

**ETP4890-A2 Embedded Power**

# **User Manual**

**Issue**        10  
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# About This Document

## Purpose

This document describes the DC power system in terms of product overview, components, installation, commissioning, and maintenance. This document also describes operations for the site monitoring unit (SMU) and rectifiers.

The figures provided in this document are for reference only.






## Intended Audience

This document is intended for:

- Sales specialist
- Technical support personnel
- Maintenance personnel

## Symbol Conventions

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

| Symbol   | Description   |
|--|---|
|  <b>DANGER</b>  | Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.  |
|  <b>WARNING</b> | Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.   |
|  <b>CAUTION</b> | Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.  |
|  <b>NOTICE</b>  | Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results.<br>NOTICE is used to address practices not related to personal injury. |
|  <b>NOTE</b>    | Calls attention to important information, best practices and tips.<br>NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.  |

# Change History

Changes between document issues are cumulative. The latest document issue contains all the changes made in earlier issues.

## Issue 10 (2017-11-28)

### Chapter 2 Overview

Modified section "[2.3 Configuration](#)".

## Issue 09 (2017-08-08)

Modified chapter "[4.3 Installing Cables](#)".

## Issue 08 (2014-10-30)

### Chapter 6 Commissioning

Added section "[6.5 Setting Battery Parameters](#)".

## Issue 07 (2014-02-20)

### Chapter 4 Installation

Added section "[4.3.2 \(Optional\) Installing Dry Contact Signal Cables](#)".

### Chapter 6 Commissioning

Added section "[6.4 Setting System Type](#)".

## Issue 06 (2013-12-10)

Modified section "[2.3 Configuration](#)".

## Issue 05 (2013-07-02)

Add the configuration of R4830N2 and SMU01C.

## Issue 04 (2013-05-30)

The operating temperature is modified.

## Issue 03 (2013-05-06)

Optimized the content of the document, including standardizing the terminology and improving the accuracy of the description.

## Issue 02 (2012-11-24)

Port description is modified.

## Issue 01 (2012-08-13)

This issue is the first official release.

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# 1 Safety Precautions

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## 1.1 General Safety

- Ensure that the product is used in an environment that meets the product design specifications such as the grid power, input voltage, temperature, and humidity. Using the product in an incompatible environment may cause malfunctions, damage components, or invalidate the warranty.
- Follow the precautions and special safety instructions provided by Huawei when operating this product. Personnel who plan to install or maintain Huawei equipment must receive thorough product training, understand all necessary safety precautions, and be able to correctly perform all operations. Huawei will not be liable for any consequences that are caused by the violation of general safety regulations and equipment usage safety standards.
- The upstream power distribution box for the cabinet should be equipped with a protection switch that has the same specifications as or higher specifications than the input switch of the cabinet.
- Comply with local laws and regulations. The safety instructions in this document are only supplemental to local laws and regulations.
- Do not operate the product or handle cables during thunderstorms.
- Do not expose the equipment to flammable or explosive gas or smoke. Keep batteries away from strong infrared radiation, organic solvents, and corrosive gas.
- Do not use water to clean the product's internal or external electrical components.
- To avoid electric shock, do not connect safety extra-low voltage (SELV) circuits to telecommunication network voltage (TNV) circuits.
- Do not place any irrelevant objects on batteries.
- Before using the product, remove any conductors such as jewelry or watches.
- Use insulated tools for all operations that involve electrical connections.
- Bolts should be tightened with a torque wrench and marked using red or blue color. Installation personnel mark tightened bolts in blue. Quality inspection personnel confirm if the bolts are tightened and then mark them in red.
- Follow specified procedures during installation and maintenance. Do not attempt to alter the product or deviate from the recommended installation procedures without prior consent from the manufacturer.
- Disconnect the AC power supply before maintaining AC power distribution.



- Measure contact point voltage with a multimeter before handling a conductor surface or terminal. Ensure that the contact point has no voltage or the voltage is within the specified range.
- When installing or removing power cables, ensure that the corresponding circuits are disconnected to prevent electric arcs or sparks.
- If AC input power cables need to be routed from the top, bend the cables in a U shape outside the cabinet and then route them into the cabinet.
- Performing maintenance or replacing components may interrupt power to the loads if batteries are not connected or the battery reserve is insufficient. Ensure that the switches for primary loads are in the ON position and do not turn off the battery switch and the AC input switch at the same time.
- Cables stored at subzero temperatures must be stored at room temperature for at least 24 hours before they are laid out.
- Perform routine maintenance as described in this manual; replace faulty components at the earliest.
- After maintenance is completed, lock cabinet doors and seal cable holes to prevent rodents from entering the cabinet.

## 1.2 Electrical Safety

### Grounding

- When installing a device, install the ground cable first. When uninstalling a device, remove the ground cable last.
- Before operating a device, ensure that the device is properly grounded. Ensure that the ground cable is installed securely (the ground resistance should be less than 0.1 ohm). Inappropriate grounding may cause device damage and personal injury.

### AC and DC Power



#### **DANGER**

- The power system is powered by high-voltage power sources. Direct or indirect contact (through damp objects) with high-voltage power sources may result in serious injury or death.
  - Non-standard and improper operations may result in fire or electric shocks.
- 
- Before making electrical connections, turn off the protection switch on the upstream device to cut the power supply.
  - Before connecting the AC power supply, ensure that electrical connections are complete.
  - Before connecting cables to loads or battery cables, check cable and terminal polarities to prevent reverse connections.

## ESD

- To prevent electrostatic-sensitive components from being damaged by static from human bodies, wear a grounded electrostatic discharge (ESD) wrist strap or ESD gloves when touching circuit boards.
- When holding a board, hold its edge without touching any components, especially chips.
- Package boards with ESD packaging materials before storing or transporting them.

## Liquid Prevention

- Do not place the product in areas prone to water leakage, such as near air conditioner vents, ventilation vents, or feeder windows of the equipment room.
- Ensure that there is no condensation inside the product or equipment room.
- Ensure that no liquid enters the product. Otherwise, short circuits will occur and may result in serious injury or death.
- If any liquid is detected inside the product, immediately disconnect the power supply and contact the administrator.

## 1.3 Battery Safety

Before installing, operating, or maintaining the batteries, read the battery manufacturer's safety instructions. Observe the safety precautions provided in this section, which are supplemental to the safety instructions provided by the battery manufacturer.

### Basic Requirements

- Avoid skin contact with battery electrolyte. Before handling batteries, wear goggles, rubber gloves, and protective clothing.
- When handling a battery, ensure that its electrodes always point upward. Do not tilt or overturn batteries.
- Before installing or maintaining batteries, switch off the battery circuit breaker or remove the battery fuse.
- Install batteries in a dry, clean, and ventilated environment that is free from sources of ignition. Do not expose batteries to sunlight or water.
- Ensure that the load-bearing capacity of the floor in the installation area is sufficient. Install additional supports if required.
- Secure battery cables to the torque specified in the battery documentation. Loose connections will result in excessive voltage drop or cause batteries to burn out in the case of excessive current.
- Ensure that battery cables do not come in contact with water.

### Battery Short Circuit



## DANGER

High short circuit currents or electric shocks can cause equipment damage, personal injury, or death.

To prevent short circuit or electric shock, disconnect the batteries before performing any operation or maintenance.

## Flammable Gas



## NOTICE

- Do not use unsealed lead-acid batteries.
- Lead-acid batteries emit flammable gas. Therefore, place and secure lead-acid batteries horizontally to prevent fire or corrosion.

Store lead-acid batteries in a place with good ventilation, and take fire safety precautions.

## Battery Leakage



## NOTICE

High temperatures may result in battery distortion, damage, and electrolyte overflow.

If the battery temperature is higher than 60 °C, battery electrolyte may overflow. If the electrolyte overflows, wear goggles, rubber gloves, and protective clothing and absorb the leaking electrolyte using sodium bicarbonate (NaHCO<sub>3</sub>) or sodium carbonate (Na<sub>2</sub>CO<sub>3</sub>). Do not transport or move batteries if there is an electrolyte leakage.

## Battery Overdischarge

After connecting the batteries, remove the battery fuse or turn the battery circuit breaker OFF and then power on the power system. This prevents battery overdischarge. After the power system is on, replace the battery fuse or turn the battery circuit breaker ON.

## 1.4 Cable Layout

- When routing cables, ensure that a sufficient distance exists between the cables and the DC busbar, shunt, and fuse. This prevents damage to the insulation layer of the cables.
- Route and bind signal cables and power cables separately.
- Ensure that cables meet the VW-1 testing requirements.
- Do not route cables behind the air exhaust vents of rectifiers in the cabinet.
- Ensure that all cables are securely bound.

## 1.5 Mechanical Safety

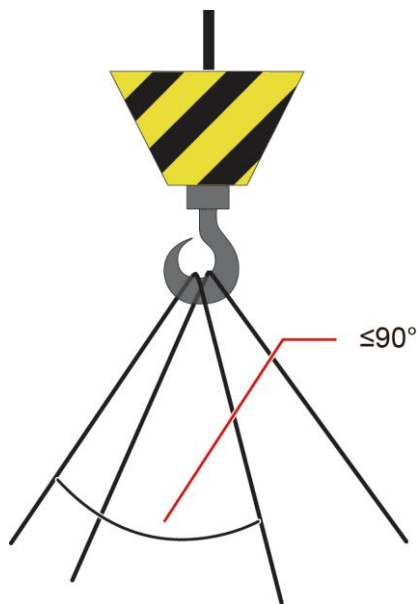
### Hoisting Devices



Do not walk under hoisted objects.

