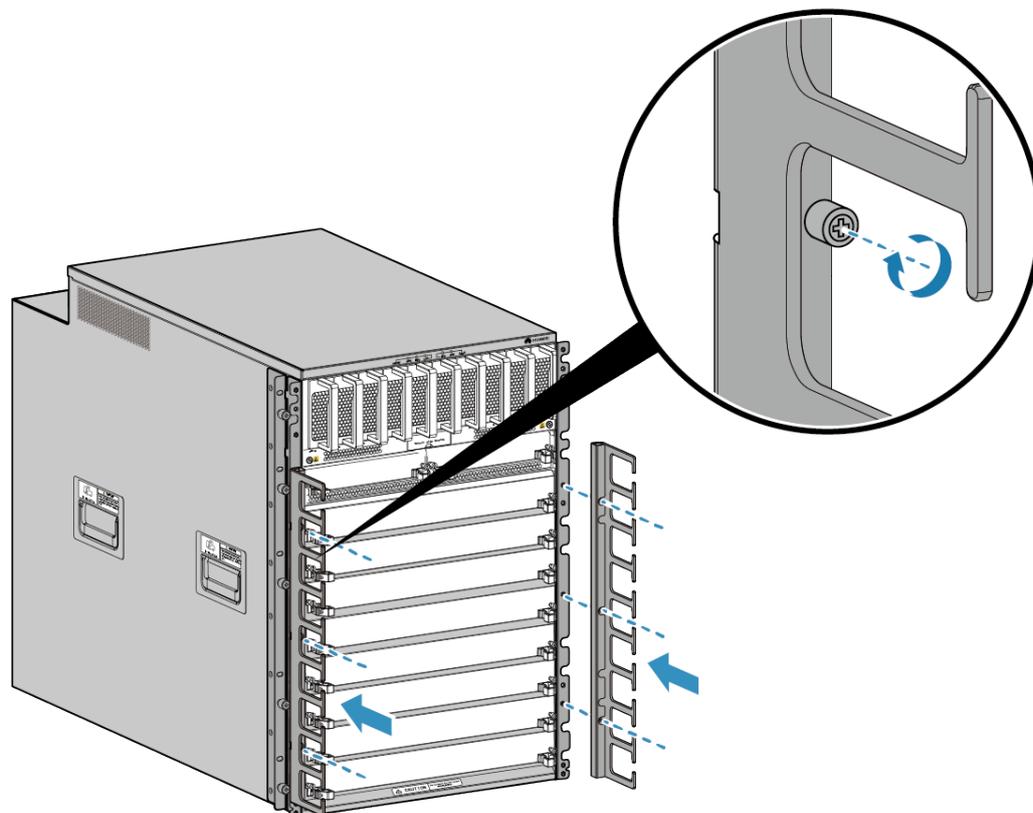
- ESD wrist strap or ESD gloves
- Phillips screwdriver

Procedure

- Step 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 cabinet or rack.
- Step 2** Install cable management frames on the device. Insert the positioning pins of a cable management frame into mounting holes on the device, slide the cable

management frame up and down to fit the positioning pins in the recess of the mounting holes, and tighten the captive screws on the cable management frame. Tighten the captive screws with a torque of 0.54 N·m.

Figure 6-1 Installing cable management frames



----End

6.2 Installing Power Modules

Context

The CloudEngine 16800 supports pluggable power modules. The procedures and methods for installing power modules on all the CloudEngine 16800 models are the same. The following figure shows power module installation on a CloudEngine 16808 as an example.

NOTICE

- Do not remove the filler panel on a power module slot if no power module needs to be installed in the slot.
- Do not install DC power modules and AC & high-voltage DC power modules on the same device.
- When installing a power module, ensure that the indicator on the power module is on the top.

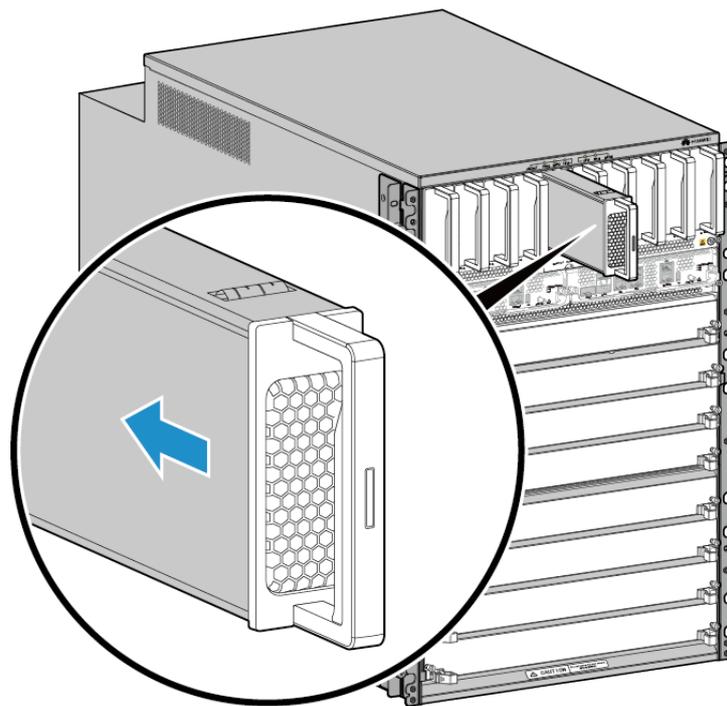
Tools

ESD wrist strap or ESD gloves

Procedure

- Step 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.
- Step 2** Install a power module on the device, with the silkscreen of the power module being presented in the upper left corner.
1. Remove the filler panel from the slot where the power module will be installed. Keep the filler panel in an appropriate place for later use.
 2. Grasp the power module handle with one hand and use the other hand to support the bottom of the power module. Slowly push the power module into the slot along the guide rails, until you hear a click and the power module cannot move forward.

Figure 6-2 Installing a power module on the device



----End

6.3 Installing Filler Panels in a Cabinet or Rack

Context

If the top of the chassis is vacant, you need to install filler panels in the cabinet or rack for front and rear airflow isolation. If a cabinet accommodates multiple chassis, filler panels must be installed in the space between the chassis.

Tools

- ESD wrist strap or ESD gloves
- Phillips screwdriver

Procedure

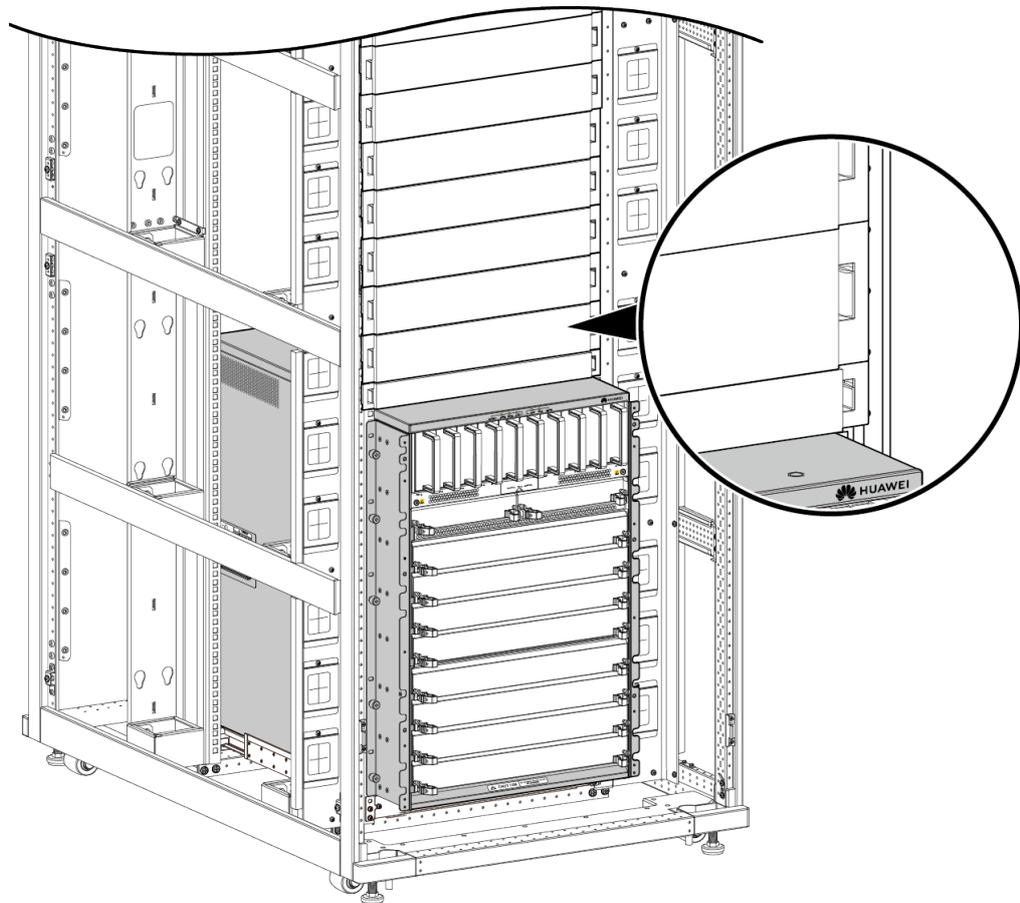
- Step 1** Wear an ESD wrist strap or ESD gloves. When wearing an ESD wrist strap, ensure that the ESD wrist strap is in close contact with your wrist, and insert the other end into the ESD jack of the device or cabinet/rack.
- Step 2** Install a 1U filler panel directly above the chassis. Place the bottom of the 1U filler panel against the top of the chassis. Then install 2U filler panels above the 1U filler panel. The following figure uses the CloudEngine 16808 as an example.

NOTE

For the CloudEngine 16804 and CloudEngine 16808, 1U and 2U filler panels are required. Part numbers of 1U and 2U filler panels are 21141166 and 21141167, respectively. Filler panels must be installed in vacant slots of a cabinet to isolate airflows; otherwise, heat dissipation of devices will be less effective. Huawei cabinets must be equipped with filler panels. If another vendor's cabinet with no filler panels is used, filler panels must also be prepared. Filler panels of Huawei cabinets are recommended.

For the CloudEngine 16816, only 1U filler panels are required.

Figure 6-3 Installing filler panels in a cabinet or rack



----End

6.4 Installing SFUs

Context

SFU slots of the CloudEngine 16800 chassis are behind fan slots. Slots SFU1, SFU2, and SFU9 cannot be used. If the **set sfu reduced-mode** command is run to configure the SFU reduction mode, only slots SFU3, SFU5, SFU6, and SFU8 can be used. The procedures and methods for installing SFUs on all the CloudEngine 16800 models are the same. The following figure shows SFU installation on a CloudEngine 16816 as an example.

NOTICE

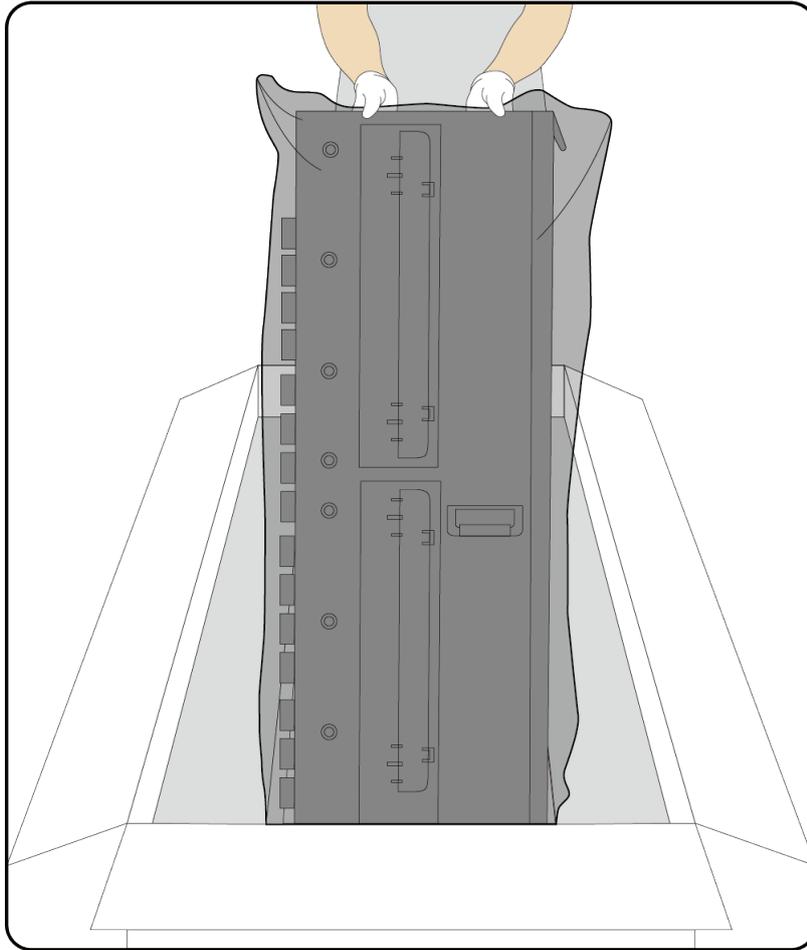
- Cover all the vacant slots with filler panels to ensure good electromagnetic shielding and heat dissipation.
 - Before removing the filler panel from the fan slots, ensure that all M3 screws on the filler panel have been removed. If some M3 screws are not removed when the filler panel is removed, the screws will be bent.
 - Before installing SFUs on a device, make sure that the device and SFUs are all free from damp.
 - When installing an SFU, gently push the SFU along the guide rails, and be careful not to crash the card connector. Distorted card connector will cause pins on the backplane connector to bend.
 - If the connector of an SFU has collided with the slot or other objects, ask Huawei professionals whether the SFU can still be installed. Installing an SFU with distorted connector may cause damage to the device.
 - Before installing an SFU, remove the filler panel from the fan slots.
-

Tools

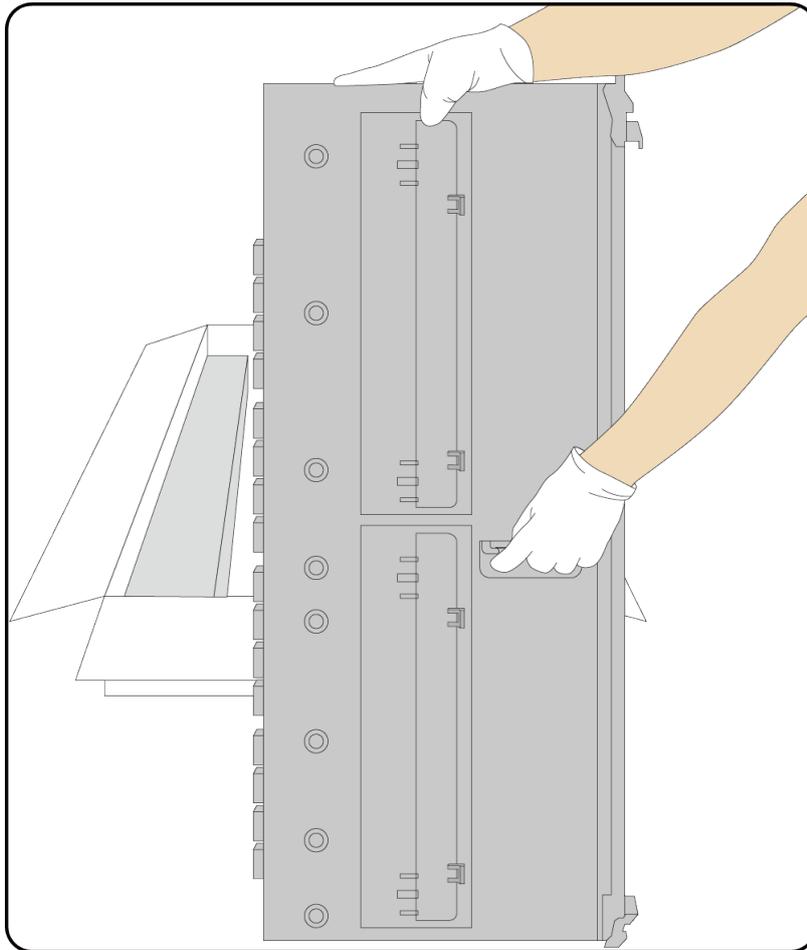
- ESD wrist strap or ESD gloves
- Phillips screwdriver

Procedure

- Step 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.
- Step 2** Remove the filler panel from the fan slots at the rear of the chassis and from the slot where an SFU is to be installed.
- Step 3** Hold the top of the SFU with both hands and stand the SFU upright. Take the SFU out from the ESD bag.



Step 4 Open the handle on the left side of the SFU. Grasp the handle with one hand and the top of the SFU with the other hand to stabilize the SFU.



 NOTE

- For the CloudEngine 16804 and CloudEngine 16808, use one hand to support the bottom of the SFU, use the other hand to grasp the panel of the SFU, and place the SFU in the slot.

Step 5 Place the SFU in the slot and gently push the SFU along the guide rails. See callout 1 in [Figure 6-4](#).

 WARNING

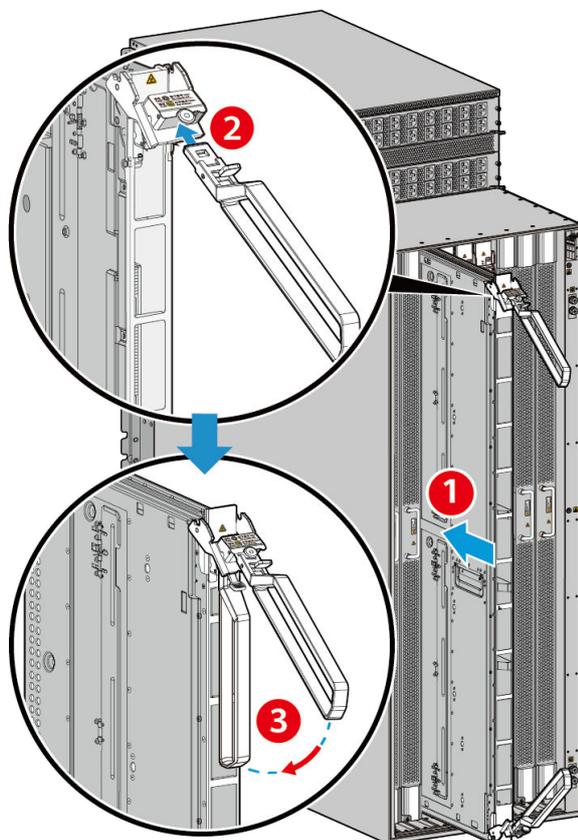
Do not carry an SFU horizontally by one person because it is heavy and long. Two persons are required when moving an SFU for a long distance. To prevent personal injury or damage to the SFU, follow the preceding steps.

Step 6 Take out the wrenches for SFUs, and install the wrenches on the SFU. A wrench is successfully installed until you hear a click. Grasp the wrenches with both hands, and gently push the SFU until the hooks of the wrenches are attached to the interior sides of the slot. Close the wrenches until the SFU is securely installed in the chassis. See callouts 2 and 3 in [Figure 6-4](#).

NOTICE

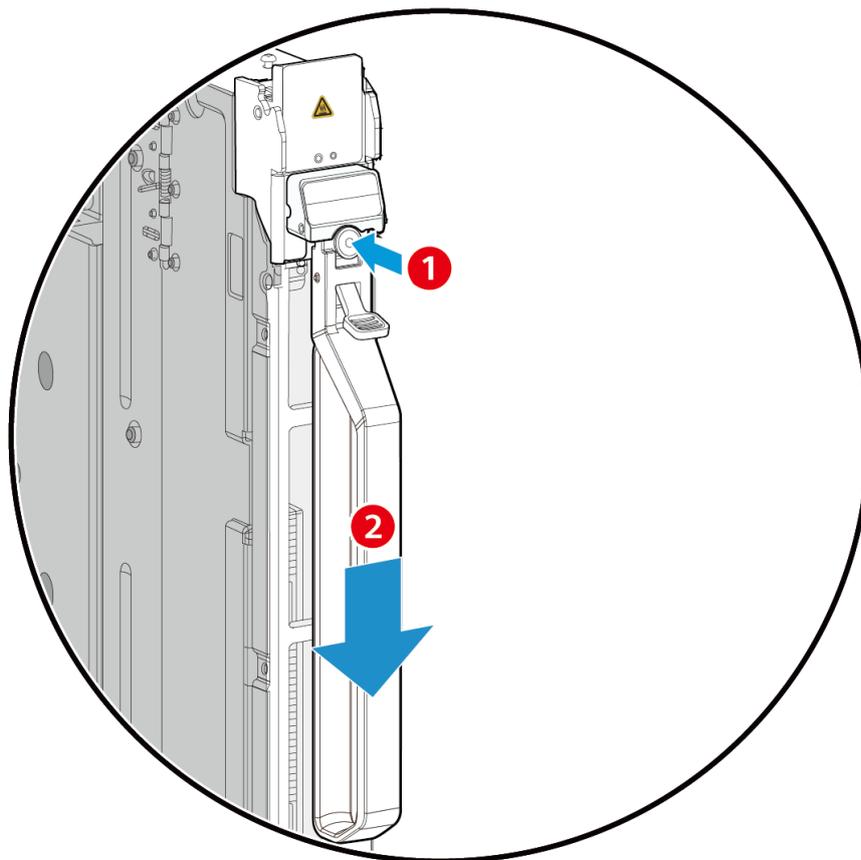
Do not use a tool other than the wrenches to install or remove an SFU.

Figure 6-4 Installing an SFU in the chassis



Step 7 Remove the wrenches. Press and hold down a round button on the SFU with one hand and hold one wrench with the other hand to remove it downwards. See [Figure 6-5](#). Remove the other wrench in the same way.

Figure 6-5 Removing wrenches from an SFU



----End

6.5 Installing Fan Modules

Context

Fan module slots of the CloudEngine 16800 are outside SFUs. Install SFUs before installing fan modules. The procedures and methods for installing fan modules on all the CloudEngine 16800 models are the same. The figure shows fan module installation on the CloudEngine 16808 as an example.

NOTICE

- Do not stand a fan module upright to avoid it falling over and causing damage or injury.
 - To prevent a fan module from falling down, hold both handles while removing it.
-

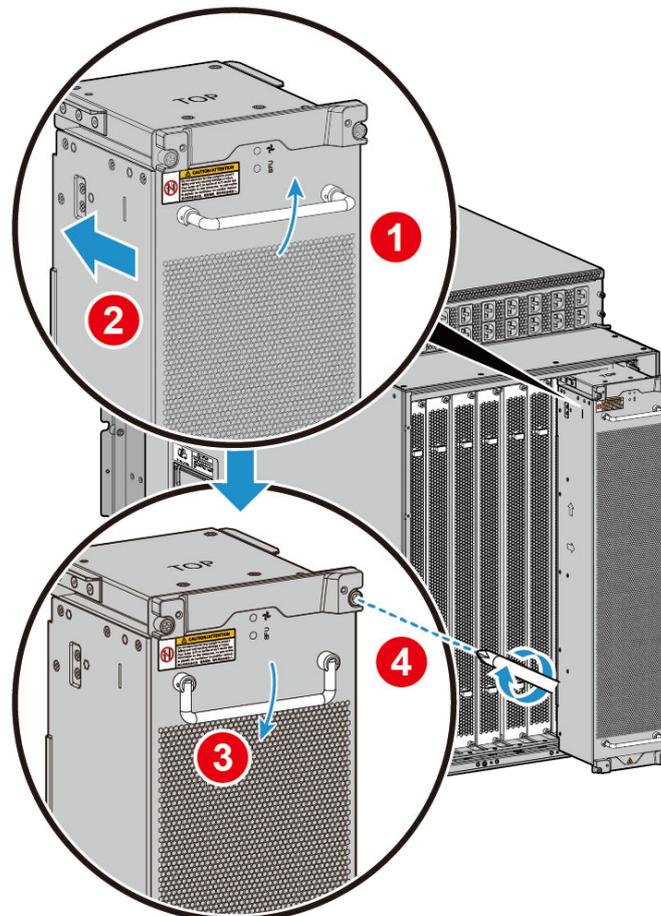
Tools

- ESD wrist strap or ESD gloves
- Phillips screwdriver

Procedure

- Step 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.
- Step 2** Take a fan module out from the ESD bag, and turn the fan module handles out. See callout 1 in [Figure 6-6](#).
- Step 3** Hold the handles with both hands and gently push the fan module into the slot along the guide rails until the fan module cannot move forward. See callout 2 in [Figure 6-6](#).
- Step 4** Fold the handles. See callout 3 in [Figure 6-6](#).
- Step 5** Tighten the captive screws on the fan module. See callout 4 in [Figure 6-6](#). Tighten the captive screws with a torque of 0.54 N m.

Figure 6-6 Installing a fan module on a device



----End

6.6 Installing MPUs and LPUs

Context

MPUs and LPUs of the CloudEngine 16800 are installed in different slots, but their installation methods are similar. This section uses an LPU as an example to describe the installation procedure of MPUs and LPUs. The procedures and methods for installing LPUs are the same on all the CloudEngine 16800 models. The following figure shows LPU installation on the CloudEngine 16808.

NOTICE

- Cover all the vacant slots with filler panels to ensure good electromagnetic shielding, heat dissipation, and dustproof performance of the device.
- Before installing a card, ensure that the device and card are not damped, and that the backplane and card connectors are not damaged or have foreign objects.
- When installing a card, ensure that ejector levers of the card are at the bottom to avoid incorrect card installation. Incorrect card installation will damage the connector at the rear of the card.
- When installing a card, gently push the card along the guide rails, and be careful not to crash the card connector. Distorted card connector will cause pins on the backplane connector to bend.
- If the connector of a card has collided with the slot or other objects, ask Huawei professionals whether the card can still be installed. Installing a card with distorted connector may cause damage to the device.
- For the CloudEngine 16816, do not install an MPU in an LPU slot or install an LPU in an MPU slot.

Tools

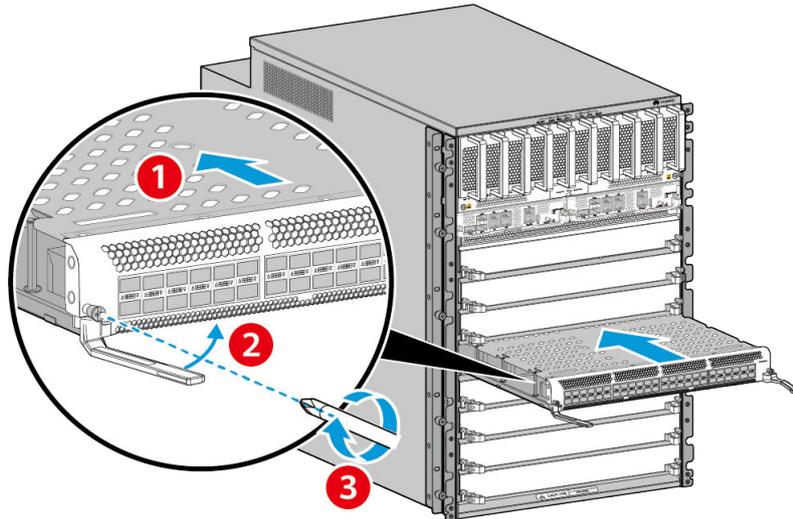
- ESD wrist strap or ESD gloves
- Phillips screwdriver

Procedure

- Step 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.
- Step 2** (Optional) If the slot where the LPU will be installed has a filler panel, remove the filler panel first.
- Step 3** Take an LPU out from the ESD bag and verify that the captive screws on the LPU panel are loosened. Rotate the ejector levers of the LPU 45 degrees outward. With one hand supporting the LPU bottom and the other hand grasping the LPU panel, slowly slide the LPU into the slot along the guide rails, until the LPU cannot move forward. See callout 1 in [Figure 6-7](#).

- Step 4** Rotate the ejector levers inward and push them until they cannot move forward. See callout 2 in [Figure 6-7](#).
- Step 5** Use a Phillips screwdriver to tighten the captive screws on both ends of the LPU panel. See callout 3 in [Figure 6-7](#). Tighten the captive screws with a torque of 1.18 N·m.

Figure 6-7 Installing a card on the device



----End

6.7 Installing an Optical Module

NOTICE

- Huawei-certified optical modules are strongly recommended because non-Huawei-certified optical modules cannot ensure transmission reliability and may affect service stability.
- Wear an ESD wrist strap or ESD gloves before installing optical modules.
- Install dust-proof caps on optical ports without optical modules.
- Do not insert an optical module reversely. If an optical module cannot be completely inserted into an optical port, do not force it into the port. Turn the optical module over and try again.

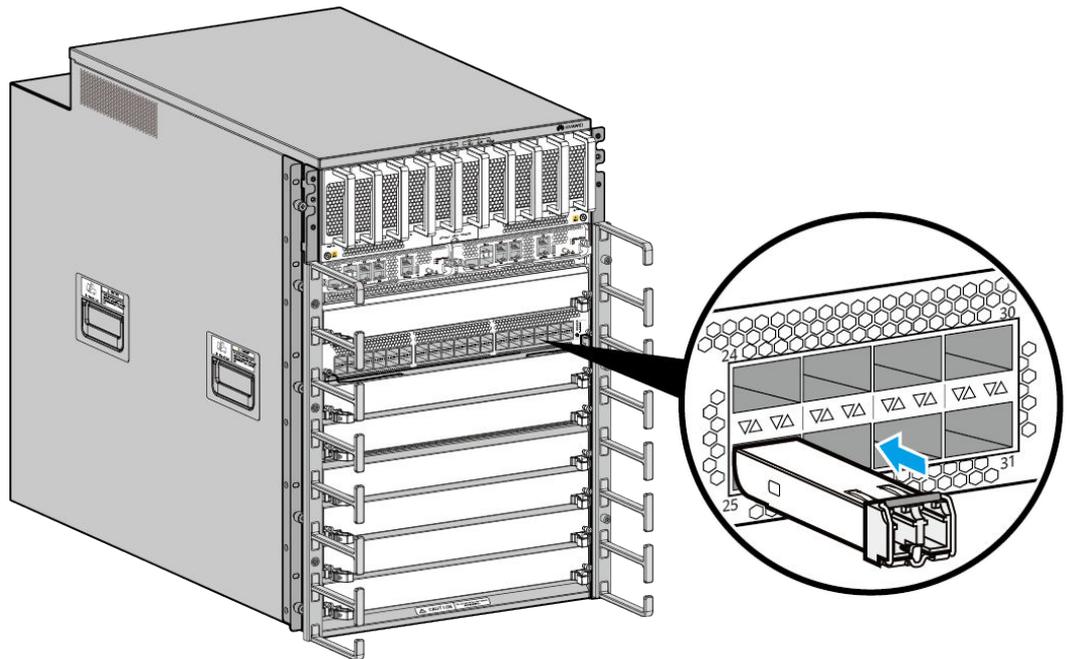
Tools

- ESD wrist strap or ESD gloves
- Dust caps
- (Optional) Optical port dust plug

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. Insert the optical module into the optical port until the optical module is secured in the optical port.

Figure 6-8 Installing an optical module



Follow-up Procedure

If the optical module does not work normally, contact the equipment supplier for technical support.

6.8 (Optional) Installing a Chassis Door

Context

Chassis doors of the CloudEngine 16800 are optional. The cable management frames matching chassis doors have rubber components. A chassis door is installed at the front side of a chassis to shield electromagnetic noise. The procedures and methods for installing chassis doors are the same for all the CloudEngine 16800 models. The following figures show chassis door installation on the CloudEngine 16808.

The chassis door can be installed after cables are connected.

 NOTE

- Components of the chassis door include dedicated cable management frames. When installing the chassis door components, you do not need to install the cable management frames that are delivered with the chassis.
- The chassis door and cabinet door cannot be installed together.

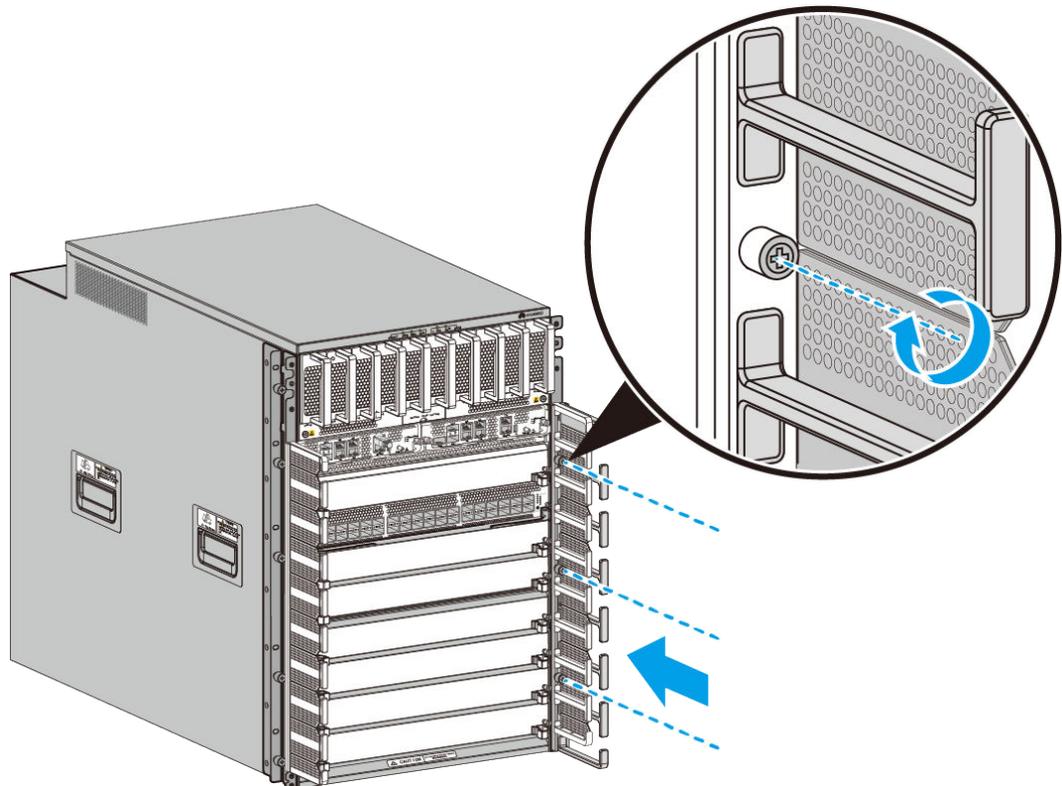
Tools and Accessories

- ESD wrist strap or ESD gloves
- Phillips screwdriver

Procedure

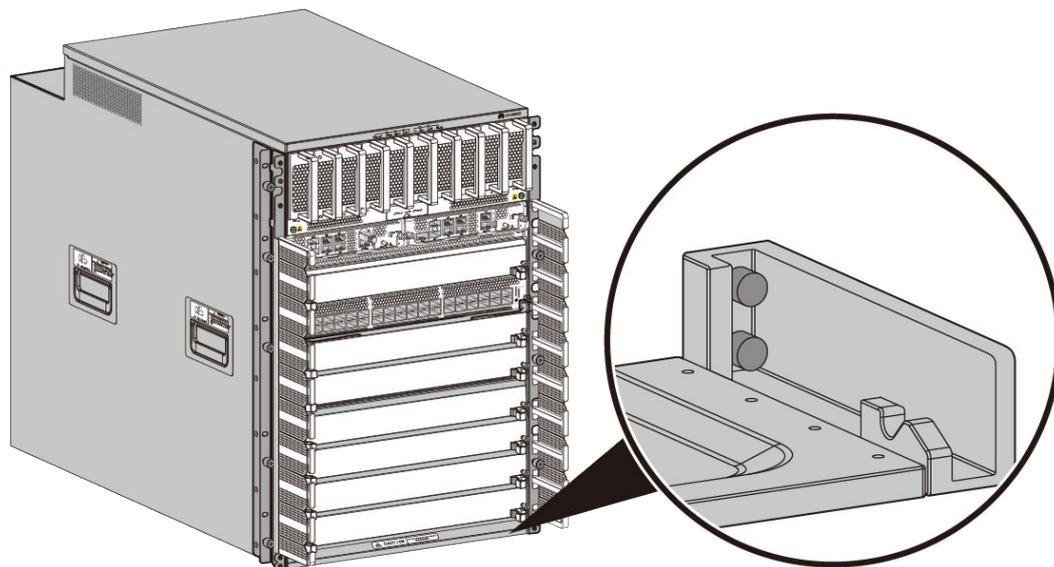
- Step 1** Wear an ESD wrist strap or ESD gloves. When wearing an ESD wrist strap, ensure that the ESD wrist strap is in close contact with your wrist, and insert the other end into the ESD jack of the device or cabinet/rack.
- Step 2** Install cable management frames on the device. Insert the positioning pins of a cable management frame into mounting holes on the device, insert the cable management frame horizontally, and tighten the captive screws on the cable management frame with a torque of 0.54 N m.

Figure 6-9 Installing cable management frames on the device



- Step 3** Install upper and lower enclosure frames on the device. Align the upper and lower enclosure frames with mounting holes on the device, insert the upper and lower enclosure frames horizontally, and tighten the captive screws on the upper and lower enclosure frames with a torque of 0.54 N m.

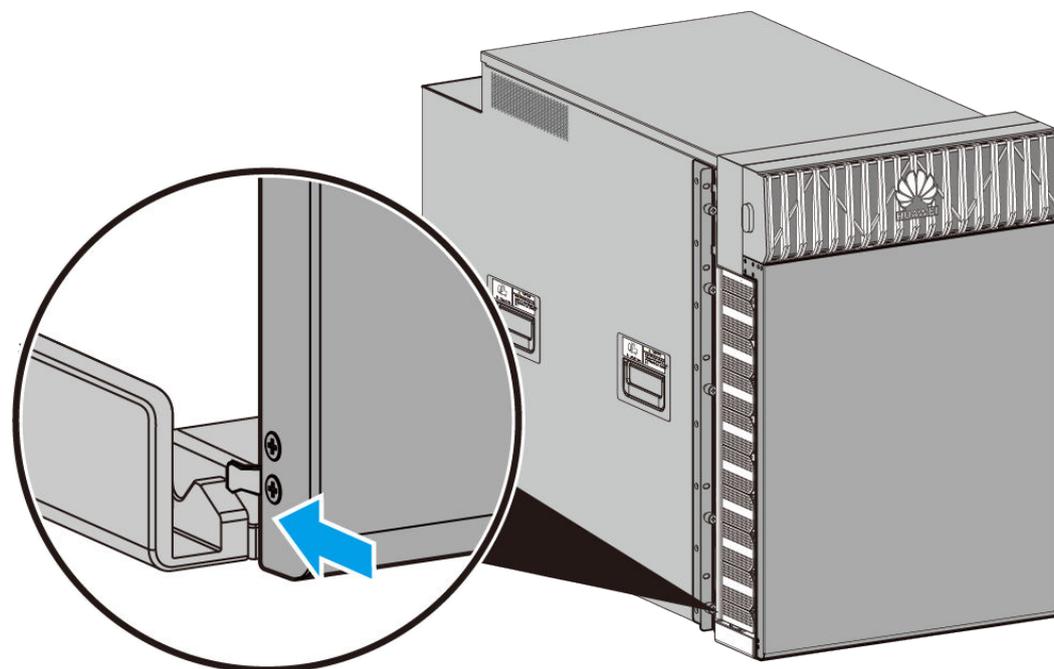
Figure 6-10 Installing the upper and lower enclosure frames on the device



Step 4 Install a chassis door on the device.

1. Align the buckles at the bottom of the chassis door with the lower enclosure frame and insert the buckles.
2. Push the chassis door to the upper enclosure frame until you hear a click indicating that hooks of the chassis door clasp in the upper enclosure frame.

Figure 6-11 Installing a chassis door



----End

7 Connecting a Switch

- [7.1 Connecting the Switch](#)
- [7.2 Connecting the Ground Cable](#)
- [7.3 Connecting AC Power Cables](#)
- [7.4 Connecting DC Power Cables](#)
- [7.5 Connecting High-Voltage DC Power Cables](#)
- [7.6 Connecting Signal Cables](#)

7.1 Connecting the Switch

7.1.1 AC & High-Voltage DC Power Cable Routing Planning of the CloudEngine 16804

Context

To ensure that power cables are connected in order, you are advised to plan power cable routing in advance.

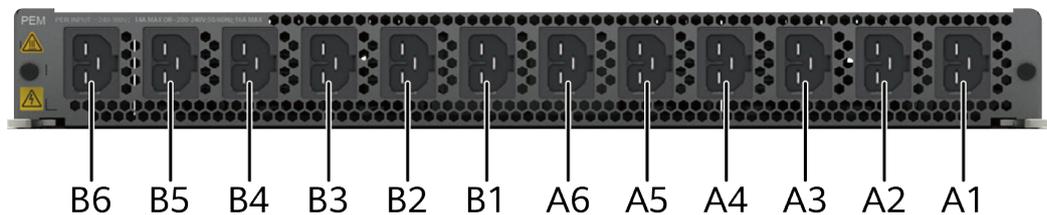
 NOTE

- If only one power source is available in the equipment room, connect all power modules to power source A (terminal blocks or power sockets A1 to A n) or power source B (terminal blocks or power sockets B1 to B n).
- When both power sources A and B are available:
 - In AC or high-voltage DC scenarios, power source A is used by default. If power source A is faulty, the system automatically switches to power source B.
 - In DC scenarios, if the two power sources have different voltages, the power source with a higher voltage provides a higher current.
 - If AC & high-voltage DC inputs are available to both power sources A and B, the 220 V AC input is used by default. If the 220 V AC input is faulty, the system automatically switches to the high-voltage DC input.
- Requirements for the power distribution of a customer's cabinet: The output power of power sources A and B must be greater than the maximum input power of the device.
- The cabinet supports overhead cabling and underfloor cabling, and the cabling scenarios of third-party cabinets need to be evaluated separately.

Mapping Between Power Sockets of the PEM and Power Modules

One power module at the front of the chassis corresponds to two power sockets. For example, the power module in PM1 slot corresponds to power sockets A1 and B1.