- 
- Only trained and qualified personnel should perform hoisting operations.
  - Check that all hoisting tools are available and in good condition.
  - Before hoisting objects, ensure that hoisting tools are firmly fixed onto a load-bearing object or wall.
  - Ensure that the angle formed by each hoisting cable is less than 90 degrees.
  - If metal hoisting cables are used, place protective pads between the cables and the cabinet to prevent scratches to the cabinet surface.

**Figure 1-1** Hoisting heavy objects



### Drilling Holes



Do not drill holes into a cabinet without permission. Incorrect drilling operations may affect the electromagnetic shielding of the cabinet and damage cables inside. Metal shavings from drilling may short-circuit boards inside the cabinet.

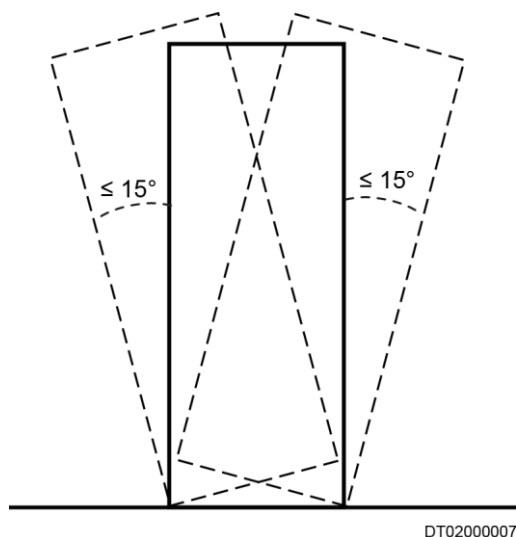
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- Before drilling holes into a cabinet, wear goggles and protective gloves. Remove cables from inside the cabinet.
- After drilling, clean up any metal shavings that have accumulated inside or outside the cabinet.

## Moving Heavy Objects

- Only trained personnel are allowed to move heavy objects.
- Wear protective gloves and shoes before moving heavy objects.
- Be cautious to prevent injury when moving heavy objects.
- At least two people are required to move heavy objects.
- When you transport cabinets, ensure that there is no excessive tilt and no sudden jolt. The maximum allowed tilt angle when loading and unloading a cabinet is 15 degrees. Secure the cabinet to a pallet truck before you transport it.
- When you move a cabinet, ensure that it does not bump into other objects or fall down.

**Figure 1-2** Transportation gradient



# 2 Overview

---

## 2.1 Introduction

The ETP4890-A2 is a box-type power system that supplies power for –48 V DC communications equipment. It uses 15 A or 30 A rectifiers and provides a maximum output current of 90 A.

## 2.2 Features

The ETP4890-A2 has the following features:

- Supports a wide voltage range of 85 V AC to 300 V AC.
- Provides comprehensive battery management.
- The SMU01A communicates with Huawei Network Ecosystem (NetEco) and third-party network management systems (NMSs) over various security protocols, such as the Simple Network Management Protocol (SNMP) and Hypertext Transfer Protocol Secure (HTTPS), featuring flexible networking. It provides WebUI and implements remote unattended management.
- The SMU01B supports Huawei master/slave protocols and access network point-to-point protocols, which allows Huawei access network communications equipment to connect to the U2000.
- Displays information on a liquid crystal display (LCD) and provides buttons for operations.
- Supports electronic labels.
- Rectifiers and the site monitoring unit (SMU) are hot-swappable.
- Allows high-efficiency and standard-efficiency rectifiers with the same capacity to coexist.

## 2.3 Configuration

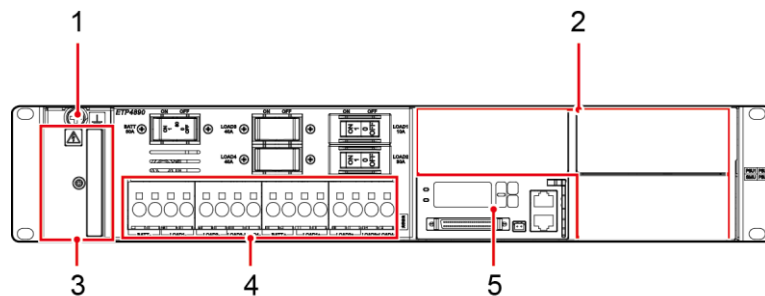
**Table 2-1** ETP4890-A2 configuration

| Item      | Configuration   |  |   |
|-----------|---|--|---|
| PDU       | AC input  | 220 V AC single-phase (default mode)<br>110 V AC dual-live wire<br>220/380 V AC three-phase, four-wire |   |
|           | DC power distribution   | Battery circuit breaker  | One 1-pole 80 A circuit breaker (BATT)  |
|           |   | Load circuit breaker   | Two 1-pole 40 A circuit breakers (LOAD3, LOAD4), one 1-pole 30 A circuit breaker (LOAD2), and one 1-pole 10 A circuit breaker (LOAD1) |
| SMU       | The following SMUs are supported: <ul style="list-style-type: none"><li>• One SMU01A</li><li>• One SMU01B</li><li>• One SMU01C</li></ul>  |  |   |
| Rectifier | The following rectifiers are supported: <ul style="list-style-type: none"><li>• Two to three R4830G1s</li><li>• Two to three R4830N2s</li><li>• Two to three R4815G1s</li><li>• Two to three R4815N1s</li></ul> <b>NOTE</b> <ul style="list-style-type: none"><li>• The R4830G1 and R4830N2 can be installed together.</li><li>• The R4815G1 and R4815N1 can be installed together.</li></ul> |  |   |

# 3 Components

## 3.1 Appearance

Figure 3-1 Appearance



PQ07W00003

- (1) Ground screw      (2) Space for rectifiers      (3) AC input terminals (behind the cover)  
(4) DC output ports      (5) Space for the SMU

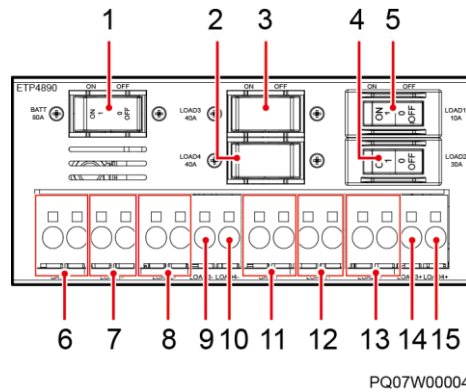


### NOTICE

Do not mix up the slots for installing the SMU and rectifier. Otherwise, the SMU and rectifier may be damaged.



**Figure 3-2 PDU**



- |                           |                           |                           |
|---------------------------|---------------------------|---------------------------|
| (1) BATT circuit breaker  | (2) LOAD4 circuit breaker | (3) LOAD3 circuit breaker |
| (4) LOAD2 circuit breaker | (5) LOAD1 circuit breaker | (6) BATT– ports           |
| (7) LOAD1– ports          | (8) LOAD2– ports          | (9) LOAD3– port           |
| (10) LOAD4– port          | (11) BATT+ ports          | (12) LOAD1+ ports         |
| (13) LOAD2+ ports         | (14) LOAD3+ port          | (15) LOAD4+ port          |

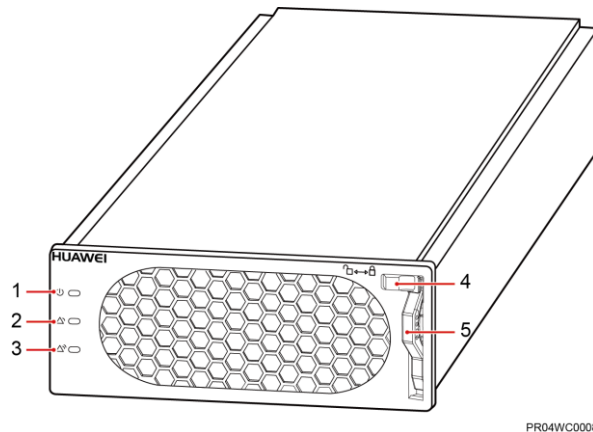
**NOTE**

- A port marked – is a negative port. A port marked + is a positive port.
- The maximum output currents for each wiring hole of LOAD1 and LOAD2 are 10 A and 30 A respectively. The maximum output currents for each of the corresponding circuit breakers are 10 A and 30 A respectively.
- The maximum output current for each wiring hole of BATT is 40 A. The maximum output current for the corresponding circuit breaker is 80 A.

## 3.2 Rectifier

Rectifiers convert AC input into stable DC output.

**Figure 3-3** Rectifier



- (1) Run indicator                      (2) Alarm indicator                      (3) Fault indicator  
(4) Locking latch                      (5) Handle

**Table 3-1** Rectifier indicator description

| Indicator          | Color   | Status             | Description  |
|--------------------|---|--------------------|--|
| Run indicator      | Green   | Steady on          | The rectifier has an AC power input.   |
|                    |   | Off                | The rectifier has no AC power input.   |
|                    |   |                    | The rectifier is faulty.   |
|                    |   | Blinking at 0.5 Hz | The rectifier is being queried.  |
| Blinking at 4 Hz   | The rectifier is loading an application program.                          |                    |  |
| Alarm indicator    | Yellow  | Off                | No alarm has been generated.   |
|                    |   | Steady on          | <ul style="list-style-type: none"> <li>The rectifier has generated an alarm for power limiting due to ambient overtemperature.</li> <li>The rectifier has generated an alarm for shutdown due to ambient overtemperature or undertemperature.</li> </ul> |
|                    |   |                    | The rectifier is protecting itself against AC input overvoltage or undervoltage.   |
|                    |   |                    | The rectifier is hibernating.  |
| Blinking at 0.5 Hz | The communication between the rectifier and the SMU has been interrupted. |                    |  |
| Fault indicator    | Red   | Off                | The rectifier is running properly.   |
|                    |   | Steady on          | The rectifier has been locked out due to   |

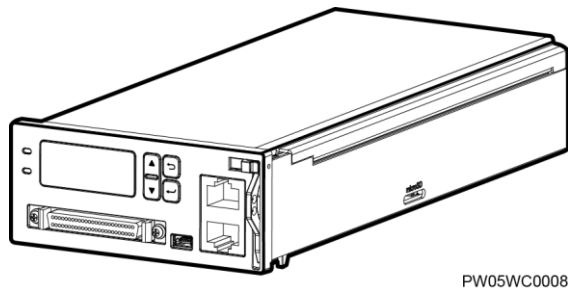
| Indicator | Color | Status | Description   |
|-----------|-------|--------|---|
|           |       |        | output overvoltage.                                   |
|           |       |        | The rectifier has no output due to an internal fault. |

### 3.3 SMU

#### 3.3.1 SMU01A

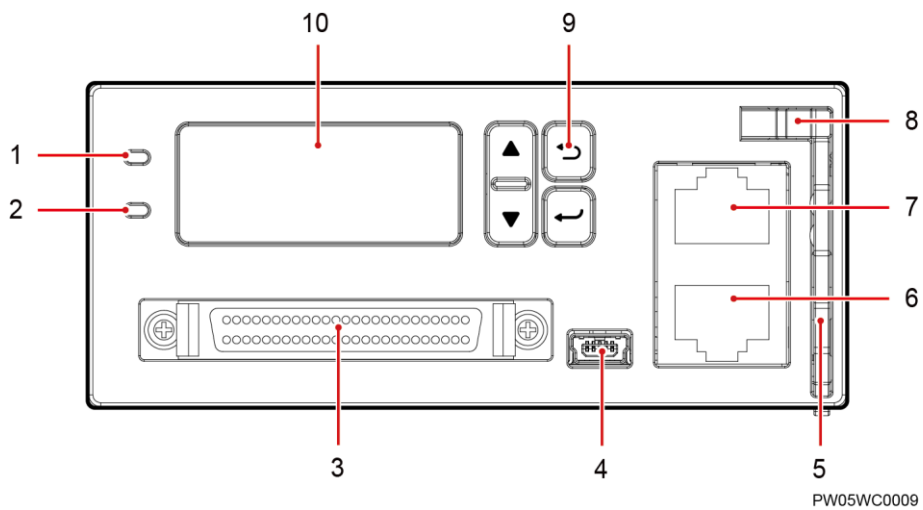
##### Appearance

Figure 3-4 SMU01A appearance



##### Panel

Figure 3-5 SMU01A panel



- (1) Run indicator
- (2) Alarm indicator
- (3) DB50 port
- (4) USB port (reserved)
- (5) Handle
- (6) RS485/RS232 port

(7) COM port

(8) Locking latch

(9) Buttons

(10) LCD





## Indicators

**Table 3-2** Indicator description

| Name                     | Color | Status             | Description   |
|--------------------------|-------|--------------------|---|
| Running status indicator | Green | Off                | The SMU01A is faulty or has no DC input.                                  |
|                          |       | Blinking at 0.5 Hz | The SMU01A runs properly and communicates with the host properly.         |
|                          |       | Blinking at 4 Hz   | The SMU01A runs properly but does not communicate with the host properly. |
| Alarm indicator          | Red   | Off                | No critical or major alarm is generated.                                  |
|                          |       | Steady on          | A critical or major alarm is generated.                                   |

## Buttons

**Table 3-3** Button description

| Button   | Name        | Description  |
|--|-------------|--|
|  and                         | Up and down | Go to the previous or next menu item and select a value.   |
|   | Back        | Return to the previous menu without saving the settings.   |
|   | Enter       | <ul style="list-style-type: none"><li>Enter the main menu from the standby screen.</li><li>Enter a submenu from the main menu.</li><li>Save the menu settings.</li></ul> |
| <b>NOTE</b> <ul style="list-style-type: none"><li>The LCD backlight turns off if no button is pressed for 5 minutes.</li><li>Re-login is required if no button is pressed for 8 minutes.</li></ul> |             |  |

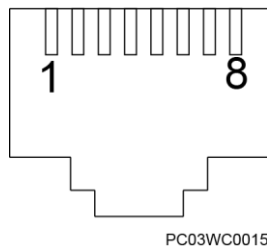
## Communications Ports

**Table 3-4** Communications port description

| Port  | Communications Mode | Communications Parameter              |
|---|---------------------|---------------------------------------|
| COM   | FE                  | Autonegotiation                       |
|   | RS485/RS232         | Baud rate: 9600 bit/s or 19,200 bit/s |
| RS485/RS232   | RS485/RS232         | Baud rate: 9600 bit/s or 19,200 bit/s |
| <b>NOTE</b><br>All ports are protected by a security mechanism. |                     |                                       |

**Figure 3-6** Communications port

RJ45 female connector



[Table 3-5](#) describes the pins in the COM port used as an FE port. [Table 3-6](#) describes the pins in the COM port used as an RS485/RS232 port.

**Table 3-5** Pins in the COM port (used as an FE port)

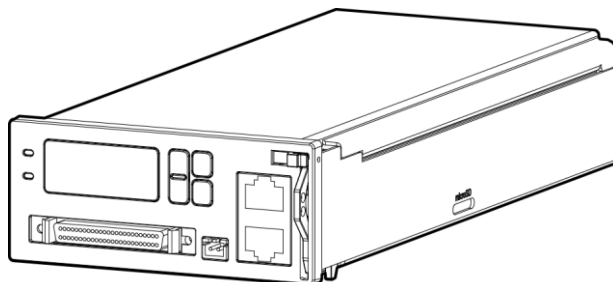
| Pin        | Signal   | Description            |
|------------|----------|------------------------|
| 1          | TX+      | Sends data over FE.    |
| 2          | TX-      |                        |
| 3          | RX+      | Receives data over FE. |
| 6          | RX-      |                        |
| 4, 5, 7, 8 | Reserved | N/A                    |

**Table 3-6** Pins in the RS485/RS232 port

| Pin | Signal   | Description               |
|-----|----------|---------------------------|
| 1   | TX+      | Sends data over RS485.    |
| 2   | TX-      |                           |
| 4   | RX+      | Receives data over RS485. |
| 5   | RX-      |                           |
| 3   | RX232    | Receives data over RS232. |
| 7   | TX232    | Sends data over RS232.    |
| 6   | PGND     | Protective grounding.     |
| 8   | Reserved | N/A                       |

### 3.3.2 SMU01B

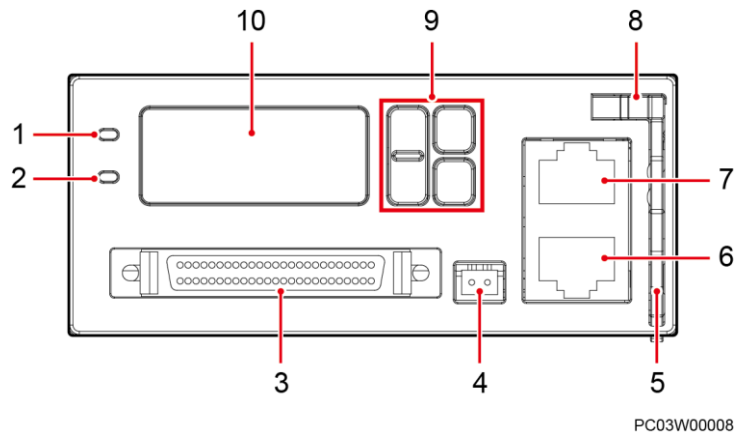
#### Appearance

**Figure 3-7** SMU01B

PC03W00007

## Panel

**Figure 3-8** SMU01B panel



- |                                     |                     |                      |
|-------------------------------------|---------------------|----------------------|
| (1) Run indicator                   | (2) Alarm indicator | (3) DB50 port        |
| (4) Battery temperature sensor port | (5) Handle          | (6) RS485/RS232 port |
| (7) COM port                        | (8) Locking latch   | (9) Four buttons     |
| (10) Liquid crystal display (LCD)   |                     |                      |





## Indicators

**Table 3-7** Indicator description

| Name                     | Color | Status             | Description   |
|--------------------------|-------|--------------------|---|
| Running status indicator | Green | Off                | The SMU01B is faulty or has no power input.                               |
|                          |       | Blinking at 0.5 Hz | The SMU01B runs properly and communicates with the host properly.         |
|                          |       | Blinking at 4 Hz   | The SMU01B runs properly but does not communicate with the host properly. |
| Alarm indicator          | Red   | Off                | No critical or major alarm is generated.                                  |
|                          |       | Steady on          | A critical or major alarm is generated.                                   |

## Buttons

**Table 3-8** Button description

| Button   | Name       | Description   |
|--|------------|---|
|  or    | Up or Down | Allows you to view menu items and set the value of a menu item.   |
|   | Back       | Returns to the previous menu without saving the settings.   |
|   | Enter      | <ul style="list-style-type: none"> <li>Enters the main menu from the standby screen.</li> <li>Enters a submenu from the main menu.</li> <li>Saves the menu settings.</li> </ul> |
| <p><b>NOTE</b></p> <ul style="list-style-type: none"> <li>The LCD screen becomes dark if no button is pressed within 5 minutes.</li> <li>You need to log in again if no button is pressed within 8 minutes.</li> </ul> |            |   |

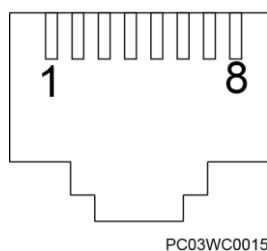
## Communications Ports

**Table 3-9** Communications ports

| Port   | Communications Mode | Communications Parameters               |
|--|---------------------|---|
| COM  | RS485/RS232         | Baud rate: 9600 bits/s or 19,200 bits/s |
| RS485/RS232  | RS485/RS232         | Baud rate: 9600 bits/s or 19,200 bits/s |
| <p><b>NOTE</b></p> <p>All the preceding ports are protected by a security mechanism.</p> |                     |   |

**Figure 3-9** Communications port

RJ45 female connector



[Table 3-10](#) describes the pins in the COM port and RS485/RS232 port.