Figure 7-1 Power sockets of the AC & high-voltage DC PEM on the CloudEngine 16804

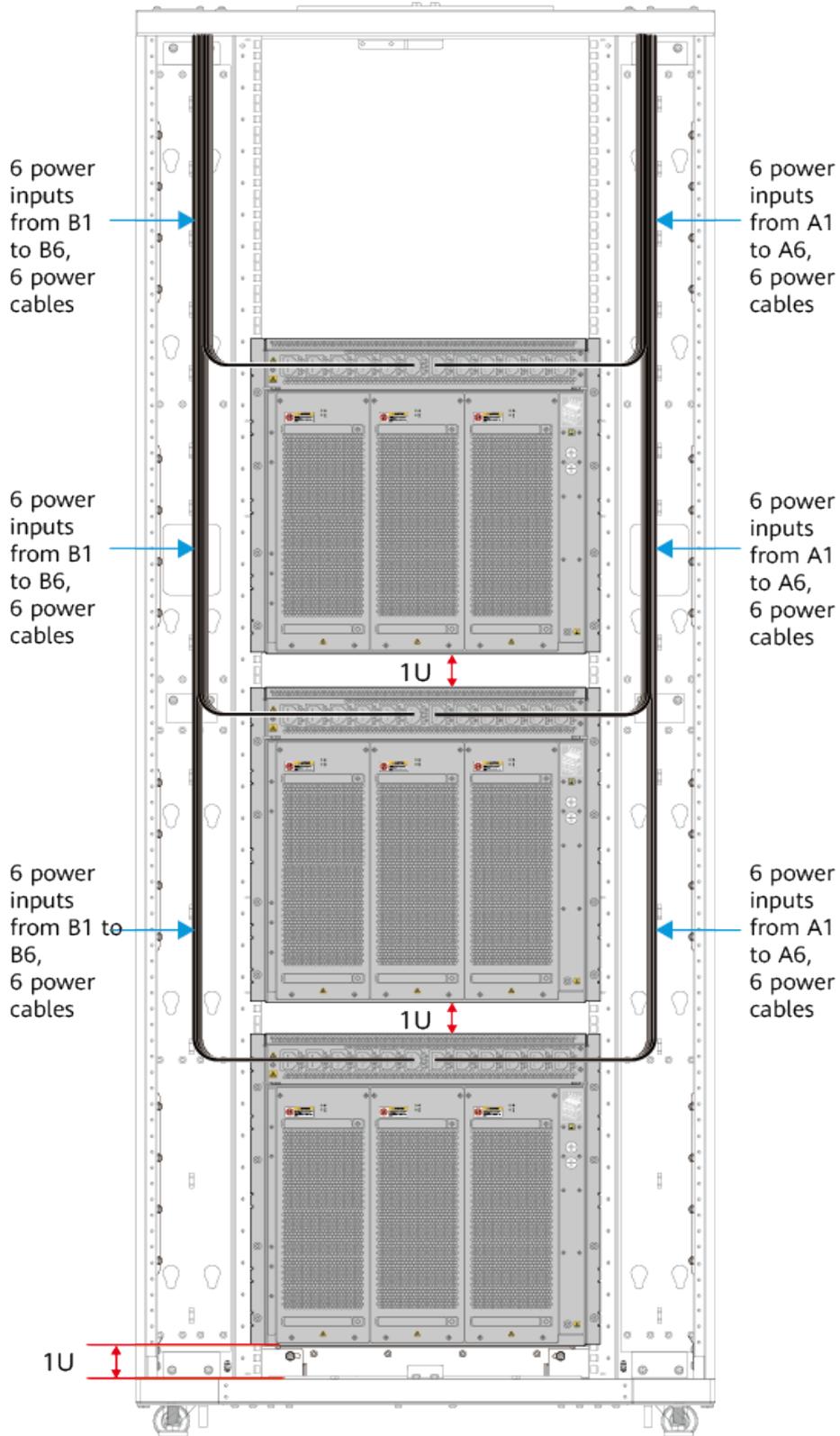


Power Cable Routing Planning

To facilitate power cable routing, reserve at least 1U space on the top of the CloudEngine 16804 AC & high-voltage DC chassis.

On the CloudEngine 16804, six power cables from A1 to A6 are routed from the right side of the cabinet or rack (when the installation personnel is opposite to the rear of the cabinet or rack, as mentioned below), and six power cables from B1 to B6 are routed from the left side of the cabinet or rack, as shown in [Figure 7-2](#).

Figure 7-2 Routing of AC & high-voltage DC power cables of the CloudEngine 16804



7.1.2 DC Power Cable Routing Planning of a CloudEngine 16804

Context

To ensure that power cables are connected in order, you are advised to plan power cable routing in advance.

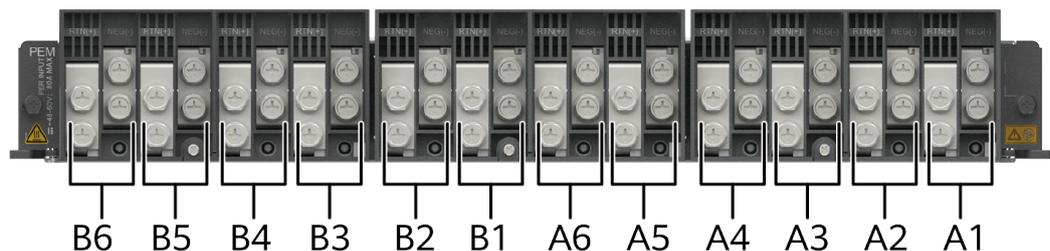
NOTE

- If only one power source is available in the equipment room, connect all power modules to power source A (terminal blocks or power sockets A1 to A n) or power source B (terminal blocks or power sockets B1 to B n).
- When both power sources A and B are available:
 - In AC or high-voltage DC scenarios, power source A is used by default. If power source A is faulty, the system automatically switches to power source B.
 - In DC scenarios, if the two power sources have different voltages, the power source with a higher voltage provides a higher current.
 - If AC & high-voltage DC inputs are available to both power sources A and B, the 220 V AC input is used by default. If the 220 V AC input is faulty, the system automatically switches to the high-voltage DC input.
- Requirements for the power distribution of a customer's cabinet: The output power of power sources A and B must be greater than the maximum input power of the device.
- The cabinet supports overhead cabling and underfloor cabling, and the cabling scenarios of third-party cabinets need to be evaluated separately.

Mapping Between Terminal Blocks of the PEM and Power Modules

One power module at the front of the chassis corresponds to two terminal blocks. For example, the power module in PM1 slot corresponds to terminal blocks A1 and B1.

Figure 7-3 Terminal blocks of the DC PEM on the CloudEngine 16804

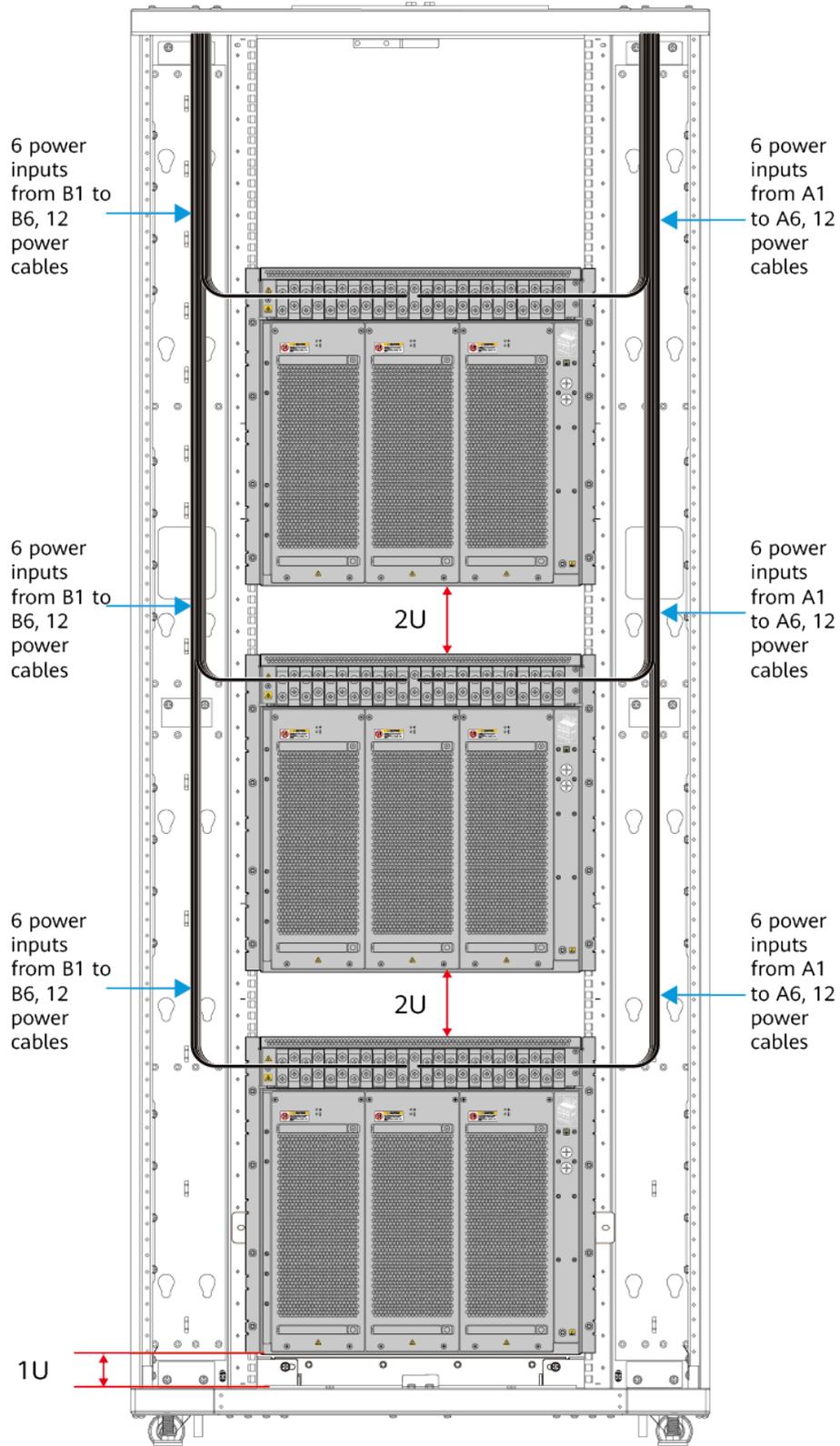


Power Cable Routing Planning

To facilitate power cable routing, reserve at least 2U space on the top of the CloudEngine 16804 DC chassis.

On the CloudEngine 16804, 12 power cables from A1 to A6 are routed from the right side of the cabinet or rack (when the installation personnel is opposite to the rear of the cabinet or rack, as mentioned below), and 12 power cables from B1 to B6 are routed from the left side of the cabinet or rack, as shown in [Figure 7-4](#).

Figure 7-4 Routing of DC power cables of the CloudEngine 16804



7.1.3 AC & High-Voltage DC Power Cable Routing Planning of the CloudEngine 16808

Context

To ensure that power cables are connected in order, you are advised to plan power cable routing in advance.

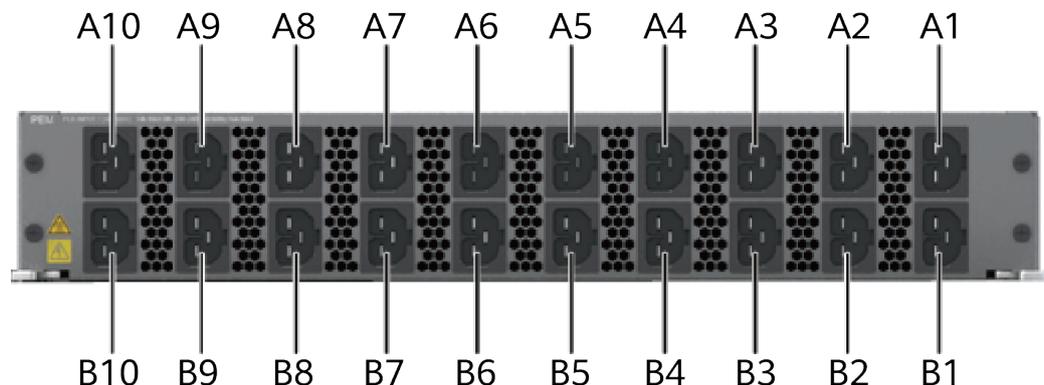
NOTE

- If only one power source is available in the equipment room, connect all power modules to power source A (terminal blocks or power sockets A1 to A*n*) or power source B (terminal blocks or power sockets B1 to B*n*).
- When both power sources A and B are available:
 - In AC or high-voltage DC scenarios, power source A is used by default. If power source A is faulty, the system automatically switches to power source B.
 - In DC scenarios, if the two power sources have different voltages, the power source with a higher voltage provides a higher current.
 - If AC & high-voltage DC inputs are available to both power sources A and B, the 220 V AC input is used by default. If the 220 V AC input is faulty, the system automatically switches to the high-voltage DC input.
- Requirements for the power distribution of a customer's cabinet: The output power of power sources A and B must be greater than the maximum input power of the device.
- The cabinet supports overhead cabling and underfloor cabling, and the cabling scenarios of third-party cabinets need to be evaluated separately.

Mapping Between Power Sockets of the PEM and Power Modules

One power module at the front of the chassis corresponds to two power sockets. For example, the power module in PM1 slot corresponds to power sockets A1 and B1.

Figure 7-5 Power sockets of the AC & high-voltage DC PEM on the CloudEngine 16808

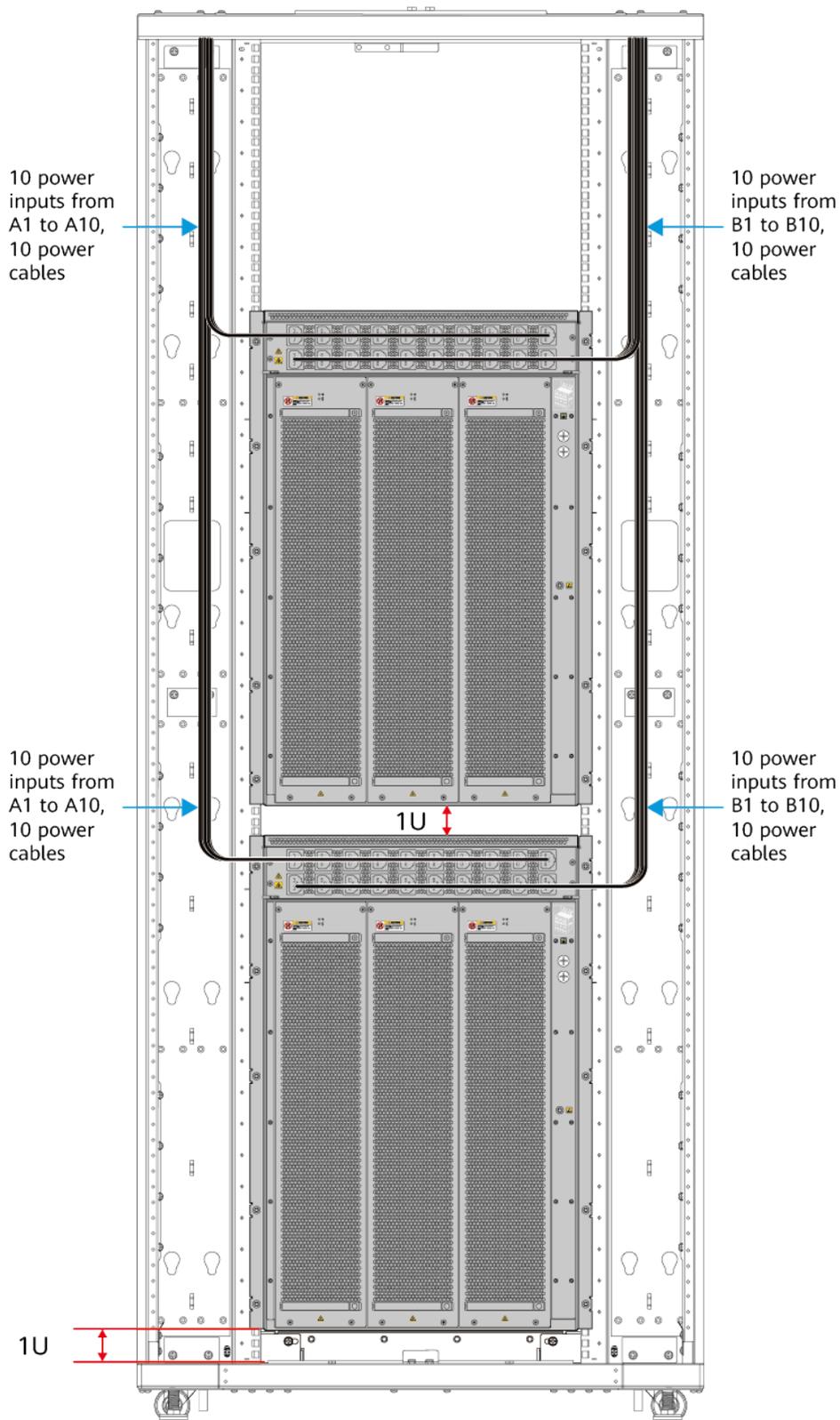


Power Cable Routing Planning

To facilitate power cable routing, reserve at least 1U space on the top of the CloudEngine 16808 AC & high-voltage DC chassis.

On the CloudEngine 16808, 10 power cables connected to the PEM's power sockets A1 to A10 are routed from the left side of the cabinet or rack and 10 power cables connected to the PEM's power sockets B1 to B10 are routed from the right side of the cabinet or rack (when facing the rear of the cabinet or rack), as shown in [Figure 7-6](#).

Figure 7-6 Routing of AC & high-voltage DC power cables of the CloudEngine 16808



7.1.4 DC Power Cable Routing Planning of a CloudEngine 16808

Context

To ensure that power cables are connected in order, you are advised to plan power cable routing in advance.

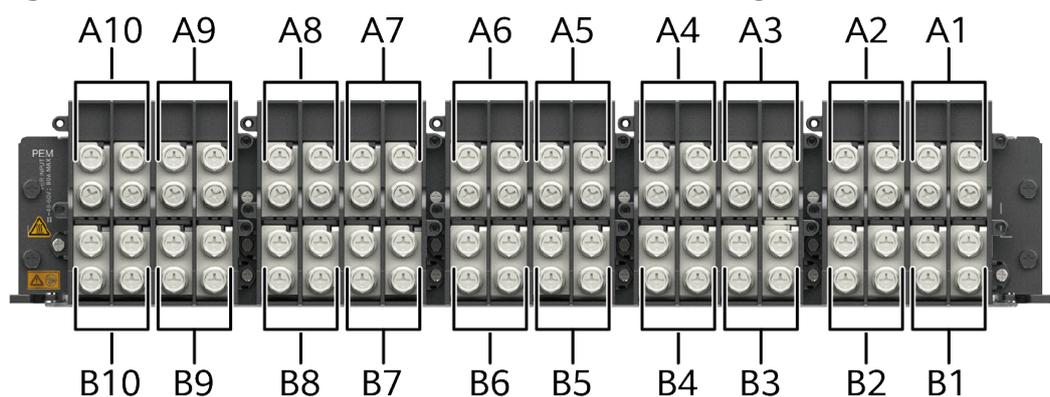
NOTE

- If only one power source is available in the equipment room, connect all power modules to power source A (terminal blocks or power sockets A1 to A*n*) or power source B (terminal blocks or power sockets B1 to B*n*).
- When both power sources A and B are available:
 - In AC or high-voltage DC scenarios, power source A is used by default. If power source A is faulty, the system automatically switches to power source B.
 - In DC scenarios, if the two power sources have different voltages, the power source with a higher voltage provides a higher current.
 - If AC & high-voltage DC inputs are available to both power sources A and B, the 220 V AC input is used by default. If the 220 V AC input is faulty, the system automatically switches to the high-voltage DC input.
- Requirements for the power distribution of a customer's cabinet: The output power of power sources A and B must be greater than the maximum input power of the device.
- The cabinet supports overhead cabling and underfloor cabling, and the cabling scenarios of third-party cabinets need to be evaluated separately.

Mapping Between Terminal Blocks of the PEM and Power Modules

One power module at the front of the chassis corresponds to two terminal blocks. For example, the power module in PM1 slot corresponds to terminal blocks A1 and B1.

Figure 7-7 Terminal blocks of the DC PEM on the CloudEngine 16808



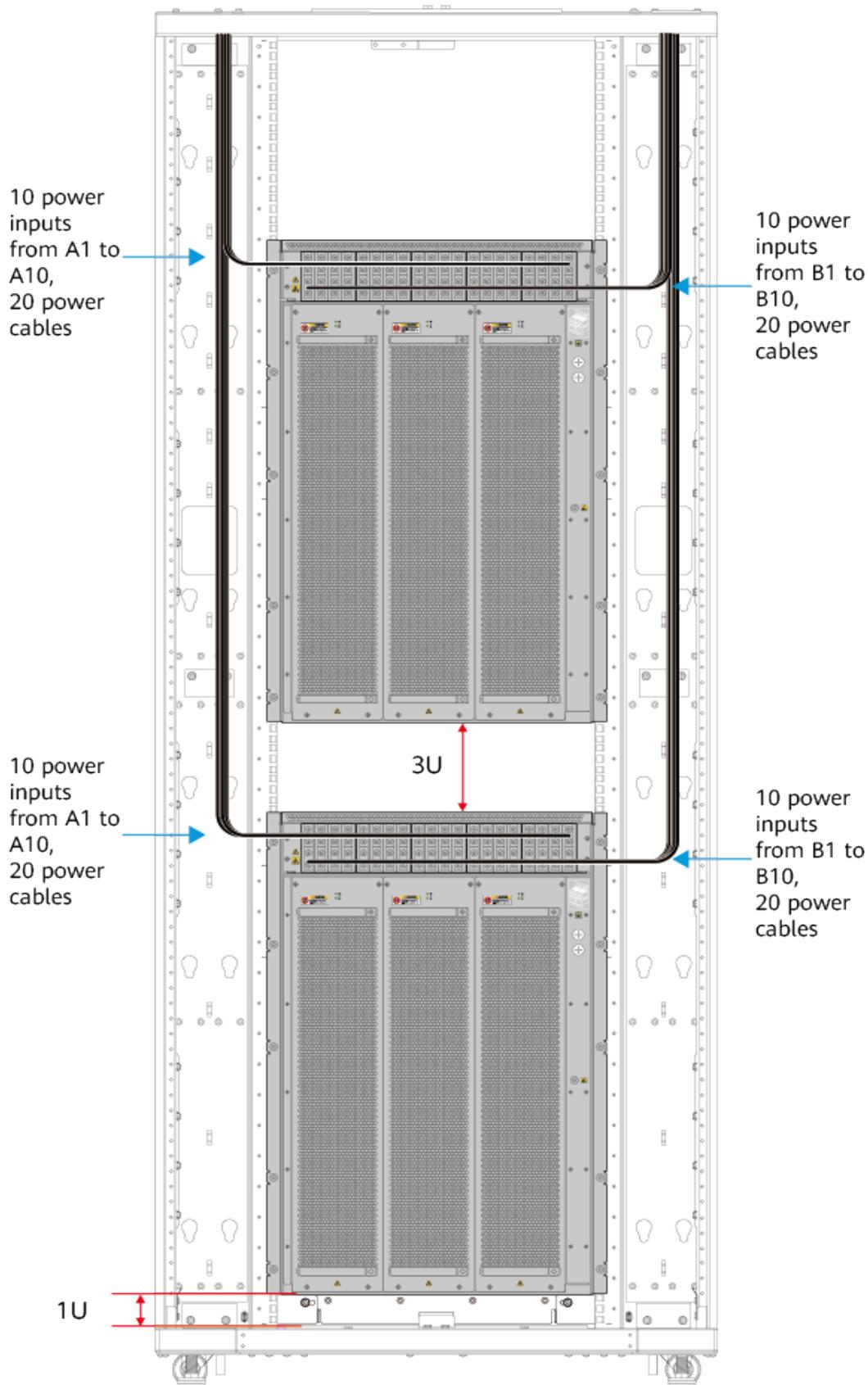
Power Cable Routing Planning

To facilitate power cable routing, reserve at least 3U space on the top of the CloudEngine 16808 DC chassis.

On the CloudEngine 16808, 20 power cables connected to the PEM's terminal blocks A1 to A10 are routed from the left side of the cabinet or rack and ten

power cables connected to the PEM's terminal blocks B1 to B10 are routed from the right side of the cabinet or rack (when facing the rear of the cabinet or rack), as shown in [Figure 7-8](#).

Figure 7-8 Routing of DC power cables of the CloudEngine 16808



7.1.5 AC & High-Voltage DC Power Cable Routing Planning of a CloudEngine 16816

Context

To ensure that power cables are connected in order, you are advised to plan power cable routing in advance.

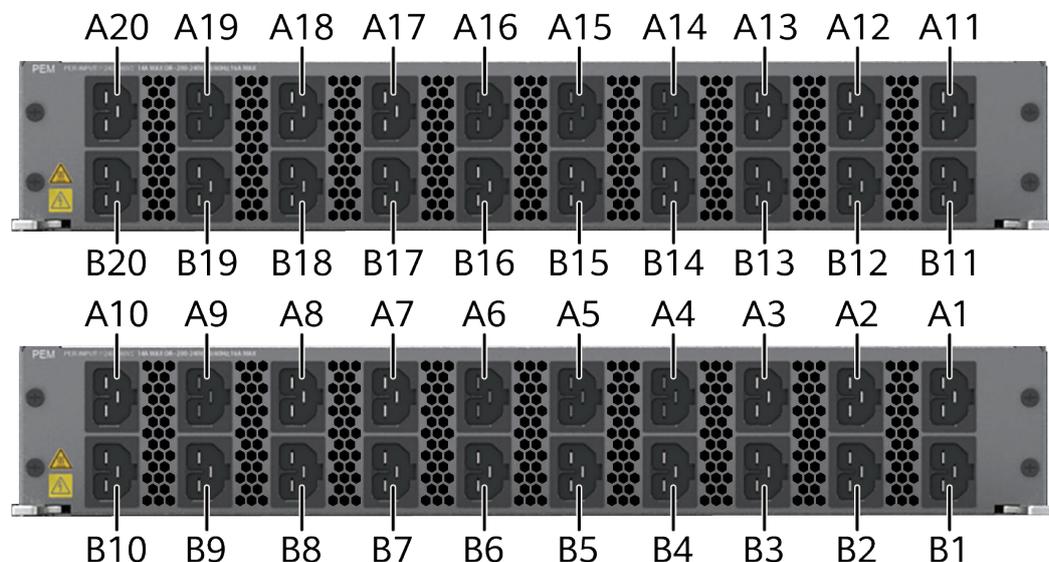
NOTE

- If only one power source is available in the equipment room, connect all power modules to power source A (terminal blocks or power sockets A1 to A*n*) or power source B (terminal blocks or power sockets B1 to B*n*).
- When both power sources A and B are available:
 - In AC or high-voltage DC scenarios, power source A is used by default. If power source A is faulty, the system automatically switches to power source B.
 - In DC scenarios, if the two power sources have different voltages, the power source with a higher voltage provides a higher current.
 - If AC & high-voltage DC inputs are available to both power sources A and B, the 220 V AC input is used by default. If the 220 V AC input is faulty, the system automatically switches to the high-voltage DC input.
- Requirements for the power distribution of a customer's cabinet: The output power of power sources A and B must be greater than the maximum input power of the device.
- The cabinet supports overhead cabling and underfloor cabling, and the cabling scenarios of third-party cabinets need to be evaluated separately.

Mapping Between Power Sockets of the PEM and Power Modules

One power module at the front of the chassis corresponds to two power sockets. For example, the power module in PM1 slot corresponds to power sockets A1 and B1.

Figure 7-9 Power sockets of the AC and high-voltage DC PEM on the CloudEngine 16816

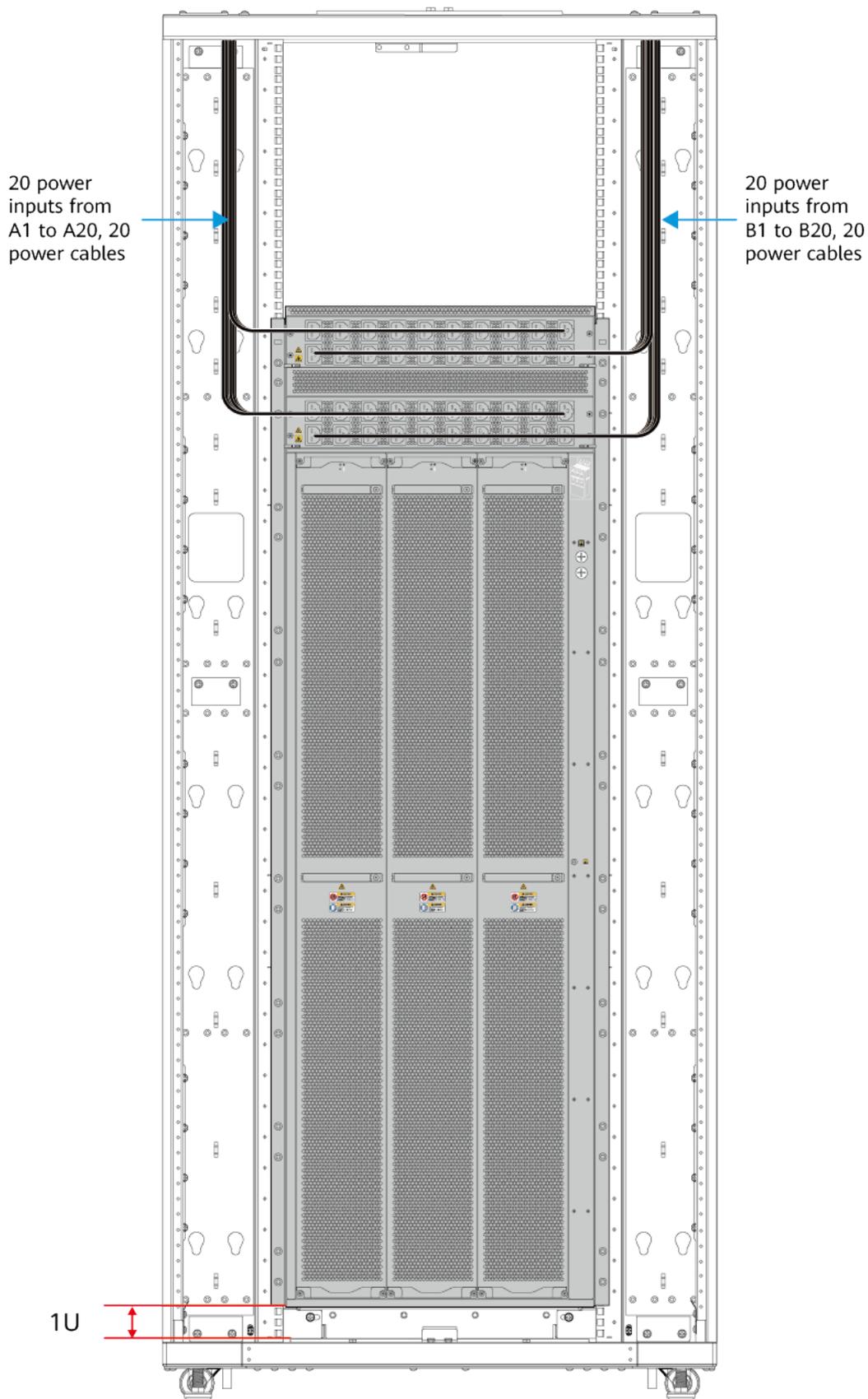


Power Cable Routing Planning

To facilitate power cable routing, reserve at least 1U space on the top of the CloudEngine 16816 AC & high-voltage DC chassis.

On the CloudEngine 16816, 20 power cables from A1 to A20 are routed from the left side of the cabinet or rack, and 20 power cables from B1 to B20 are routed from the right side of the cabinet or rack, as shown in [Figure 7-9](#).

Figure 7-10 Routing of AC or high-voltage DC power cables of the CloudEngine 16816



7.1.6 DC Power Cable Routing Planning of a CloudEngine 16816

Context

To ensure that power cables are connected in order, you are advised to plan power cable routing in advance.

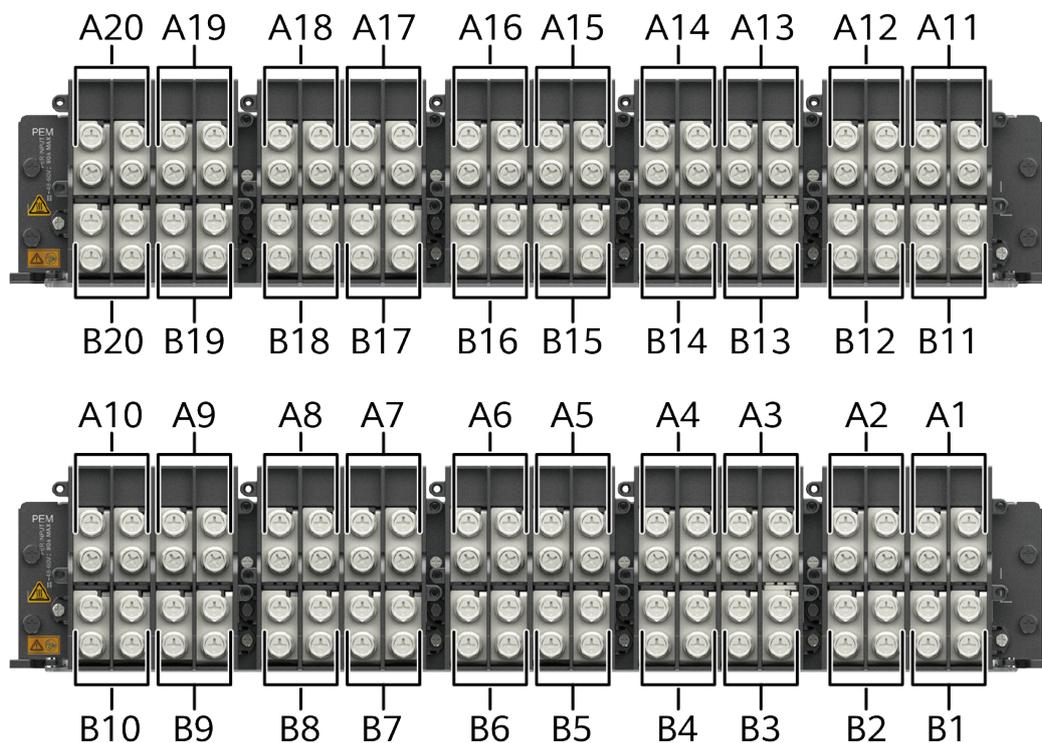
NOTE

- If only one power source is available in the equipment room, connect all power modules to power source A (terminal blocks or power sockets A1 to A*n*) or power source B (terminal blocks or power sockets B1 to B*n*).
- When both power sources A and B are available:
 - In AC or high-voltage DC scenarios, power source A is used by default. If power source A is faulty, the system automatically switches to power source B.
 - In DC scenarios, if the two power sources have different voltages, the power source with a higher voltage provides a higher current.
 - If AC & high-voltage DC inputs are available to both power sources A and B, the 220 V AC input is used by default. If the 220 V AC input is faulty, the system automatically switches to the high-voltage DC input.
- Requirements for the power distribution of a customer's cabinet: The output power of power sources A and B must be greater than the maximum input power of the device.
- The cabinet supports overhead cabling and underfloor cabling, and the cabling scenarios of third-party cabinets need to be evaluated separately.

Mapping Between Terminal Blocks of the PEM and Power Modules

One power module at the front of the chassis corresponds to two terminal blocks. For example, the power module in PM1 slot corresponds to terminal blocks A1 and B1.

Figure 7-11 Terminal blocks of the DC PEM on the CloudEngine 16816

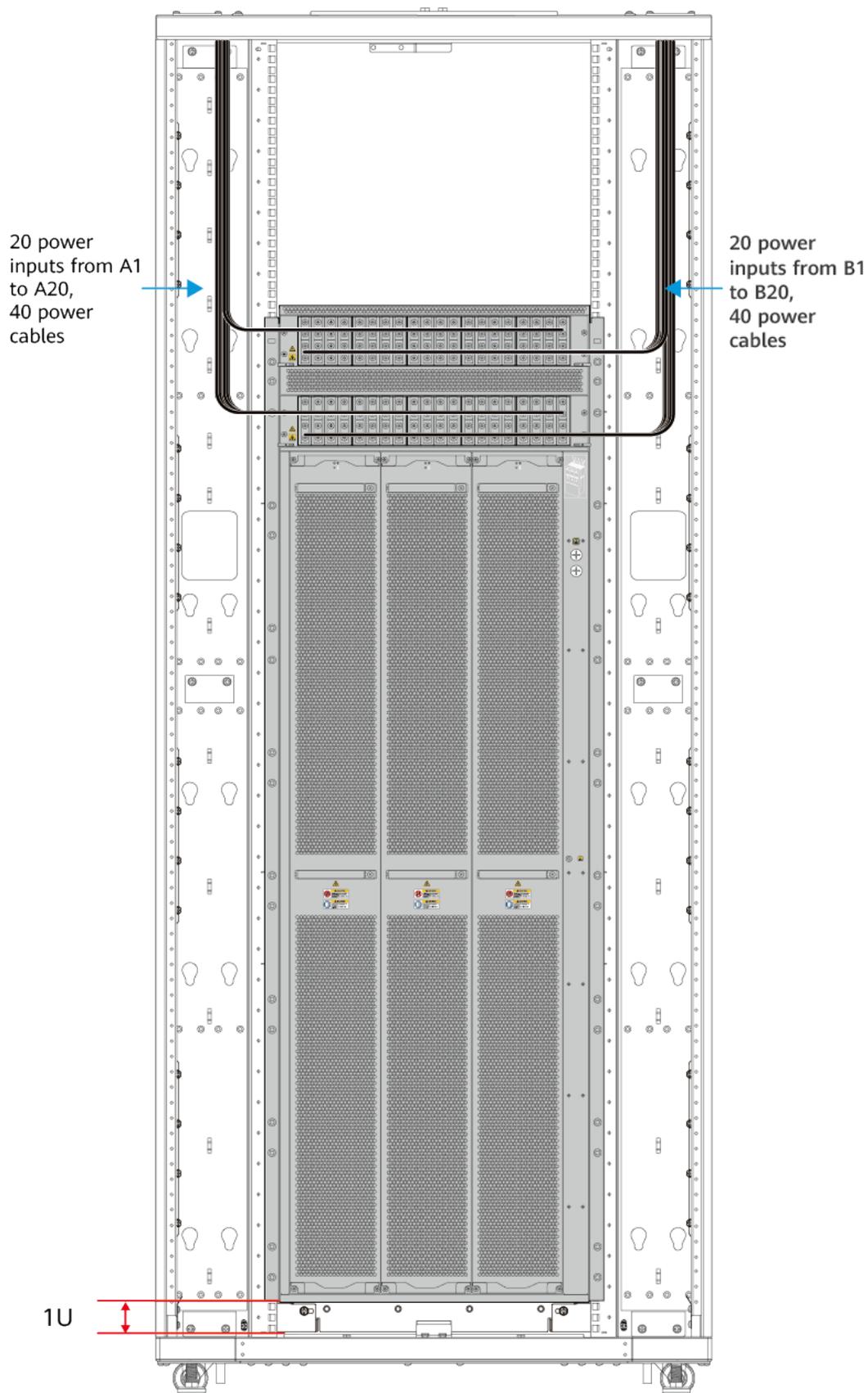


Power Cable Routing Planning

To facilitate power cable routing, reserve at least 3U space on the top of the CloudEngine 16816 DC chassis.

On the CloudEngine 16816, 40 power cables from A1 to A20 are routed from the left side of the cabinet or rack, and 40 power cables from B1 to B20 are routed from the right side of the cabinet or rack, as shown in [Figure 7-11](#).

Figure 7-12 Routing of DC power cables of the CloudEngine 16816



7.2 Connecting the Ground Cable

Context

The ground cable of a device can be connected in either of the following ways:

- If the device is installed close to a ground bar in the equipment room, connect the ground cable to this ground bar.
- If the device is installed far from available ground bars, connect the ground cable to the equipotential terminal or ground point on a cabinet or rack. (Ensure that the cabinet or rack is reliably grounded.)

The following procedure connects the ground cable to the ground point on a cabinet.

NOTE

- Use the ground cable delivered with the device.
- The ground point of a CloudEngine 16800 is located at its rear and supports a ground cable with a two-hole OT terminal.
- When using a ground cable with a one-hole OT terminal, route the ground cable properly to prevent it from hindering installation and removal of fan modules.

Tools

- ESD wrist strap or ESD gloves
- Phillips screwdriver
- Multimeter

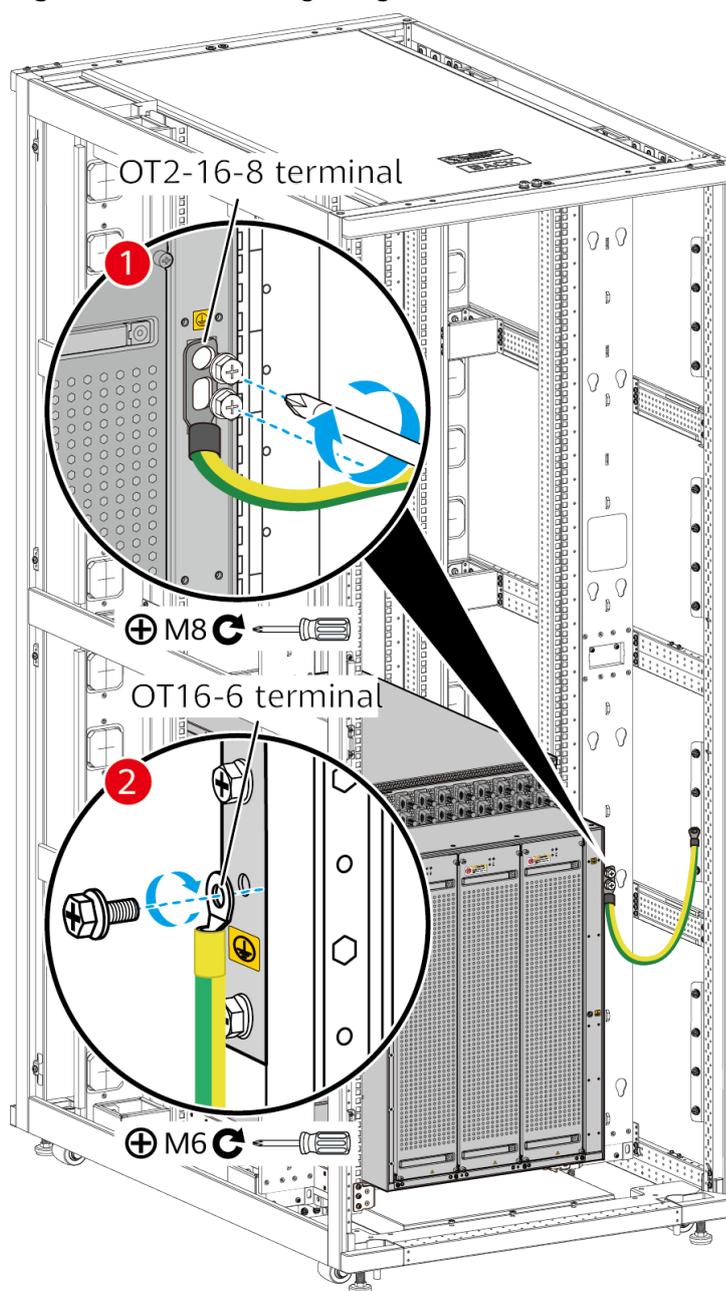
NOTE

The procedures and methods for connecting ground cables of all the CloudEngine 16800 models are the same. The following figure shows the ground cable connection for a CloudEngine 16808 as an example.

Procedure

- Step 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.
- Step 2** Connect the two-hole OT terminal (OT2-16-8 terminal) of the ground cable to the ground point of the device. See callout 1 in [Figure 7-13](#). Tighten the M8 screws with a torque of 12 N m.
- Step 3** Connect the one-hole OT terminal (OT16-6 terminal) of the ground cable to the ground point on the cabinet/rack. See callout 2 in [Figure 7-13](#). Tighten the M6 screws with a torque of 4.8 N m.

Figure 7-13 Connecting the ground cable



----End

Follow-up Procedure

After the ground cable is connected, verify that the electrical resistance between the ground terminal and ground point is no more than 0.1 ohm on a multimeter.

7.3 Connecting AC Power Cables

Context

AC power cables can be connected directly to an EoR or to a PDU. Select AC power cables based on the types of power sockets used in your equipment room. Huawei offers PDU power cables and country-specific power cables to suit types of power sockets.

NOTE

The AC&240 V/380 V high-voltage DC chassis requires Huawei-customized high-voltage DC connectors. Only AC&240 V/380 V high-voltage DC cables delivered by Huawei can be used.

DANGER

Do not install AC power cables while the power is on.

NOTICE

- Before connecting AC power cables, make sure that the power switches of the external power supply system are all in OFF position.
 - The connector types and maximum input current of AC power cables used on a device must meet requirements of the device. Use the power cables delivered with the device.
 - Each device must have at least two independent power inputs for power redundancy. Do not connect all the AC power cables of a device to the PDUs controlled by the same circuit breaker.
-

CAUTION

UK-specific cables are not recommended for cabinets that house AC and high-voltage DC chassis. This is because the through-current capability of the UK-specific cables is just 13 A, failing to meet the 16-A requirement of 3000 W AC power modules.

NOTE

- If only one power source is available in the equipment room, connect all power modules to power source A (terminal blocks or power sockets A1 to An) or power source B (terminal blocks or power sockets B1 to Bn).
- In AC scenarios, if both power sources A and B are connected to power supplies, power source A is used by default. If power source A is faulty, power source B is used.
- Requirements for the power supply system of a customer's cabinet: The output power of two power sources must be greater than the maximum input power of the device.

Tools

- ESD wrist strap or ESD gloves
- Diagonal pliers

- Cable ties

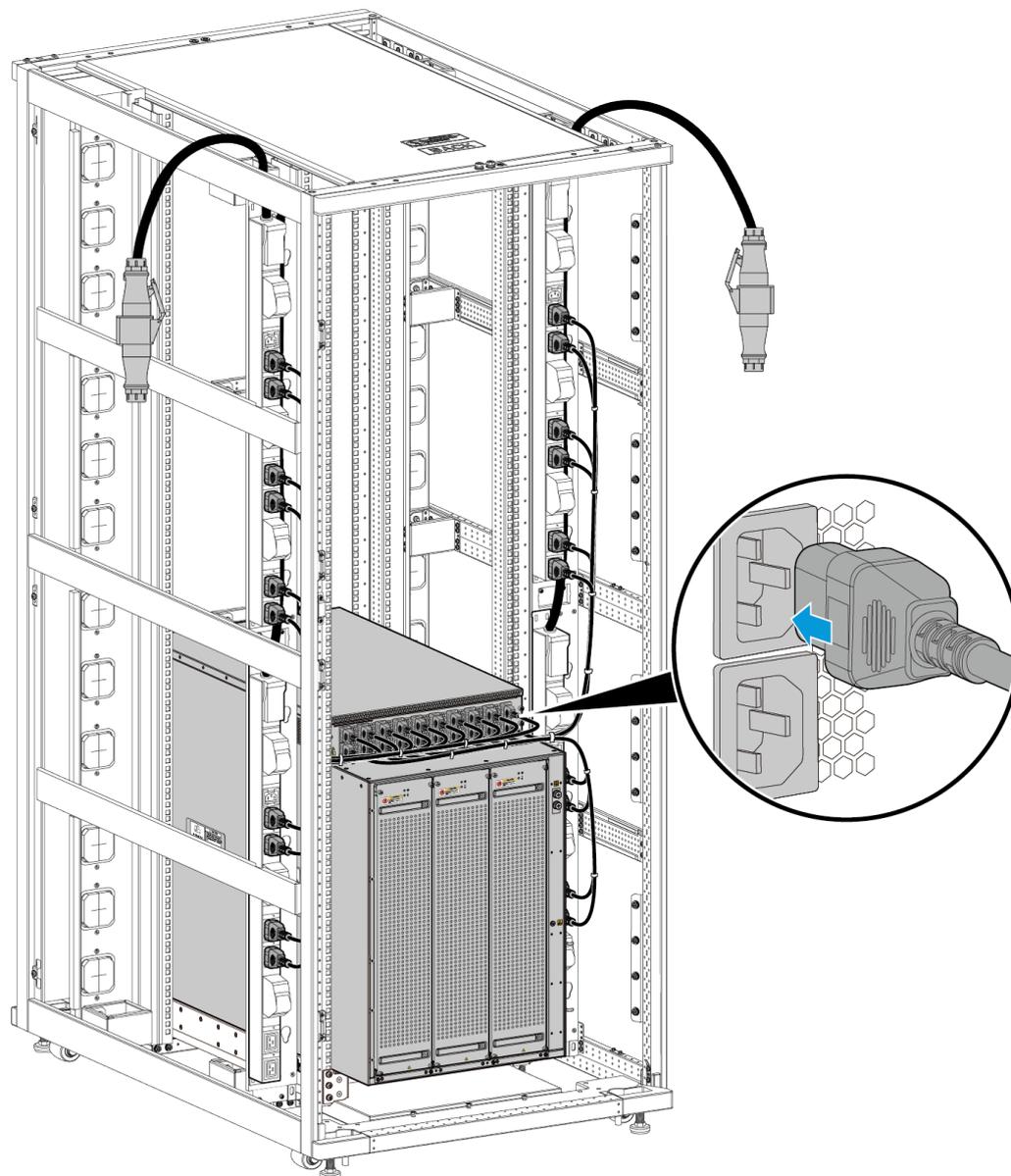
 NOTE

- The procedures and methods for connecting AC power cables of all the CloudEngine 16800 models are the same. The following figure shows the AC power cable connection for the CloudEngine 16808.
- If you use AC power cables delivered from Huawei, ensure that an AC power source is available within 2500 mm (cable distance) away from the device.
- It is recommended that you divide all cables in the cabinet into two equal bundles and route them from left and right sides of the cabinet respectively.
- Bundle AC power cables with appropriate stress. Ensure that power cables are not crossed or twisted.

Procedure

- Step 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.
- Step 2** Attach temporary labels to both ends of each AC power cable.
- Step 3** Connect the HVDC 3 straight female connector of the AC power cable to the power socket on the PEM corresponding to the power module, and connect the C20 straight male connector of the AC power cable to the PDU, as shown in [Figure 7-14](#).
- Step 4** After connecting all the AC power cables, bundle them from bottom to top with cable ties, at intervals of 250 mm. Fix the power cables on the rack and use diagonal pliers to cut off redundant cable ties.
- Step 5** Replace the temporary labels with formal labels.

Figure 7-14 Connecting AC power cables



----End

7.4 Connecting DC Power Cables

Context

DC power cables of a device include a -48 V power cable and an RTN ground cable. You need to cut the delivered DC power cables into appropriate lengths according to actual situations in your site and make DC power cables onsite.

 **DANGER**

Do not install DC power cables while the power is on.

NOTICE

- Before connecting DC power cables, make sure that the power switches of the external power supply system are all in OFF position.
- Connect power cables to terminal blocks of the power modules at the rear of the chassis.

 **CAUTION**

Use the JG2 90° bent terminals delivered with the device. To avoid short circuits and incorrect cable connections, customers are not advised to make JG2 90° bent terminals.

 **NOTE**

- If only one power source is available in the equipment room, connect all power modules to power source A (terminal blocks or power sockets A1 to An) or power source B (terminal blocks or power sockets B1 to Bn).
- In DC scenarios, when both power sources A and B are connected to power supplies, the circuit with a higher voltage provides a larger current if the voltages of the two power sources are different.
- Requirements for the power supply system of a customer's cabinet: The output power of two power sources must be greater than the maximum input power of the device.
- For the CloudEngine 16808 and CloudEngine 16816, to facilitate cable connections, connect terminal blocks on the upper row and lower row in sequence. Before removing power cables, loosen terminal blocks on the lower row and upper row in sequence.

Tools

- ESD wrist strap or ESD gloves
- Phillips screwdriver
- Diagonal pliers
- Cable ties

 **NOTE**

- The procedures and methods for connecting DC power cables of all the CloudEngine 16800 models are the same. The following figure shows the DC power cable connection for the CloudEngine 16808.
- It is recommended that you divide all cables in the cabinet into two equal bundles and route them from left and right sides of the cabinet respectively.
- Bundle DC power cables with appropriate stress. Ensure that power cables are not crossed or twisted.

Procedure

- Step 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.
- Step 2** Measure the distance that the power cables will go through, cut the DC power cables into an appropriate length accordingly, and make power cables.
- Step 3** Attach temporary labels to both ends of each DC power cable.
- Step 4** Use a Phillips screwdriver to loosen the screw on the plastic cover of the terminal block unit, and then open the cover. See callout 1 in [Figure 7-15](#).
- Step 5** Identify the positive (black/red) and negative (blue) power cables, and connect them to the RTN (+) and (NEG-) terminals respectively. See callout 2 in [Figure 7-15](#). Connect the other end to a DC power distribution box. Tighten screws with a torque of 4.9 N m.

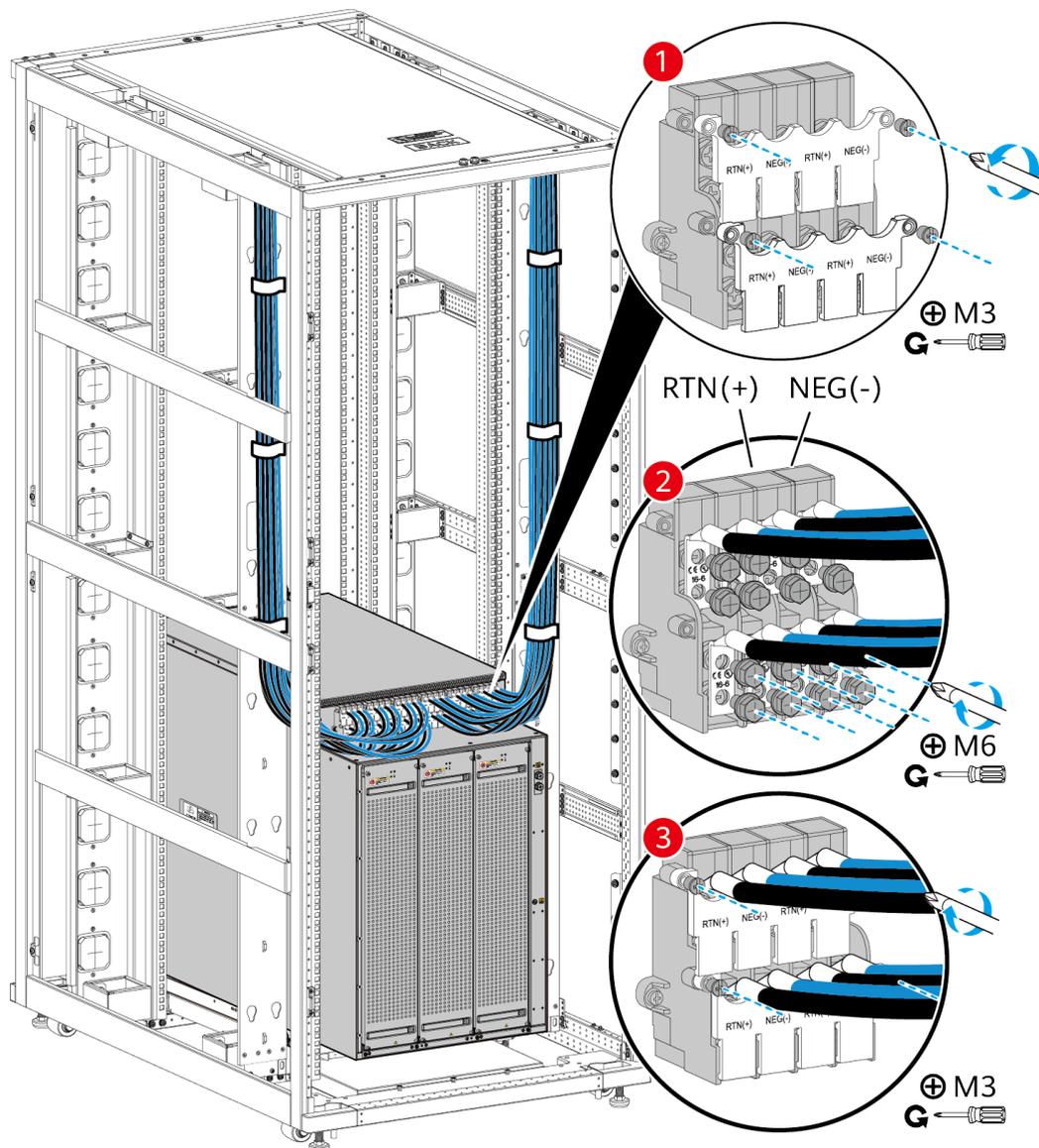
NOTE

Different DC power cables may be delivered in compliance with local regulations or user requirements.

Ensure that terminal blocks of the PEM are connected to power cables and screws are tightened.

- Step 6** After connecting the DC power cables, close the plastic cover of the terminal block unit and tighten the screw on the cover. See callout 3 in [Figure 7-15](#). Tighten screws with a torque of 0.54 N m.
- Step 7** After connecting all the DC power cables, bundle them from bottom to top with cable ties, at intervals of 250 mm. Fix the power cables on the rack and use diagonal pliers to cut off redundant cable ties.
- Step 8** Replace the temporary labels with formal labels.

Figure 7-15 Connecting DC power cables



----End

7.5 Connecting High-Voltage DC Power Cables

Context

High-voltage DC power cables can be connected directly to an EoR or to a PDU. For details about how to directly connect high-voltage DC power cables to an EoS, see *Connecting AC Power Cables*. The following describes how to connect high-voltage DC power cables to a PDU. A high-voltage DC power cable can transmit 240 V/380 V high-voltage DC power.

 **NOTE**

The AC or 240 V/380 V high-voltage DC chassis requires Huawei-customized high-voltage DC connectors. Only AC or 240 V/380 V high-voltage DC cables delivered by Huawei can be used.

 **DANGER**

Do not install high-voltage DC power cables while the power is on.

NOTICE

- Before connecting DC PDU power cables, make sure that the power switches of the external power supply system are all in OFF position.
 - The connector types and maximum input current of high-voltage DC PDU power cables used on a device must meet requirements of the device. Use the power cables delivered with the device.
 - Each device must have at least two independent power inputs for power redundancy. Do not connect all the high-voltage DC PDU power cables of a device to the PDUs controlled by the same circuit breaker.
-

 **NOTE**

- If only one power source is available in the equipment room, connect all power modules to power source A (terminal blocks or power sockets A1 to An) or power source B (terminal blocks or power sockets B1 to Bn).
- In high-voltage DC scenarios, if both power sources A and B are connected to power supplies, power source A is used by default. If power source A is faulty, power source B is used.
- Requirements for the power supply system of a customer's cabinet: The output power of two power sources must be greater than the maximum input power of the device.

Tools

- ESD wrist strap or ESD gloves
- Diagonal pliers
- Cable ties

 **NOTE**

- The procedures and methods for connecting high-voltage DC PDU power cables of all the CloudEngine 16800 models are the same. The following figure shows the high-voltage DC PDU power cable connection for the CloudEngine 16808.
- If you use high-voltage DC PDU power cables delivered from Huawei, ensure that a DC power source is available within 3000 mm (cable distance) away from the device.
- It is recommended that you divide all cables in the cabinet into two equal bundles and route them from left and right sides of the cabinet respectively.
- Bundle high-voltage DC PDU power cables with appropriate stress. Ensure that power cables are not crossed or twisted.

Procedure

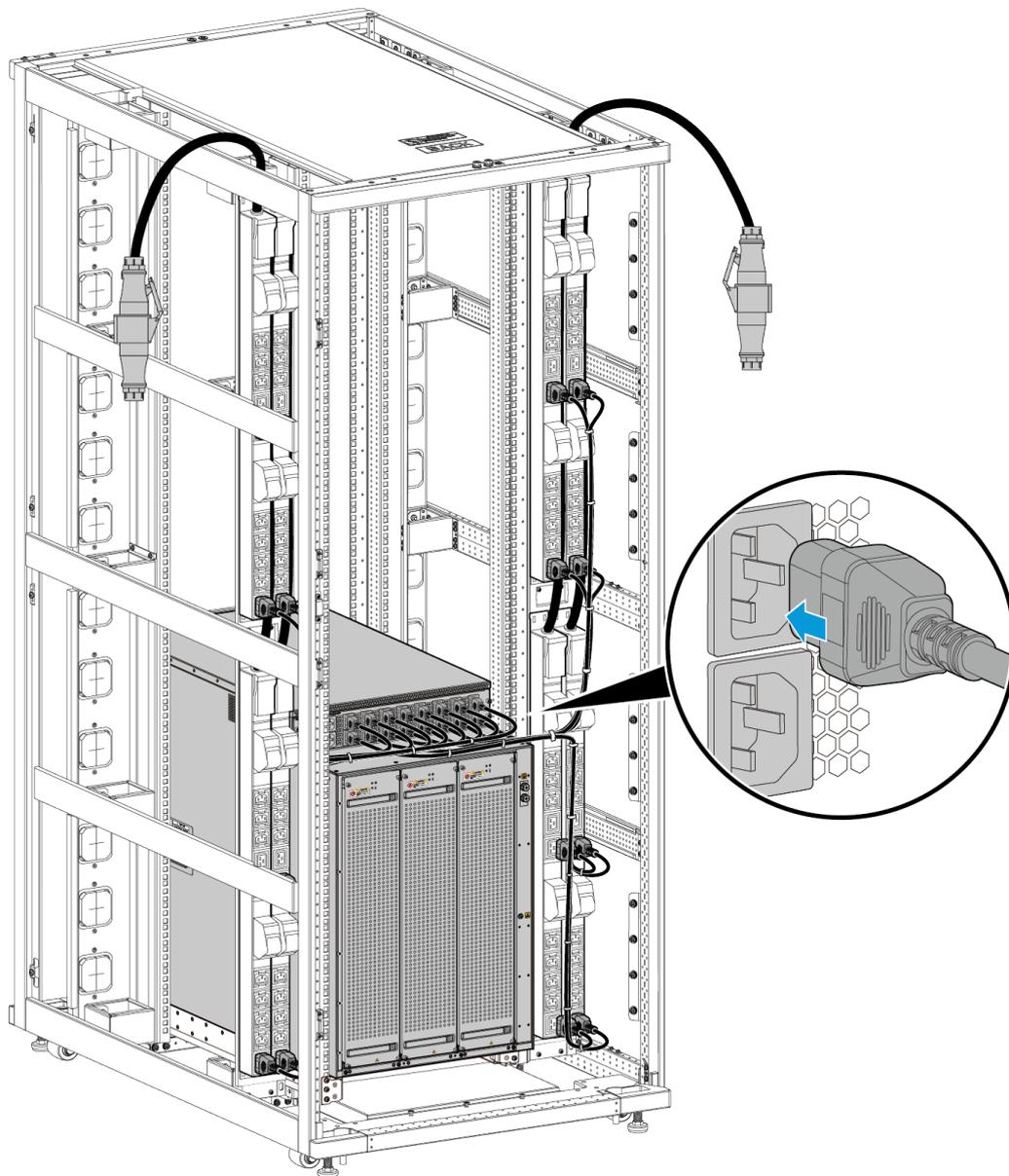
- Step 1** Wear an ESD wrist strap or ESD gloves. When wearing an ESD wrist strap, ensure that the ESD wrist strap is in close contact with your wrist, and insert the other end into the ESD jack of the device or cabinet/rack.
- Step 2** Attach temporary labels to both ends of each high-voltage DC PDU power cable.
- Step 3** Connect the HVDC-3T-01 straight female connector of the high-voltage DC PDU power cable to the power socket on the PEM of the power module, and connect the HVDC-3T-03 straight male connector of the high-voltage DC PDU power cable to the PDU, as shown in [Figure 7-16](#).

NOTE

In [Figure 7-16](#), eight power modules are used as an example to describe how to route power cables.

- Step 4** After connecting all the high-voltage DC PDU power cables, bundle them from bottom to top with cable ties, at intervals of 250 mm. Fix the power cables on the rack and use diagonal pliers to cut off redundant cable ties.
- Step 5** Replace the temporary labels with formal labels.

Figure 7-16 Connecting high-voltage DC PDU power cables



----End

7.6 Connecting Signal Cables

Context

Signal cables used on the CloudEngine 16800 series devices include high-speed cables, active optical cables (AOCs), and optical fibers.

NOTICE

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

NOTE

- To connect cables in a cabinet or rack more conveniently, you can remove the side panels of the cabinet or rack before connecting cables.
- Keep power cables and ground cables more than 30 mm away from signal cables.

Connecting High-Speed Cables

NOTICE

- 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. The minimum cabling clearance and minimum bend radius for various high-speed cables are as follows:
 - SFP+ to SFP+ high-speed cables (active and passive): The minimum cabling clearance is 60 mm, and the minimum bend radius is 35 mm.
 - QSFP+ to QSFP+ high-speed cables (passive): The minimum cabling clearance is 75 mm, and the minimum bend radius is 50 mm.
 - QSFP+ to 4*SFP+ high-speed cables (passive): For the QSFP+ end, the minimum cabling clearance is 100 mm, and the minimum bend radius is 50 mm. For the SFP+ end, the minimum cabling clearance is 60 mm, and the minimum bend radius is 35 mm.
 - QSFP28 to 4*SFP28 high-speed cables (passive): For the QSFP28 end, the minimum cabling clearance is 100 mm, and the minimum bend radius is 50 mm. For the SFP28 end, the minimum cabling clearance is 70 mm, and the minimum bend radius is 40 mm.
-

Connecting Optical Fibers

CAUTION

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

NOTICE

- Cover idle optical ports and optical modules with dust plugs and cover idle optical fibers with dust caps.
 - Optical fibers routed into a cabinet must be protected by a corrugated pipe. The bend radius of an optical fiber must be at least 20 times larger than its diameter. Generally, the bend radius of optical fibers should be no less than 40 mm.
 - Bundle optical fibers with binding tapes using the appropriate force. Ensure that the optical fibers in a bundle can be moved easily.
 - Fiber connectors must be tidy and clean to ensure normal communication. If a fiber connector is contaminated, clean it using a piece of fiber cleaning fabric.
-

Connecting AOCs

NOTICE

- Both ends of an idle AOC must be covered by an ESD cap.
 - The bend radius of AOCs must be no less than 30 mm. Overbending AOCs may damage wires in the cables.
-

Tools

- ESD wrist strap or ESD gloves
- Corrugated pipe
- Diagonal pliers
- Cable ties
- Fiber binding tape
- Marker
- Signal cable labels
- (Optional) Tweezers

Procedure

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

Step 2 Select signal cables of appropriate quantity and lengths according to the number of ports and measured cabling distances.

 **NOTE**

Select optical fibers of appropriate modes, quantity, and lengths according to the optical module types, number of ports to be connected, and measured cabling distances.

Step 3 Attach temporary labels to both ends of each signal cable and write numbers on the labels to identify the cables.

- For details on how to number Ethernet cables, see engineering labels for Ethernet cables.
- For details on how to number high-speed cables and AOCs, see engineering labels for Ethernet cables.
- For details on how to number optical fibers, see engineering labels for Ethernet cables.

Step 4 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.

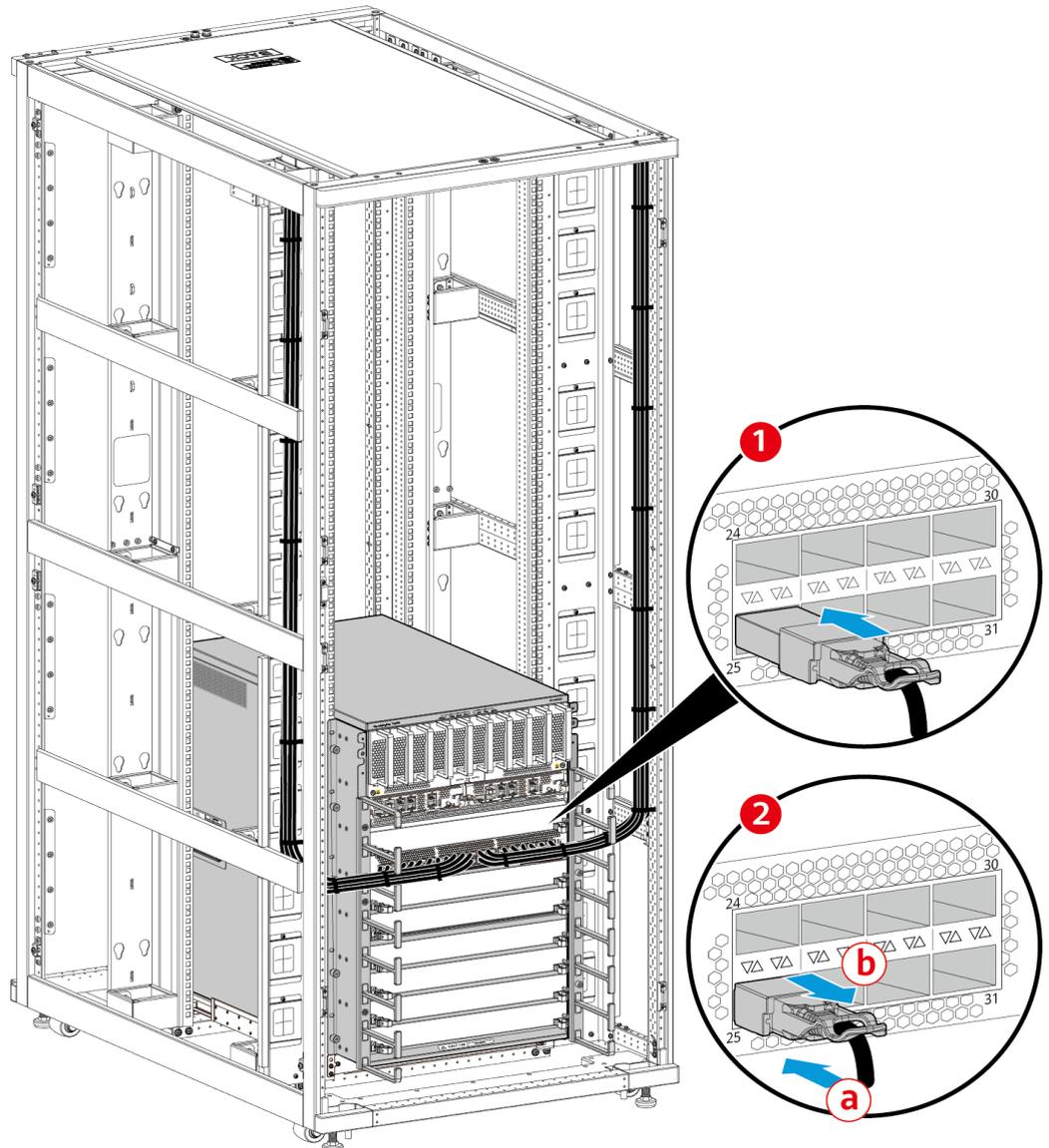
Step 5 Route signal cables. Unroll the signal cables and arrange them into a bundle. Route the bundle of signal cables to the cabinet/rack along the cable tray, and lead the power cables into the cabinet/rack from both sides.

Step 6 Connect signal cables to ports of the device.

- To connect a high-speed cable, find the port matching the number on the high-speed cable and plug the cable connector to the port. If you hear a click when inserting the cable connector, the high-speed cable has been securely seated in the port. See callout 1 in [Figure 7-17](#). After verifying that all high-speed cables are correctly connected, go to [Step 7](#).

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 callout 2 in [Figure 7-17](#).

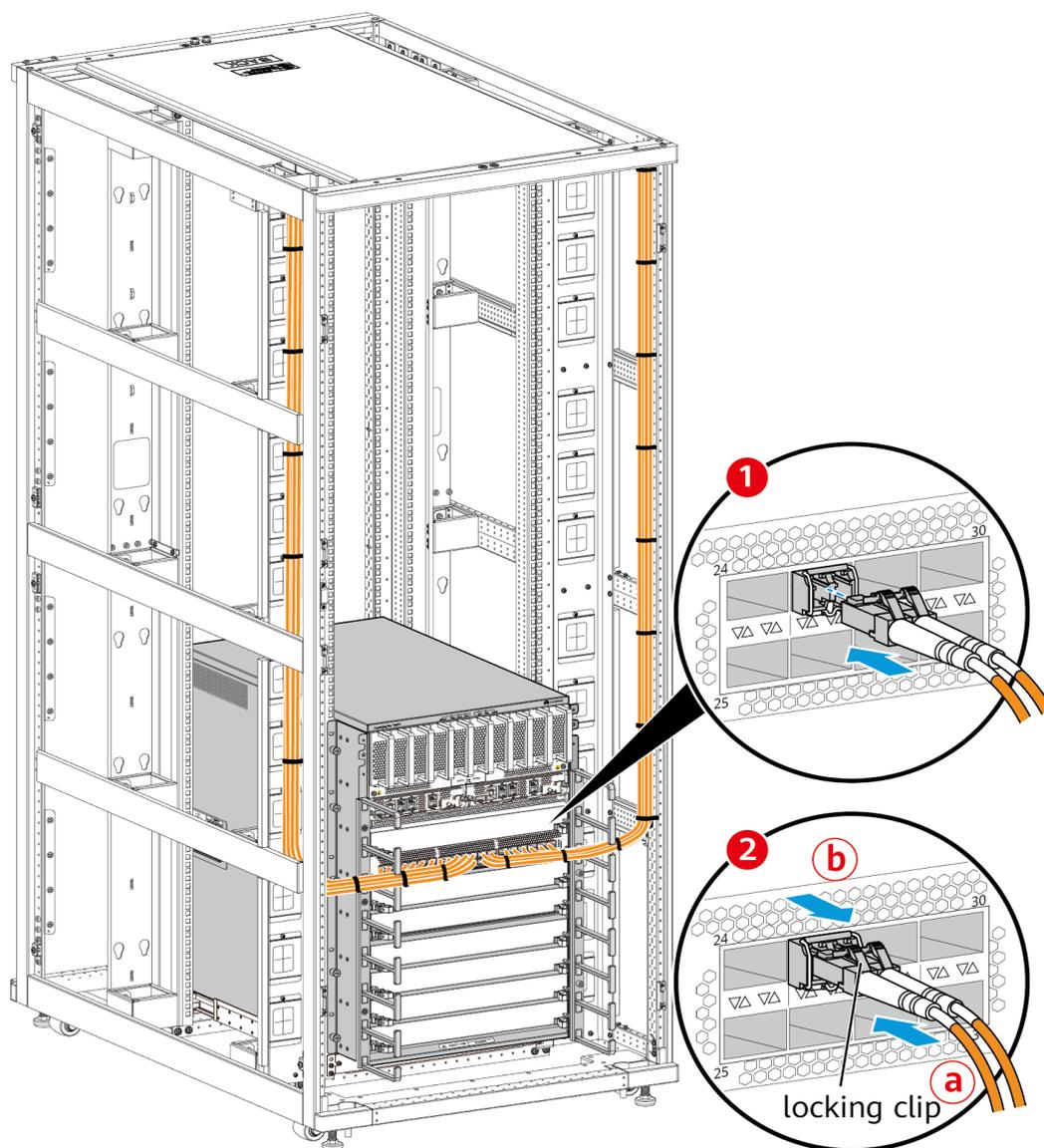
Figure 7-17 Connecting high-speed cables



- To connect a pair of optical fibers, find the optical port matching the number on the optical fibers, install an optical module matching the optical fibers on the optical port, and then insert the fiber connector into the optical module. If you hear a click when inserting the fiber connector, the optical fibers have been securely seated in the optical module. See callout 1 in [Figure 7-18](#). After verifying that all optical fibers are correctly connected, go to [Step 7](#).

To remove optical fibers from an optical module, gently push the fiber connector, and then pull the fiber connector while pressing the locking clips. Do not directly pull the fiber connector with force. See callout 2 in [Figure 7-18](#).

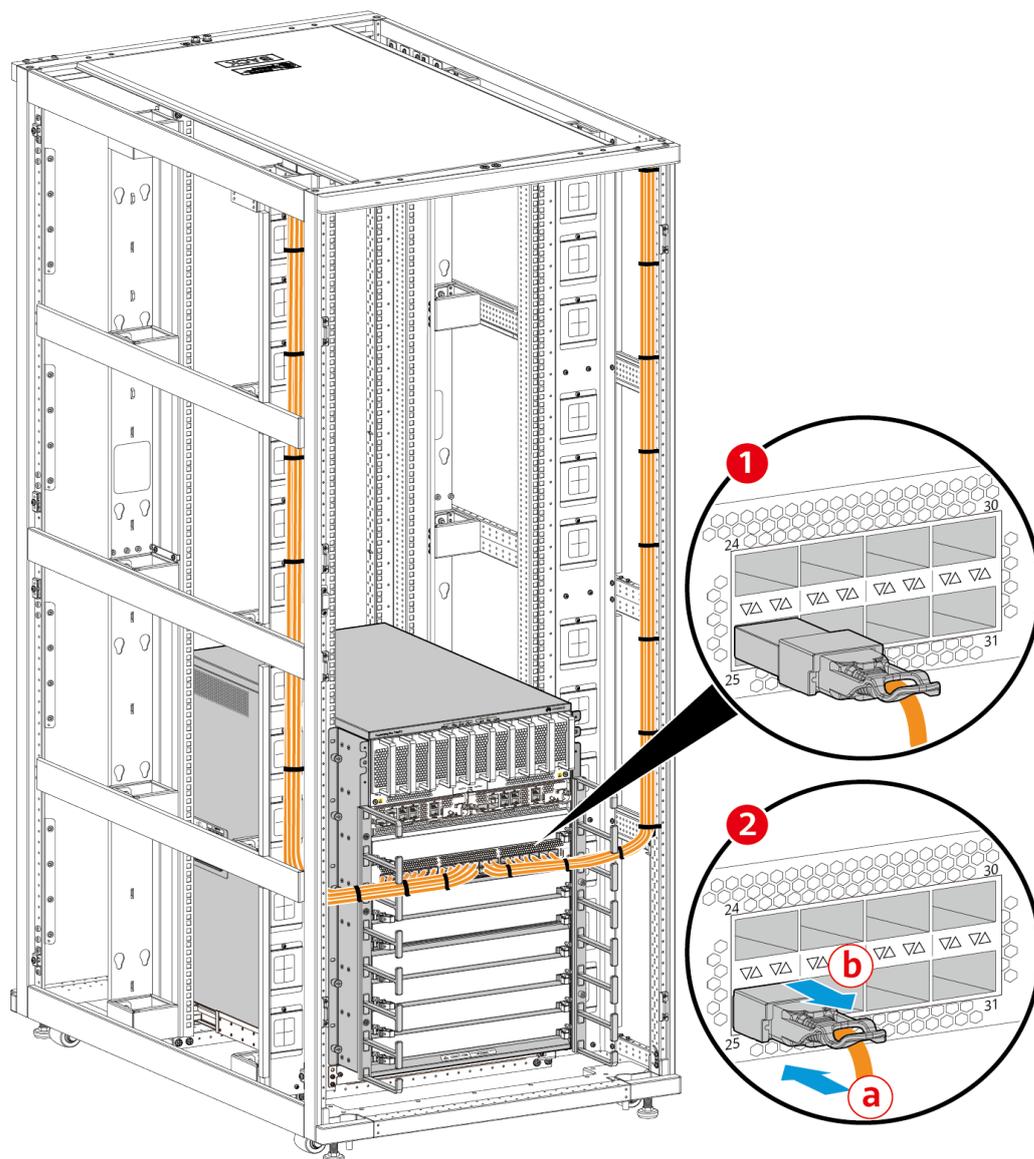
Figure 7-18 Connecting optical fibers



- To connect an AOC, find the port matching the number on the AOC and plug the cable connector to the port on the switches. If you hear a click when inserting the cable connector, the AOC has been securely seated in the port. See callout 1 in [Figure 7-19](#). After verifying that all AOCs have been correctly connected to the switches, go to [Step 7](#).

To remove an AOC, gently push the cable connector and then pull the handle of the connector. Do not directly pull the cable connector with force. See callout 2 in [Figure 7-19](#).

Figure 7-19 Connecting AOCs



NOTE

If many signal cables are connected to a device, use the tweezers delivered with the device to remove signal cables.

Step 7 Bundle signal cables. Arrange the signal cables and put them through the cable management frames of the corresponding slots orderly. Use cable ties to bundle the signal cables at an interval of 200 mm to 300 mm. Fix the bundled signal cables on the cabinet/rack and cut redundant cable ties with a pair of diagonal pliers.

Step 8 Replace all the temporary labels with formal labels on the signal cables.

----End

8 Post-Installation Check

 **CAUTION**

Before starting the post-installation check, make sure that the power switches of the external power supply system are in OFF position.

After completing installation of a device, check the items listed in the following table. If any item fails the check, check for the reason, reinstall the related component, and check again. Ensure that all the items pass the check.

Check cabinets according to [Table 8-1](#).

Table 8-1 Cabinet checklist

No.	Item	Method
1	The cabinet installation location complies with the engineering design document.	Observe
2	Components are correctly installed in a cabinet. No component is loose or damaged.	Observe
3	All the screws are correctly fixed. The chassis bottom is completely attached to the guide rails or tray.	Observe
4	The vertical deviation of a cabinet is less than 3 mm. You can use a plumb bob to measure the vertical deviation.	Measure
5	The cabinets on the sides of the main path are aligned in a line, with a deviation of less than 5 mm.	Measure
6	The surfaces of the cabinets in the same row are on the same plane. The cabinets are deployed close to each other.	Observe

No.	Item	Method
7	The front door of a cabinet can be opened and closed easily.	Observe
8	The cable outlets on the top and bottom of a cabinet are properly sealed.	Observe
9	Metal components in a cabinet have good electrical connections with the rack. Screw mounting holes, guide rails, and mounting brackets are not covered with insulation painting.	Observe
10	Ground busbars of adjacent cabinets are connected through busbar cables.	Observe

Check cables according to [Table 8-2](#).