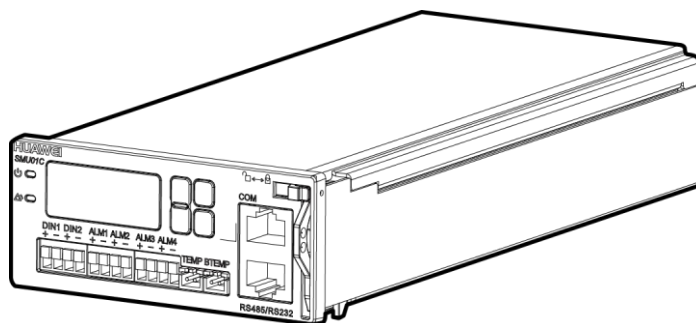
**Table 3-10** Pins in the RS485/RS232 port

| Pin | Signal   | Description               |
|-----|----------|---------------------------|
| 1   | TX+      | Sends data over RS485.    |
| 2   | TX-      |                           |
| 4   | RX+      | Receives data over RS485. |
| 5   | RX-      |                           |
| 3   | RX232    | Receives data over RS232. |
| 7   | TX232    | Sends data over RS232.    |
| 6   | PGND     | Protective grounding.     |
| 8   | Reserved | N/A                       |

### 3.3.3 SMU01C

#### Appearance

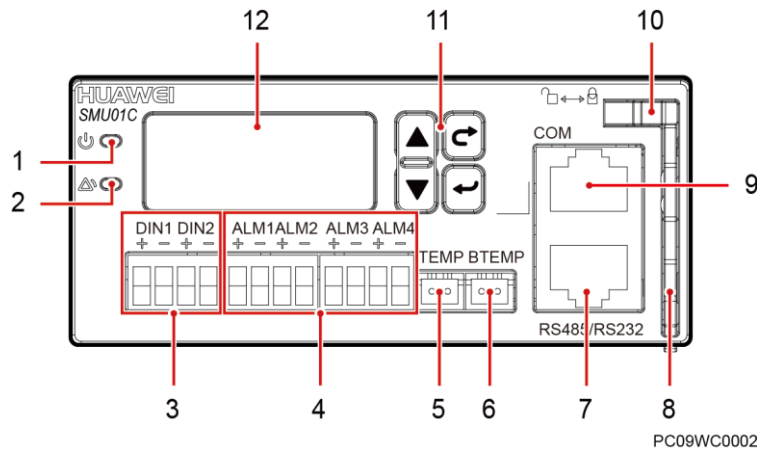
**Figure 3-10** SMU01C



PC09WC0001

## Panel

Figure 3-11 SMU01C panel



- |                              |                                     |                                     |
|------------------------------|-------------------------------------|-------------------------------------|
| (1) Run indicator            | (2) Alarm indicator                 | (3) Dry contact input ports         |
| (4) Dry contact output ports | (5) Ambient temperature sensor port | (6) Battery temperature sensor port |
| (7) RS485/RS232 port         | (8) Handle                          | (9) COM port                        |
| (10) Locking latch           | (11) Four buttons                   | (12) Liquid crystal display (LCD)   |





## Indicators

Table 3-11 Indicator description

| Name                     | Color | Status             | Description   |
|--------------------------|-------|--------------------|---|
| Running status indicator | Green | Off                | The SMU01C is faulty or has no DC input.                                  |
|                          |       | Blinking at 0.5 Hz | The SMU01C runs properly and communicates with the host properly.         |
|                          |       | Blinking at 4 Hz   | The SMU01C runs properly but does not communicate with the host properly. |
| Alarm indicator          | Red   | Off                | No critical or major alarm is generated.                                  |
|                          |       | Steady on          | A critical or major alarm is generated.                                   |

## Buttons

**Table 3-12** Button description

| Button   | Name       | Description   |
|--|------------|---|
|  or    | Up or Down | Allows you to view menu items and set the value of a menu item.   |
|   | Back       | Returns to the previous menu without saving the settings.   |
|   | Enter      | <ul style="list-style-type: none"> <li>Enters the main menu from the standby screen.</li> <li>Enters a submenu from the main menu.</li> <li>Saves the menu settings.</li> </ul> |
| <p><b>NOTE</b></p> <ul style="list-style-type: none"> <li>The LCD screen becomes dark if no button is pressed within 5 minutes.</li> <li>You need to log in again if no button is pressed within 8 minutes.</li> </ul> |            |   |

## Dry contact ports

**Table 3-13** Dry contact ports description

| Port Type               | Silk-screen | Description          | Default Alarms   |
|-------------------------|-------------|----------------------|--|
| Dry contact input port  | DIN1        | Dry contact input 1  | Reserved   |
|                         | DIN2        | Dry contact input 2  | Reserved   |
| Dry contact output port | ALM1        | Dry contact output 1 | Major Alarm<br>Mains Fault, DC Over Volt, DC Under Volt, Batt Off, Batt Loop Trip, Rect Fault, Load Fuse Trip  |
|                         | ALM2        | Dry contact output 2 | Minor Alarm<br>AC Over Volt, AC Under Volt, Amb. Over Temp1, Amb. Under Temp1, Batt Over Temp, Batt Under Temp, Rect Protect, Rect Comm Fail, Batt Over Curr, Dig. Input1 ALM, Dig. Input2 ALM, Batt Discharge |
|                         | ALM3        | Dry contact output 3 | Reserved   |
|                         | ALM4        | Dry contact output 4 | Reserved   |

## Communications Ports

**Table 3-14** Communications ports

| Port  | Communications Mode | Communications Parameters               |
|---|---------------------|---|
| COM   | RS485/RS232         | Baud rate: 9600 bits/s or 19,200 bits/s |
| RS485/RS232   | RS485/RS232         | Baud rate: 9600 bits/s or 19,200 bits/s |
| <b>NOTE</b> <ul style="list-style-type: none"> <li>The COM ports and RS485/RS232 ports work in active/standby mode. Either of them is at work.</li> <li>The RS485 and RS232 serial ports are mutually exclusive.</li> </ul> |                     |   |

**Figure 3-12** Communications port

RJ45 female connector

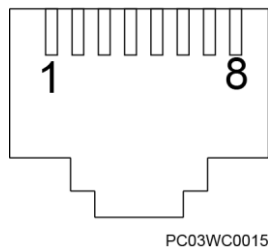


Table 3-15 describes the pins in the COM port and RS485/RS232 port.

**Table 3-15** Pins in the RS485/RS232 port

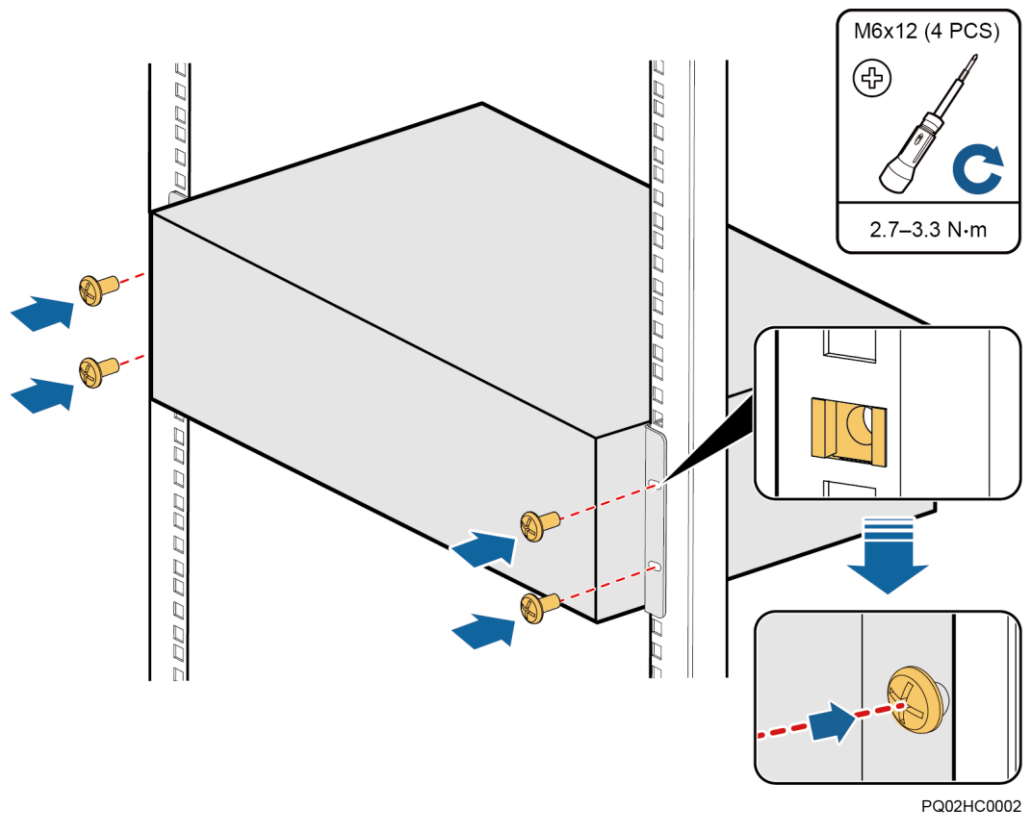
| Pin | Signal   | Description               |
|-----|----------|---------------------------|
| 1   | TX+      | Sends data over RS485.    |
| 2   | TX-      |                           |
| 4   | RX+      | Receives data over RS485. |
| 5   | RX-      |                           |
| 3   | RX232    | Receives data over RS232. |
| 7   | TX232    | Sends data over RS232.    |
| 6   | PGND     | Protective grounding.     |
| 8   | Reserved | N/A                       |

# 4 Installation

## 4.1 Installing a Subrack

Install the subrack in 19-inch rack, as shown in [Figure 4-1](#).