Table 8-2 Cable checklist

No.	Item	Method
1	Routes of signal cables comply with the engineering design document.	Observe
2	Signal cables are not damaged or broken and have no splices.	Observe
3	Signal cable connectors are clean, intact, and correctly connected. Wires of each signal cable are securely clamped in the connectors.	Observe
4	Signal cables do not cross each other and have sufficient slack at the bent part. (Signal cables can be crossed within 1 m outside the cabinet.)	Observe
5	Pigtail fibers outside a cabinet are laid in a protection pipe or trough and are not squeezed by other cables or objects.	Observe
6	Optical fibers are led into a cabinet through a corrugated pipe. The corrugated pipe should be no longer than 100 mm and be bundled on the cabinet.	Observe and measure
7	The bend radius of optical fibers is 20 times larger than their diameters. Generally, the bend radius of optical fibers should be no less than 40 mm. The path of optical fibers is not blocked by any components.	Observe and measure

No.	Item	Method
8	Optical fibers are bundled by binding tape with appropriate force.	Observe
9	Each signal cable has correct, clear, and tidy labels attached on both ends.	Observe
10	The routes of power cables and ground cables conform to the engineering design document, facilitating future maintenance and system expansion.	Observe
11	All power cables and ground cables are complete copper wires without splices. Coatings of power cables and ground cables are intact.	Observe
12	Power cables and ground cables are connected properly.	Observe
13	Power cables and ground cables are routed in compliance with the engineering design document, meeting power distribution requirements.	Observe
14	Power cables and ground cables are separated from signal cables.	Observe
15	Power cables and ground cables are routed straightly and properly bundled, with sufficient slack at the bend part.	Observe
16	Power cables, ground cables, and power switches on power distribution boxes and power distribution frames are identified by correct, clear, and tidy labels.	Observe
17	The yellow-green ground cables are correctly connected. One end of a ground cable is connected to the PGND ground bar in the power distribution cabinet, and the other end is connected to the ground point on a cabinet. Screws at both ends of a ground cable are securely fastened.	Observe

9 Powering on a Device for the First Time

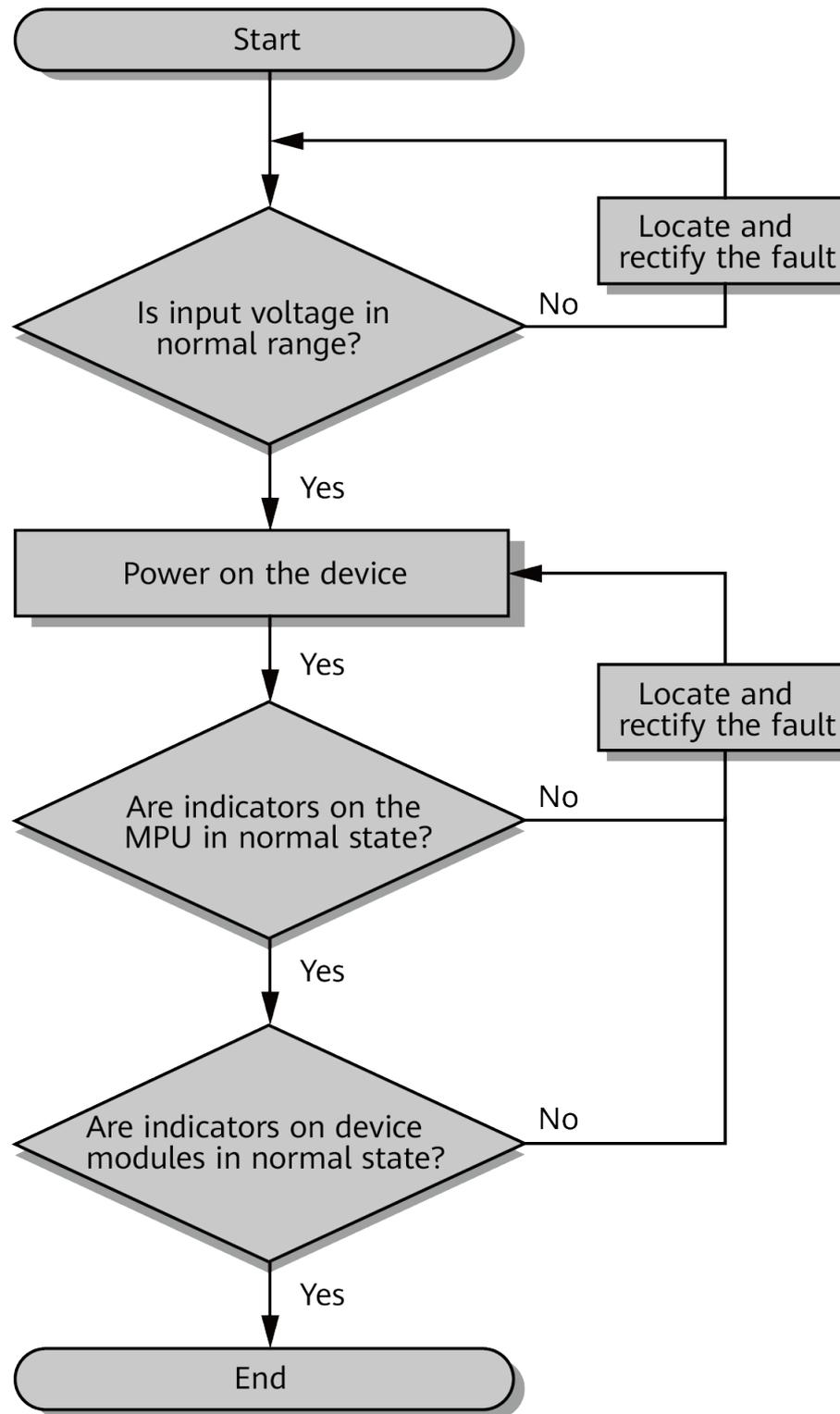
Procedure for Powering On a Device

 NOTE

After powering on a device, check indicators on the MPU first. If indicators on the MPU are in normal states, check indicators on other modules.

Figure 9-1 shows the procedure for powering on a device for the first time.

Figure 9-1 Procedure for powering on a device for the first time



Checking the Device After Power-On

NOTE

Modules of the same type used on different CloudEngine 16800 models have same indicators (same colors and meanings). The following figures show indicators on a CloudEngine 16808 as an example.

Figure 9-2 CloudEngine 16808 front view

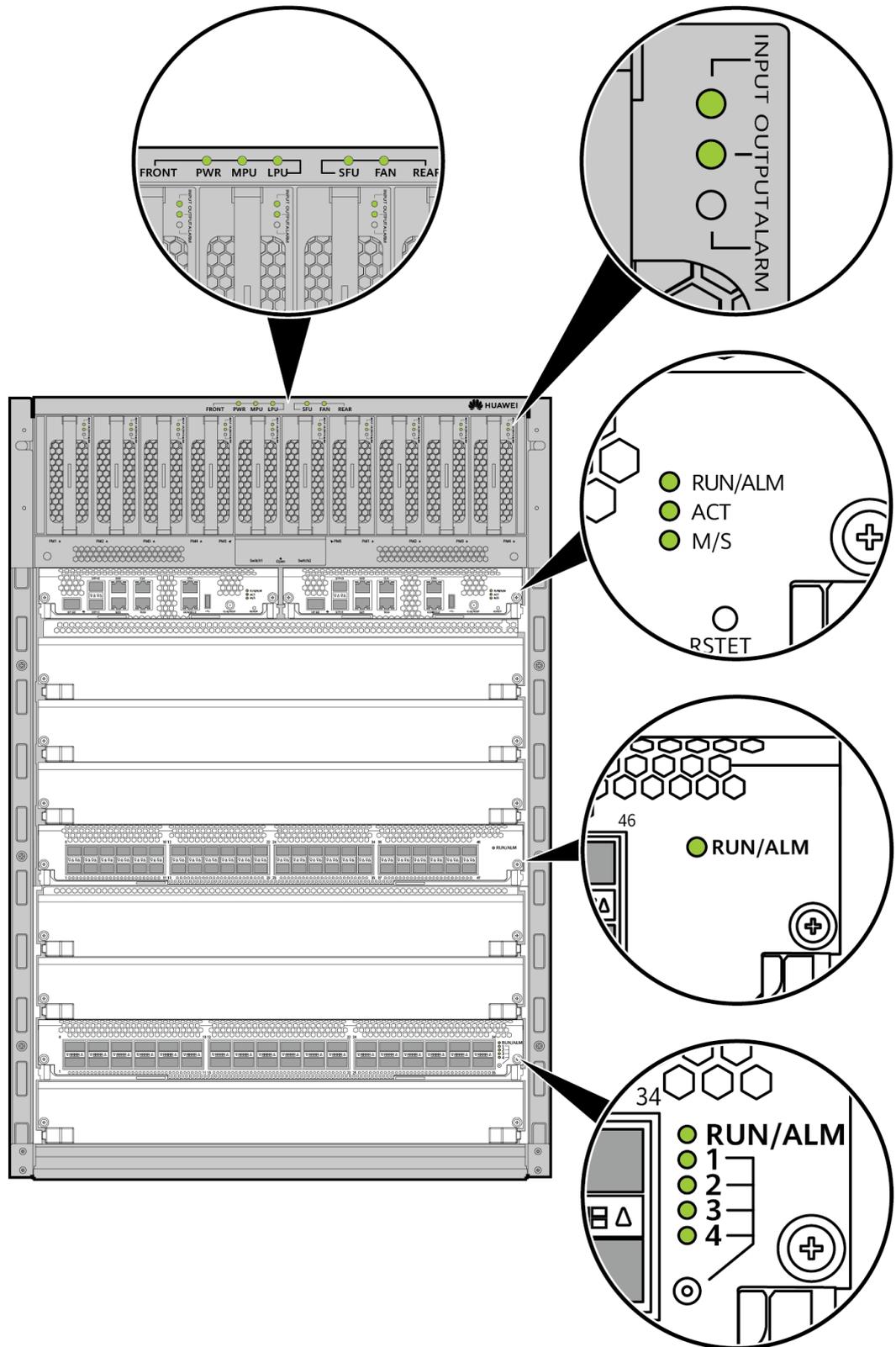


Figure 9-3 CloudEngine 16808 rear view

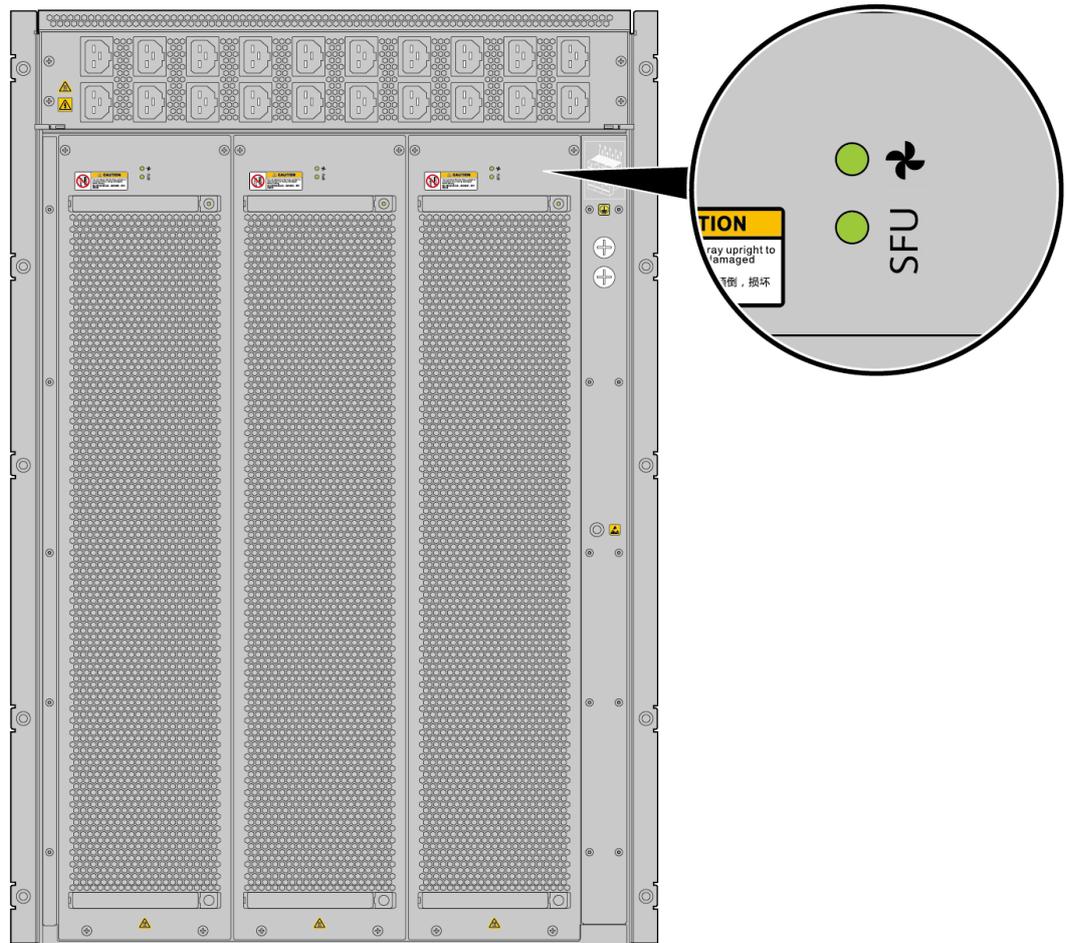


Table 9-1 shows the normal states of indicators on the modules of a device after it is powered on.

Table 9-1 Normal states of module indicators

Module Name	Indicator	Color	Description
System status	PWR	Green	Steady on: All installed power modules are working properly.
	MPU	Green	Steady on: All installed MPUs are working properly.
	LPU	Green	Steady on: All installed LPUs are working properly.
	SFU	Green	Steady on: All installed SFUs are working properly.
	FAN	Green	Steady on: All fan modules are installed and working properly.

Module Name	Indicator	Color	Description
MPU	RUN(G)/ ALM(R)/ OFL(Y)	Green	<ul style="list-style-type: none"> Steady on: The card has been powered on but the system software is not running. Slow blinking (0.5 Hz): The card is running properly. Fast blinking (4 Hz): The card is loading the system software or is resetting.
	ACT	Green	<ul style="list-style-type: none"> Steady on: The card is the active MPU. Off: The card is the standby MPU.
	M/S	Green	<ul style="list-style-type: none"> Slow blinking (0.5 Hz): The stacking function is enabled, and the card is not the active MPU of the stack system. Steady on: The stacking function is enabled, and the card is the active MPU of the stack system. Off: The stacking function is disabled.
LPU	RUN/ALM	Green	<ul style="list-style-type: none"> Steady on: The card has been powered on but the system software is not running. Slow blinking (0.5 Hz): The card is running properly. Fast blinking (4 Hz): The card is loading the system software or is resetting.
Power module	Input	Green	<ul style="list-style-type: none"> Steady on: The input power of the power module is in the normal range. Fast blinking (4 Hz): The input voltage of the power module is out of the normal range. Off: The power module receives no input power.
	Output	Green	<ul style="list-style-type: none"> Steady on: The output power of the power module is in the normal range. Off: The power module has no output power or the output power is abnormal.
SFU	RUN(G) ALM(R) OFL(Y)	Green	<ul style="list-style-type: none"> Steady on: The card has been powered on but the system software is not running. Slow blinking (0.5 Hz): The card is running properly. Fast blinking (4 Hz): The card is loading the system software or is resetting.

Module Name	Indicator	Color	Description
Fan module		Green	<ul style="list-style-type: none">Fast blinking (4 Hz): The fan module has not established communication with the MPU or communication loss occurs.Slow blinking (0.5 Hz): The fan module is working properly and communicating with the MPU normally.
	SFU	Green	Steady on: The SFU is working properly.

 NOTE

For more information about indicators on the device, see [Indicators](#).

Follow-up Procedure

NOTICE

Powering off the device will interrupt all the services on the device. Exercise caution when deciding to perform this operation.

To power off the device, perform the following steps:

1. Turn off the two power switches under the power modules of the device.
2. Turn off power switches of the external power supply system connected to the device.
3. Verify that the device and all its modules are powered off.

10 Maintaining a Device

NOTICE

Unauthorized field maintenance on electronic components such as fuses in a device is not allowed. The problematic component or device must be returned for repair. Faulty fuses and other electronic components can only be replaced by professionals authorized by Huawei.

- [10.1 Replacing a Power Module](#)
- [10.2 Replacing a Fan Module](#)
- [10.3 Replacing an Optical Module](#)
- [10.4 Replacing an LPU](#)
- [10.5 Replacing the Only MPU on a Device \(Services Have Been Interrupted\)](#)
- [10.6 Replacing the Only MPU on a Device \(Services Are Not Interrupted\)](#)
- [10.7 Replacing One of MPUs on a Device](#)
- [10.8 Replacing an SFU](#)
- [10.9 Replacing and Clearing Air Filters](#)

10.1 Replacing a Power Module

Context

The power modules on the CloudEngine 16800 are hot swappable. The procedures and methods for replacing power modules on all the CloudEngine 16800 models are similar. Any operation difference between different models will be noted. The following illustrates how to replace a power module on the CloudEngine 16808.

CAUTION

- Do not install DC power modules and AC & high-voltage DC power modules on the same device; otherwise, the device may be damaged.
- The power module can get very hot. Be careful when replacing it.

Tools

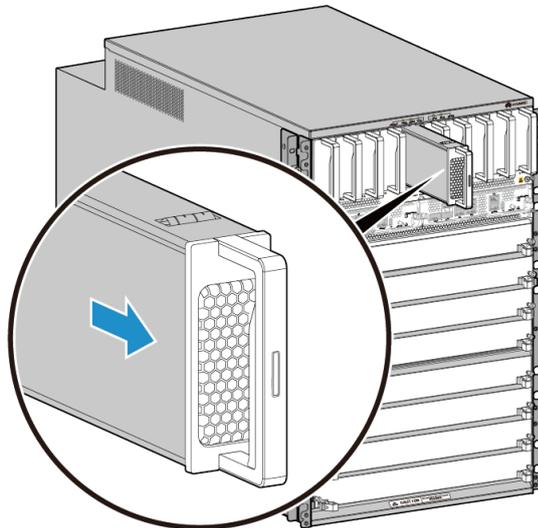
- ESD wrist strap or ESD gloves
- Flat-head screwdriver

Procedure

- Step 1** Before replacing a power module, determine in which cabinet and chassis the power module is installed, find the power module in the chassis, and attach a label to the panel of the power module.
- Step 2** 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.
- Step 3** Remove the power module.

Use one hand to hold the handle of the power module and slowly pull it out of the slot while supporting the bottom of the power module with the other hand.

Figure 10-1 Removing a power module



- Step 4** Install the new power module. For details, see [6.2 Installing Power Modules](#).
- Step 5** Verify whether the new power module functions normally:
- Observe indicators on the power module panel. If the Input and Output indicators are steady green and the Alarm indicator is off, the power module is working normally. If the Alarm indicator is steady red, the power module does not work normally.

- Run the **display device** command to check whether the new power module is running properly. If the **Alarm** field is **Normal**, the power module is running properly.

If the new power module does not work normally, contact the equipment supplier for technical support.

----End

Follow-up Procedure

After the replacement is complete, tidy up all tools. If the replaced power module is confirmed to be faulty, you need to fill in the **Fault Tag**, and mail the tag together with the faulty power module back to Huawei for timely maintenance.

10.2 Replacing a Fan Module

Context

Fan modules on the CloudEngine 16800 are hot swappable. If a fan module fails, replace it within 10 minutes to ensure stable running of the device. The methods for replacing fan modules on the CloudEngine 16800 are similar. The following illustrates how to replace a fan module on the CloudEngine 16808.

CAUTION

- To prevent a fan module from falling down, hold both handles while removing it.
 - Do not stand a fan module upright to avoid it falling over and causing damage or injury.
 - The fan module can get very hot. Be careful when replacing it.
 - Only one fan module can be replaced at a time. Do not remove two or more fan modules at the same time when the device is running. Replace the fan module within 10 minutes.
-

Tools

- ESD wrist strap or ESD gloves
- Phillips screwdriver

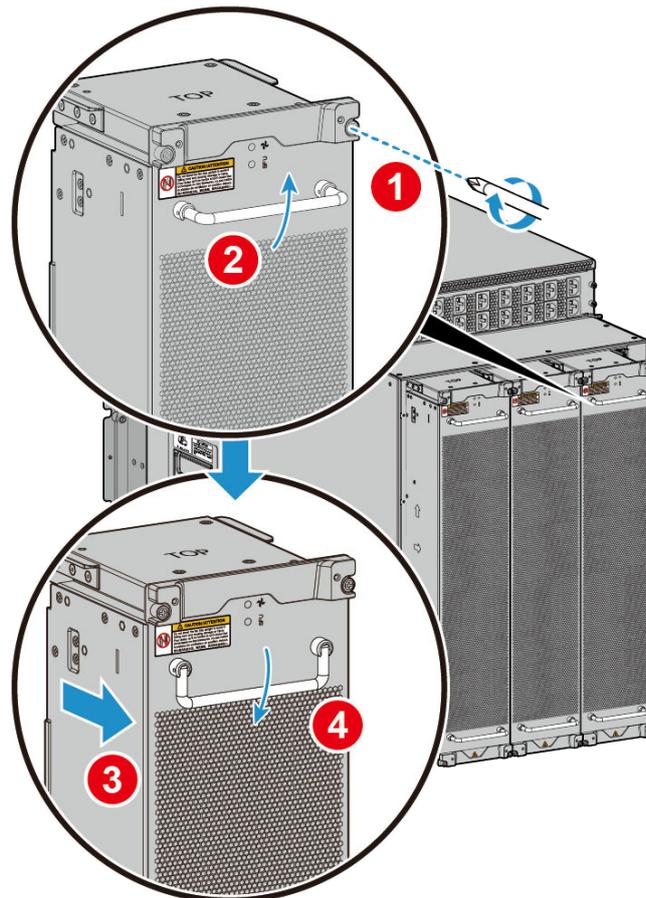
Procedure

Step 1 Before replacing a fan module, determine in which cabinet and chassis the fan module is installed, find the fan module in the chassis, and attach a label to the panel of the fan module.

Step 2 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.

- Step 3** Remove the fan module to be replaced from the device.
1. Loosen the captive screws on the fan module. See callout 1 in [Figure 10-2](#).
 2. Turn the handles out. See callout 2 in [Figure 10-2](#).
 3. Hold the handles with your hands, and evenly pull the fan module slowly along the guide rails. See callout 3 in [Figure 10-2](#).
 4. Fold the handles. See callout 4 in [Figure 10-2](#).

Figure 10-2 Removing a fan module



Step 4 Install the new fan module. For details, see [6.5 Installing Fan Modules](#).

Step 5 After the new fan module is installed, fans run at a low speed for about 10 seconds. The fan module then works in intelligent fan speed adjustment mode. Use either of following methods to check whether the new fan module works normally:

- Observe the indicator on the fan module. If the indicator blinks green slowly, the fan module is working normally. If the indicator is steady red, the fan module does not work normally.
- Run the **display device fan** command to check the running status of the fan module.

If the fan module does not work normally, contact the equipment supplier for technical support.

----End

Follow-up Procedure

After the replacement is complete, tidy up all tools. If you confirm that the replaced fan module is faulty, fill in the **Fault Tag**, and mail the tag together with the faulty power module back to Huawei for timely maintenance.

10.3 Replacing an Optical Module

Context

CAUTION

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

NOTICE

- Huawei-certified optical modules are strongly recommended because non-Huawei-certified optical modules cannot ensure transmission reliability and may affect service stability.
 - Optical modules are hot swappable, and you do not need to power off the device when replacing optical modules.
 - Optical modules are electrostatic-sensitive components. Therefore, you must take ESD protection measures when replacing optical modules.
 - Do not insert an optical module reversely. If an optical module cannot be completely inserted into an optical port, do not force it into the port. Instead, turn the optical module over and try again.
 - Only external optical modules can be replaced and pluggable. Built-in optical modules cannot be replaced.
-

Follow these guidelines when replacing an optical module:

- Replacing an optical module interrupts service transmission. Therefore, replace an optical module only when you confirm that the optical module has failed.
- Ensure that the new optical module has the same center wavelength and complies with the same standards as the old one.
- 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.
- After removing the optical fibers from an optical module, cover the fiber connectors with dust caps. Place the optical fibers in an appropriate place to prevent them from swinging.
- Use assistant tools like the tweezers delivered with the device to remove an optical module in a confined space.

- After removing a copper module, wait at least 2 seconds before inserting a new one. Otherwise, the port may fail to go Up. If the port cannot go Up, remove the copper module and install it 2 seconds later.
- If the LINK indicator on an optical port with two optical fibers is off, swap the two optical fibers.
- During the replacement, keep the bores of the optical module and fiber connectors clean, protecting them from dust and other contamination sources. Install dust plugs on idle optical ports.

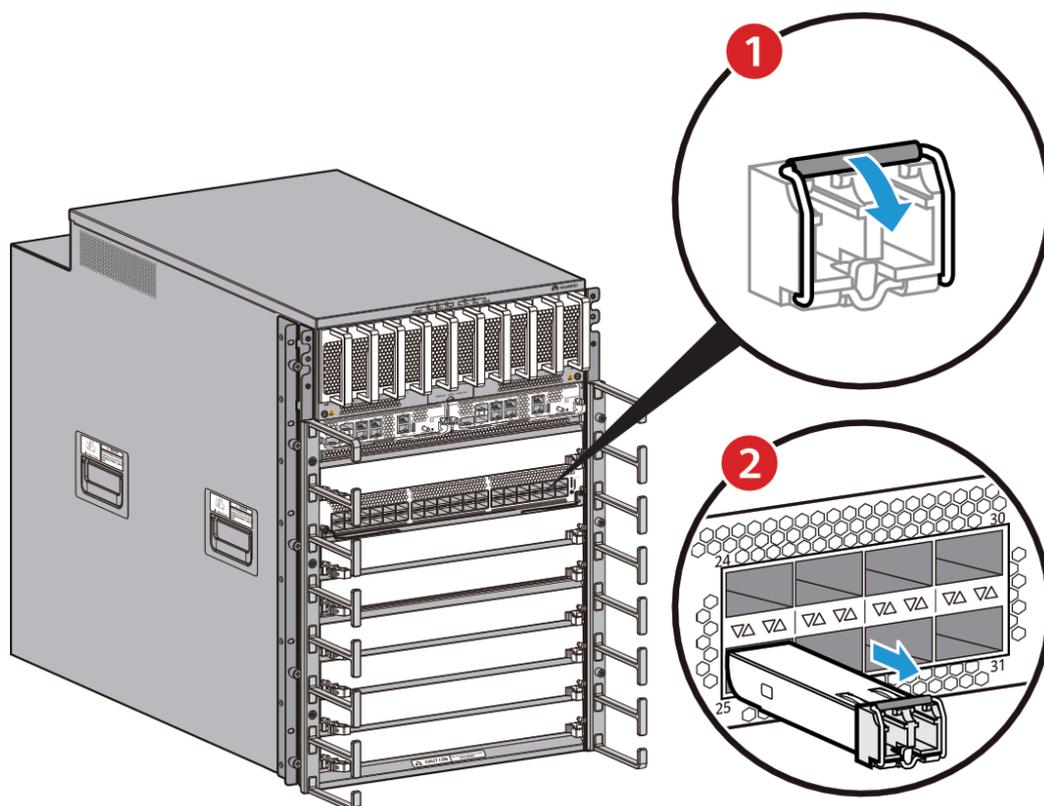
Tools and Accessories

- ESD wrist strap or ESD gloves
- Spare optical module
- Dust caps
- (Optional) Optical port dust plug
- (Optional) Tweezers

Procedure

- Step 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.
- Step 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.
- Step 3** 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.
- Step 4** Remove the optical fibers from the optical module and cover them with dust caps.
- Step 5** Rotate the handle of the optical module down, gently push the optical module, and then pull out the optical module by the handle, as shown in [Figure 10-3](#). When installing a CFP optical module, hold the screw rods with both hands, and slightly pull out the optical module from the optical port.

Figure 10-3 Replacing an optical module



Step 6 Perform the following steps to insert the spare optical module into the optical port.

1. Take out the new optical module from the packing box and check whether any part of the module is damaged or missing. Ensure that the type of the new optical module is the same as that of the optical module to be replaced.
2. Insert the new optical module fully into the optical port. When the optical module clicks, it has been seated correctly in the optical port. If the new optical module is a CFP one, insert the new optical module into the optical port of the card, push the module panel horizontally into the connector using even force with both thumbs. After the module is inserted, push the module slightly to ensure that it has reached the stop position. Pull out the two screw rods slightly to ensure that they can properly function. Pre-tighten one of the screw rods. Then, tighten the other screw rod. After that, tighten the first screw rod. To prevent the optical module from getting loosened due to vibration or collision, you are advised to use a screwdriver to tighten the screw rods.

Step 7 Connect the optical fibers to the marked positions.

Step 8 Check the LINK indicator on the corresponding optical port. If the LINK indicator is steady green, the new optical module is working normally.

----End

Follow-up Procedure

After the replacement is complete, tidy up all tools. If the replaced optical module is confirmed to be faulty, you need to fill in the **Fault Tag**, and mail the tag together with the faulty optical module back to Huawei for timely maintenance.

Configuration requirements for copper modules, high-speed cables, and optical modules differ depending on their models. For details, see "Licensing Requirements and Limitations for Ethernet Interfaces" located under *Configuration > Interface Management Configuration Guide > Ethernet Interface Configuration*. When a module is replaced by a module of a different type, configuration on the corresponding port may be changed. In this case, check the port configuration after the replacement.

If the new optical module fails to function properly, connect the local office of Huawei for timely technical support.

10.4 Replacing an LPU

Context

All the LPUs on the CloudEngine 16800 are hot swappable. The procedures and methods for replacing an LPU are the same on the CloudEngine 16800. The following illustrates how to replace an LPU on the CloudEngine 16808.

NOTICE

- During the replacement, pull or push the LPU slowly and horizontally to prevent it from colliding with adjacent cards. Collisions may cause damages to the adjacent running cards.
 - Do not touch the electronic components on the LPU during the replacement.
 - After an LPU is powered off, if the remaining power of the entire device meets requirements, the LPU will be automatically powered on after the device is restarted. The LPU power-off scenarios include:
 - The **power off** command is run to manually power off the LPU.
 - The device does not support the LPU.
 - The current version does not support the LPU.
-

Tools

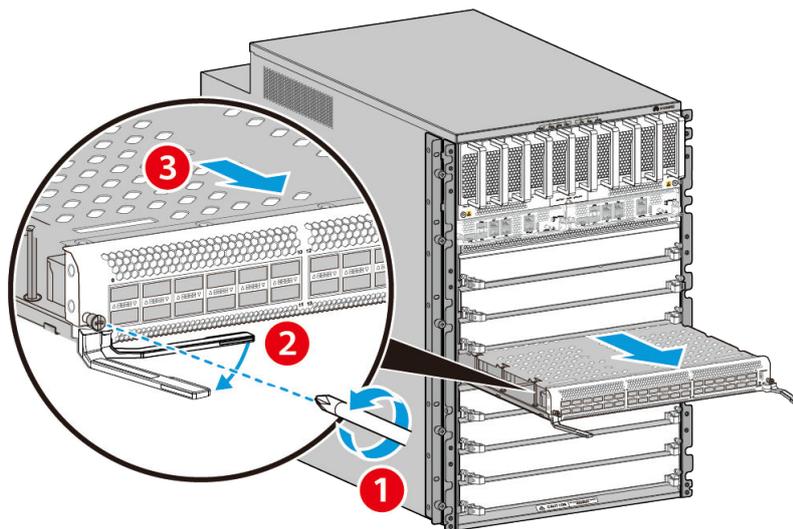
- ESD wrist strap or ESD gloves
- Phillips screwdriver

Procedure

- Step 1** Before replacing an LPU, determine in which cabinet and chassis the LPU is installed, find the LPU in the chassis, and attach a label to the LPU panel.

- Step 2** 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.
- Step 3** Select an LPU of the same model for replacement. If the new LPU is of a different model, ensure that it can replace the old one. Inspect the new LPU to ensure that no component is damaged or detached, and record the bar code on the new LPU.
- Step 4** Unplug cables from the LPU to be replaced and attach labels to the cables to identify the ports to which they are connected.
- Step 5** Remove the LPU to be replaced from the chassis.
1. Use a Phillips screwdriver to loosen the captive screws on both ends of the LPU panel. See callout 1 in [Figure 10-4](#).
 2. Rotate the ejector levers of the LPU outward to release the LPU from the backplane. See callout 2 in [Figure 10-4](#).
 3. Grasp the ejector levers and slowly pull out the LPU along the guide rails. See callout 3 in [Figure 10-4](#). Place the LPU in an ESD bag or on an ESD pad.

Figure 10-4 Removing an LPU



CAUTION

Before removing an LPU, remove the optical modules close to the card edges. This prevents these optical modules from being damaged when we rotate the ejector levers on the card.

- Step 6** Install the new LPU. For details, see [6.6 Installing MPUs and LPUs](#).

- Step 7** Observe the RUN/ALM indicator on the new LPU.

NOTE

It takes some time for the new LPU to start and operate normally.

- If the RUN/ALM indicator blinks green fast, the new LPU is loading the software or resetting.

- If the RUN/ALM indicator blinks green slowly, the new LPU is running normally.

Step 8 Connect cables to the LPU according to labels on the cables. For details, see [7.6 Connecting Signal Cables](#).

----End

Follow-up Procedure

After the replacement is complete, tidy up all tools. If you confirm that the replaced LPU is faulty, fill in the [Fault Tag](#) and send the faulty LPU and the fault tag to Huawei.

10.5 Replacing the Only MPU on a Device (Services Have Been Interrupted)

Context

If a device has only one MPU, the MPU replacement procedure varies depending on whether the MPU has completely or partially failed:

- If the MPU has completely failed, services on the device are interrupted and the command line interface (CLI) cannot be used.
- If the MPU has partially failed, services are still running and you can run commands on the CLI.

NOTICE

- If the MPU has stopped working, no commands can be executed on the CLI. Perform the following operations after the replacement:
 - Check the software version of the new MPU. Ensure that the software version of the new MPU is the same as that of the old MPU or is the required version.
 - (Optional) If the configuration file cannot be exported from the old MPU or the exported configuration file is not the latest, reconfigure services on the new MPU.
 - During the replacement, pull or push the MPU slowly and horizontally to prevent it from colliding with adjacent cards. Collisions may cause damages to the adjacent running cards.
 - Do not touch the electronic components on the MPU during the replacement.
-

Tools

- ESD wrist strap or ESD gloves
- Phillips screwdriver

Procedure

- Step 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.
- Step 2** Enter the BIOS menu on the MPU from the serial port and copy the configuration file and license file from the MPU.
- If the configuration file and license file are copied successfully, perform steps 3 to 9.
 - If the configuration file and license file fail to be copied, perform steps 3 to 8.
- Step 3** Take out the new MPU from the package, and make sure that no component on the new MPU is damaged or detached.
- Step 4** Unplug cables from the MPU to be replaced and attach labels to the cables to identify the ports to which they are connected.
- Step 5** Remove the MPU from the chassis and install the new one. For details on how to remove and install a card, see [10.4 Replacing an LPU](#).

 **NOTE**

Ensure that the new MPU uses the same software version as the old one.

- Step 6** Observe the RUN(G)/ALM(R)/OFL(Y) indicator on the new MPU.

 **NOTE**

After the new MPU is installed in the chassis, it starts and registers automatically. The start and registration process takes a few minutes.

- If the RUN(G)/ALM(R)/OFL(Y) indicator blinks green fast, the new MPU is loading the software or resetting.
 - If the RUN(G)/ALM(R)/OFL(Y) indicator blinks green slowly, the new MPU is running normally.
- Step 7** Connect cables to the correct ports on the new MPU according to labels on the cables.
- Step 8** After the replacement is complete, perform the following operations to verify whether the replacement is successful:
- Run the **display device board** command to check whether the new MPU is running properly. If the **Alarm** field is **Normal**, the MPU is running properly.
 - Run the **display startup** command to view the system software name and configuration file name for next startup. The system software name and configuration file name on the new MPU must be the same as those on the old MPU.
 - Run the **display current-configuration** command to check the current parameter settings. The parameter settings must be the same as those before the replacement.

 **NOTE**

The network monitoring engineers or system maintenance engineers can configure the software using the CLI.

Step 9 (Optional) If the configuration file has been copied from the old MPU, upload the configuration file to the new MPU.

----End

Follow-up Procedure

After the replacement is complete, tidy up all tools. If you confirm that the replaced MPU is faulty, fill in the **Fault Tag** and send the faulty MPU and the fault tag to Huawei.

10.6 Replacing the Only MPU on a Device (Services Are Not Interrupted)

Context

If a device has only one MPU, the MPU replacement procedure varies depending on whether the MPU has completely or partially failed:

- If the MPU has completely failed, services on the device are interrupted and the CLI cannot be used.
- If the MPU has partially failed, services are still running and you can run commands on the CLI.

NOTICE

- During the replacement, pull or push the MPU slowly and horizontally to prevent it from colliding with adjacent cards. Collisions may cause damages to the adjacent running cards.
 - Do not touch the electronic components on the MPU during the replacement.
 - After the new MPU is installed and powered on, it automatically synchronizes the system software from the active MPU.
 - After replacing the MPU, ensure that the new MPU uses the same software version as the old one.
-

Tools

- ESD wrist strap or ESD gloves
- Phillips screwdriver

Procedure

Step 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.

Step 2 Take out the new MPU from the package, and make sure that no component on the new MPU is damaged or detached.

Step 3 Install the new MPU into the standby MPU slot. For details on how to install a card, see [6.6 Installing MPUs and LPUs](#).

Step 4 Observe the RUN(G)/ALM(R)/OFL(Y) indicator on the new MPU.

 **NOTE**

After the new MPU is installed in the chassis, it starts and registers automatically. The start and registration process takes a few minutes.

- If the RUN(G)/ALM(R)/OFL(Y) indicator blinks green fast, the new MPU is loading the software or resetting.
- If the RUN(G)/ALM(R)/OFL(Y) indicator blinks green slowly, the new MPU is running normally.

Step 5 Run the **dir** command to check whether the configuration file names and sizes on the new MPU are the same as those on the old MPU.

- If the configuration file names and sizes on the two MPUs are the same, the file synchronization is successful. Go to step 7.
- If the configuration file names or sizes on the two MPUs are different, go to step 6 to manually synchronize the configuration file to the new MPU.

Step 6 (Optional) Save data.

1. Log in to the device from a client.
2. Copy the configuration file to the standby MPU using either of the following methods:

– Method 1:

```
<HUAWEI> copy flash:/XXX.cfg slave#flash:/XXX.cfg
```

 **NOTE**

XXX.cfg is the configuration file name.

– Method 2:

Run the **save** command to save the configuration file to the standby MPU.

3. Copy the license file to the standby MPU.

```
<HUAWEI> copy flash:/XXX.dat slave#flash:/XXX.dat
```

 **NOTE**

XXX.dat is the license file name. Skip this step if there is no license file in the system.

Step 7 Run the **display switchover state** command to check the active/standby switchover status. When the **Switchover State** field displays **Ready**, go to the next step.

Step 8 Run the **slave switchover** command in the user view to perform an active/standby switchover.

Step 9 Unplug cables from the MPU to be replaced and attach labels to the cables to identify the ports to which they are connected.

Step 10 Remove the MPU from the chassis. For details on how to remove a card, see [10.4 Replacing an LPU](#).

Step 11 Connect cables to the correct ports on the new MPU according to labels on the cables.

Step 12 Perform the following operations to verify whether the replacement is successful:

- Run the **display device board** command to check whether the new MPU is running properly. If the **Alarm** field is **Normal**, the MPU is running properly.
- Run the **display startup** command to view the system software name and configuration file name for next startup. The system software name and configuration file name on the new MPU must be the same as those on the old MPU.
- Run the **display current-configuration** command to check the current parameter settings. The parameter settings must be the same as those before the replacement.

 **NOTE**

The network monitoring engineers or system maintenance engineers can configure the software using the CLI.

----End

Follow-up Procedure

After the replacement is complete, tidy up all tools. If you confirm that the replaced MPU is faulty, fill in the **Fault Tag** and send the faulty MPU and the fault tag to Huawei.

10.7 Replacing One of MPUs on a Device

Context

If a device has double MPUs, the MPU replacement procedure varies depending on whether the MPU to be replaced is the active or standby one. If it is the active MPU, perform an active/standby switchover first. If it is the standby MPU, replace it directly.

NOTICE

- During the replacement, pull or push the MPU slowly and horizontally to prevent it from colliding with adjacent cards. Collisions may cause damages to the adjacent running cards.
 - Do not touch the electronic components on the MPU during the replacement.
 - The system software has been loaded to the flash storage of a new MPU before the delivery.
 - After replacing the MPU, ensure that the new MPU uses the same software version as the old one.
-

Tools

- ESD wrist strap or ESD gloves
- Phillips screwdriver

Procedure

- Step 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.
- Step 2** Take out the new MPU from the package, and make sure that no component on the new MPU is damaged or detached.
- Step 3** If the MPU to be replaced is the active MPU, perform an active/standby switchover. Run the **display switchover state** command to check the active/standby switchover status. When the **Switchover State** field displays **Ready**, go to the next step. If it is the standby MPU, go to step 5.
- Step 4** Run the **slave switchover** command in the user view to perform an active/standby switchover.
- Step 5** Unplug cables from the MPU to be replaced and attach labels to the cables to identify the ports to which they are connected.
- Step 6** Remove the MPU from the chassis and install the new one. For details on how to replace a card, see [10.4 Replacing an LPU](#).
- Step 7** Observe the RUN(G)/ALM(R)/OFL(Y) indicator on the new MPU.

NOTE

After the new MPU is installed in the chassis, it starts and registers automatically. The start and registration process takes a few minutes.

- If the RUN(G)/ALM(R)/OFL(Y) indicator blinks green fast, the new MPU is loading the software or resetting.

NOTICE

When the RUN(G)/ALM(R)/OFL(Y) indicator of the standby MPU blinks green fast, the standby MPU is performing batch backup. Do not insert or remove the active MPU in this case.

- If the RUN(G)/ALM(R)/OFL(Y) indicator blinks green slowly, the new MPU is running normally.
- Step 8** Run the **dir** command to check whether the configuration file names and sizes on the new MPU are the same as those on the old MPU.
 - If the configuration file names and sizes are the same, the file synchronization is successful. Go to step 10.
 - If the configuration file names or sizes on the two MPUs are different, go to step 9 to manually synchronize the configuration file to the new MPU.
 - Step 9** (Optional) Save data.
 1. Log in to the device from a client.
 2. Copy the configuration file to the standby MPU using either of the following methods:

- Method 1:

```
<HUAWEI> copy flash:/XXX.cfg slave#flash:/XXX.cfg
```

 NOTE

XXX.cfg is the configuration file name.

- Method 2:

Run the **save** command to save the configuration file to the standby MPU.

3. Copy the license file to the standby MPU.

```
<HUAWEI> copy flash:/XXX.dat slave#flash:/XXX.dat
```

 NOTE

XXX.dat is the license file name. Skip this step if there is no license file in the system.

Step 10 Connect cables to the correct ports on the new MPU according to labels on the cables.

Step 11 After the replacement is complete, perform the following operations to verify whether the replacement is successful:

- Run the **display device board** command to check whether the new MPU is running properly. If the **Alarm** field is **Normal**, the MPU is running properly.
- Run the **display startup** command to view the system software name and configuration file name for next startup. The system software name and configuration file name on the new MPU must be the same as those on the old MPU.
- Run the **display current-configuration** command to check the current parameter settings. The parameter settings must be the same as those before the replacement.

 NOTE

The network monitoring engineers or system maintenance engineers can configure the software using the CLI.

----End

Follow-up Procedure

After the replacement is complete, tidy up all tools. If you confirm that the replaced MPU is faulty, fill in the **Fault Tag** and send the faulty MPU and the fault tag to Huawei.

10.8 Replacing an SFU

Context

All the SFUs on the CloudEngine 16800 are hot swappable. The procedures and methods for replacing an SFU on the CloudEngine 16800 are the same. The following illustrates how to replace an SFU on the CloudEngine 16808.

 **CAUTION**

Before replacing an SFU, remove the fan module corresponding to the SFU. Note:

- Prepare the materials and tools for replacing the SFU in advance, and ensure that the SFU is replaced and the fan module is inserted back within 10 minutes.
 - Only one fan module can be removed at a time.
 - If two or three SFUs matching one fan module need to be replaced, remove the fan module, replace the SFUs one by one, and install the fan module back. Ensure only one SFU is removed at a time; otherwise, the corresponding LPU will be powered off due to overheating.
 - When we need to replace an SFU on the CloudEngine 16816, push one ejector lever forward and press the green button to release the ejector lever. Perform similar operations for the other ejector lever.
-

NOTICE

- During the replacement, pull or push the SFU slowly and horizontally to prevent it from colliding with adjacent cards. Collisions may cause damages to the adjacent running cards.
 - Do not touch the electronic components on the SFU during the replacement.
 - To ensure that services are not affected when a running SFU is replaced, press and hold down the OFL button on the SFU for at least 6s before removing the SFU. Remove the SFU when the SFU is isolated from the system (its OFL indicator is steady yellow). You can directly replace an unregistered SFU without having to press and hold down the OFL button.
 - After an SFU is powered off, if the remaining power of the entire device meets requirements, the SFU will be automatically powered on after the device is restarted. The SFU power-off scenarios include:
 - The **power off** command is run to manually power off the SFU.
 - The device does not support the SFU.
 - The current version does not support the SFU.
-

Tools

ESD wrist strap or ESD gloves

Procedure

- Step 1** Before removing the SFU to be replaced, you should first determine the location of the SFU, for example, the cabinet and chassis where the SFU resides and the location of the fan module corresponding to the SFU.
- Step 2** 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.

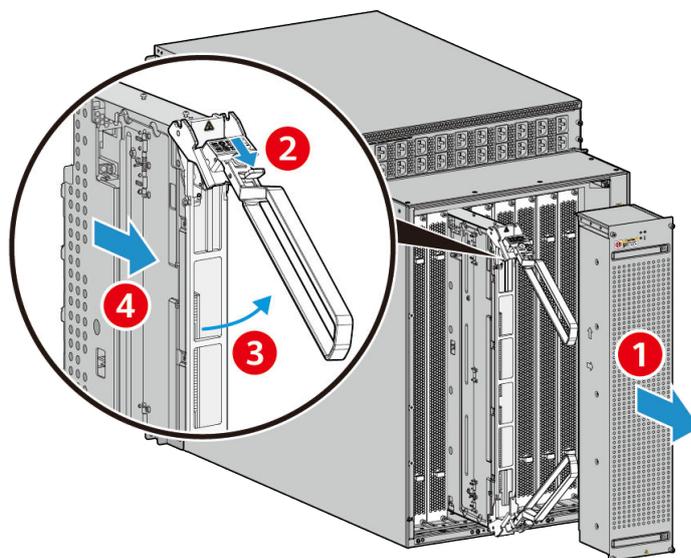
- Step 3** Take out a new SFU from the package, and check that no component on the SFU is damaged or detached.
- Step 4** Then, remove the fan module corresponding to the SFU to be replaced from the chassis. Locate the SFU to be replaced and attach a label on the front panel of the SFU to prevent misoperations. See callout 1 in [Figure 10-5](#).
- Step 5** Take out SFU ejector levers.
- Step 6** Remove the SFU to be replaced from the chassis.
1. Power off the SFU to be replaced.

You can power off an SFU using either of the following methods:
 - Press and hold down the OFL button on the panel of the SFU for at least 6 seconds until the RUN(G)/ALM(R)/OFL(Y) indicator is steady yellow, indicating that the SFU is powered off.
 - Run the **power off slot** *slotid* command in the user view.
 2. Install the ejector levers on the SFU to be replaced, and press and hold the square buttons on the ejector levers to rotate them outward and release the SFU from the chassis. See callouts 2, 3, and 4 in [Figure 10-5](#).
 3. Grasp the ejector levers with both hands and pull the SFU out slowly along the guide rails. When most part of the SFU is out of the chassis, use one hand to support the bottom of the SFU and the other hand to grasp its panel, while pulling the SFU out of the chassis. Place the SFU in an ESD bag or on an ESD pad.
 4. Press and hold the round button on the SFU to remove the ejector levers.

NOTICE

Do not use a tool other than the ejector levers to install or remove an SFU.

Figure 10-5 Removing an SFU



Step 7 Install the new SFU. For details, see [6.4 Installing SFUs](#).

Step 8 Insert a fan module.

Step 9 After the replacement is complete, perform the following operations to verify whether the replacement is successful.

 **NOTE**

After the new SFU is installed in the chassis, it starts and registers automatically. The start and registration process takes a few minutes.

- Observe the RUN(G)/ALM(R)/OFL(Y) indicator on the new SFU.
 - If the RUN(G)/ALM(R)/OFL(Y) indicator blinks green fast, the new SFU is loading the software or resetting.
 - If the RUN(G)/ALM(R)/OFL(Y) indicator blinks green slowly, the new SFU is running normally.
- Run the **display device board** command to check whether the new SFU is running properly. If the **Alarm** field is **Normal**, the SFU is running properly.

----End

Follow-up Procedure

After the replacement is complete, tidy up all tools. If you confirm that the replaced SFU is faulty, fill in the [Fault Tag](#) and send the faulty SFU and the fault tag to Huawei.

10.9 Replacing and Clearing Air Filters

Context

The environment of an equipment room must conform to relevant national or industrial standards. Keep the room clean, tidy, dustproof, and moistureproof. Prevent rodents and insects from entering the room. Perform routine maintenance to maintain the environment of the equipment room.

- Clean the equipment room periodically. You can clean the equipment room during daily or monthly maintenance.
- Periodically clean the dust-proof sponges of devices. Clean or replace the air filters every three to six months. If the dust is heavy, clean or replace the air filters at least once every three months.

NOTICE

- To prevent dust from falling off, remove the air filters slowly.
 - Clean the air filters gently. Otherwise, the dust-proof sponges may be pulled, causing unrecoverable stretching and deformation.
 - If the air filters cannot be washed or cannot be dry in cloudy days, take the air filters out of the equipment room and pat them gently to reduce dust.
 - The air filters may be deformed after being cleaned for multiple times. You are advised to replace them at least once a year.
-

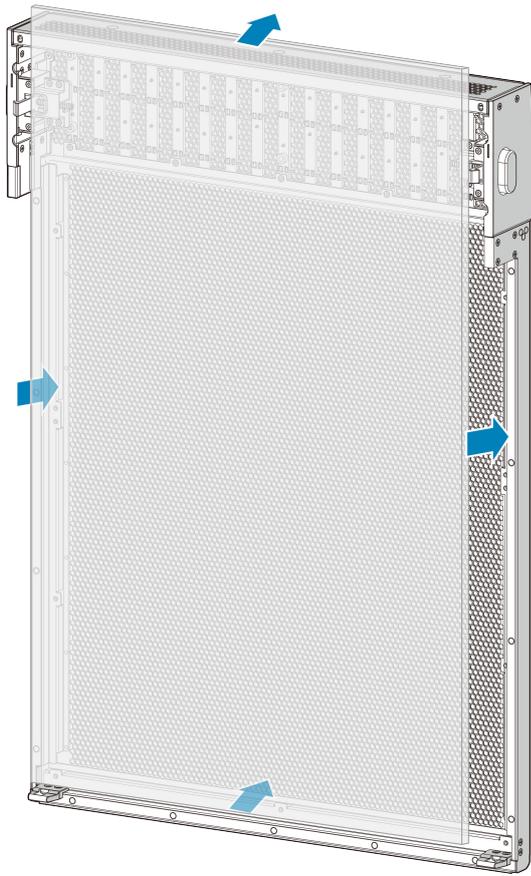
Tools

ESD wrist strap or ESD gloves

Procedure

- Step 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.
- Step 2** Remove the air filter to be replaced from the inner side of the cabinet door or chassis door (optional).
- Step 3** Wash the air filter with clean water. Add detergent if necessary. After cleaning, place it in a well-ventilated place for drying.
- Step 4** Align the cleaned air filter with the cabinet door or chassis door (optional). Gently press the contact positions between the air filter and sponge fixing strips to secure the air filter. Check whether the air filter covers holes on the door plate.

Figure 10-6 Replacing an air filter



----End

Follow-up Procedure

After the replacement is complete, tidy up all tools. Handle the replaced air filter in compliance with local safety regulations.

11 Appendix

[11.1 Appendix A Indicators](#)

[11.2 Appendix B On-site Cable Assembly and Installation](#)

[11.3 Appendix C Environmental Requirements for Device Operation](#)

[11.4 Appendix D Equipment Grounding Specifications](#)

[11.5 Appendix E Engineering Labels for Cables](#)

[11.6 Appendix F Guide to Using Optical Modules](#)

[11.7 Appendix G Fault Tag](#)

11.1 Appendix A Indicators

NOTE

This section only provides the status and meanings of some indicators for quick query. To check detailed status and meanings of indicators on modules, see the *CloudEngine 16800 Series Switches Hardware Description*.

Power Module Indicators

Table 11-1 describes the status and meanings of indicators on a 3000 W AC power module.

Table 11-1 Description of indicators on a 3000 W AC power module

Silkscreen	Name	Color	Description
Input	Power indicator	Green	<ul style="list-style-type: none"> Steady on: The input power of the power module is in the normal range. Fast blinking (4 Hz): The input voltage of the power module is out of the normal range. Off: The power module receives no input power.
Output	Alarm indicator	Green	<ul style="list-style-type: none"> Steady on: The output power of the power module is in the normal range. Off: The power module has no output power or the output power is abnormal.
Alarm	Fault indicator	Red	<ul style="list-style-type: none"> Off: The power module is working properly. Steady on: The power module has failed. Possible causes include internal short circuit, fan failure, output overvoltage, overtemperature-triggered shutdown, system loading failure, communication failure, and severely uneven current.

Table 11-2 describes the status and meanings of indicators on a 2200 W DC power module.

Table 11-2 Description of indicators on a 2200 W DC power module

Silkscreen	Name	Color	Description
INPUT	Power indicator	Green	<ul style="list-style-type: none"> Steady on: The input power of the power module is in the normal range. Fast blinking (4 Hz): The input voltage of the power module is out of the normal range. Off: The power module receives no input power.
OUTPUT	Alarm indicator	Green	<ul style="list-style-type: none"> Steady on: The output power of the power module is in the normal range. Off: The power module has no output power or the output power is abnormal.

Silkscreen	Name	Color	Description
ALARM	Fault indicator	Red	<ul style="list-style-type: none"> Off: The power module is working properly. Steady on: The power module has failed. Possible causes include internal short circuit, fan failure, output overvoltage, overtemperature-triggered shutdown, communication failure, and severely uneven current.

MPU Indicators

[Table 11-3](#) describes the status and meanings of indicators on MPUs.

Table 11-3 Description of indicators on MPUs

Silkscreen	Name	Color	Description
RUN(G))/ ALM(R) /OFL(Y)	Running status indicator NOTE This indicator only shows the running status of the local card.	Green	<ul style="list-style-type: none"> Steady on: The card has been powered on but the system software is not running. Slow blinking (0.5 Hz): The card is running properly. Fast blinking (4 Hz): The card is loading the system software or is resetting.
		Red	<ul style="list-style-type: none"> Steady on: A fault that affects services has occurred and it cannot be rectified automatically (critical alarm about hardware), or the card has generated an alarm because the memory size is not equal to the standard specification. Fast blinking (4 Hz): The system power is insufficient.
		Yellow	Steady on: The card is in power-off state. (For example, the card has been forcibly powered off using the power off command or is about to start.)
ACT	Active/Standby status indicator	Green	<ul style="list-style-type: none"> Steady on: The card is the active MPU. Off: The card is the standby MPU.

Silkscreen	Name	Color	Description
M/S	Stack status indicator	Green	<ul style="list-style-type: none"> Steady on: The stacking function is enabled, and the card is the active MPU of the stack. Slow blinking (0.5 Hz): The stacking function is enabled, and the card is not the active MPU of the stack. Off: The stacking function is disabled.

LPU Indicators

[Table 11-4](#) describes the status and meanings of indicators on LPUs.

Table 11-4 Description of indicators on LPUs

Silkscreen	Name	Color	Description
RUN/ALM	Running status indicator	Green	<ul style="list-style-type: none"> Steady on: The card has been powered on but the system software is not running. Slow blinking (0.5 Hz): The card is running properly. Fast blinking (4 Hz): The card is loading the system software or is resetting.
		Red	Steady on: The card has a fault that affects services and cannot be rectified automatically (critical alarm about hardware).
		Yellow	Steady on: The card is in power-off state. (For example, the card has been forcibly powered off using the power off command or is about to start.)

SFU Indicators

[Table 11-5](#) describes the status and meanings of indicators on SFUs.

Table 11-5 Description of indicators on SFUs

Silkscreen	Name	Color	Description
RUN(G) ALM(R) OFL(Y)	Running status indicator	Green	<ul style="list-style-type: none"> Steady on: The card has been powered on but the system software is not running. Slow blinking (0.5 Hz): The card is running properly. Fast blinking (4 Hz): The card is loading the system software or is resetting.
		Red	Steady on: The card has a fault that affects services and cannot be rectified automatically (critical alarm about hardware).
		Yellow	Steady on: The card is in power-off state. (For example, the card has been forcibly powered off using the power off command or is about to start.)

Fan Module Indicators

Table 11-6 describes the status and meanings of indicators on fan modules.

Table 11-6 Description of indicators on fan modules

Silkscreen	Name	Color	Description
	Fan status indicator	Green	<ul style="list-style-type: none"> Fast blinking (4 Hz): The fan module has not established communication with the MPU or communication loss occurs. Slow blinking (0.5 Hz): The fan module is working properly and communicating with the MPU normally.
		Red	Slow blinking (0.5 Hz): An alarm is generated, and the fan module is faulty.
		Yellow	Steady on: The fan module is abnormal. The possible cause is that the software of the fan monitoring unit (FMU) on the fan module is abnormal or the fan module fails.

Silkscreen	Name	Color	Description
SFU	SFU status indicator	Green	Steady on: The SFU is working properly.
		Red	Steady on: A fault that affects services has occurred. The fault cannot be rectified automatically and requires manual intervention.
		Yellow	Steady on: The fan module software is not loaded, or the communication fails, and the SFU indicator cannot be properly displayed.

11.2 Appendix B On-site Cable Assembly and Installation

11.2.1 Cable Assembly Precautions

Checking the Appearance of Cables

- If the cable jacket or insulation is visibly dirty, clean it before assembly.
- If the jacket or insulation of a cable has visible damage, irreparable scuffing, or other defects, do not use the cable.
- If the shield layer of a cable is damaged, do not use the cable.
- If the cable jacket or insulation cracks after the cable is bent or twisted, discard this cable and check whether other cables have the same problem. If other cables have the same problem, replace these cables.

Checking the Appearance of Connectors

- Do not use connectors with visible defects, damage, rust, or scuffing.
- Do not use connectors if their shells or pins have exposed part or uneven plating, or their pins are lost, broken, or bent.
- Do not use connectors that have dirt on their pins or in their jacks or if there are conductors between pins or between pins and the shell.

Precautions for Assembly

- Use dedicated tools or tools delivered by Huawei and follow the methods given here during assembly.
- Hold terminals of cables instead of pulling the cables themselves when installing or removing cable components.
- Take the following precautions when cutting or stripping cables:
 - Make cables slightly longer than necessary.

- Coil cables longer than 2 m (6.56 ft) after cutting. Bind and fasten the coils using bundling ropes. The inner diameters of the coils should be larger than 20 times the outer diameters of the cables.
- When stripping the jackets of cables, avoid damaging the shield layers (braid or aluminum foil), insulation, core conductors, and other jackets that do not need to be stripped.
- After assembling cables, cut all visible cross sections of jackets to ensure that the cross sections are arranged neatly.
- Do not touch the core conductors of cables with your hands. Terminate exposed conductors in a timely way after stripping off insulation so that the surface of the conductors does not become oxidized.
- Take the following precautions when crimping and connecting cables or connectors:
 - The terminals and conductors should be connected tightly after they are crimped. They should not be moved or turned.
 - Cut all the exposed copper wires.
 - Try to avoid a second crimping of sleeves.
 - Keep all the conductors clean and aligned.

 **NOTE**

The connectors, cables, and tools provided by different vendors may be different. The figures in this document are for your reference only.

11.2.2 Assembling Power Cables

11.2.2.1 Assembling the OT Terminal and Power Cable

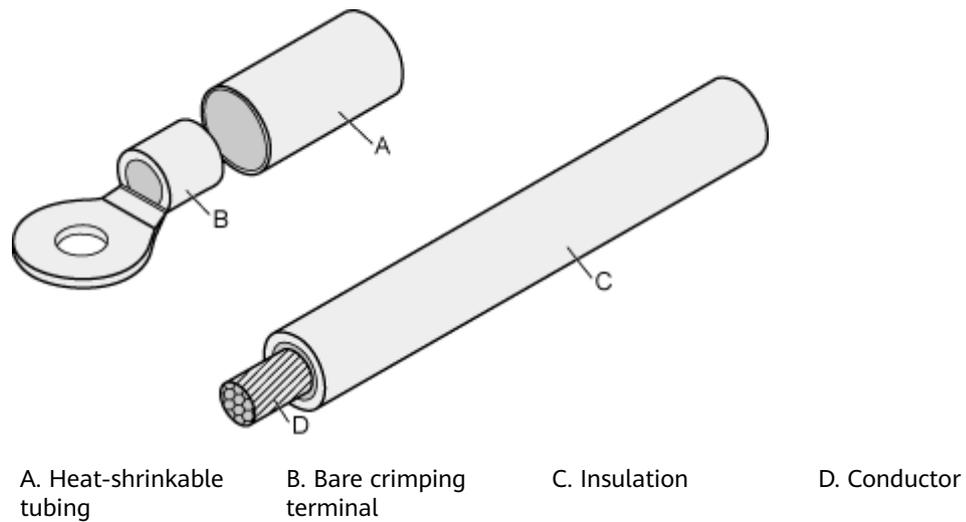
Context

NOTICE

Do not bend OT terminals to 90 degrees onsite.

Figure 11-1 shows the components of an OT terminal and a power cable.

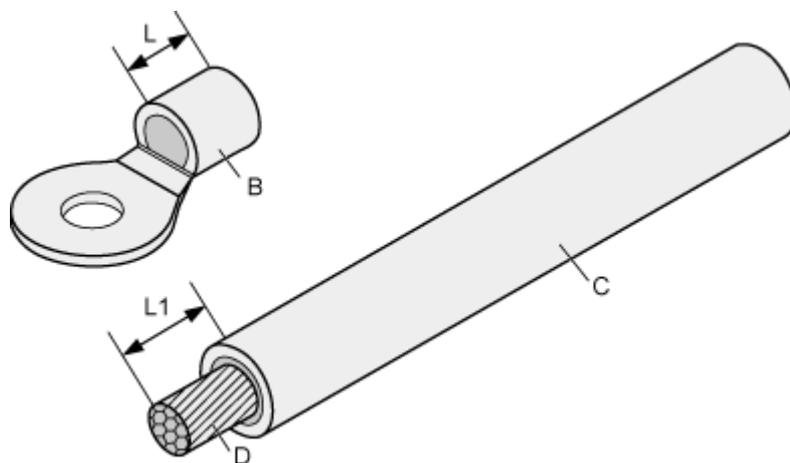
Figure 11-1 Components of an OT terminal and a power cable



Procedure

- Step 1** Based on the cross-sectional area of the cable conductor, strip a length of insulation coating C to expose the conductor D of length L1, as shown in [Figure 11-2](#). The recommended values of L1 are listed in [Table 11-7](#).

Figure 11-2 Stripping a power cable (OT terminal)



NOTICE

- When you strip a power cable, do not damage the conductor of the cable.
- If the bare crimping terminal is not provided by Huawei, the value of L1 is 1 mm (0.04 in.) to 2 mm (0.08 in.) greater than the value of L.

Table 11-7 Mapping between the cross-sectional area of the conductor and the value of L1

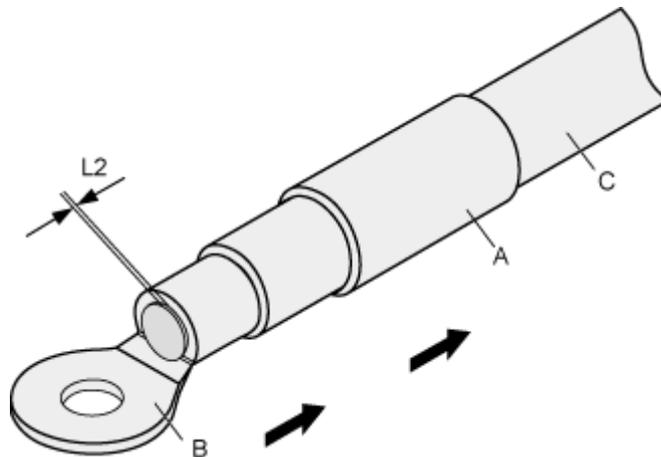
Cross-Sectional Area of Conductor (mm ² (in. ²))	Value of L1 (mm (in.))	Cross-Sectional Area of Conductor (mm ² (in. ²))	Value of L1 (mm (in.))
1 (0.002)	7 (0.28)	10 (0.015)	11 (0.43)
1.5 (0.002)	7 (0.28)	16 (0.025)	13 (0.51)
2.5 (0.004)	7 (0.28)	25 (0.039)	14 (0.55)
4 (0.006)	8 (0.31)	35 (0.054)	16 (0.63)
6 (0.009)	9 (0.35)	50 (0.077)	16 (0.63)

NOTE

If you are proficient in assembling OT terminals and power cables, you can obtain the value of L1 by comparing the part to be crimped with the power cable.

Step 2 Put the heat-shrinkable (A) tubing onto the bare crimping terminal, as shown in [Figure 11-3](#).

Figure 11-3 Putting the heat shrink tubing onto the bare crimping terminal



Step 3 Put the OT terminal B onto the exposed conductor, and ensure that the OT terminal is in good contact with the insulation coating C, as shown in [Figure 11-3](#).

NOTICE

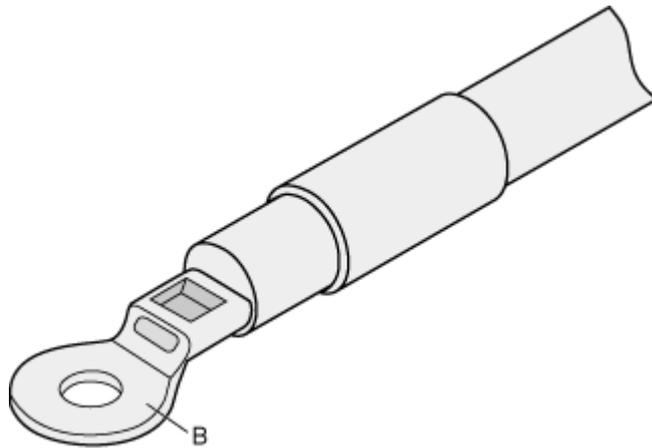
After the conductor is fed into the OT terminal, the protruding part of the conductor, or L2 in [Figure 11-3](#), must not be longer than 2 mm (0.08 in.).

Step 4 Crimp the joint parts of the bare crimping terminal and the conductor, as shown in [Figure 11-4](#).

 **NOTE**

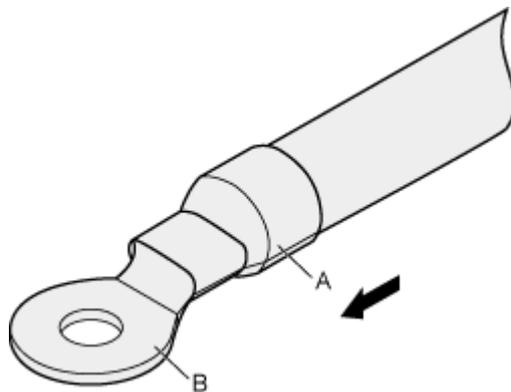
The shapes of crimped parts may vary with the crimping dies.

Figure 11-4 Crimping the joint parts of the bare crimping terminal and the conductor (OT terminal)



Step 5 Push the heat shrink tubing (A) toward the connector until the tube covers the crimped part, and then use a heat gun to heat the tube, as shown in [Figure 11-5](#).

Figure 11-5 Heating the heat shrink tubing (OT terminal)



NOTICE

Stop heating the shrink tubing when the connector is securely locked in the shrink tubing. Do not heat the shrink tubing too long as this may damage the insulation coating.

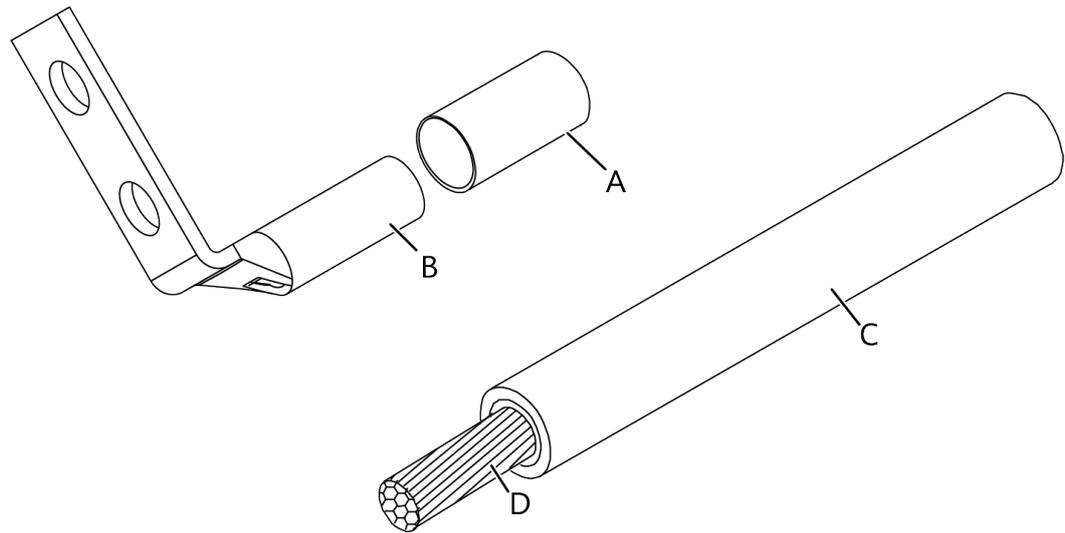
----End

11.2.2.2 Assembling the JG2 Terminal and Power Cable

Context

Figure 11-6 shows the components of a JG2 terminal and a power cable.

Figure 11-6 Components of a JG2 terminal and a power cable



A. Heat shrink tubing B. JG2 terminal C. Insulation layer of a power cable D. Conductor of a power cable

Procedure

- Step 1** Strip a part of the insulation to expose the cable conductor with a length of L, as shown in **Figure 11-7**. The recommended values of L are listed in **Table 11-8** 1.

NOTICE

- When you strip a power cable, do not damage the conductor of the cable.
 - If the bare crimping terminal is not provided by Huawei, you can adjust the value of L as required.
-

Figure 11-7 Stripping a power cable (JG2 terminal)

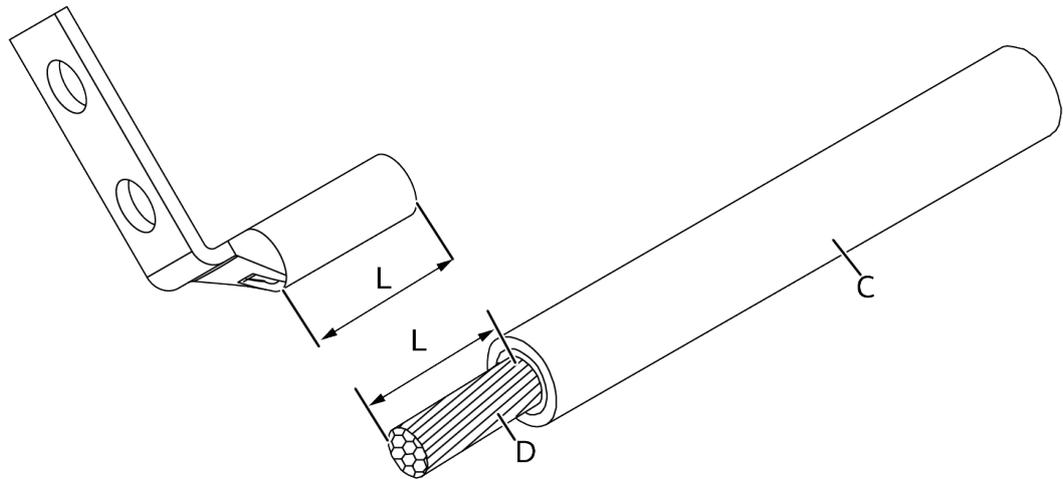
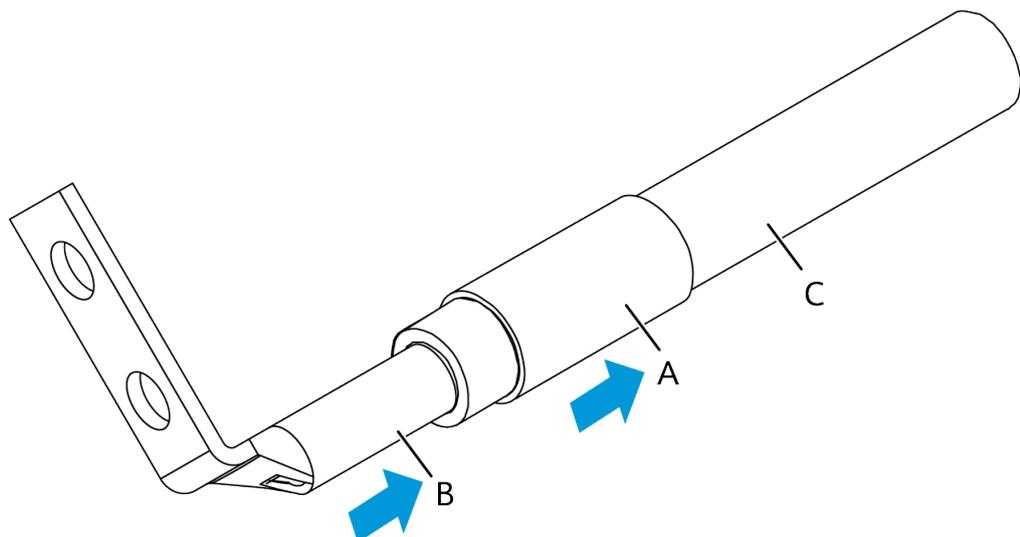


Table 11-8 Mapping between the cross-sectional area of the conductor and the value of L

Cross-Sectional Area of Conductor (mm ² (in. ²))	Value of L (mm (in.))
25 (0.039)	21~23 (0.83~0.91)
35 (0.054)	30~32 (1.18~1.26)

Step 2 Put the heat shrink tubing onto the bare crimping terminal, as shown in [Figure 11-8](#).

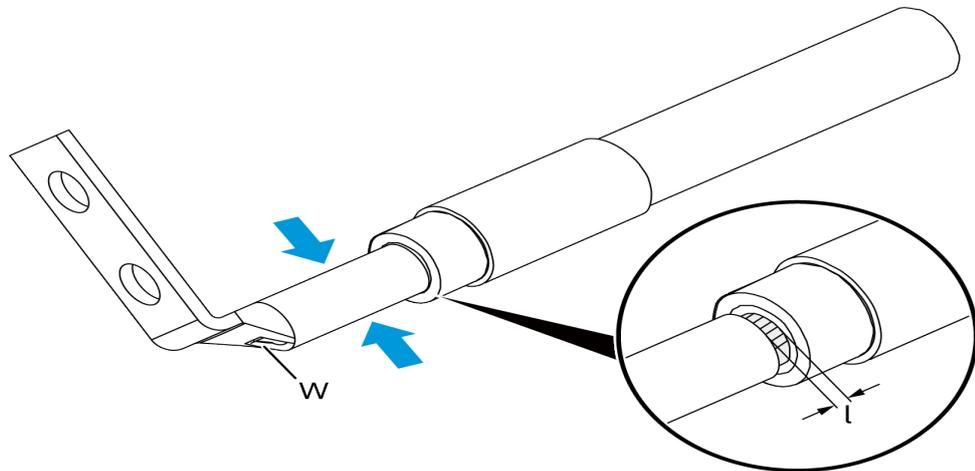
Figure 11-8 Putting the heat shrink tubing onto the bare crimping terminal



Step 3 Put the bare crimping terminal onto the exposed conductor, and ensure that the bare crimping terminal is in good contact with the insulation of the power cable, as shown in [Figure 11-8](#).

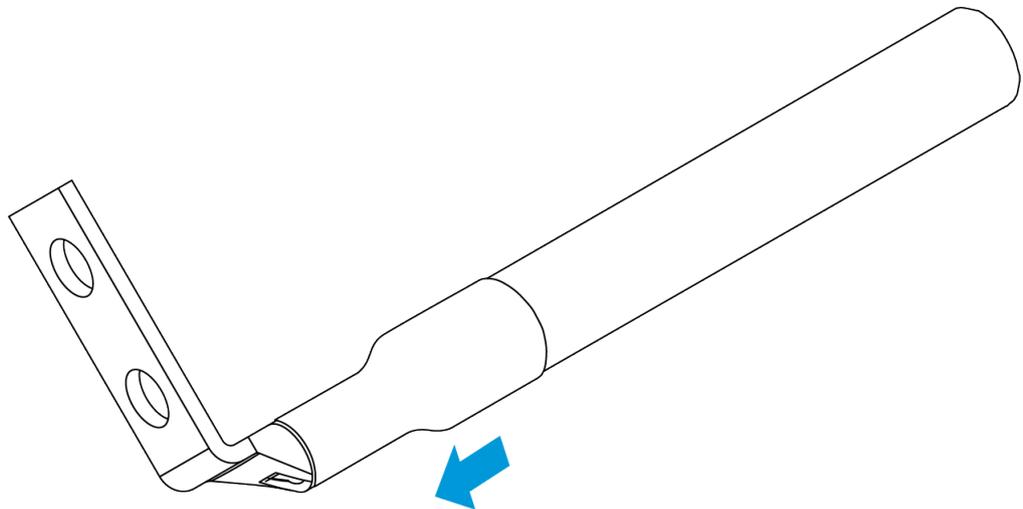
- Step 4** Crimp the joint parts of the bare crimping terminal and the conductor, as shown in [Figure 11-9](#).

Figure 11-9 Crimping the joint parts of the bare crimping terminal and the conductor (JG2 terminal)



- Step 5** Push the heat shrink tubing toward the connector until the tube covers the crimped part, and then use a heat gun to heat the tube, as shown in [Figure 11-10](#).

Figure 11-10 Heating the heat shrink tubing (JG2 terminal)



----End

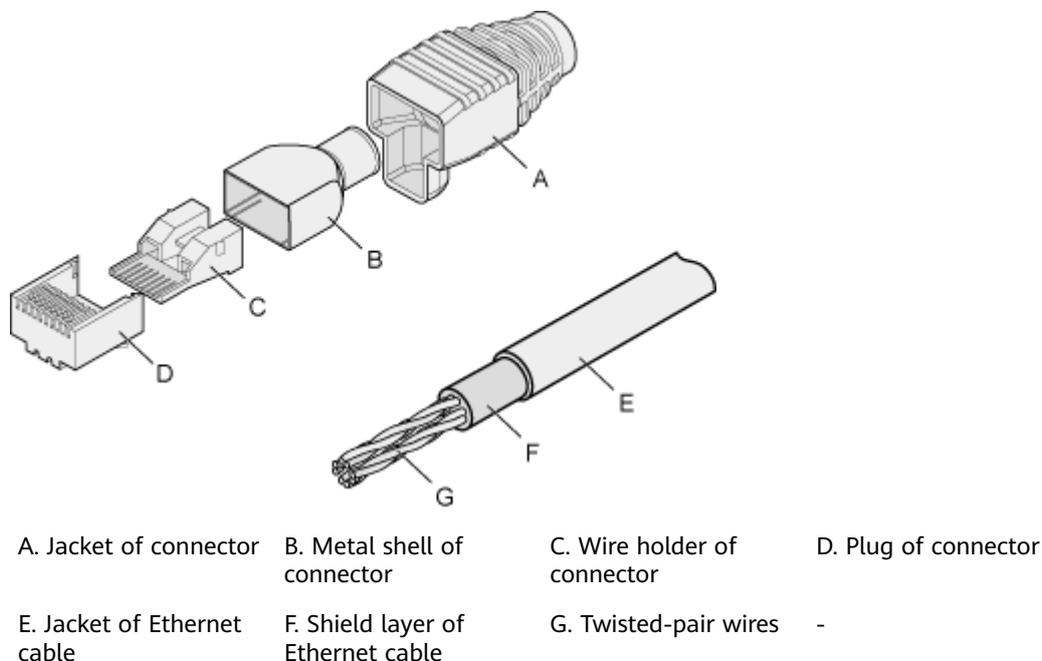
11.2.3 Assembling Ethernet Cables

11.2.3.1 Assembling the Shielded RJ45 Connector and Ethernet Cable

Context

Figure 11-11 shows the components of an RJ45 connector and a shielded Ethernet cable.

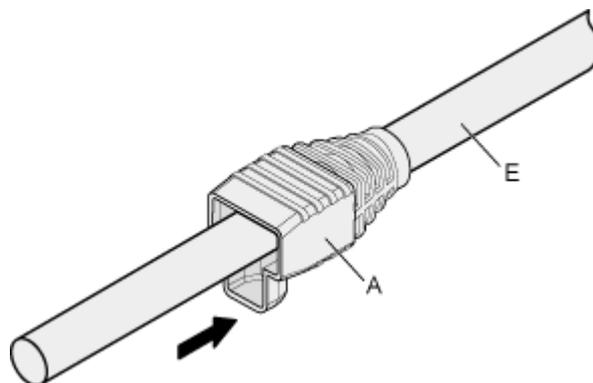
Figure 11-11 Shielded RJ45 connector and cable



Procedure

Step 1 Fit the jacket of the connector onto the Ethernet cable, as shown in **Figure 11-12**.

Figure 11-12 Fitting the jacket of the connector onto the Ethernet cable

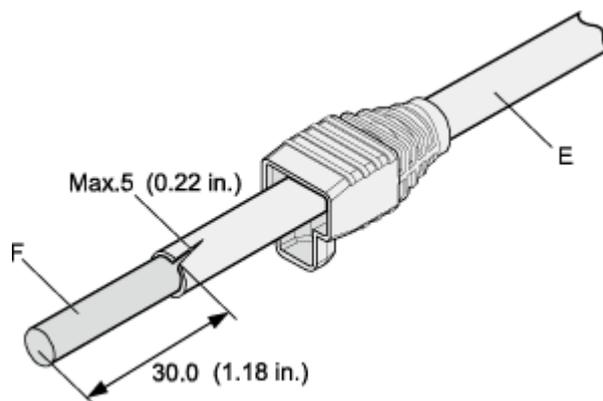


Step 2 Remove a 30 mm (1.18 in.) long section of the jacket, cut off the nylon twine inside the jacket, and cut a no more than 5 mm (0.20 in.) cleft in the jacket, as shown in **Figure 11-13**.

NOTICE

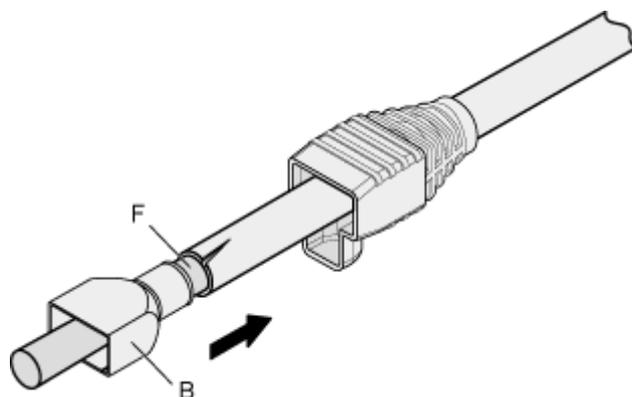
- When you remove a section of the jacket, do not damage the shield layer of the twisted-pair cable.
- When you remove the shield layer, do not damage the insulation of the twisted-pair cable.

Figure 11-13 Removing the jacket of a twisted-pair cable (unit: mm (in.))



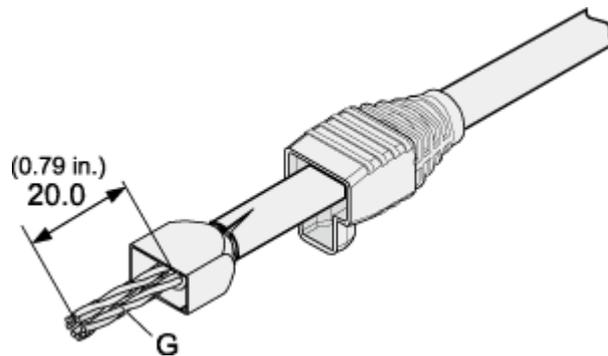
Step 3 Fit the metal shell onto the twisted-pair cable. The shield layer is covered by the metal shell, as shown in [Figure 11-14](#).