**Figure 4-1** Installing a subrack



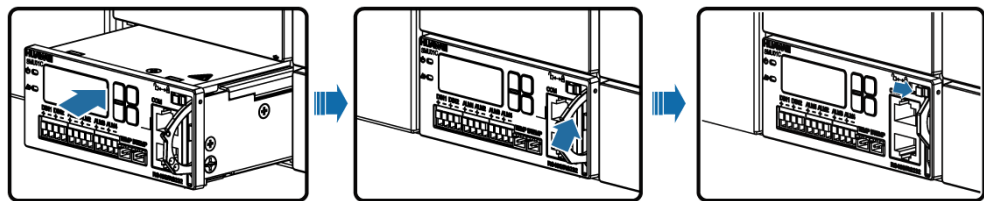
## 4.2 Installing Components

### 4.2.1 Installing an SMU

#### Procedure

- Step 1** Push the locking latch towards the left, and pull out the handle.
- Step 2** Slide the SMU into the subrack along the guide rail, push in the handle, and then push the locking latch towards the right.

**Figure 4-2** Installing an SMU



PQ071C0001

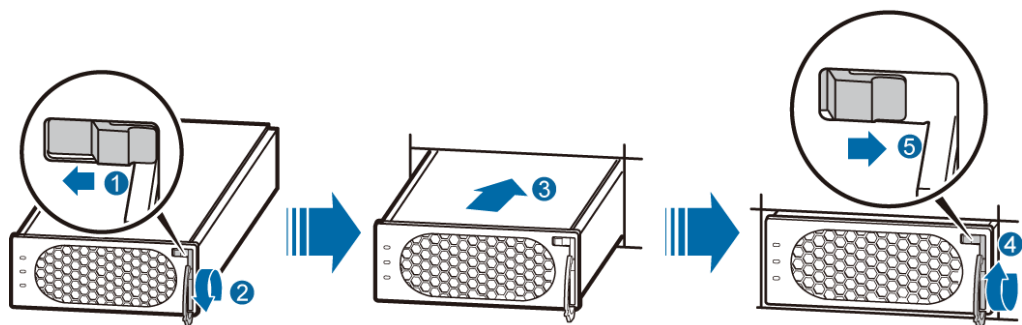
----End

### 4.2.2 Installing a Rectifier

#### Procedure

- Step 1** Push the locking latch towards the left.
- Step 2** Draw the handle downwards.
- Step 3** Insert the rectifier into the slot and slide the rectifier into the subrack along the guide rails.
- Step 4** Push the handle upwards.
- Step 5** Push the locking latch towards the right to secure the handle.

**Figure 4-3** Installing a rectifier



PQ021C0007

----End

## 4.3 Installing Cables

### DANGER

- Ensure that the upstream AC input circuit breaker is OFF, and attach warning labels such as "Do not operate."
- Before installing cables, switch all the circuit breakers to OFF and remove the fuses that need to connect to cables.

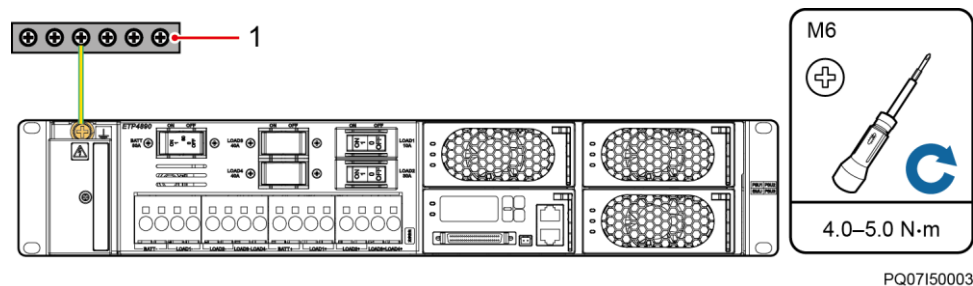
### 4.3.1 Installing a Ground Cable

Figure 4-4 shows how to install a ground cable.

### CAUTION

Ensure that the ground cable is installed securely. Inappropriate grounding may cause device damage and personal injury.

Figure 4-4 Installing a ground cable



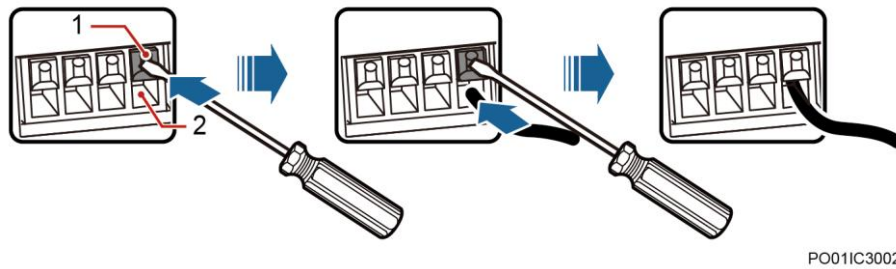
(1) Ground bar

### 4.3.2 (Optional) Installing Dry Contact Signal Cables

#### Procedure

- Step 1** Press the contact plate using a flat-head screwdriver to flip the metal spring inside each dry contact.
- Step 2** Connect the signal cables to the corresponding dry contacts.
- Step 3** Remove the flat-head screwdriver and check that the signal cables are connected securely.

**Figure 4-5** Installing a dry contact signal cable



(1) Contact plate

(2) Dry contact port

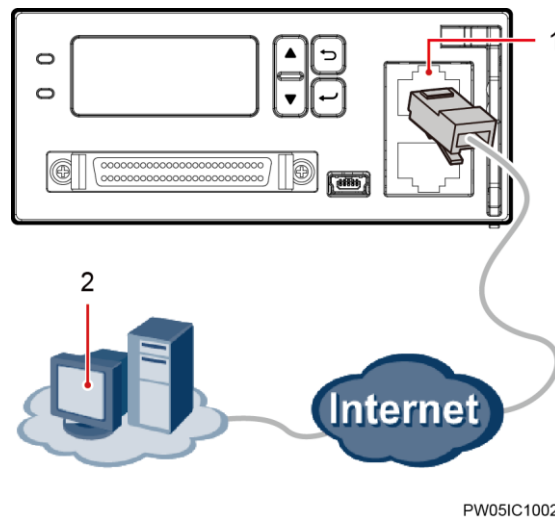
----End

### 4.3.3 Connecting the Communications Cable

#### Connecting a Communications Cable to the SMU01A

Connect a communications cable to the COM port on the SMU01A when you use the Web UI, NetEco, or SNMP to remotely manage the power supply system, as shown in [Figure 4-6](#).

**Figure 4-6** Connecting a communications cable to the SMU01A COM port



(1) COM port

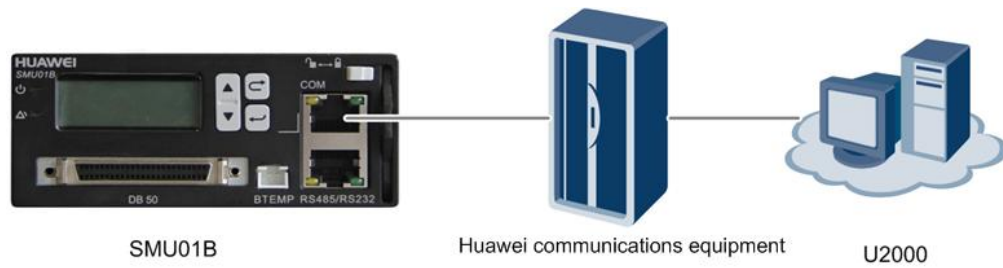
(2) Remote management

#### Connecting a Communications Cable to the SMU01B

Connect the COM port on the SMU01B to the corresponding serial port on the Huawei access network communications equipment using a communications cable when you use the U2000 network management system to remotely manage the power supply system, as shown in [Figure 4-7](#).



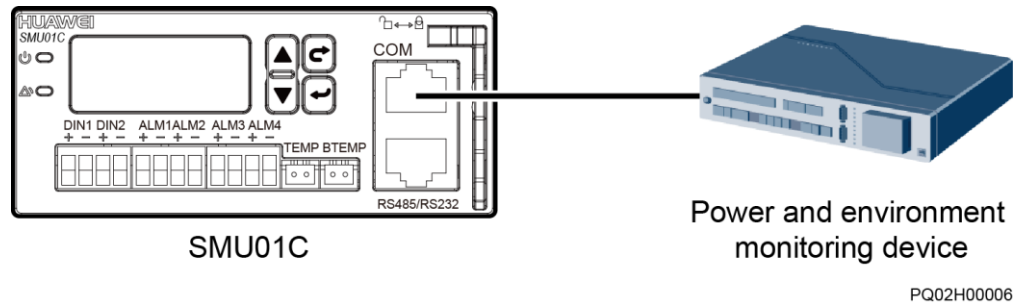
**Figure 4-7** Connecting a communications cable to the SMU01B COM port