Figure 11-14 Fitting the metal shell onto the twisted-pair cable



Step 4 Fit the metal shell onto the twisted-pair cable until the shield layer is covered completely. Along the edge of the metal shell, cut off the aluminum foil shield layer and ensure that there is no surplus copper wire. The exposed twisted-pair cable is about 20 mm (0.79 in.) long, as shown in [Figure 11-15](#).

Figure 11-15 Removing the shield layer of a twisted-pair cable (unit: mm (in.))



Step 5 Lead the four pairs of twisted-pair wires through the wire holder, as shown in [Figure 11-16](#) and [Figure 11-17](#). Ensure that the colored wires are in the correct location in the cable.

Figure 11-16 Leading wires through the wire holder

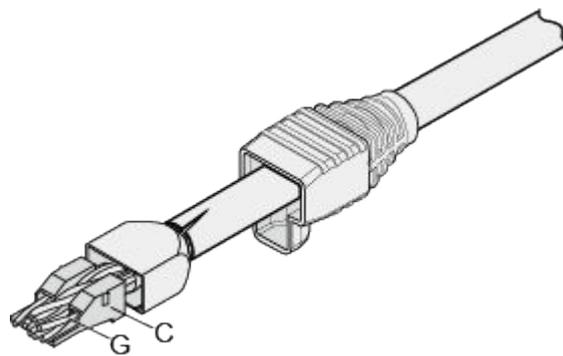
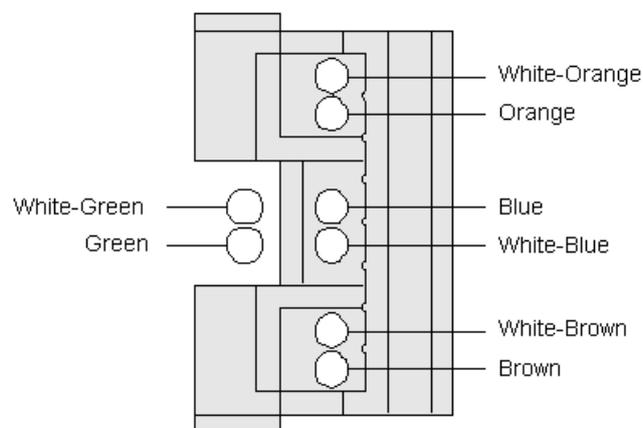


Figure 11-17 Cable locations in a wire holder



Step 6 Align the four pairs of cables in the holder, as shown in [Figure 11-18](#). The connections between the wires and the pins are shown in [Figure 11-19](#) and listed in [Table 11-9](#).

Figure 11-18 Four pairs of cables on a wire holder

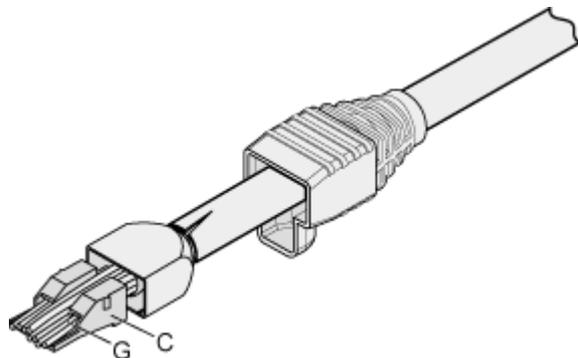


Figure 11-19 Connections between wires and pins

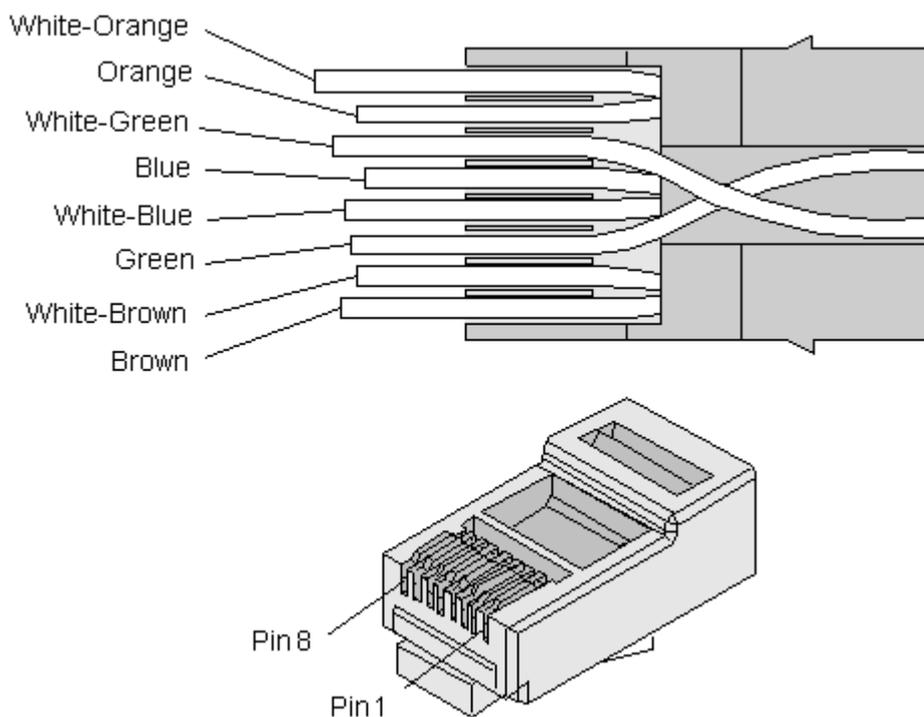


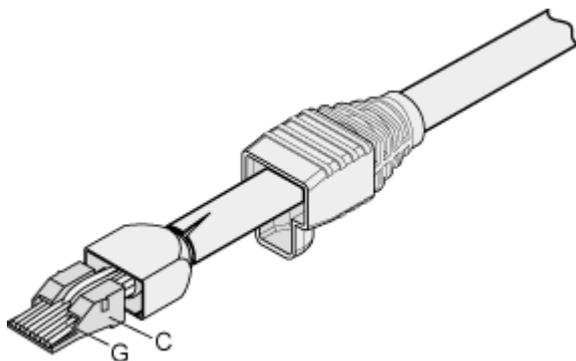
Table 11-9 Connections between wires and pins (using a straight-through cable as an example)

Matching Pins of Wires	Wire Color
1	White-Orange

Matching Pins of Wires	Wire Color
2	Orange
3	White-Green
4	Blue
5	White-Blue
6	Green
7	White-Brown
8	Brown

Step 7 Cut off the surplus cables along the lower edge of the wire holder, as shown in [Figure 11-20](#).

Figure 11-20 Cutting off surplus cables

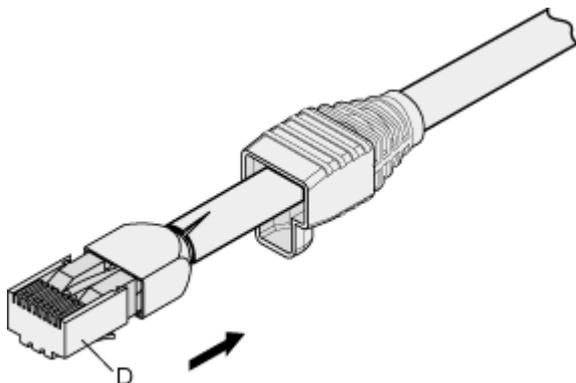


Step 8 Put the connector body onto the wire holder and turn the metal shell by 90°, as shown in [Figure 11-21](#).

NOTE

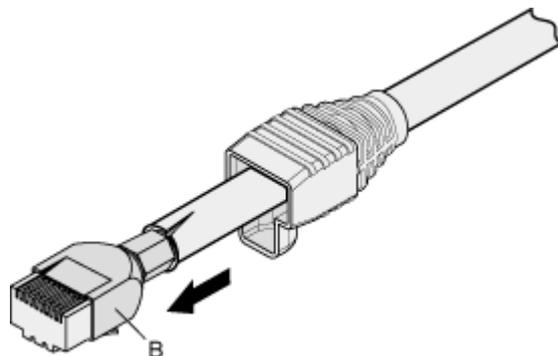
Ensure that the wire holder is in good contact with the connector body.

Figure 11-21 Putting the connector body onto the wire holder



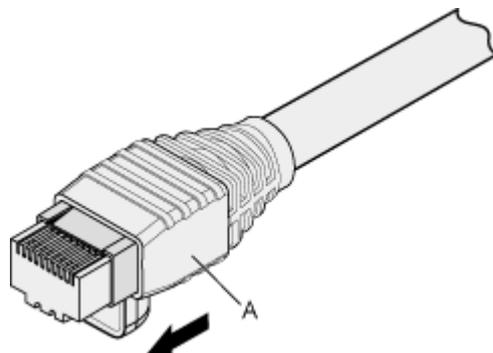
- Step 9** Push the metal shell toward the connector body until the wire holder and the connector body are engaged completely. Crimp the connector, as shown in [Figure 11-22](#).

Figure 11-22 Crimping the connector



- Step 10** Push the jacket towards the metal shell until the metal shell is covered. This completes the assembly of one end of the cable, as shown in [Figure 11-23](#).

Figure 11-23 Pushing the metal shell



- Step 11** To complete the assembly of the other end, repeat steps 1 to 10.

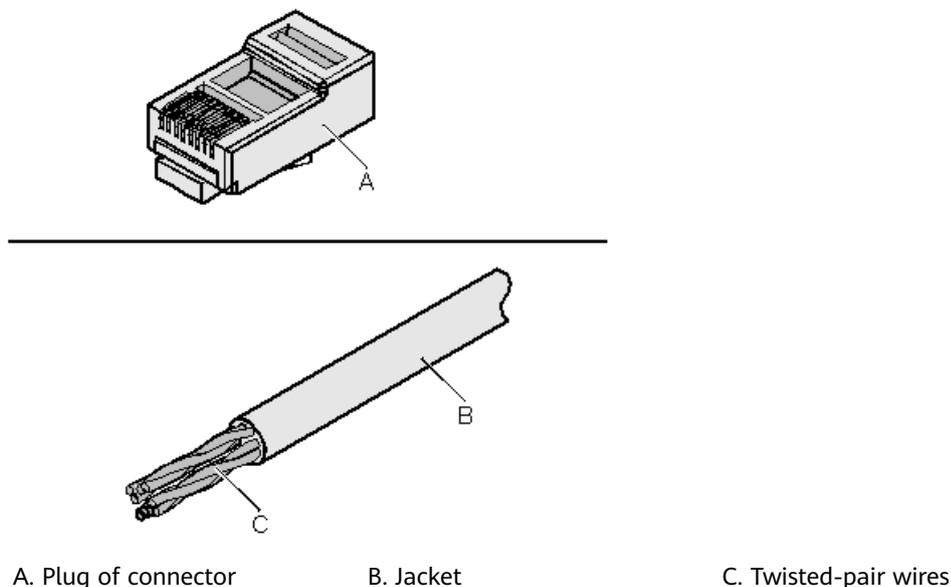
----End

11.2.3.2 Assembling an Unshielded RJ45 Connector and Ethernet Cable

Context

[Figure 11-24](#) shows the components of an unshielded RJ45 connector and cable.

Figure 11-24 Components of an unshielded RJ45 connector and cable



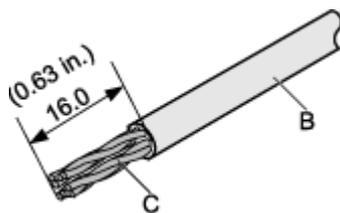
Procedure

- Step 1** Remove a 16-mm (0.63 in.) long section of the jacket, as shown in [Figure 11-25](#).

NOTICE

When you remove the shield layer, do not damage the insulation of the twisted-pair cable.

Figure 11-25 Removing the jacket of a twisted-pair cable (unit: mm (in.))



- Step 2** Align the four pairs of wires and cut the ends neatly, as shown in [Figure 11-26](#). The connections between the wires and the pins are listed in [Table 11-10](#).

Figure 11-26 Connections between wires and pins (unit: mm (in.))

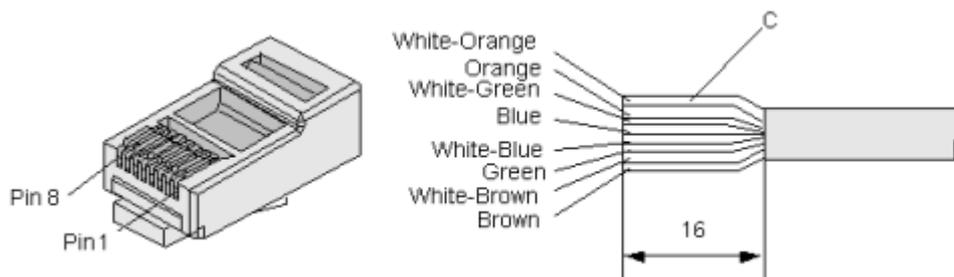


Table 11-10 Connections between wires and pins (using a straight-through cable as an example)

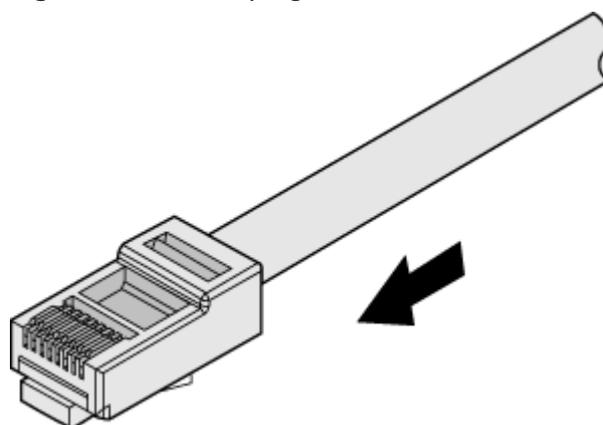
Matching Pins of Wires	Wire Color
1	White-Orange
2	Orange
3	White-Green
4	Blue
5	White-Blue
6	Green
7	White-Brown
8	Brown

Step 3 Feed the cable into the plug, and crimp the connector, as shown in [Figure 11-27](#).

NOTE

When inserting the cable, check from the side or bore of the plug to ensure that the cable is completely seated in the plug.

Figure 11-27 Crimping the connector



Step 4 To complete the assembly of the other end, repeat steps 1 to 3.

----End

11.2.3.3 Checking the Appearance of Contact Strips

Context

- To ensure proper contact between the crimped wires and the wire conductors, the heights and sizes of the contact strips must be standard and the same.
- The contact strips must be parallel to each other, with an offset of less than $\pm 5^\circ$. The top margin of a strip must be parallel to the axis of the connector, with an offset of less than $\pm 10^\circ$.
- To ensure conductivity, the surface of the contact strips must be clean.
- The contact strips must be in good contact with the RJ45 socket. The plastic separators must remain intact and be aligned.
- The contact strip blade must extend beyond the ends of the wires. The ends of the wires must be in contact with the edge of the RJ45. The distance between them must be less than 0.5 mm (0.02 in.).

Procedure

Step 1 Hold the crimped connector, with the front side facing you, and check whether the contact strips are of the same height. The height should be 6.02 ± 0.13 mm (0.237 ± 0.005). If a measuring tool is not available, you can compare the connector with a standard connector. [Figure 11-28](#) shows an unqualified piece, and [Figure 11-29](#) shows a qualified piece.

NOTE

All unqualified pieces must be crimped again.

Figure 11-28 Contact strips of different heights



Figure 11-29 Contact strips of the same height



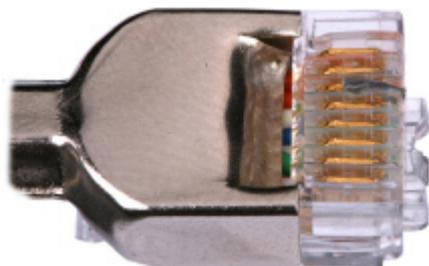
Step 2 Hold an RJ45 connector and turn it 45°. Observe the top edges of the metal contact strips. **Figure 11-30** shows an unqualified piece.

Figure 11-30 Unparallel contact strips of different heights



Step 3 Check whether the contact strips are clean. If they are not clean and the dirt cannot be removed, replace it with a new RJ45 connector. **Figure 11-31** shows an unqualified piece.

Figure 11-31 Dirt on a contact strip



Step 4 Check whether the contact strips and the plastic separators are well aligned and intact. If a separator is skewed and cannot be fixed, replace it with a new RJ45 connector. **Figure 11-32** shows an unqualified piece.

Figure 11-32 Skewed plastic separators



- Step 5** Hold the connector with the side facing towards you, and check whether you can see the cross-sections of the wires. Ensure that the ends of the wires are in good contact with the edge of the RJ45, and that the contact strip blade extends beyond the ends of the wires and is crimped with the wires. If not, replace the connector. [Figure 11-33](#) shows an unqualified piece.

Figure 11-33 Wires not in good contact with the edge of the RJ45



Not in good contact with the edge of the RJ45 trough

----End

11.2.3.4 Testing the Connection of Assembled Cables

Context

Huawei provides two types of Ethernet cables: straight-through cables and crossover cables.

- Straight-through cables are connected in a one-to-one manner. They are used to connect terminals such as a computer or switch to network devices. [Table 11-11](#) lists the connections of core wires in a straight-through cable.

Table 11-11 Connections of core wires in a straight-through cable

RJ45 Connector 1	RJ45 Connector 2	Core Wire Color	Twisted or Not
2	2	Orange	Twisted
1	1	Orange-White	
6	6	Green	Twisted
3	3	Green-White	
4	4	Blue	Twisted
5	5	Blue-White	
8	8	Brown	Twisted
7	7	Brown-White	

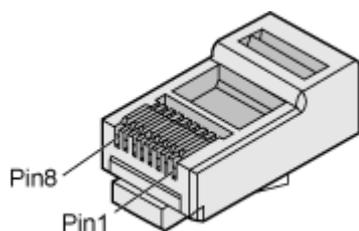
- Crossover cables are connected in a crossover manner. They are used to connect terminals such as two computers or switches. [Table 11-12](#) lists the connections of core wires in a crossover cable.

Table 11-12 Connections of core wires in a straight crossover cable

RJ45 Connector 1	RJ45 Connector 2	Core Wire Color	Twisted or Not
6	2	Orange	Twisted
3	1	Orange-White	
2	6	Green	Twisted
1	3	Green-White	
4	4	Blue	Twisted
5	5	Blue-White	
8	8	Brown	Twisted
7	7	Brown-White	

[Figure 11-34](#) shows the pins of an RJ45 connector.

Figure 11-34 Pins of an RJ45 connector



Procedure

- Step 1** Feed both connectors of the cable into the ports of the cable tester.
- Step 2** After the connectors are properly inserted, turn on the tester. If the indicators from 1 to G turn on simultaneously, you can infer that the pins work normally and the wires are correctly connected.

 **NOTE**

Turn the switch to the S position to slow down lighting of the indicators so that you can see the indicators more clearly, as shown in [Figure 11-35](#).

Figure 11-35 Testing the conduction and connections of wires



- Step 3** Gently shake the connector and repeat [Step 2](#) to check whether the metal contact strips are in good contact with the core wires and Ethernet ports, as shown in [Figure 11-36](#).

Figure 11-36 Checking the reliability



The procedure for testing a crossover cable is the same as that for testing a straight-through cable except for the sequence in which the indicators turn on, which depends on the wire connections of a crossover cable.

The Ethernet cable is qualified if the indicators turn on in the following sequence:

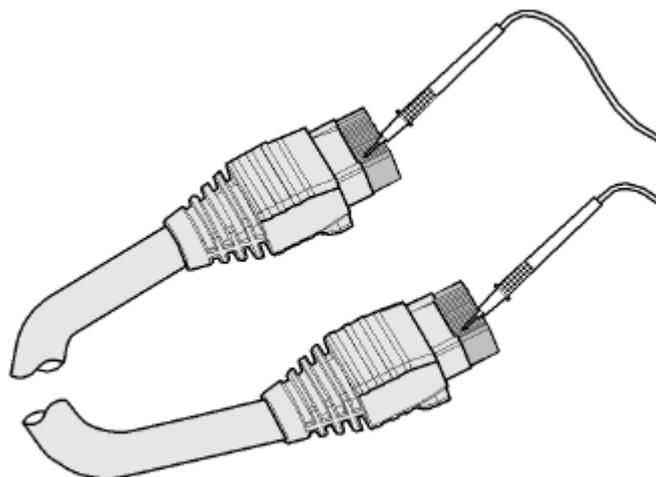
At the master (left) section of the tester, the indicators turn on in the sequence of 1-8-G. At the slave (right) section of the tester, the indicators turn on in the sequence of 3-6-1-4-5-2-7-8-G.

If the indicators do not come on in this sequence, the Ethernet cable is unqualified.

NOTE

If a tester is not available, you can use a multimeter to perform a simple test, as shown in [Figure 11-37](#).

Figure 11-37 Testing the connection of an Ethernet cable



----End

11.2.4 Installing Cable Accessories

11.2.4.1 Precautions for Installing Cable Accessories

NOTE

The illustrations in this document may differ from actual situations, but the installation methods are the same. For example, in this document, the adapters of cable connectors have separate interfaces. In the actual situation, the adapters may have interfaces fixed on equipment.

Tools

Use dedicated tools provided or specified by Huawei and follow the installation procedure described here.

Bending Radius

Unless otherwise specified, bending radius (R) of cables or fibers must meet the requirements listed in [Table 11-13](#).

Table 11-13 Bending radius of cables or fibers

Cable or Fiber	Bending Radius (R)
Ordinary cable	In normal cases, $R \geq 2d$. When the cable is connected with a connector, $R \geq 5d$.
Fiber	$R \geq 40$ mm (1.57 in.); Bending angle $> 90^\circ$

NOTE

The letter d indicates the diameter of a cable or fiber.

Precautions for Installation

- Hold terminals of cables instead of pulling the cables themselves when installing or removing cable components.
- Do not insert a connector forcibly when the connector is blocked. Use a dedicated tool to pull out the connector. Install the connector again after you check that the pins are inserted properly.
- Before tightening screws on cable connectors, ensure that the connectors are properly connected to their adapters. Tighten the screw with appropriate force using a flat-head or Phillips screwdriver instead of bare hands or an electric screwdriver. If the screw cannot be screwed into the tapped hole, determine

the reason and try again. Do not apply too much force, or the screw or adapter may be damaged.

- When removing densely aligned cables or fiber connectors, use dedicated pliers such as cable-pulling pliers and fiber-pulling pliers.
- Do not twist, bend, stretch, or extrude fibers during installation.
- Cover the idle fiber connectors with dust caps. Remove the dust caps before using the fiber connectors.

Requirements for Cable Routing

- To protect cables, remove the burrs in the cable through-holes or install protective rings in the holes.
- To ease the connection and to avoid stress, keep cable joints slack. After connecting multiple cables to a connector that has multiple interfaces, keep the cables slack to avoid generating stress.
- Bind or clean cables gently because cable distortion affects signal quality.
- Keep cables away from moveable components such as doors.
- Sharp objects must not touch cable wiring to prevent damage to cables.
- To protect power cables, route power cables of the active and standby power modules separately.

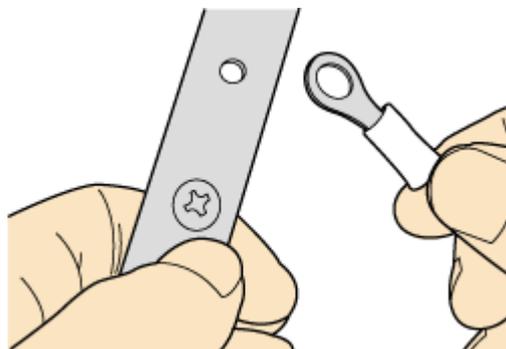
11.2.4.2 Installing Power Adapters

11.2.4.2.1 Installing the OT Terminal

Procedure

- Install an OT terminal.
 - a. Align the hole of the OT terminal (conductor upward) with a connecting hole, as shown in [Figure 11-38](#).

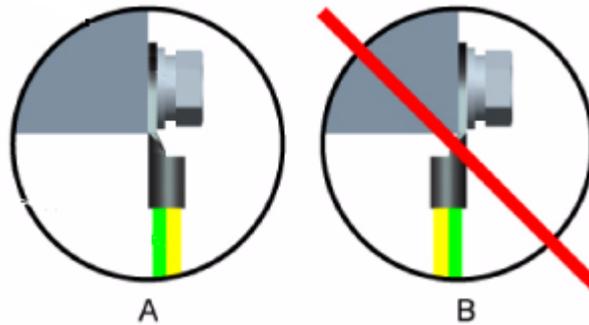
Figure 11-38 Aligning the OT terminal with a connecting hole



 NOTE

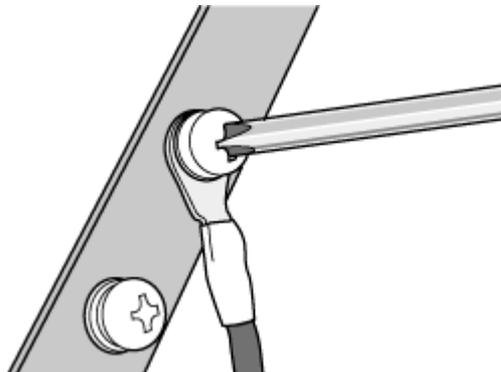
When you install an OT terminal, the crimping sleeve is installed as shown in [Figure 11-39](#), where A is correct and B is incorrect.

Figure 11-39 Installing an OT terminal, showing the orientation of crimping sleeve



- b. Place the spring washer and flat washer in turn, mount a matching screw, and fasten it clockwise, as shown in [Figure 11-40](#).

Figure 11-40 Installing two terminals back to back

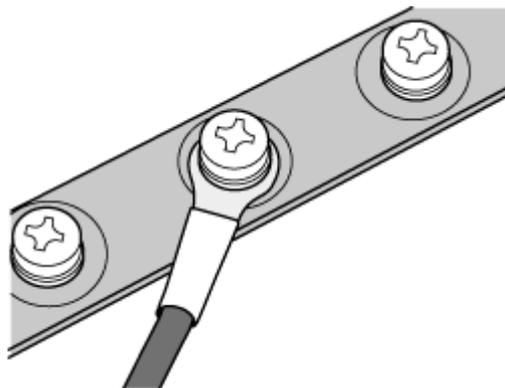


NOTICE

Ensure that the OT terminal is not in contact with other terminals or metal components.

- c. Move the cable slightly and ensure that it is securely connected, as shown in [Figure 11-41](#).

Figure 11-41 Installed OT terminal



- Install two OT terminals on a post.

Before you install two OT terminals on a post, ensure that the two terminals can be installed on the post and that the electrical connecting pieces have a large contact area. Two OT terminals can be installed using any of these methods:

- Bend the upper OT terminal at a 45- or 90-degree angle, as shown in [Figure 11-42](#).
- Cross the two terminals, as shown in [Figure 11-43](#).

Figure 11-42 Bending the upper OT terminal at a 45- or 90-degree angle

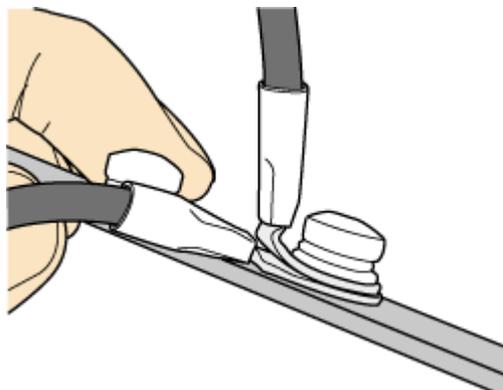
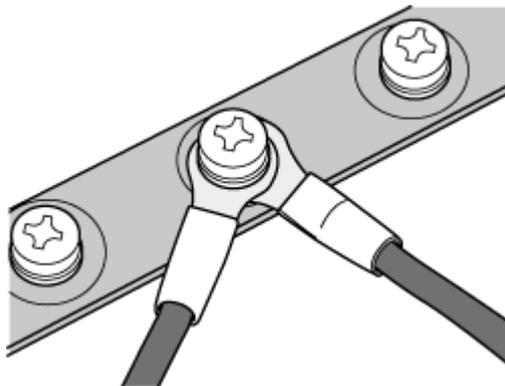


Figure 11-43 Crossing two terminals



NOTICE

If the two terminals are different sizes, place the smaller one above the bigger one. A maximum of two terminals can be installed on a post.

- To remove an OT terminal, loosen the screw counterclockwise.

----End

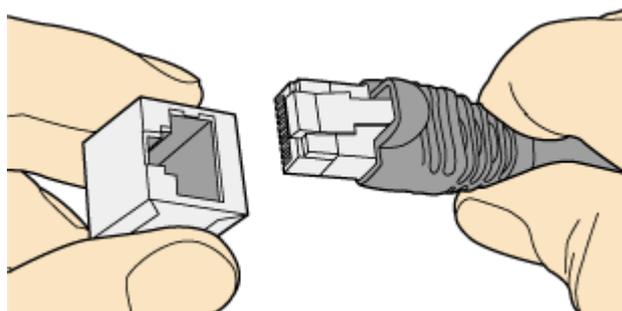
11.2.4.3 Installing Ethernet Adapters

11.2.4.3.1 Installing a Shielded Ethernet Connector

Procedure

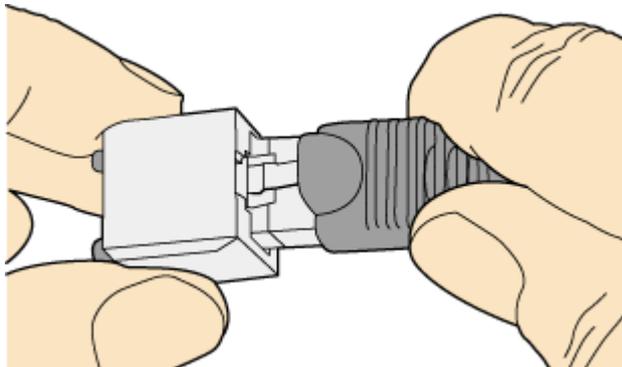
- Step 1** Hold the male and female connectors, with the male connector facing the female connector, as shown in [Figure 11-44](#).

Figure 11-44 Holding the male and female shielded connectors



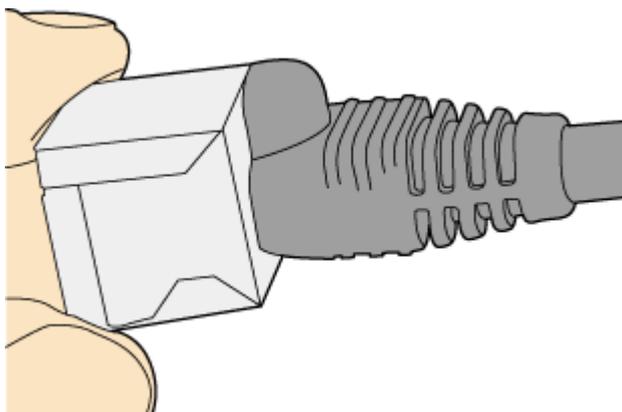
- Step 2** Insert the male connector into the female connector, as shown in [Figure 11-45](#).

Figure 11-45 Feeding the male shielded connector into the female shielded connector



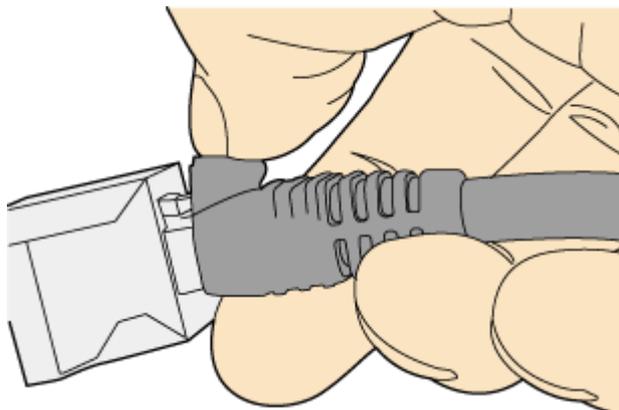
Step 3 When you hear a click, the cable connector is completely inserted in the port. (The clip on the cable connector pops up to fix the connector in the port.) Pull the connector slightly and ensure that it is securely connected, as shown in [Figure 11-46](#).

Figure 11-46 Installed shielded Ethernet connector



Step 4 To remove an Ethernet connector, press the locking key and pull out the connector, as shown in [Figure 11-47](#).

Figure 11-47 Removing a shielded Ethernet connector



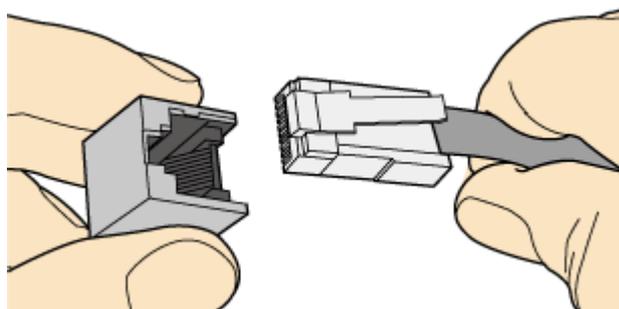
----End

11.2.4.3.2 Installing an Unshielded Ethernet Connector

Procedure

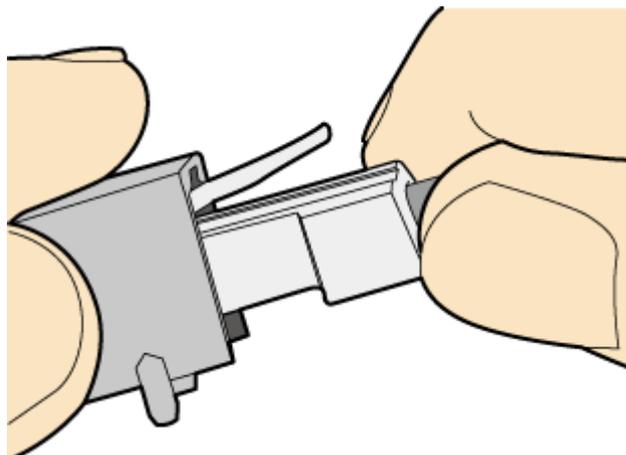
- Step 1** Hold the male and female connectors, with the male connector facing the female connector, as shown in [Figure 11-48](#).

Figure 11-48 Holding the male and female unshielded connectors



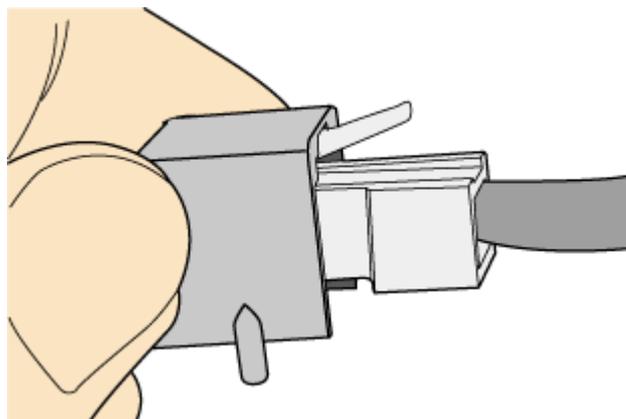
- Step 2** Feed the male connector into the female connector, as shown in [Figure 11-49](#).

Figure 11-49 Feeding the male connector into the female unshielded connector



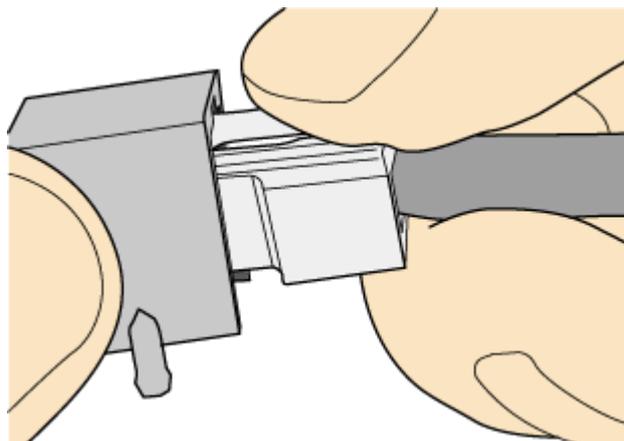
Step 3 A crisp click indicates that the connector is locked by the locking key. Pull the connector slightly and ensure that it is securely connected. [Figure 11-50](#) shows an installed Ethernet connector.

Figure 11-50 Installed unshielded Ethernet connector



Step 4 To remove an Ethernet connector, press the locking key and pull out the connector, as shown in [Figure 11-51](#).

Figure 11-51 Removing an unshielded Ethernet connector



----End

11.2.4.4 Installing Fiber Connectors

Context

NOTICE

- After you remove the dustproof cap, ensure that the fiber pins are clean and install them as soon as possible.
 - When you disassemble fiber connectors, you must use a dedicated tool if the connectors are densely installed. Do not pull fiber protection pipes to remove fiber connectors.
-

11.2.4.4.1 Cleaning Fiber Connectors

Procedure

- Step 1** Clean the pins of a fiber connector by using lint-free cotton and alcohol.
- Step 2** Clean the pins again by using dust-free cotton. If necessary, clean the pins by using an air gun. Ensure that the pins are free from any fiber or debris.

----End

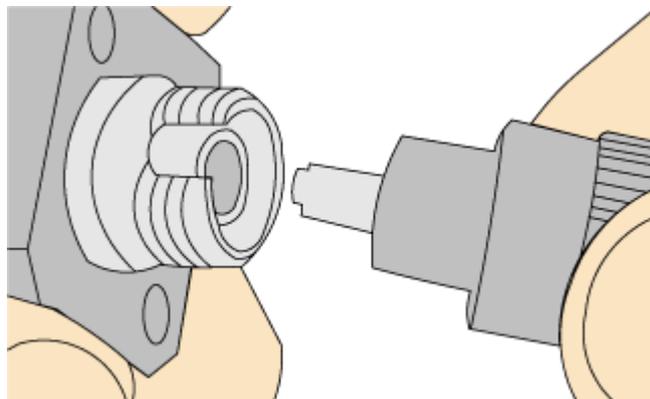
11.2.4.4.2 Installing an FC Fiber Connector

Procedure

- Step 1** Remove the dustproof cap of the FC connector and store it for future use.

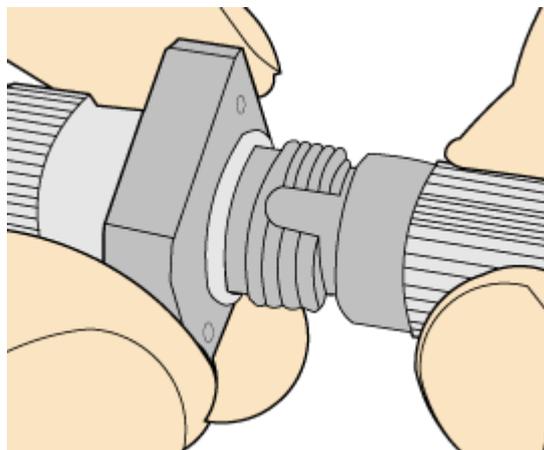
- Step 2** Align the core pin of the male connector with that of the female connector, as shown in [Figure 11-52](#).

Figure 11-52 Aligning the male connector with the female connector



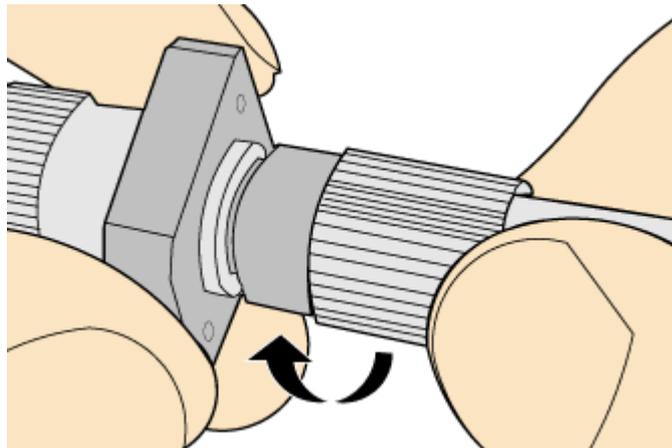
- Step 3** Align the male connector with the female connector and gently push the male connector until it is completely seated in the female connector, as shown in [Figure 11-53](#).

Figure 11-53 Feeding the male connector into the female connector



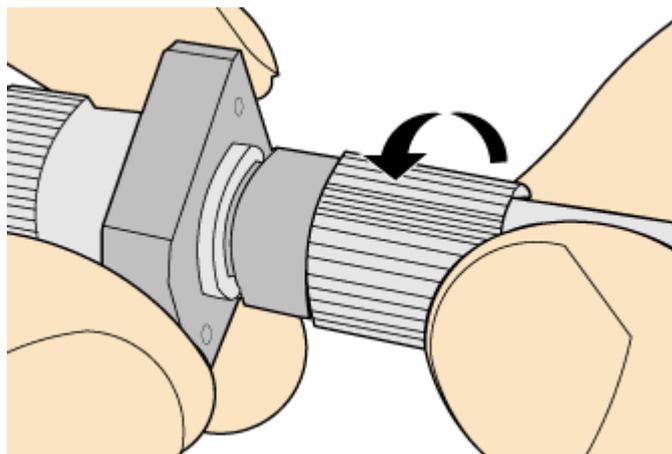
- Step 4** Fasten the locking nut clockwise and ensure that the connector is securely installed, as shown in [Figure 11-54](#).

Figure 11-54 Fastening the locking nut



- Step 5** To disassemble an FC fiber connector, loosen the locking nut counterclockwise, and gently pull the male connector, as shown in [Figure 11-55](#).

Figure 11-55 Disassembling an FC fiber connector



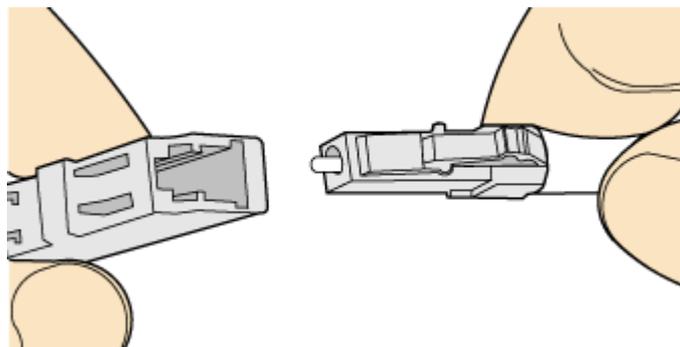
----End

11.2.4.4.3 Installing an LC Fiber Connector

Procedure

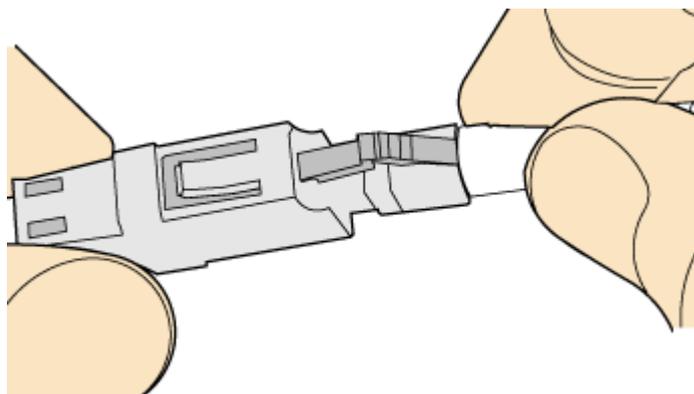
- Step 1** Remove the dustproof cap of the LC fiber connector and store it for future use.
- Step 2** Align the core pin of the male connector with that of the female connector, as shown in [Figure 11-56](#).

Figure 11-56 Aligning the male connector with the female connector



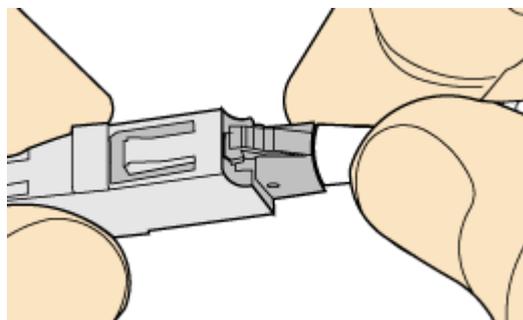
Step 3 Align the male connector with the fiber adapter and gently push the male connector until it is completely seated in the fiber connector, as shown in [Figure 11-57](#).

Figure 11-57 Feeding the male connector into the female connector



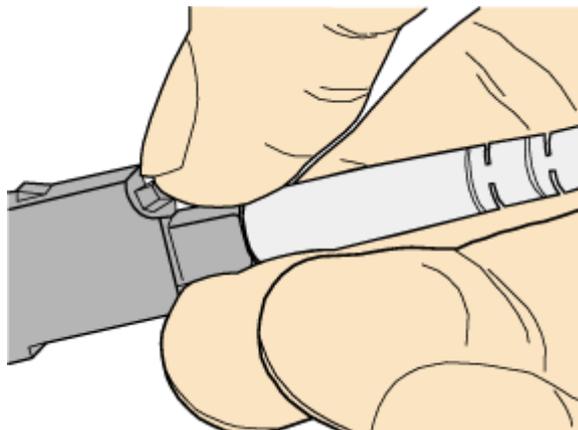
Step 4 A clicking sound indicates that the male connector is locked, as shown in [Figure 11-58](#).

Figure 11-58 Installed LC connector



Step 5 To disassemble an LC fiber connector, press the locking nut to release the locking clips from the bore, and gently pull the male connector, as shown in [Figure 11-59](#).

Figure 11-59 Disassembling an LC fiber connector



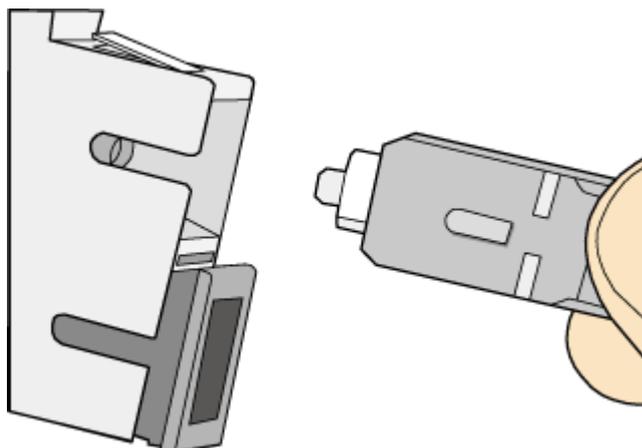
----End

11.2.4.4.4 Installing the SC Fiber Connector

Procedure

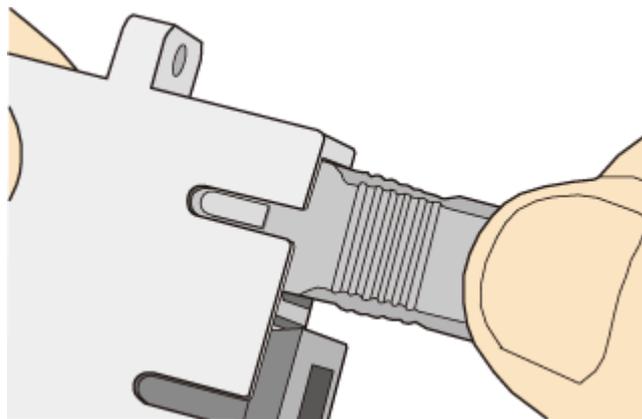
- Step 1** Remove the dustproof cap of the SC fiber connector and store it for future use.
- Step 2** Align the core pin of the male connector with that of the female connector, as shown in [Figure 11-60](#).

Figure 11-60 Aligning the male connector with the female connector



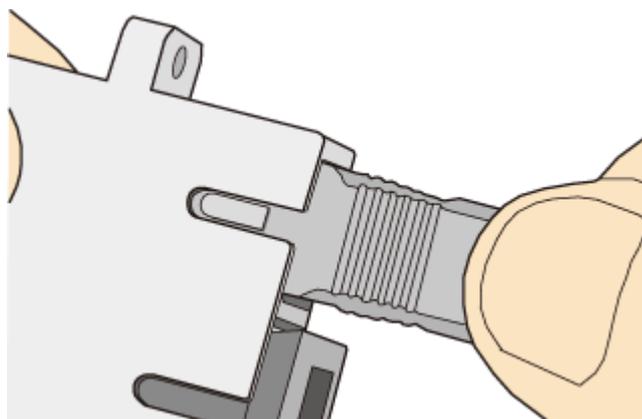
- Step 3** Feed the fiber connector into the female connector, with your fingers holding the shell of the fiber connector (not the pigtail). When you hear a click, the fiber connector is secured by the clips (internal parts, not illustrated in the figure). Pull the fiber connector gently. If the connector does not loosen, the installation is complete. See [Figure 11-61](#).

Figure 11-61 Installed SC fiber connector



- Step 4** To disassemble an SC fiber connector, hold the shell of the connector (do not hold the fiber) and gently pull the connector in the direction vertical to the adapter. Unlock the male connector, and then separate it from the shell, as shown in [Figure 11-62](#).

Figure 11-62 Disassembling an SC fiber connector



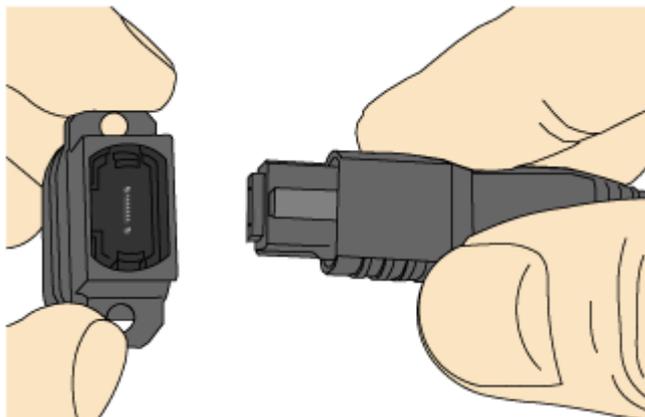
----End

11.2.4.4.5 Installing an MPO Connector

Procedure

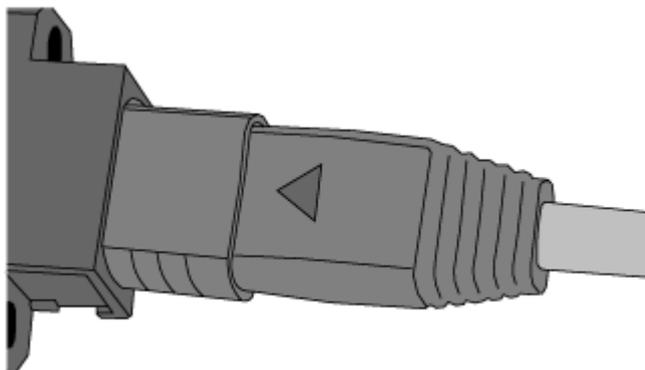
- Step 1** Remove the dustproof cap of the MPO fiber connector and store it for future use.
- Step 2** Align the core pin of the male connector with that of the female connector, as shown in [Figure 11-63](#).

Figure 11-63 Aligning the male connector with the female connector



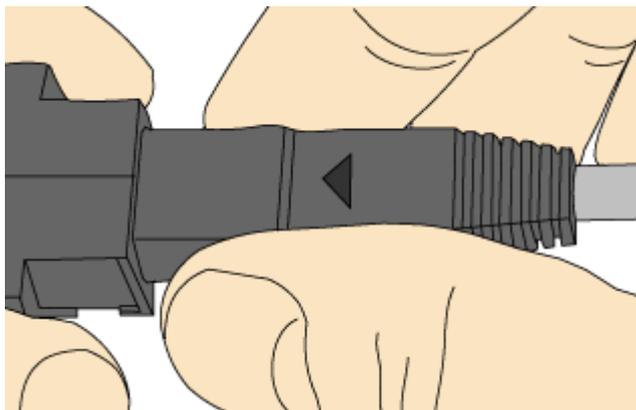
- Step 3** Hold the shell labeled "PUSH" and feed the male connector into the female connector until you hear a clicking sound. The male and female connectors are securely installed, as shown in [Figure 11-64](#).

Figure 11-64 Installed MPO fiber connector



- Step 4** To disassemble an MPO fiber connector, hold the shell labeled "PULL" and remove the male connector, as shown in [Figure 11-65](#).

Figure 11-65 Disassembling an MPO fiber connector



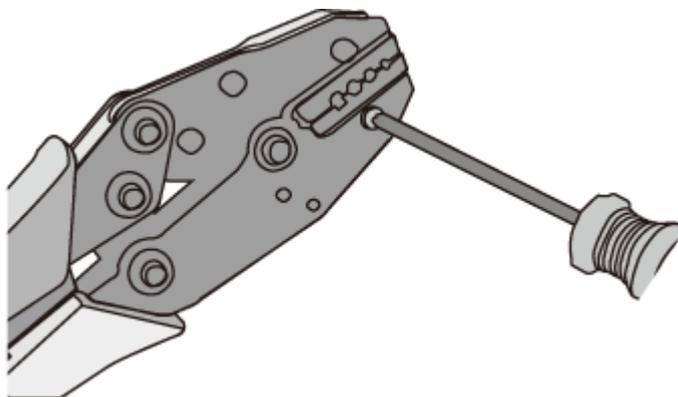
----End

11.2.5 Replacing the Mold of the Crimping Tool

Procedure

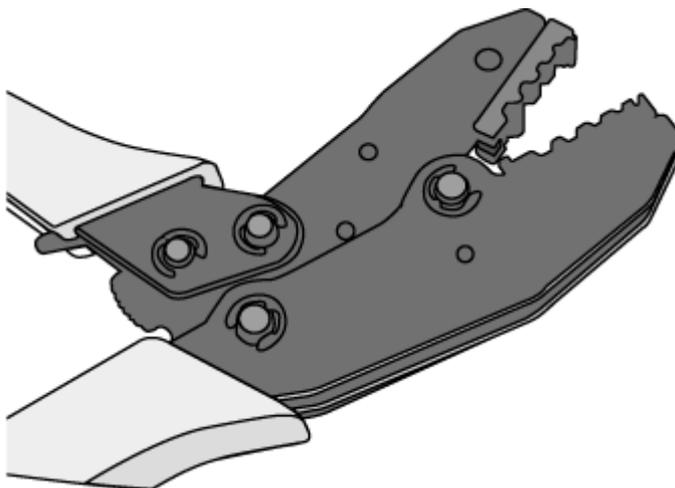
- Step 1** Hold the handles of a pair of COAX crimping tools. Loosen the two fastening screws counterclockwise, as shown in [Figure 11-66](#).

Figure 11-66 Loosening two fastening screws



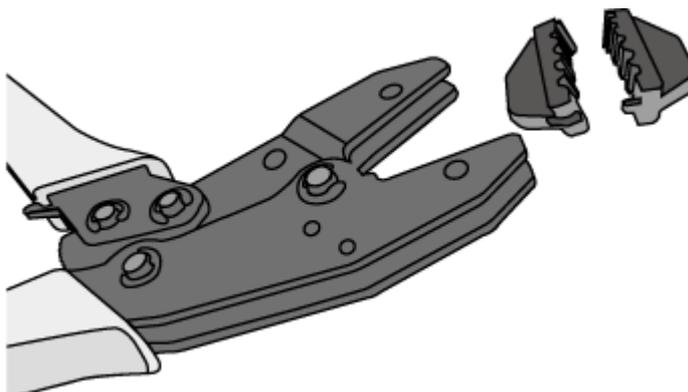
- Step 2** Hold the handles of the COAX crimping tools to open the self-locking mechanism. The jaw of the COAX crimping tools opens automatically, as shown in [Figure 11-67](#).

Figure 11-67 Pliers jaw opening automatically



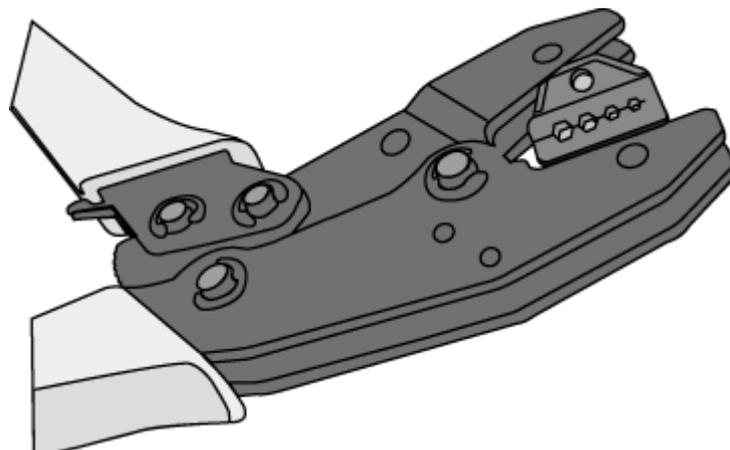
Step 3 Remove the mold from the COAX crimping tools, as shown in [Figure 11-68](#).

Figure 11-68 Removing the mold from the COAX crimping tools



Step 4 Place the mold to be installed into the jaw of the COAX crimping tools and align the screw holes, as shown in [Figure 11-69](#).

Figure 11-69 Installing a new mold in the COAX crimping tool

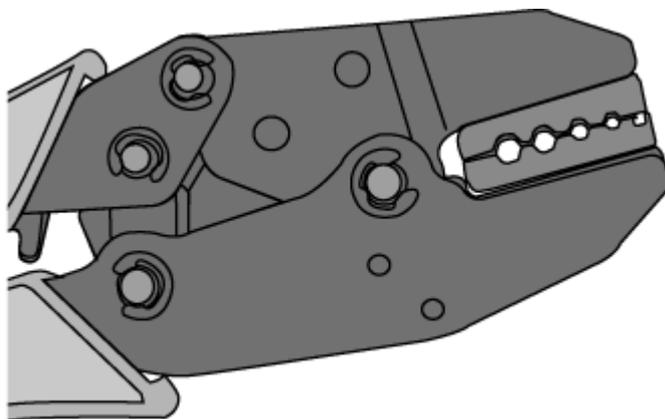


NOTICE

Keep the short side of the mold inwards and the long side outwards, with the teeth of the mold aligning from the larger size to the smaller size.

- Step 5** Hold the handles of the COAX crimping tools tightly to match the mold and the jaw completely. Align the screw holes, as shown in [Figure 11-70](#).

Figure 11-70 Aligning the screw holes



- Step 6** Hold the handles of the COAX crimping tools with one hand. Tighten the two fastening screws clockwise. [Figure 11-71](#) and [Figure 11-72](#) shows the mold installed in the COAX crimping tool.

Figure 11-71 Mold installed in the COAX crimping tool

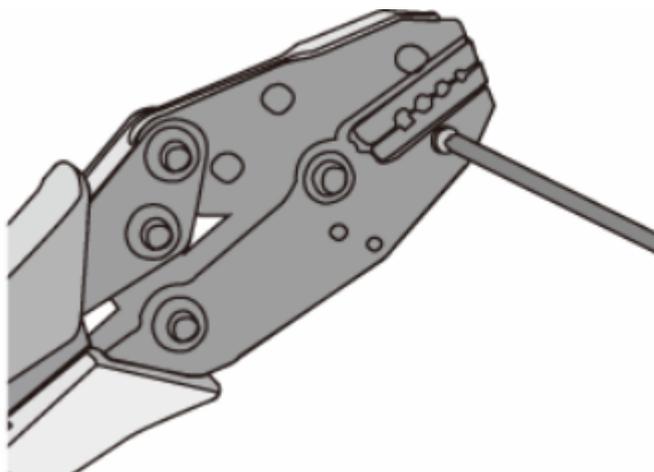
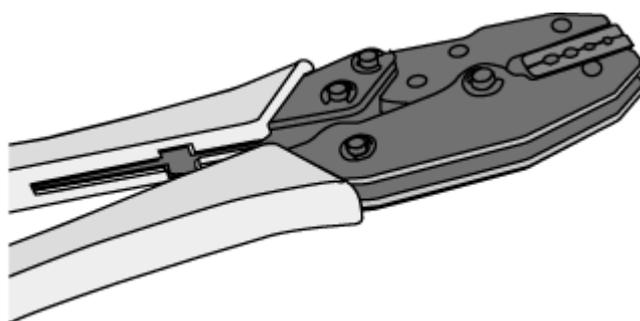


Figure 11-72 An installed mold



----End

11.3 Appendix C Environmental Requirements for Device Operation

11.3.1 Environmental Requirements for an Equipment Room

11.3.1.1 Requirements for Selecting a Site for an Equipment Room

When designing a project, consider the communication network planning and technical requirements of the equipment. Also consider hydrographic, geological, seismic, power supply, and transportation factors.

Construction, structure, heating and ventilation, power supply, lighting and fire-proof construction of the equipment room should be designed by specialized

construction designers to suit the environmental requirements of devices. The equipment room should also follow local regulations concerning the industrial construction, environmental protection, fire safety, and civil air defense. Construction must conform to government standards, regulations, and other requirements.

The equipment room should be located in a place free from high temperature, dust, toxic gases, explosive materials, or unstable voltage. Keep the equipment room away from significant vibrations or loud noises, as well as power transformer stations.

The specific requirements for selecting a site for an equipment room are as follows:

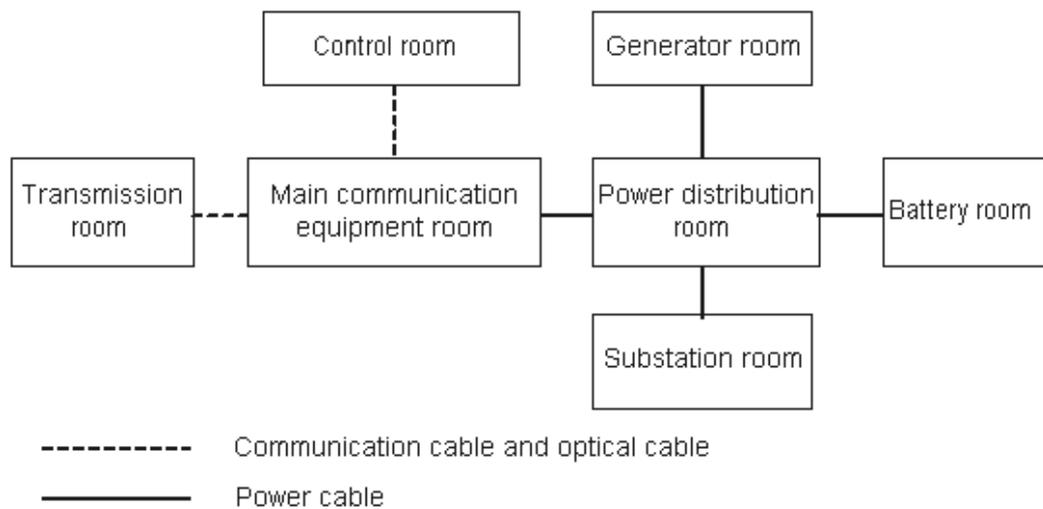
- The room should be located at a distance of at least 5 km (3.11 mi.) from heavy pollution sources such as smelting and coal mines. It should be located at a distance of at least 3.7 km (2.30 mi.) from moderate pollution sources such as chemical, rubber, and galvanization factories. It should be located at a distance of at least 2 km (1.24 mi.) from light pollution sources such as packinghouses and tanyards. If these pollution sources cannot be avoided, ensure that the equipment room is upwind of the pollution sources. In addition, use a high-quality equipment room or protection products.
- The room should be located away from livestock farms, or be upwind of the livestock farms. Do not use an old livestock room or fertilizer warehouse as the equipment room.
- The equipment room must be far away from residential areas. An equipment room that is not far away from residential areas must comply with equipment room construction standards to avoid noise pollution.
- The room should be located far away from industrial and heating boilers.
- The room should be at least 3.7 km (2.30 mi.) away from the seaside or salt lake. Otherwise, the equipment room should be airtight with cooling facilities. In addition, alkalized soil cannot be used as the construction material. Otherwise, equipment suitable for wet conditions must be used.
- The doors and windows of the equipment room must be kept closed to maintain an airtight room.
- Using steel doors to ensure sound insulation is recommended.
- No cracks or openings are allowed on the walls or floors. The outlet holes on the walls or windows must be sealed. Walls must be constructed such that they are smooth, wear-resistant, dustproof, flame retardant, sound insulated, heat absorptive, and have electromagnetic shielding.
- The air vent of the room should be far from the exhaust of city waste pipes, big cesspools and sewage treatment tanks. The room should be in the positive pressure state to prevent corrosive gases from entering the equipment room and corroding components and circuit boards.
- It is recommended that the room be on or above the second floor. If this requirement cannot be met, the ground for equipment installation in the room should be at least 600 mm (23.62 in.) above the maximum flood level.
- The equipment room should be strong enough to resist winds and downpours.
- The room should be located away from dusty roads or sand. If this is unavoidable, the doors and windows of the equipment room must not face pollution sources.

- Do not place air conditioning vents near the equipment so that they blow directly on the equipment because condensation may be blown into the equipment.
- Do not use decorative materials that contain sulfur in the equipment room.

11.3.1.2 Equipment Room Layout

An equipment room usually contains mobile switching equipment, telecommunications equipment, power supply equipment, and other auxiliary equipment. To ensure easy maintenance and management, place the equipment in different rooms. **Figure 11-73** shows the layout of the equipment room.

Figure 11-73 Layout of the equipment room



The general layout principles of the equipment room are as follows:

- It should meet requirements for laying out and maintaining communication cables and power cables.
- It should reduce the cabling distance, which facilitates cable maintenance, reduces potential communication faults, and maximizes efficiency.

11.3.1.3 Construction Requirements for the Equipment Room

Table 11-14 describes the construction requirements for the equipment room.

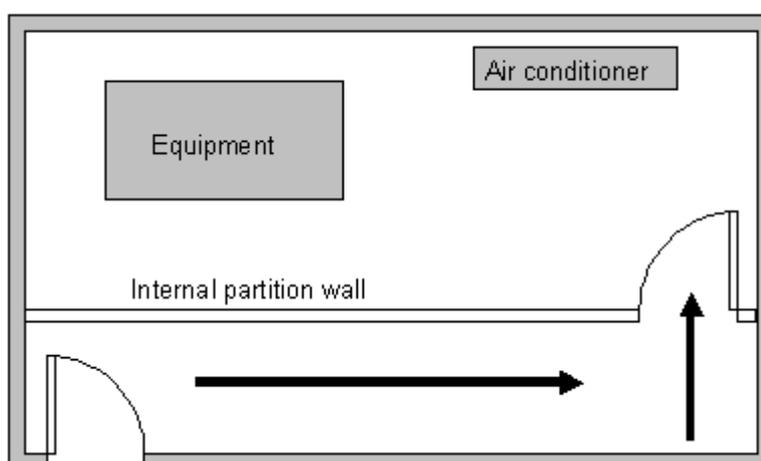
Table 11-14 Construction requirements for the equipment room

Item	Requirements
Area	The smallest area of the equipment room can accommodate the equipment with the largest capacity.
Net height	The minimum height of the equipment room should not be less than 3 m (9.84 ft). The minimum height of the equipment room is the net height below overhead beams or ventilation pipes.

Item	Requirements
Floor	<p>The floor in the equipment room should be semi-conductive and dustproof. A raised floor with an ESD covering is recommended. Cover the raised floor tightly and solidly. The horizontal tolerance of each square meter should be less than 2 mm (0.08 in.). If raised floors are unavailable, use a static-electricity-conductive floor material, with a volume resistivity of 1.0×10^7 ohms to 1.0×10^{10} ohms. Ground this floor material or raised floor. You can connect them to ground using a one megohm current-limiting resistor and connection line.</p>
Load-bearing capacity	<p>Evaluate whether the load bearing capacity of the floor in the equipment room meets the deployment requirements based on the model and number of devices to be housed in each cabinet. If it is uncertain whether the load bearing capacity of the floor in the equipment room meets the device installation requirements, you are advised to contact a local professional architecture design institute for further evaluation and hardening solution formulation.</p> <ul style="list-style-type: none"> • When one device is installed in each cabinet, the minimum load bearing capacity of the equipment room is 200 kg/m^2 (CloudEngine 16804), 450 kg/m^2 (CloudEngine 16816), and 300 kg/m^2 (CloudEngine 16808). • When multiple devices are installed in each cabinet, the minimum load bearing capacity of the equipment room is 450 kg/m^2 (CloudEngine 16804) and 450 kg/m^2 (CloudEngine 16808).
Door and windows	<p>The door of the equipment room should be 2 m (6.56 ft) high and 1 m (3.28 ft) wide. One door is enough. Seal the doors and windows with dustproof plastic tape. Use double-pane glass in the windows and seal them tightly.</p>
Wall surface treatment	<p>Paste wallpaper on the wall or apply flat paint. Do not use pulverized paint.</p>
Cable trays	<p>Use cable trays to arrange cables. The inner faces of the cable trays must be smooth. The reserved length and width of the cable trays, and the number, position and dimensions of the holes must comply with the requirements of device arrangement.</p>
Water pipe	<p>Do not pass service pipes, drainpipes, and storm sewers through the equipment room. Do not place a fire hydrant in the equipment room, but place it in the corridor or near the staircase.</p>
Internal partition wall	<p>Separate the area where the equipment is installed from the equipment room door. The partition wall can block some outside dust.</p>

Item	Requirements
Installation position of the air conditioner	Install air conditioner vents so that the air does not blow directly on equipment.
Other requirements	Avoid the proliferation of mildew, and keep out rodents (like mice).

Figure 11-74 Internal partition wall inside the equipment room



11.3.1.4 Equipment Room Environment

Dust on devices may cause electrostatic discharge and result in poor contact for connectors or metal connection points. This problem can shorten the life span of devices and cause faults.

The equipment room must be free from explosive, conductive, magnetically-permeable, and corrosive dust. [Table 11-15](#) lists the requirement for dust concentration in the equipment room.

Table 11-15 Requirements for dust particles in the equipment room

Mechanical active material	Unit	Concentration
Dust particle	Particle /m ³	≤ 3x 10 ⁴ (no visible dust accumulated on a workbench in three days)
Suspending dust	mg/m ³	≤0.2

Mechanical active material	Unit	Concentration
Precipitable dust	mg/m ² ·h	≤1.5
Description <ul style="list-style-type: none"> • Dust particle diameter ≥ 5 μm • Suspending dust diameter ≤ 75 μm • 75 μm ≤ precipitable dust diameter ≤ 150 μm 		

Take the following measures to meet the requirements:

- Use dustproof materials for ground, wall, and ceiling construction.
- Use screens on the door and windows facing outside. The outer windows should be dust-proof.
- Clean the equipment room and clean devices' air filters monthly.
- Wear shoe covers and ESD clothing before entering the equipment room.

11.3.1.5 Requirements for Corrosive Gases

The room should be free from dusts and corrosive gases, such as SO₂, H₂S, and NH₃. [Table 11-16](#) lists the requirements for the corrosive gas concentration.

Table 11-16 Requirements for corrosive gas concentration

Chemical active material	Unit	Concentration
SO ₂	mg/m ³	≤0.30
H ₂ S	mg/m ³	≤0.10
NO _x	mg/m ³	≤0.50
NH ₃	mg/m ³	≤1.00
Cl ₂	mg/m ³	≤0.10
HCl	mg/m ³	≤0.10
HF	mg/m ³	≤0.01
O ₃	mg/m ³	≤0.05

Take the following measures to meet the requirements:

- Avoid constructing the room near a place where the corrosive gas concentration is high, such as a chemical plant.
- Ensure the air intake vent of the room is in the prevailing upwind direction from any pollution source.

- Place batteries in different rooms.
- A professional service should monitor the corrosive gas conditions regularly.

11.3.1.6 Requirements for ESD Prevention

The absolute value of electrostatic voltage must be less than 1000 V.

Take the following measures to meet this requirement:

- Train operators about ESD prevention.
- Keep the correct humidity level in the equipment room to reduce the impact of static electricity.
- Lay out an ESD floor in equipment rooms.
- Wear ESD shoes and clothing before entering equipment room.
- Use ESD tools, such as wrist straps, tweezers, and pullers.
- Ground all conductive materials in the room, including computer terminals. Use ESD worktables.
- Keep non-ESD materials (such as common bags, foam, and rubber) at least 30 cm (11.81 in.) away from boards and ESD-sensitive components.

11.3.1.7 Electromagnetism Requirements for the Equipment Room

All interference sources, inside or outside the equipment room, can cause equipment problems with capacitive coupling, inductive coupling, electromagnetic wave radiation, and common impedance (including grounding system) coupling. Prevent the interference using these approaches:

- Take effective measures against electrical interference from the power supply system.
- Do not use the working ground of the equipment as the same ground for surge protection. Separate them as far as possible.
- Keep the equipment far away from high-power radio transmitters, radar units, and high-frequency and high-current equipment.
- Use electromagnetic shielding if necessary.

11.3.1.8 Requirements for Lightning Proof Grounding

[Table 11-17](#) lists the requirements for lightning proof grounding.

Table 11-17 Requirements for lightning proof grounding

Item	Requirements
Capital construction	<ul style="list-style-type: none">• Use reinforced concrete to construct the equipment room.• Install a lightning proof device like a lightning rod outside the room.• The lightning proof ground shares the same grounding body with the protective ground of the room.

Item	Requirements
Power cables leading in the equipment room need to be equipped with a surge protector	<ul style="list-style-type: none"> ● After the low-voltage power cables are led into the room, install the surge protector for the power cables in the AC voltage stabilizer and the AC power distribution panel (box). Correctly ground the surge protector nearby. ● For an equipment room in urban area, install a power supply surge protector with the nominal discharge current of no less than 20 kA. For an equipment room that is built in a suburb and subject to lightning strikes, install a power supply surge protector with the nominal discharge current of more than 60 kA. For an equipment room that is built in a mountain area and subject to frequent lightning strikes, or in a separate high-rise building in a city, install a power supply surge protector with the nominal discharge current of more than 100 kA. ● The ground cable of the surge protector should be no longer than 1 m (3.28 ft).
Grounding for DC power distribution	<ul style="list-style-type: none"> ● Connect the DC working ground (positive pole of the -48 V DC power supply or the negative pole of the 24 V DC power supply) with the indoor collective ground cable nearby. The total ground cable should meet the maximum load of the equipment. ● The power equipment must have a DC working ground cable, which can connect the power equipment to the collective ground cable of the telecommunication site (or the protective ground bar of the equipment room).
Equipotential connection	<ul style="list-style-type: none"> ● Properly ground the devices and auxiliary devices in the room such as mobile base station, transmission, switching equipment, power supply equipment, and cable distribution frame. Connect all PGND cables to the collective protective ground bar. Connect all PGND cables in one equipment room to one protective ground bar. ● Apply joint grounding to the working ground and protective ground of devices, which means the two share one grounding network. ● The cable tray, rack or shell, metal ventilation pipe, metal door or window of the equipment should be grounded for protection.
General requirements for grounding	<ul style="list-style-type: none"> ● Do not connect the neutral line of the AC power cable with the protective ground of any telecom equipment in the equipment room. ● Do not install a fuse or switch on the ground cable. ● All ground cables should be as short as possible, and arranged in a straight line.

Item	Requirements
Grounding resistance	<ul style="list-style-type: none"> • The grounding resistance must be lower than 1 ohm. • The upper end of the grounding body should be at least 0.7 m (2.30 ft) over the ground. In cold areas, bury the grounding body below the frozen ground. • Measure the grounding resistance periodically to ensure effective grounding.
Routing of signal cable	<ul style="list-style-type: none"> • Do not arrange the signal cables overhead in the equipment room. All signal cables must be led into the site underground. • Use the cables with a metal jacket or place them into a metal pipe if they come out/in the equipment room. • Ground the idle lines inside the cable in the equipment room. • Signal cables should be deployed on internal walls. Do not deploy outdoor aerial cables. • Keep signal cables away from power cables and surge protection devices.
Collective ground cable	<ul style="list-style-type: none"> • Use a ground ring or ground bar for the collective ground cable. • Do not use aluminum cables as ground cables. Adopt measures to prevent electrification corrosion when connecting different metal parts together. • Use a copper busbar as the collective ground cable with a cross-sectional area of no less than 120 mm² (0.19 in.²), or use the galvanized flat steel of the same resistance. Insulate the collective ground cable from the reinforcing steel bars of the building.
Grounding lead-in	<p>The grounding lead-in should be a maximum of 30 m (98.42 ft) long. Use the galvanized flat steel with cross-sectional area of 40 mm x 4 mm (1.58 in. x 0.158 in.) or 50 mm x 5 mm (1.97 in. x 0.197 in.).</p>
Leakage current test	<p>A 100 mA residual-current circuit breaker (RCCB) is recommended for a leakage current test.</p>

11.3.2 Requirements for Power Supply

11.3.2.1 Requirements for AC Power Supply

An AC power supply system consists of power mains, uninterruptible power supplies (UPSs), and self-supplied electric generators, and should use a centralized power supply mode. In addition to meeting the requirements of the server load,

the AC power supply must have a simple connection line, safe operation, flexible scheduling, and easy maintenance.

The low-voltage power supply should be 3-phase, 5-wire mode or monophas 3-wire mode. This AC power supply should be 110 V/220 V, with a frequency of 50 Hz.

The UPS should supply the same power and operate at the same phase as the power mains. The switching time between the UPS and mains should be less than 10 ms; otherwise, the networking devices will reboot or reset.

For power distribution capacity in the equipment room, both the working current and fault current of the devices should be considered. Ensure that independent AC power supplies protect independent devices. Configure the current-carrying capacity of the protection switch of the equipment room for more than that of the devices.

Table 11-18 lists the voltage range of the AC power supply for the devices.

Table 11-18 Voltage range of AC power supply

Item	Requirements
AC power capacity to support the devices	-10% to +5% of the rated voltage
AC power capacity to support the power modules and important buildings	-15% to +10% of the rated voltage
Frequency of alternating current	-4% to +4% of the rated value
Voltage wave shape sine distortion	Within 5% of the rated voltage

The automated electric generator must have a standard interface that supports telecommunication protocols, remote telecommunication, monitoring, and control.

AC power cables should meet the following specifications:

- AC neutral should have a conductor with the same cross section as the phase line.
- AC cables should have non-flammable insulation. The layout of AC cables should comply with local regulations. Low-voltage power distribution rooms should comply with local regulations.

11.3.2.2 Recommendations for AC Power Supply

The following are recommendations for the AC power supply.

- If the voltage of the power mains that supply power directly to devices exceeds the rated voltage by -10% to 5%, or exceeds the voltage range that devices can support, a voltage regulating device or voltage stabilizing device is required.

- If the mains do not supply power for the device directly, or if the mains voltage exceeds the rated voltage by -15% to 10% or exceeds the input voltage range of the DC power supply, a voltage regulating device or voltage stabilizing device is required.
- A UPS or inverter power supply system is required to provide uninterrupted AC power to support the telecommunication load.
- If abnormalities occur on the mains, telecommunication servers should be equipped with a self-supplied electric generator to support the key telecommunication load. The capacity should be not less than 150% to 200% of the total uninterruptible power supply.
- Storage batteries are usually installed in a parallel connection of two groups. UPS storage batteries are generally installed in one group. The redundancy required for the UPS can rely on concatenation or parallel connection. When an inverter or a UPS is used, the active inverter is determined by the maximum power and a backup inverter is required.

11.3.2.3 Requirements for DC Power Supply

The equipment room should receive stable and reliable DC power. Deploy the power equipment near the telecommunications equipment to make the DC feeder as short as possible. To reduce power consumption and installation cost, the loop voltage drop from the battery port to the equipment port should be less than 3.2 V.

- A large-scale enterprise can deploy an independent power supply system on each floor to supply power to the telecommunications equipment room on the respective floor.
- A medium-scale enterprise can use a power room and a battery room for centralized power supply or use distributed power supply systems.
- A small-scale enterprise can deploy an integrated power supply system in its equipment room but must take measures to prevent corrosive gases released from batteries from eroding circuit boards of telecommunications equipment.

Table 11-19 lists the specifications for the DC power supply.

Table 11-19 Specifications for the DC power supply

Item	Requirements
DC power capacity to support the surge current	Greater than 1.5 times the rated current
Regulated voltage precision	If the AC input voltage is in the range of 85% to 110% of the rated value, and the load current is in the range of 5% to 100% of the rated value, the output voltage of the rectifier ranges from -46.0 V to -56.4 V, with the regulated voltage precision less than or equal to 1%.
Overshoot amplitude of switch on/off	Integral value of the DC output voltage $\pm 5\%$

Item	Requirements
Peak noise voltage	≤200 mV
Dynamic response	The recovery time is less than 200 ms. The overshoot is in the range of the integral value of the DC output voltage ±5%.

11.3.2.4 Recommendations for DC Power Supply

The following are recommendations for the DC power supply.

- Use distributed power supply mode. Use multiple DC power supply systems and put power equipment in multiple locations.
- Adopt a standard DC power supply system, and set the output voltage to the communications equipment within the required range.
- Improve reliability of the AC power supply system to reduce the necessary capacity of storage batteries. For small offices, increase the capacity of storage batteries if it is difficult to enhance reliability of the AC power supply system.
- The total capacity of the high-frequency switching rectifier must satisfy the power of the communication loading and battery charging. If there are 10 or fewer active rectifier modules, configure one backup module. If there are more than 10 active modules, configure one backup module for every 10 active modules.
- Install storage batteries in two or more groups. The capacity is determined by the duration for which the storage batteries must supply power. For most offices, the batteries should be able to supply power for at least one hour.

11.4 Appendix D Equipment Grounding Specifications

11.4.1 General Grounding Specifications

[Table 11-20](#) shows the general grounding specifications.

Table 11-20 General grounding specifications

No.	Description
1	The working ground and protective ground, including the shielded ground and the lightning-proof ground of the cable distribution frame should share the same grounding conductor.
2	The cable trays, shells, metal ventilation pipes, metal doors and windows in the equipment room should be grounded for protection.
3	The metal parts of the equipment which are electrically floating in normal conditions should be grounded for protection.

No.	Description
4	The ground cable must be connected securely to the protective ground bar of the equipment room.
5	Do not use other equipment as part of the ground cable or electrical connection.

11.4.2 Grounding Specifications for an Equipment Room

The grounding resistance of a comprehensive communication building should be less than or equal to one ohm. The grounding resistance of an ordinary communication office should be less than five ohms. The grounding resistance in an area where the earth resistance rate is high should be less than 10 ohms.

11.4.3 Grounding Specifications for Devices

[Table 11-21](#) lists the equipment grounding specifications.

Table 11-21 Equipment Grounding Specifications

No.	Description
1	All communication devices and auxiliary devices (such as mobile base stations, transmission and switching devices, power supply devices) in the equipment room should be grounded for protection. Connect all protective ground for various devices jointly to a general ground bar, and then to the same protective ground bar in the room together with the protective ground (PGND) of the device.
2	The PGND of the equipment is shorted to the copper ground bar provided by the customer. The short-circuiting cable used should be a yellow-green plastic insulated cable with a copper core and a cross-sectional area greater than 25 sq. mm (0.039 sq. in.).
3	There are grounding terminals and grounding lugs at the lower part of the front door, rear door and side panel of the cabinet, connected to the grounding terminals of the cabinet framework through connection cables with cross-sectional area of no less than 1.6 sq. mm (0.002 sq. in.).
4	Ensure that all metal components of the cabinet conduct well. No insulating coating should be sprayed on the connection part of the metal components.