## Installing SMU01C Communications Cables

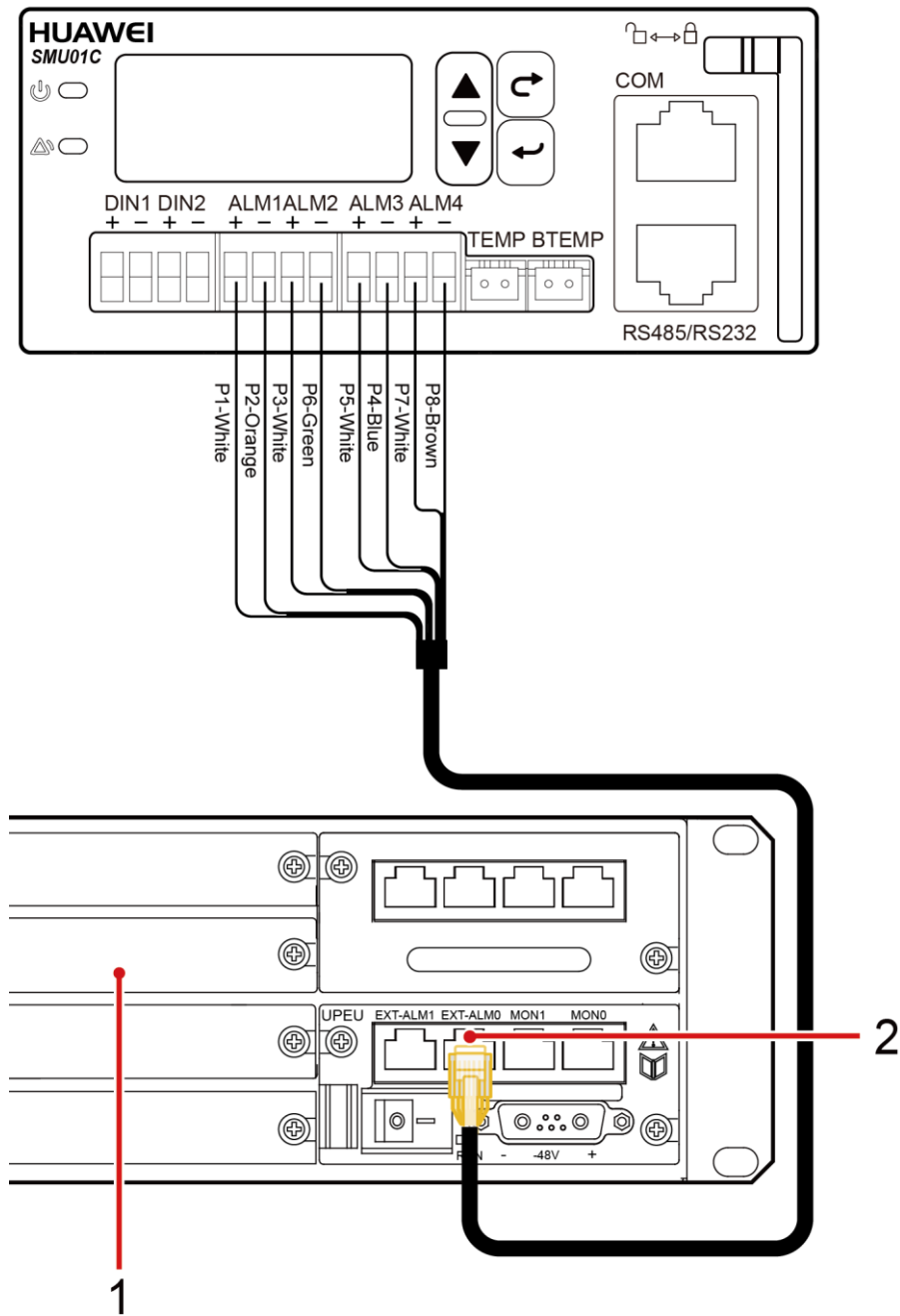
If the power system connects to a power and environment monitoring device, connect a communications cable to the COM port on the SMU01C.

**Figure 4-8** Connecting the SMU01C and the power and environment monitoring device



Alarm signals of the power system can be uploaded over dry contacts. Connect dry contact signal cable to the EXT-ALM0 port on the BBU.

**Figure 4-9** Connecting the SMU01C and the BBU



PO09I20004

(1) BBU

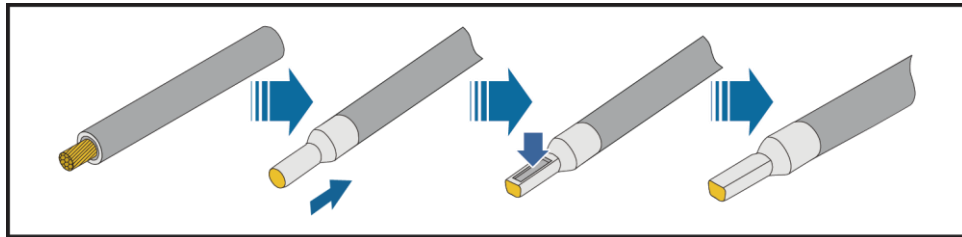
(2) EXT-ALM0 port

## 4.3.4 Installing DC Load Cables

### Procedure

**Step 1** Use cables (maximum size: 10 mm<sup>2</sup>) and cord end terminals to prepare DC load cables.

**Figure 4-10** Preparing a DC load cable

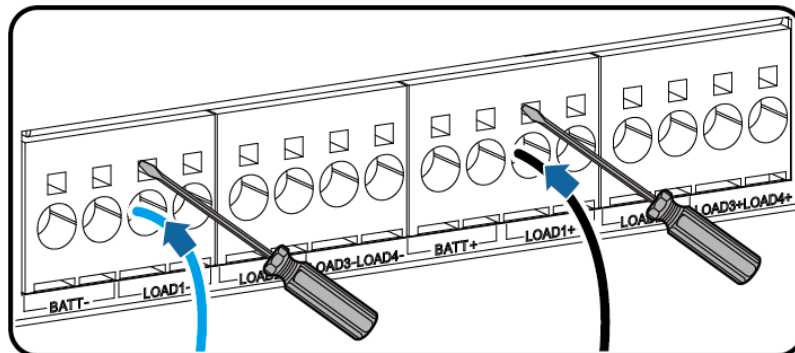


PL00ZC1002

**Step 2** Connect the DC load cables.

1. Horizontally insert a flat-head screwdriver (2 mm wide) into the hole above a load wiring hole.
2. Install a load cable at the wiring hole (insertion depth: 18 mm).
3. Remove the screwdriver and ensure that the load cable is securely installed.

**Figure 4-11** Installing DC load cables



PQ07I20009

----End

## 4.3.5 Installing Battery Cables

### Prerequisites



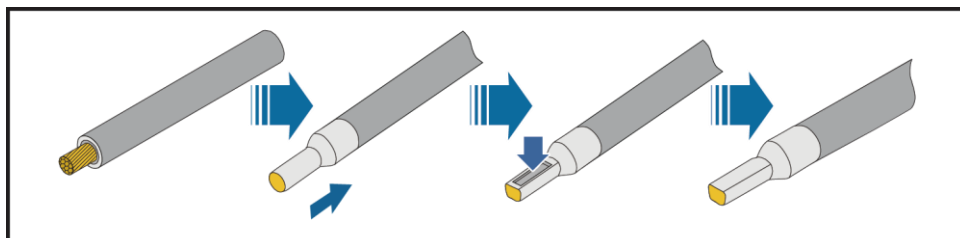
#### DANGER

- Smoking and sources of ignition are prohibited near batteries.
- Switch off the battery circuit breakers before installing batteries.
- Comply with regulations and warnings issued by the battery manufacturer.
- Use tools with insulated handles. Using tools without insulated handles may cause personal injury or result in batteries burning out.
- Before handling batteries, wear goggles, rubber gloves, and protective clothes. Remove any conductors such as jewelry or watches.
- Ensure that battery acid does not come into contact with the eyes. If battery acid gets in the eyes, rinse the eyes with cold water for at least 15 minutes and then seek medical advice immediately. If battery acid comes into contact with skin or clothing, immediately wash the affected area with soap and water.
- Do not use metal or conductors to simultaneously touch two or more battery terminals. Do not use metal or conductors to simultaneously touch battery terminals and grounded objects (for example, the battery compartment); otherwise, transient short circuits will occur, which may produce sparks or explosions.
- During battery installation, ensure that the positive and negative battery terminals are correctly connected to prevent reverse polarity. First connect the negative battery cable and then connect the positive battery cable.
- Secure battery cables to the torque specified in battery documentation. Loose connections will result in excessive voltage drops or cause batteries to burn out when the current increases.

### Procedure

**Step 1** Use cables (maximum size: 10 mm<sup>2</sup>) and cord end terminals to prepare battery cables.

**Figure 4-12** Preparing a battery cable



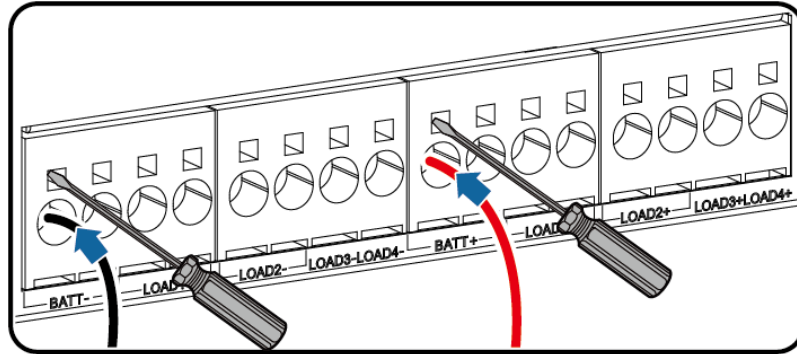
PL002C1002

**Step 2** Install the battery cables.

1. Horizontally insert a flat-head screwdriver (2 mm wide) into the hole above a battery wiring hole.

2. Install a battery cable at the wiring hole (insertion depth: 18 mm).
3. Remove the screwdriver and ensure that the battery cable is securely installed.