No.	Description
5	Connect the cabinets in the same row by fastening captive screws and gaskets on the top of the cabinets. Do not spray any coating into a rectangular area measuring 30 mm x 50 mm (1.18 in. x 1.97 in.) around the connection hole for a captive bolt. Measures to prevent rust and corrosion must be taken for this area. Zinc electroplating with iridescent yellow chromate conversion coating should be applied to the gasket and nut to ensure good electrical contact.
6	When combining cabinets of the same type, short-circuiting cables are required to connect the ground busbars (if any) of the cabinets. The cross-sectional area of the short-circuiting cable is 6 sq. mm (0.009 sq. in.) and is no more than 300 mm (11.8 in.) long. Connect the two ends of the short-circuiting cable to the ground busbar terminals of neighboring cabinets and fix them firmly.

11.4.4 Grounding Specifications for Communications Power Supply

Table 11-22 shows the grounding specifications for communication power supplies.

Table 11-22 Grounding specifications for communication power supplies

No.	Description
1	The inlet for the AC power cable at the equipment room should be equipped with a surge protection device (C-level) with a nominal discharge current no less than 20 kA.
2	The protective ground for the power supply and that for communication equipment share the same grounding conductor. If the power supply and the equipment are in the same equipment room, use the same protective ground bar for them if possible.
3	Use a surge protection circuit on the AC power interface.
4	The positive of the -48 V DC power supply or negative pole of the 24 V DC power supply should be grounded at the output of the DC power supply.
5	The working ground and protective ground of the DC power supply equipment should use the same grounding conductor with the protective ground of the switching equipment. If the power supply and equipment are in the same equipment room, use the same protection ground bar for them if possible.
6	Add surge protection on the DC power interface.

11.4.5 Grounding Specifications for Signal Cables

Table 11-23 lists the grounding specifications for signal cables.

Table 11-23 Grounding specifications for signal cables

No.	Description
1	Equip the cable outdoors with a metal jacket, well grounded at both ends, or connect the ends of the metal jacket to the protective ground bar of the equipment room. For cables inside the equipment room, install surge protection devices at the interface to the equipment. The PGND cable for the surge protection devices should be as short as possible.
2	The incoming and outgoing signal cables to and from the office and unused wires inside the cable should be grounded for protection.
3	The Tone & Data Access (TDA) cable must pass through the Main Distribution Frame (MDF) with surge protective device (SPD) when going out of the office. The cable's shield layer should be connected to the protective ground of the MDF. The MDF should use the same grounding conductor as the cabinet.
4	Do not route signal cables overhead.

11.4.6 Specifications for Laying Out Grounding Cables

Table 11-24 shows the specifications for the ground cable.

Table 11-24 Specifications for laying out ground cables

No.	Description
1	The grounding wire should not run parallel to or twist around the signal cable.
2	Bury ground underground or arrange them indoors. Do not route ground cables overhead.
3	Do not connect two cables together to extend the PGND cable, or add any switches or fuses.
4	The PGND cable should be an alternating yellow and green plastic insulated one with a copper core.
5	The neutral line of the AC power cable cannot be connected to the protective ground of transmission and communication equipment in the equipment room.
6	A PGND cable should be as short as possible, with a length of no more than 45 m (147.64 ft).

11.5 Appendix E Engineering Labels for Cables

An engineering label serves as an identifier for on-site installation and maintenance after the installation. Labels on the cables facilitate correct and orderly connection of cables, and easy maintenance after installation.

Engineering labels are specialized for power cables and signal cables:

- Signal cables include network cables, optical fibers, and user cables.
- Power cables include the AC power cables and DC power cables.

NOTE

Fill in labels according to specified requirements to keep consistency of labels in the equipment room. Make a relevant statement in the self-check report.

11.5.1 Introduction to Labels

11.5.1.1 Label Materials

Features:

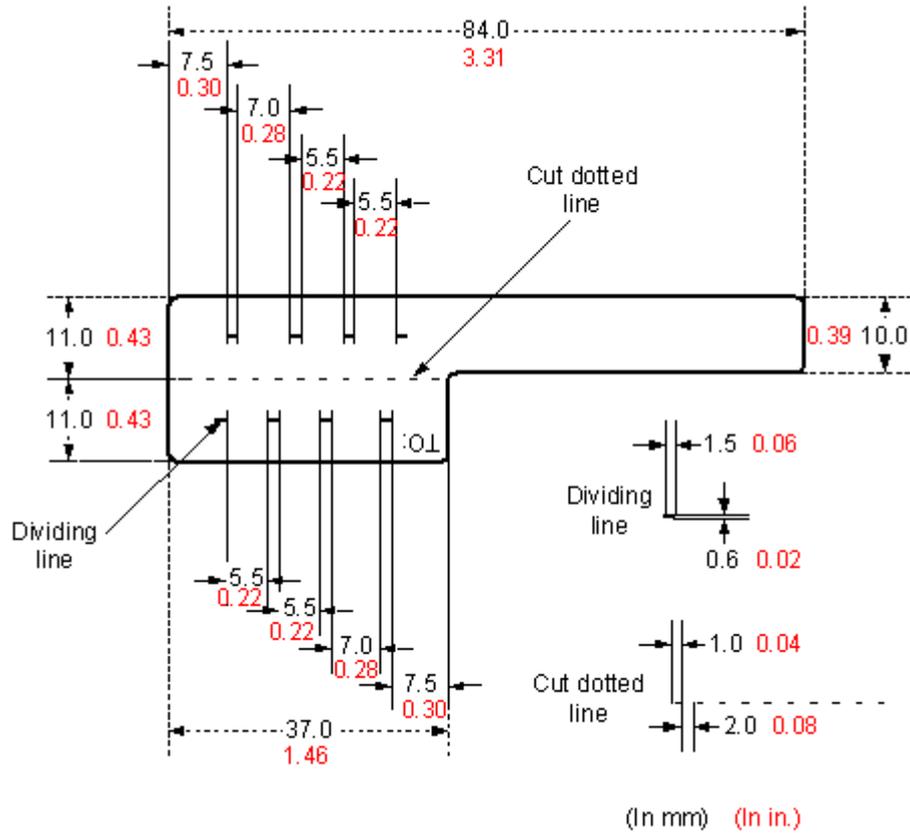
- Thickness: 0.09 mm (0.004 in.)
- Color: chalk white
- Material: polyester (PET)
- Ambient temperature: -29°C (-20.2°F) to +149°C (300.2°F)
- Printed by a laser printer and written with a marker
- Pass UL and CSA authentication

11.5.1.2 Type and Structure

Label for Signal Cables

The label for signal cables is L-shaped with fixed dimensions, as shown in [Figure 11-75](#).

Figure 11-75 Label for signal cables



To specify more clearly the position of a cable, use the dividing lines on the label. For example, there is a dividing line between the cabinet number and the chassis number, and another one between the chassis number and the slot number. Each dividing line is light blue (Pantone 656c) and 1.5 mm x 0.6 mm (0.06 in. x 0.02 in.).

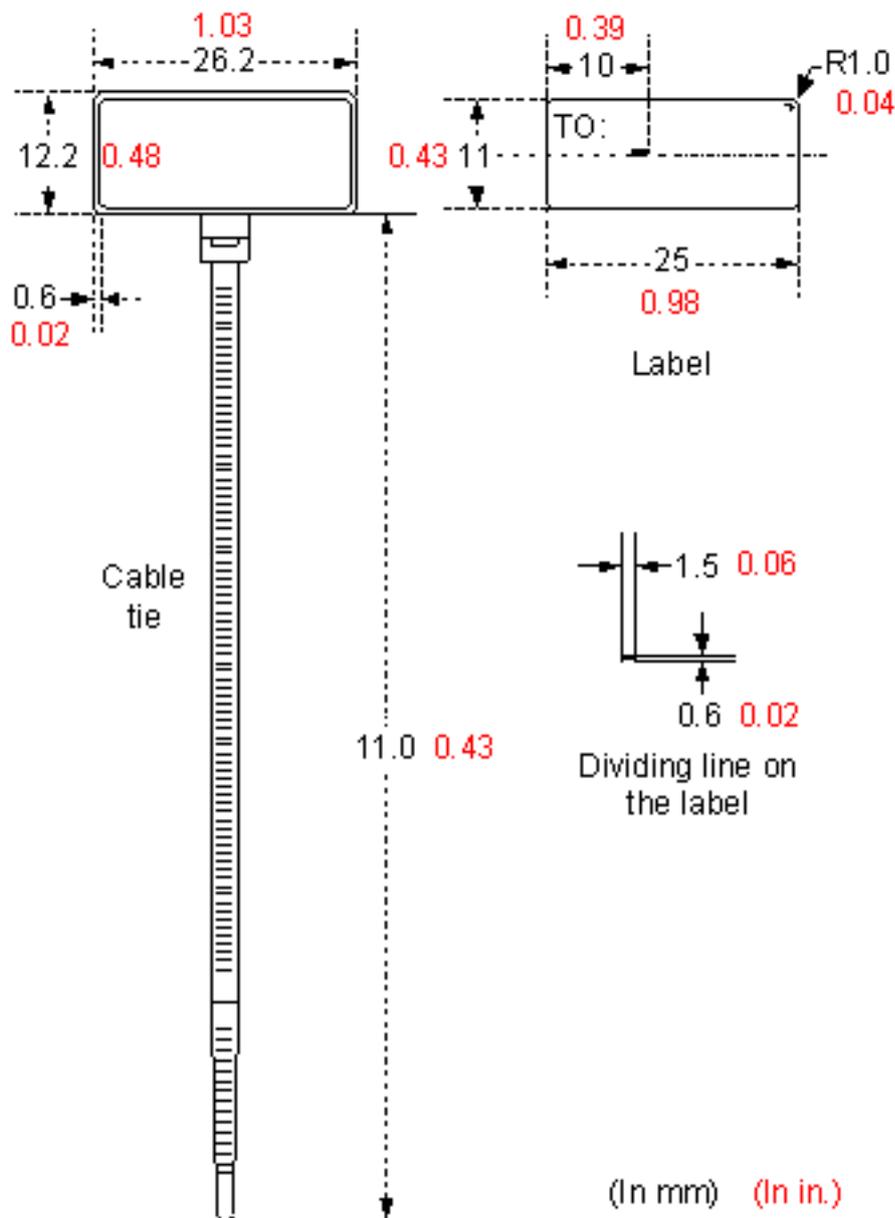
The cut dotted line helps to fold the label when affixed to the cable, and its size is 1 mm x 2 mm (0.04 in. x 0.08 in.).

The word "TO:" (upside down in the figure) at the lower right corner of the label is used to identify the opposite end of the cable on which the label is affixed.

Power Cable Label

The label for power cables should be attached to the identification plate on the cable ties that are attached to the cable. The identification plate has an embossed area 0.2 mm x 0.6 mm (0.008 in. x 0.02 in.) around (symmetric on both sides), and the area in the middle is for affixing the label, as shown in [Figure 11-76](#).

Figure 11-76 Power cable label



11.5.1.3 Label Printing

The contents can be printed or written on the labels. Printing is recommended for the sake of high efficiency and eye-pleasant layout.

Template for Printing

You can obtain a template from the Huawei local office to print labels.

The template is made in Microsoft Word. Follow these instructions to use the template:

- You can modify the contents of the template. Do not change settings of centered characters, direction, and fonts.
- If many characters need to be filled in, decrease the font size, but make sure that the printouts are clear and legible.

Merging Cells in the Template

To merge two or more cells, do as follows:

1. Select **Edit/Select All**.
2. Select **Format/Borders and Shading/Borders**. Select **Box** tab and click **OK**.
3. Drag the mouse to select cells to be merged and select the **Table/Merge Cells**.

Requirements on the Printer

To print labels, use a laser jet printer of any model. Before printing labels, set up the page and try printing.

1. Try printing on ordinary paper with both sides blank. Place the blank paper over the whole page of the label paper, and check whether the page setup conforms to the label layout.
2. Make sure the printer properties, such as "paper size" and "direction", have been set correctly.
 - If the printout conforms to the sheet of labels, print the labels on the label paper.
 - If the printout does not conform, adjust the page setup and try printing again until the correct printout is produced.

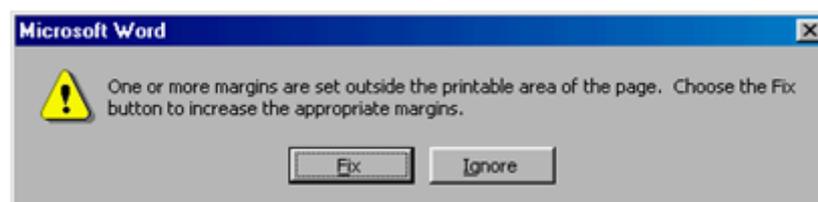
The method for adjusting the page setup is as follows.

1. Select **File/Page Setup**.
2. Select **Layout** and set Header and Footer as 0.
3. Select the **Margins** tab page. Select Left for Gutter Position and adjust the values of Top, Bottom, Left, and Right.

NOTE

If the warning prompt as shown in [Figure 11-77](#) appears before printing, click **Ignore** to continue the printing.

Figure 11-77 Warning prompt before printing



After the page setup has been made correctly, save it for future use. This page setup is only necessary the first time you use the template to print the labels.

Requirements for Feeding the Printer

The label paper consists of two layers and has undergone multiple processing procedures such as printing and cutting. No matter what model of printer you use, feed in the labels one page at a time. To avoid jamming the labels, never use the auto-feed mode.

Feed in the label paper in the correct direction to ensure that the text is printed in a correct position.

Requirements for the Printed Label

Make sure that the printed labels satisfy the following requirements:

- All the printouts must be on the label, and nothing should be printed on the backing layer of the label page.
- Contents in the cells should be aligned in the center. In a single-line printout, the dividing lines and the word "TO:" should not be covered by printed characters.
- When the cells are merged and the printouts are made in multiple lines, avoid covering the word "TO:" when printing the text. Use the space bar to move the text to the next line.

11.5.1.4 Writing Labels

Writing Tools

To make sure the printouts are clear and legible, use black markers instead of ball-point pens to write the labels.

If no marker is available, black ball-point pens are allowed, although not recommended. Compared with ball-point pens, waterproof markers are better. When writing with a ball-point pen, do not leave the oil on the label, which may contaminate the label and blur the words.

NOTE

The delivered marker has two nibs. Use the smaller nib to write the labels.

Font

For the sake of legibility, use standard block letters and numbers as shown in [Table 11-25](#) (Times New Roman).

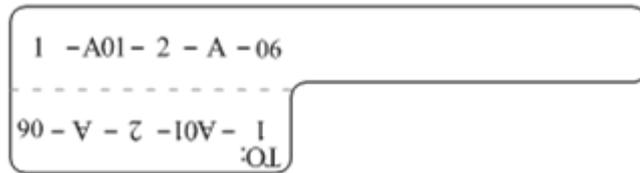
Table 11-25 Standard typeface for handwriting

0	1	2	3	4	5	6	7	8
9	A	B	C	D	E	F	G	H
I	J	K	L	M	N	O	P	Q
R	S	T	U	V	W	X	Y	Z

Determine the size of characters based on the number of letters or digits and ensure that the characters are distinct and tidy.

Placement of text on a label is shown in [Figure 11-78](#).

Figure 11-78 Placement of text on a label



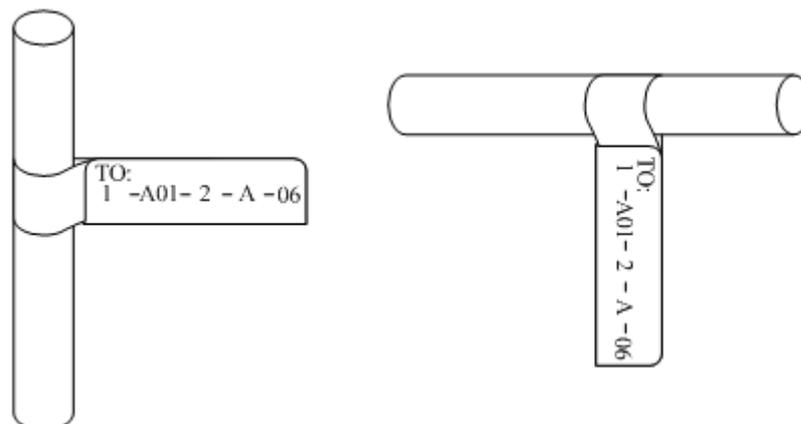
11.5.1.5 Attaching Labels

After printing or writing the label, remove the label from the page and attach it to the signal cable, or the identification plate of the power cable. The methods for attaching labels are described in the following sections.

Label for Signal Cables

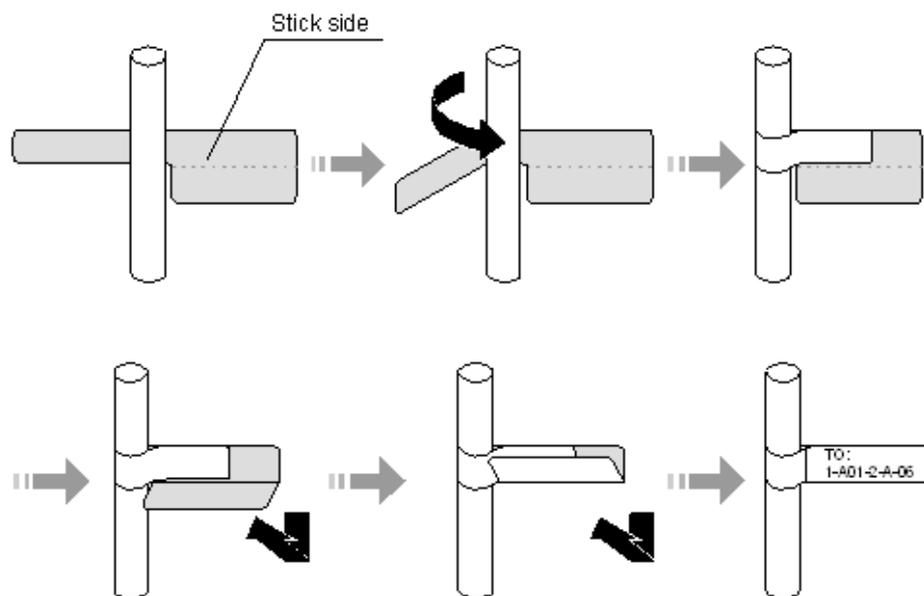
- Choose the place to attach labels.
The label is attached 2 cm (0.79 in.) from the connector on a signal cable. In special cases (for example, to avoid cable bending or affecting other cables), other positions are allowed to attach the labels. The rectangular part with text is attached facing right or downward, as shown in [Figure 11-79](#). The details are as follows:
 - The identification card is to the right of the cable in vertical cabling.
 - The identification card should be downward when you lay out the cable horizontally.

Figure 11-79 Text area of the label



- Procedure for attaching labels
[Figure 11-80](#) shows the methods and procedures for attaching labels.

Figure 11-80 Label for signal cables



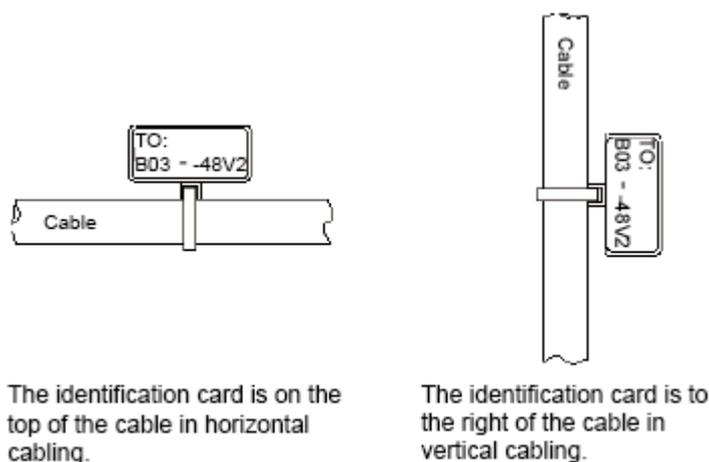
Power Cable Label

Remove the label from the backing page, and attach it to the identification plate on the cable tie. The label should be attached to the rectangular flute on the identification plate, and attached to only one side of the identification plate. In an equipment room, all labels should be attached in the same way. The cable ties are bundled at 2 cm (0.79 in.) from the connectors, and other positions are allowed in special circumstances.

Cable ties should be bound on both ends of a cable. After the bundling, the finished identification plate should be on top of the cable in horizontal cabling, or on the right side of the cable in vertical cabling, as shown in [Figure 11-81](#). The details are as follows:

- The identification card is to the right of the cable in vertical cabling.
- The identification card is on the top of the cable in horizontal cabling. Make sure that the label is facing out.

Figure 11-81 Binding the label for the power cable



11.5.1.6 Contents of Engineering Labels

Contents of Labels for Power Cables

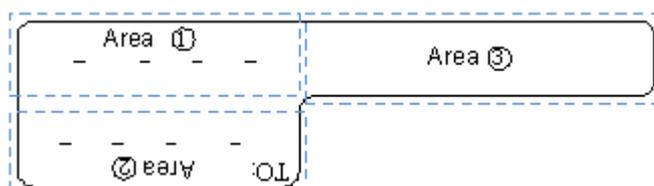
Labels for power cables are affixed on only one side of the identification plates. On the labels, there is information (the part after the word "TO:") about the location of the device on the other end of the cable, like the location of control cabinet, distribution box or power socket.

Contents of Labels for Signal Cables

The two sides of the label affixed on the signal cable carry information about the location of the ports connected to both ends of the cable. [Figure 11-82](#) shows the information on both sides of the labels affixed to the signal cables.

- Area 1 contains the location information of the local end of the cable.
- Area 2 (with the word "TO:") contains the location information of the opposite end of the cable.
- Area 3 has been folded up inside the label.

Figure 11-82 Printed parts on the label for signal cables



Seen from the cabling end of the equipment, the text part of the label is on the right side of the cable. The side with "TO:" that is facing outside carries the

location information of the opposite end; and the other side carries the location information of the local end.

In other words, the information in Area 1 at one end is the same as the information in Area 2 at the other end of the cable.

11.5.1.7 Precautions for Using Engineering Labels

When using labels, pay attention to the following points:

- When printing, writing, or attaching labels, keep the labels clean.
- Since the label paper is made of moistureproof material, ink-jet printers and ink pens cannot be used to print and write labels.
- Labels should be attached neatly. New-type labels are L-shaped. If they are pasted at incorrect locations or in the incorrect direction, the appearance of the device is affected.
- Power cable ties should be attached in the same positions on power cables, with identification plates on the same side.
- The positions of "up", "down", "left" or "right" are all based on the viewpoint of the engineering person who is working on the label.

11.5.2 Engineering Labels for Optical Fibers

These labels are affixed to the optical fibers that connect the optical interfaces. There are two types of labels for optical cables:

- One is for the fiber that connects the optical interfaces on two devices.
- The other is for the fiber that connects the device and the ODF.

11.5.2.1 Labels for the Optical Fibers Connecting Devices

Meaning of the Label

Table 11-26 lists information on both sides of the labels affixed to the optical fibers that connect two devices.

Table 11-26 Information on labels affixed to the fibers between two devices

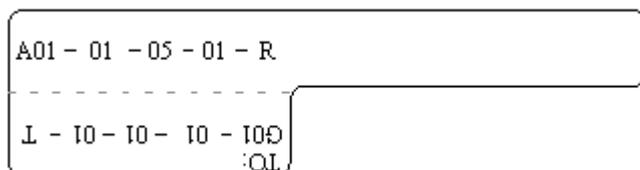
Content	Meaning	Example
MN-B-C-D-R/T	MN: cabinet number	M: The cabinet rows from front to back are numbered from A to Z. N: The cabinet columns from left to right are numbered from 01 to 99. For example, A01 is the cabinet in row A and column 01.
	B: chassis number	Numbered in bottom-up order with two digits, for example, 01.

Content	Meaning	Example
	C: physical slot number	Numbered in top-down and left-right order starting from 01. For example, 01 is the first slot at the top left of the chassis.
	D: optical interface number.	Numbered in top-down and left-right order, consistent with the port sequence number on the device.
	R: Receiving interface T: optical transmitting interface	-

Example of the Label

Figure 11-83 shows a sample label on an optical fiber.

Figure 11-83 Sample label on an optical fiber between two devices



The meaning of the label is listed in **Figure 11-83**.

- "A01-01-05-01-R" indicates that the local end of the optical fiber is connected to the optical receiving interface 01 in slot 5, chassis 01 in the cabinet in row A, column 01 in the machine room.
- "G01-01-01-01-T" indicates that the opposite end of the optical fiber is connected with optical transmitting interface 01 in slot 01, chassis 01 in the cabinet in row G, column 01 in the machine room.

11.5.2.2 Labels for the Optical Fibers Connecting the Device and an ODF

Meaning of the Labels

Table 11-27 shows information on both sides of labels attached to an optical fiber between a device and an optical distribution frame (ODF).

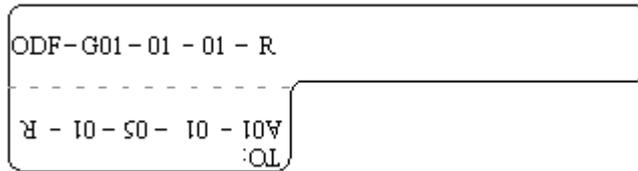
Table 11-27 Information on labels affixed to a fiber between a device and an ODF

Content	Meaning	Example
MN-B-C-D-R/T	MN: cabinet number	For example, A01.
	B: chassis number	Numbered in bottom-up order with two digits, for example, 01.
	C: physical slot number	Numbered in top-down and left-right order starting from 01. For example, 01 is the first slot at the top left of the chassis.
	D: optical interface number.	Numbered in top-down and left-right order, consistent with the port sequence number on the device.
	R: Optical receiving interface T: optical transmitting interface	-
ODF-MN-B-C-R/T	MN: row number and column number of an ODF	M: The cabinet rows from front to back are numbered from A to Z. N: The cabinet columns from left to right are numbered from 01 to 99. For example, G01 is the ODF of row G and column 01.
	B: row number of the terminal device	Range from 01 to 99, for example, 01-01.
	C: column number of the terminal device	
	R: Optical receiving interface T: optical transmitting interface	-

Example of the Label

[Figure 11-84](#) shows a sample label on an optical fiber.

Figure 11-84 Sample label on an optical fiber between the device and the ODF



Meaning of the label in [Figure 11-84](#)

- "ODF-G01-01-01-R" indicates that the local end of the optical fiber is connected to the optical receiving terminal in row 01, column 01 of the ODF in row G, column 01 in the machine room.
- "A01-01-05-01-R" indicates that the opposite end of the optical fiber is connected to optical receiving interface 1 in slot 05, chassis 01 in the cabinet in row A, column 01 in the machine room.

11.5.3 Engineering Labels for Network Cables

Applicable Ranges

The labels can be applied to Ethernet cables.

Label Content

[Table 11-28](#) shows the information on both sides of the labels affixed to Ethernet cables.

You can also decide the label content based on the actual environment. If the device is not installed in the cabinet, for example, you can remove the cabinet number.

Table 11-28 Information on the Ethernet cables

Content	Meaning	Example
MN-B-C-D	MN: cabinet number	For example, A01 is the first cabinet in row A.
	B: chassis number	Numbered in bottom-up order with two digits, for example, 01.
	C: physical slot number	Numbered with two digits in top-down and left-right order. For example, 01.
	D: network port number	Numbered in top-down and left-right orders. For example, 01.
MN-Z	MN: cabinet number	For example, B02 is the second cabinet in row B.

Content	Meaning	Example
	Z: Location number	Fill in the location number of the terminal device on site. If the cable is connected to a device in a cabinet, specify the serial numbers of the cabinet, the chassis, and the Ethernet interface of the device. For example, B02-03-12. If the cable is connected to the Network Management Station (NMS), specify the specific location of the NMS.

The contents of the labels for network cables connecting hubs and devices or agents and the network cables for other purposes should be specified according to actual connections. The details are as follows:

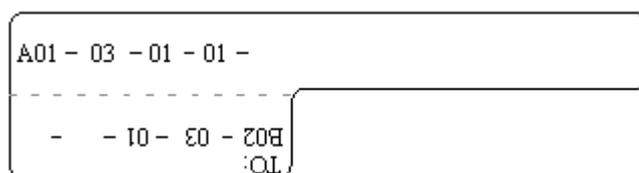
- For a network cable connecting a hub and device, the label on the hub end should indicate the numbers of the chassis and cabinet where the hub resides, and the serial number on the hub. The label on the device end should indicate the number of the chassis and cabinet where the device is located. If the device is a standalone device, provide the specific position of the device.
- For a network cable connecting a hub and an agent or terminal, the label on the agent or terminal end should contain the serial number of the network interface. The definitions of the cabinet number and chassis number are the same as those described in [Table 11-28](#).
- If the hub is a standalone device without a cabinet or chassis, the label should contain specific location information that identifies the hub.

The serial number on the hub, the network interface number of the agent or terminal, and the location of the standalone device should be specified according to actual connections.

Label Example

[Figure 11-85](#) shows a sample label on an Ethernet cable.

Figure 11-85 Sample label on an Ethernet cable



Meaning of the label in [Figure 11-85](#).

- "A01-03-01-01" indicates that one end of the network cable is connected to network interface 01 in slot 01, chassis 03 of the cabinet in row A, column 01 in the equipment room.

- "B02-03-01" indicates that another end of the network cable is connected to network interface 01 in chassis 03 of the cabinet on row B, column 02 in the equipment room. No slot number is given.

11.5.4 Engineering Labels for User Cables

Attach labels to both ends of a user cable to indicate the locations of the cable on the device and main distribution frame (MDF).

Meaning of the Engineering Labels for User Cables

Table 11-29 shows the contents of the labels.

Table 11-29 Contents of the engineering labels for user cables

Content	Meaning	Example
MN-B-C-D	MN: cabinet number	For example, A01 is the first cabinet in row A.
	B: frame number	Numbered in the bottom-up order with two digits, for example, 03.
	C: physical slot number	Numbered with two digits in top-down and left-right order. For example, 01.
	D: cable number	Numbered with two digits in top-down and left-right order. For example, 01.
MDF-MN-B-C	MN: row number and column number of the MDF	M: The rows of cabinets from front to back are numbered from A to Z. N: The columns of cabinets from left to right are numbered from 01 to 99. For example, G01 is the MDF of Row G and Column 01.
	B: row number of the terminal device	Ranges from 01 to 99, for example, 01-01.
	C: column number of the terminal device	

Example of the Label

Figure 11-86 shows a sample label on a user cable.

Figure 11-86 Sample label on a user cable



The meaning of the label in [Figure 11-86](#) is as follows:

- "A01-03-01-01" indicates that the local end of the user cable is connected to port 1 in slot 1, chassis 03 of the cabinet in row A, column 01 in the equipment room.
- "MDF-G01-01-01" indicates that the opposite end of the user cable is connected to the terminal in row 01, column 01 of the MDF in row G, column 01 in the equipment room.

11.5.5 Engineering Labels for Power Cables

11.5.5.1 Engineering Labels for DC Power Cables

These labels are affixed to the DC power cables that provide power supply for cabinets, including the -48 V, PGND, and BGND cables. Here, the DC power cables also include power cables and PGND cables.

The labels for DC power cables are affixed to one side of the identification plates on cable ties. For details of the labels, see [Table 11-30](#).

Table 11-30 Contents of the label

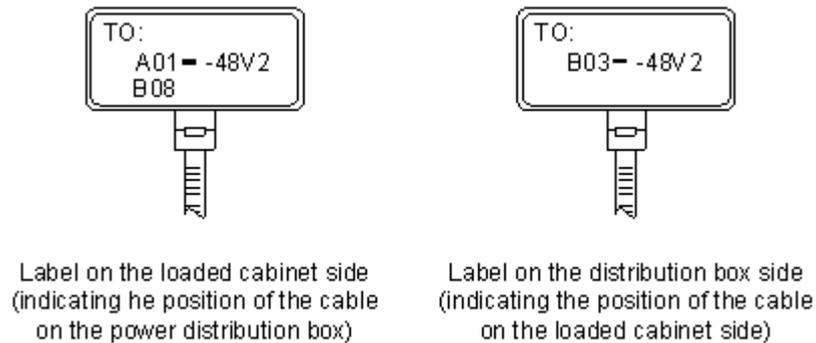
Content	Meaning
MN(BC)- B--48Vn	MN(BC): BC is written right under MN. B: chassis number, numbered in bottom-up order with two digits, for example, 01.
MN(BC)-B- BGND	N: power socket number, numbered as 1 to 3 in the bottom-up and left-to-right orders.
MN(BC)-B- PGND	On the loaded cabinet side, only MN is used to identify the cabinet. On the power cabinet side, MN identifies the row and column number of the power distribution equipment like a control cabinet and distribution box, and BC identifies the row and column number of the -48 V connector. If there is no row number or column number, or the connector can be identified without them, BC can be omitted. It is unnecessary to identify the row and column number for BGND and PGND.

The label only carries location information about the destination direction of the power cable whereas information about the local end is unnecessary. That is, the label only carries location information about the opposite equipment, the control cabinet, or the distribution box. [Table 11-30](#) lists the information on two -48 V power supplies on the label. The information on other DC voltages, such as 24 V and 60 V should be given in similar methods.

Make sure that labels are affixed in the correct direction. That is, after the cable ties are bundled onto the cable, the identification plates with the labels should

face up, and the text on the labels in the same cabinet should be in the same direction. For details, see [Figure 11-87](#).

Figure 11-87 Example of the labels for DC power cables



The meaning of the label in [Figure 11-87](#) is as follows:

- On the loaded cabinet side, the label "A01/B08--48V2" on the cable indicates that the cable is -48 V DC supply, which is from the eighth connector in row B of -48 V bus bar in the cabinet in row A, and column 1 in the equipment room.
- On the distribution box side, the label "B03--48V2" indicates that the cable is -48 V DC supply, connected to DC power socket 2 in row B, column 03 in the equipment room.

NOTE

In the power distribution box or the first power cabinet of a row in a transmission equipment room, every terminal block on the -48 V connector bar has a numeric identification. For example, in the above label of "A01/B08--48V2", "08" (or sometimes "8") is the numeric identification of the terminal block.

PGND and BGND are two copper bars, on which the terminal blocks are short-circuited. Therefore, it makes no difference which terminal is connected to them. It is only necessary to give the row and column of the power distribution box, instead of giving the specific serial number of the terminal block on the copper bar. For example, if the label on the loaded cabinet side is "A01-BGND", it means that the power cable is a BGND that connects BGND copper bar in the power distribution box in row A, column 01 in the machine room. Information on the labels for PGND cables should be given in a similar way.

11.5.5.2 Engineering Labels for AC Power Cables

These labels are affixed to both ends of an AC power cable that provides AC power supply to cabinets, including 110/220 V, PGND, and BGND cables. The 110/220 V AC cables and related PGND and BGND cables are covered with an insulating sheath, so the labels need to contain only the word "AC" and the cabinet numbers.

The labels for AC power cables are affixed to one side of the identification plates on cable ties. For details, see [Table 11-31](#).

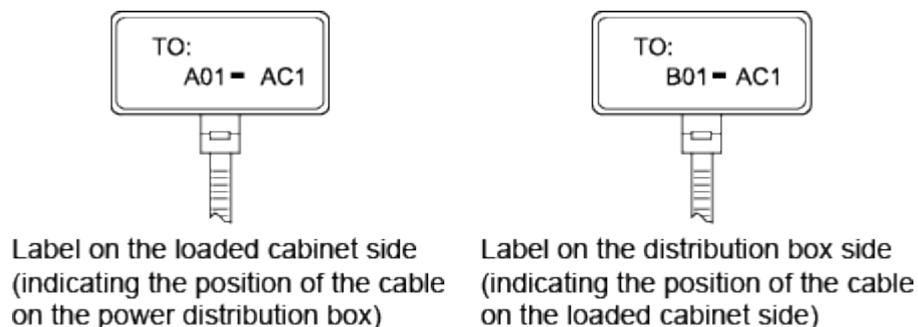
Table 11-31 Label content

Content	Meaning
MN-(B)-ACn	<p>MN: serial number of the cabinet or the socket where the power is led in</p> <p>B: chassis number, numbered in bottom-up order with two digits, for example, 01.</p> <p>n: power port number, numbered as 1 to 3 in bottom-up and left-to-right order.</p> <p>Serial number of the socket where the power is led in: the location of the socket is marked according to the actual situation. If the sockets can be identified by row numbers and column numbers, they can be numbered following the same rule for the cabinets. If the sockets cannot be identified by rows and columns, specify the detailed locations to avoid confusion with other sockets.</p>

The label only carries location information about the opposite equipment and the power socket; information about the local end is unnecessary.

Make sure that labels are affixed in the correct direction. That is, after the cable ties are bundled onto the cable, the identification plates with the labels should face up, and the text on the labels in the same cabinet should be in the same direction, as shown in [Figure 11-88](#).

Figure 11-88 Labels for AC power cables



Meaning of the label in [Figure 11-88](#).

- On the equipment cabinet side, the label marked "A01-AC1" indicates that the power cable is connected to the first AC power socket of row A and column 01 in the equipment room.
- On the power socket side, the label marked "B01-AC1" indicates that the power cable is connected to the first AC power socket in the cabinet of row B and column 01 in the equipment room.

11.6 Appendix F Guide to Using Optical Modules

Common Faults of an Optical Module

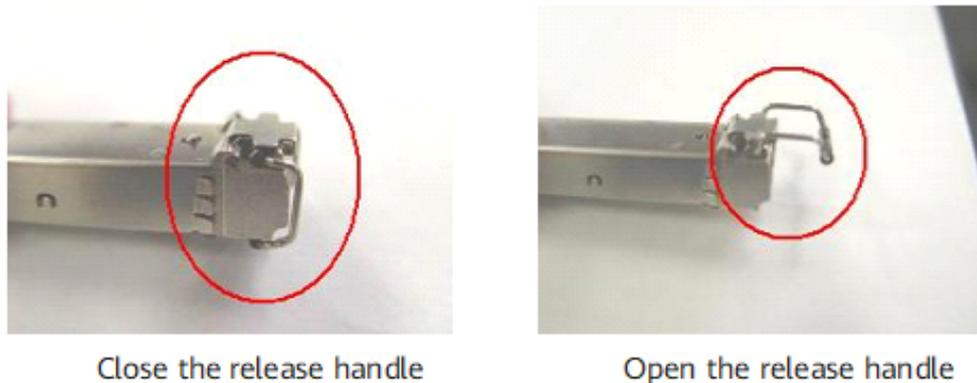
1. An optical module is not completely installed in position.
If the optical module is not completely installed in position and the latch boss is not secured, the device cannot identify the optical module. After the optical module works for a long time, it will be ejected under external stress.
2. The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

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.
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 11-89** 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.

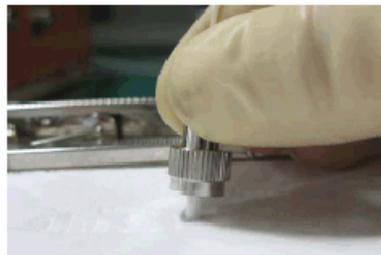
Figure 11-89 State of the release handle



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 11-90 Cleaning optical fibers with special cleaning tissues

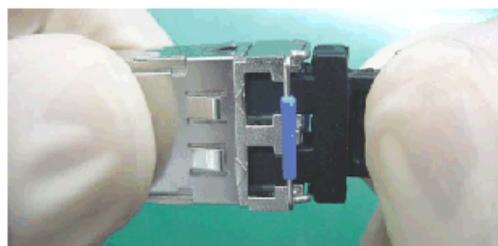


NOTE

Place at least three cleaning tissues on the work bench. As shown in [Figure Cleaning optical fibers with special cleaning tissues](#), 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.

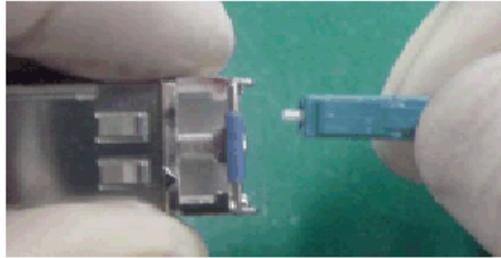
2. Cover an unused optical module with a protective cap to prevent dust, as shown in [Figure 11-91](#).

Figure 11-91 Installing a protective cap



If no protective cap is available, use fibers to protect the optical module, as shown in [Figure 11-92](#).

Figure 11-92 Using fibers to protect an optical module



3. Cover unused optical connectors with protective caps, as shown in [Figure 11-93](#), and then lay out fibers on the fiber rack or coil them in a fiber management tray to prevent fibers from being squeezed.

Figure 11-93 Installing a protective cap on a fiber



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 11-94](#). Clean an optical connector with cleaning tissues.

Figure 11-94 Cleaning a receptacle with a cotton swab



NOTICE

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.

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 an optical fiber from an optical module, and connect both ends of the optical fiber to the OTDR. 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.

Precautions

1. The optical connector should be vertically inserted in the receptacle to avoid damages to the receptacle.
2. Fibers must be inserted into optical modules of the corresponding type. That is, multimode 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.

11.7 Appendix G Fault Tag

*Customer name:						
Address:						
Contact person:						
Tel.:			Fax:			
Category*: <input type="checkbox"/> RMA <input type="checkbox"/> Return <input type="checkbox"/> Analysis						
BOM Code	Product Description	Bar Code*	Fault Occurring Date*	Description of the Fault Phenomena*	Category No.*	Software Version*
Reasons for Repairing (Category No.):						

Category No. includes the following eight types:
F001 - Wear out damaged (◇ In warranty Period ◇ Out of warranty period)
F002 - Deployment damaged
F003 - Intransit damaged
F004 - Version upgrade
F005 - Batch replace
F007 - Overdue spare parts inspecting
F008 - Others
F011 - Running circumstance change

Note:

- For optical interface cards returned, the optical interfaces should be covered with protection caps.
- In general, the analysis card will not be returned to you. If you have any special requirements, please contact Huawei.
- One **Fault Tag** should be adapted in one return category, such as RMA/Return/Analysis.
- The items marked with "*" are the mandatory fields that you must fill in.