**Figure 4-13** Installing battery cables



PQ07I20010



**NOTE**

If the load power is greater than 40 A, connect two negative battery cables to the BATT- wiring terminals and two positive battery cables to the BATT+ wiring terminals. Ensure that the cable size is 10 mm<sup>2</sup>.

----End

## 4.3.6 Installing AC Input Power Cables



### **DANGER**

- Ensure that the upstream AC input circuit breaker is OFF, and attach warning labels such as "Do not operate."
- Switch off all circuit breakers before installing the power cables.

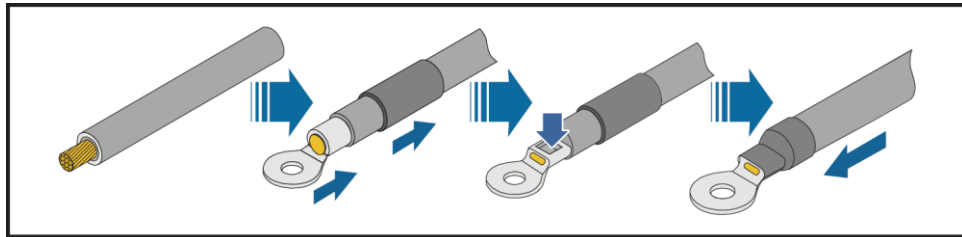
The system supports three types of input systems: 220 V AC single-phase, 110 V AC dual-live wire, and 220/380 V AC three-phase four-wire. Install AC input power cables based on site conditions.

### Installing 220 V AC Single-Phase Input Power Cables

#### Procedure

- Step 1** Use cables (minimum size: 4 mm<sup>2</sup>; maximum size: 6 mm<sup>2</sup>) and OT terminals to prepare AC input power cables.

**Figure 4-14** Preparing an AC input power cable



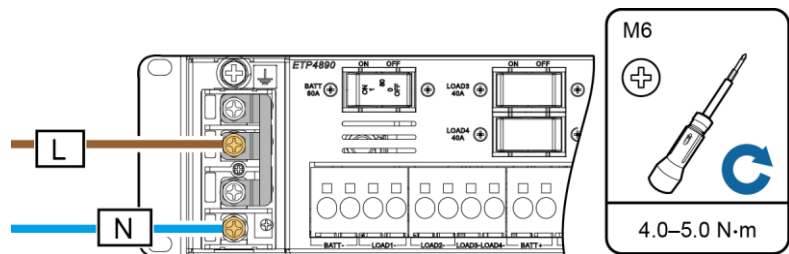
PL002C1001

**Step 2** Remove the protective cover from AC input terminals.

**Step 3** Connect the N cable to the N wiring terminal.

**Step 4** Connect the L cable to the L2 wiring terminal.

**Figure 4-15** Installing 220 V AC single-phase input power cables



PQ07120007

**Step 5** Reinstall the protective cover for the AC input terminals.

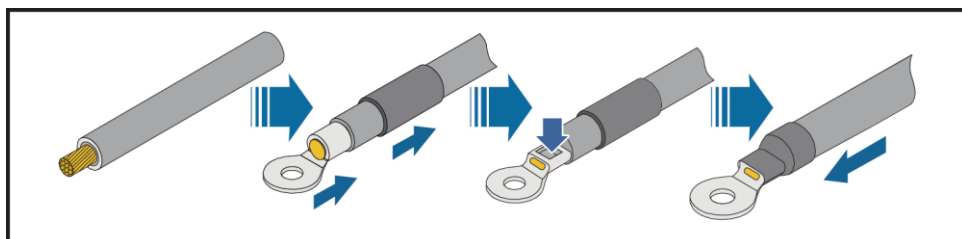
----End

## Installing 110 V AC Dual-Live Wire Input Power Cables

### Procedure

**Step 1** Use cables (minimum size: 4 mm<sup>2</sup>; maximum size: 6 mm<sup>2</sup>) and OT terminals to prepare AC input power cables.

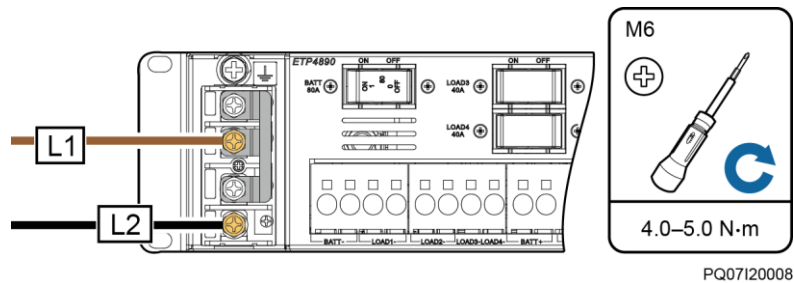
**Figure 4-16** Preparing an AC input power cable



PL002C1001

- Step 2** Remove the protective cover from AC input terminals.
- Step 3** Connect the L1 cable to the L2 wiring terminal.
- Step 4** Connect the L2 cable to the N wiring terminal.

**Figure 4-17** Installing 110 V AC dual-live wire input power cables



- Step 5** Reinstall the protective cover for the AC input terminals.

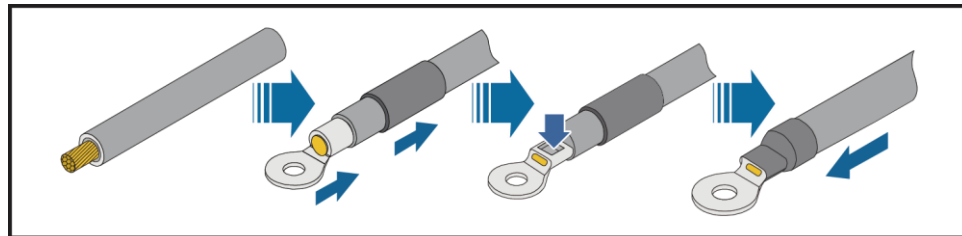
----End

## Installing 220/380 V AC Three-Phase AC Input Power Cables

### Procedure

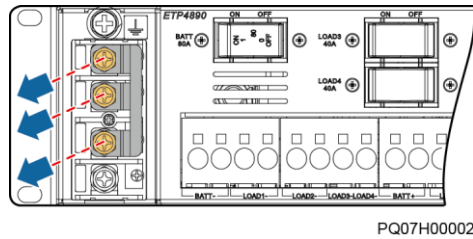
- Step 1** Use cables (minimum size: 1.5 mm<sup>2</sup>; maximum size: 6 mm<sup>2</sup>) and OT terminals to prepare AC input power cables.

**Figure 4-18** Preparing an AC input power cable



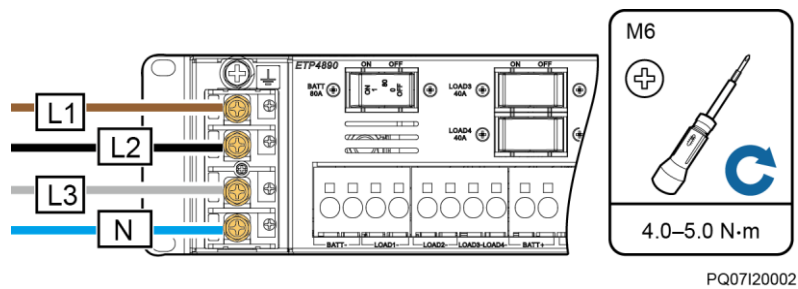
- Step 2** Remove the protective cover from AC input terminals.
- Step 3** Remove the short-circuit copper bar from the AC input terminals.

**Figure 4-19** Removing the short-circuit copper bar



**Step 4** Connect the AC input power cables to the corresponding AC input terminals.

**Figure 4-20** Installing 220/380 V AC three-phase AC input power cables



**Step 5** Reinstall the protective cover for the AC input terminals.

----End



# 5 Verifying the Installation

---

## 5.1 Checking Hardware Installation

- Check that all screws, especially those used for electrical connections, are secured. Check that flat washers and spring washers are installed properly.
- Check that rectifiers are completely inserted into their respective slots and properly locked.

## 5.2 Checking Electrical Connections

- Check that all circuit breakers are OFF or all fuses are disconnected.
- Check that flat washers and spring washers are securely installed for all OT terminals and that all the OT terminals are intact and properly connected.
- Check that batteries are correctly installed and that battery cables are correctly connected, and not short circuits exist.
- Check that input and output power cables and ground cables are correctly connected, and not short circuits exist.

## 5.3 Checking Cable Installation

- Check that all cables are securely connected.
- Check that all cables are arranged neatly and bound properly to their nearest cable ties, and are not twisted or overly bent.
- Check that cable labels are properly and securely attached in the same direction.

# 6 Commissioning



## NOTICE

- The following commissioning procedure may result in power failure or alarm generation. Inform the alarm center before and after the procedure.
- The commissioning involves various technologies. Only trained personnel are allowed to perform commissioning. Perform operations strictly in compliance with the manual.
- The commissioning is performed with power on. During commissioning, stand on dry insulating objects, and remove conductive articles such as watches and rings. Use insulated tools.
- During operations, do not contact two electric bodies that have different currents.
- During commissioning, check that the status of the related unit or component meets requirements before turning on any switch.
- When you are performing operations and do not want others to operate, attach the label "Do not turn on the switch because operations are in process." to the power distribution device.
- During commissioning, shut down the device immediately if any fault is detected. Rectify the fault and proceed with the commissioning.




## 6.1 Connecting the AC Power Supply

### Procedure

- Step 1** Check whether the voltage between the input terminals of the upstream AC input circuit breaker is the same as the local voltage. If not, ask professionals to rectify the fault.
- Step 2** Switch on the upstream AC input circuit breaker.
- Step 3** Check the Run indicator (green) on the rectifier panel. If it is steady on, the rectifier is successfully powered on.
- Step 4** Check the Run indicator (green) and LCD on the SMU panel. If the indicator is blinking and the LCD is on, the SMU is successfully powered on.

----End

## 6.2 Setting the Display Language

After powering on the SMU, press  or  on the LCD to select a display language. Then press  to enter the standby screen.



### NOTE

If an undesired language is selected, reinstall and restart the SMU and then select the desired language.

## 6.3 Setting the Date and Time

### 6.3.1 SMU01A

Set the date and time for the SMU01A as required.

**Table 6-1** Date and time parameters for the SMU01A

| Main Menu | Second-Level Menu | Third-Level Menu | Default Value | Settings        |
|-----------|-------------------|------------------|---------------|-----------------|
| Settings  | System Para       | Set Date         | -             | Local date      |
|           |                   | Set Time         | -             | Local time      |
|           |                   | Set Time Zone    | GMT+08:00     | Local time zone |



### NOTE

The preset user name for the SMU01A is **admin**, and the preset password is **001**.

### 6.3.2 SMU01B and SMU01C

Set the time and date for the SMU01B and SMU01C as required.

**Table 6-2** Time and date parameters for the SMU01B and SMU01C

| Main Menu | Second-Level Menu | Third-Level Menu | Default Value | Setting    |
|-----------|-------------------|------------------|---------------|------------|
| Settings  | System Settings   | Date             | -             | Local date |
|           |                   | Time             | -             | Local time |



### NOTE

- The preset user name of SMU01B is **admin**, and the preset password is **00200**.
- The preset user name of SMU01C is **admin**, and the preset password is **000001**.

## 6.4 Setting System Type

If the SMU01A is configured, set the system type based on the actual situation, as described in [Table 6-3](#). If the SMU01B or SMU01C is configured, you do not need to reset the system type.

**Table 6-3** Setting system type

| Main Menu | Second-Level Menu | Third-level Menu | Default Value | Setting Value |
|-----------|-------------------|------------------|---------------|---------------|
| Settings  | Site Summary      | System Type      | Standard      | ETP4890       |

## 6.5 Setting Battery Parameters



### NOTICE

If battery parameters are incorrectly set, batteries will wear out earlier than necessary. Set the parameters strictly according to requirements.

### 6.5.1 SMU01A

Set **Qty of Battery** to **1**, set **Rated Capacity** to the total capacity of battery strings, and set **Charge Coef** as required.

**Table 6-4** Battery parameters for the SMU01A

| Main Menu      | Second-Level Menu | Default Value | Settings                 |
|----------------|-------------------|---------------|--------------------------|
| Quick Settings | Qty of Battery    | 1             | 1                        |
|                | Rated Capacity    | 65 Ah         | Battery string capacity  |
|                | Charge Coef       | 0.15 C10      | Range: 0.05 C10-0.25 C10 |

### 6.5.2 SMU01B and SMU01C

Set **Battery String** to **1**, set **Capacity** to the total capacity of battery strings, and set **Charge Coef** as required.

**Table 6-5** Battery parameters for the SMU01B and SMU01C

| Main Menu | Second-Level Menu | Third-Level Menu | Default Value | Setting                  |
|-----------|-------------------|------------------|---------------|--------------------------|
| Settings  | Batt Settings     | Battery String   | 1             | 1                        |
|           |                   | Capacity         | 40 Ah         | Battery string capacity  |
|           |                   | Charge Coef      | 0.15 C10      | Range: 0.05 C10-0.25 C10 |

## 6.6 (Optional) Setting Hibernation Parameters

### 6.6.1 SMU01A

Set **Rect Redund Ena** to **Enable** if you need to use the intelligent hibernation function of the rectifiers.

**Table 6-6** Hibernation parameter for the SMU01A

| Main Menu | Second-Level Menu | Third-Level Menu | Default Value | Setting |
|-----------|-------------------|------------------|---------------|---------|
| Settings  | PSU Summary       | Rect Redund Ena  | Disable       | Enable  |

### 6.6.2 SMU01B and SMU01C

Set **Sleep Enable** to **Yes** if you need to use the intelligent hibernation function of the rectifiers.

**Table 6-7** Hibernation parameter for the SMU01B and SMU01C

| Main Menu | Second-Level Menu | Third-Level Menu | Default Value | Setting |
|-----------|-------------------|------------------|---------------|---------|
| Settings  | Rect Settings     | Sleep Enable     | No            | Yes     |

## 6.7 (Optional) Setting Alarm Parameters

### 6.7.1 SMU01A

Set the following alarm parameters as required if you need to enable the alarm function or modify the alarm severity and relay association.

**Table 6-8** Alarm parameters for the SMU01A

| Main Menu | Second-Level Menu | Third-Level Menu   | Fourth-Level Menu   | Default Value | Settings                       |
|-----------|-------------------|--------------------|---|---------------|--------------------------------|
| Settings  | Alarm Setting     | Site Summary       | Internal Fault  | Enable        | Set the parameter as required. |
|           |                   |                    | <b>NOTE</b><br>The <b>Internal Fault</b> alarm is used as an example. | MA            | Set the parameter as required. |
|           |                   |                    |   | None          | Set the parameter as required. |
|           | Site Summary      | DO (1-8) Alarm Act | -   | Close         | Set the parameter as required. |
|           |                   |                    | DI (1-8) Alarm  | -             | Close                          |

### 6.7.2 SMU01B and SMU01C

Set the following alarm parameters as required if you need to enable the alarm function or modify the alarm severity and relay association.

**Table 6-9** Alarm parameters for the SMU01B and SMU01C

| Main Menu | Second-Level Menu | Third-Level Menu | Fourth-Level Menu                                       | Default Value | Setting                        |  |
|-----------|-------------------|------------------|---|---------------|--------------------------------|--|
| Settings  | Alarm Setting     | Alarm Severity   | AC Volt Low/High  | Major         | Set the parameter as required. |  |
|           |                   | Digital Alarm    | Digital No. 1   |               |                                |  |
|           |                   |                  | <b>NOTE</b><br>Take <b>Digital No. 1</b> as an example. |               |                                |  |
|           |                   |                  | Mode  | High          | Set the parameter as required. |  |

| Main Menu | Second-Level Menu | Third-Level Menu | Fourth-Level Menu  | Default Value | Setting                        |
|-----------|-------------------|------------------|--|---------------|--------------------------------|
|           |                   | Relay Relate     | AC Volt Low/High (Alarm)<br><b>NOTE</b><br>Take the <b>AC Volt Low/High</b> alarm as an example. |               |                                |
|           |                   |                  | Relate Relay   | None          | Set the parameter as required. |
|           |                   |                  | Default type   | NC            | Set the parameter as required. |

## 6.8 (Optional) Setting Communications Parameters

### 6.8.1 SMU01A

#### Setting Parameters Before Using WebUI

Before you use the WebUI to remotely manage the SMU01A, set the required IP parameters.

#### Procedure

- Step 1** Apply to the site or equipment room network administrator for a fixed IP address.
- Step 2** Set the IP address, subnet mask, and gateway address on the SMU's LCD.

**Table 6-10** IP parameters

| Main Menu      | Second-Level Menu | Default Value | Settings   |
|----------------|-------------------|---------------|--|
| Quick Settings | IP Address        | 192.168.0.10  | Set this parameter according to the address assigned by the network administrator. |
|                | Subnet mask       | 255.255.255.0 | Set this parameter according to the address assigned by the network administrator. |
|                | Gateway           | 192.168.0.1   | Set this parameter according to the address assigned by                            |

| Main Menu | Second-Level Menu | Default Value | Settings                   |
|-----------|-------------------|---------------|----------------------------|
|           |                   |               | the network administrator. |

----End

## Setting Parameters Before Using NetEco

Before you use the NetEco to perform remote management, set the required parameters.

### Procedure

**Step 1** Apply to the site or equipment room network administrator for a fixed IP address.

**Step 2** Set **IP Address**, **Subnet Mask**, and **Gateway** on the SMU's LCD.

**Table 6-11** IP parameters

| Main Menu      | Second-Level Menu | Default Value | Settings   |
|----------------|-------------------|---------------|--|
| Quick Settings | IP Address        | 192.168.0.10  | Set this parameter according to the address assigned by the network administrator. |
|                | Subnet Mask       | 255.255.255.0 | Set this parameter according to the address assigned by the network administrator. |
|                | Gateway           | 192.168.0.1   | Set this parameter according to the address assigned by the network administrator. |

**Step 3** Set the IP addresses and ports for the active and standby servers of the NetEco on the SMU's LCD.

**Table 6-12** NetEco parameters

| Main Menu | Second-Level Menu | Third-Level Menu | Default Value  | Settings  |
|-----------|-------------------|------------------|----------------|---|
| Settings  | Comm Para         | NetEco Main IP   | 58.251.159.136 | Set an IP address for the active NetEco server. |



| Main Menu | Second-Level Menu | Third-Level Menu | Default Value  | Settings  |
|-----------|-------------------|------------------|----------------|---|
|           |                   | NetEco Bak IP    | 58.251.159.136 | Set an IP address for the standby NetEco server.  |
|           |                   | NetEco Port      | 31220          | 31220<br><b>NOTE</b><br>Please contact Huawei technical support if you need change the port number. |

----End

## Setting Parameters Before SNMP Management

Before you use SNMP to perform remote management, set the required parameters.

### Procedure

- Step 1** Apply to the site or equipment room network administrator for a fixed IP address.
- Step 2** Set the IP address, subnet mask, and gateway on the LCD, as described in [Table 6-13](#).

**Table 6-13** IP parameters

| Main Menu      | Second-Level Menu | Default Value | Setting  |
|----------------|-------------------|---------------|--|
| Quick Settings | IP Address        | 192.168.0.10  | Set this parameter according to the address assigned by the network administrator. |
|                | Subnet mask       | 255.255.255.0 | Set this parameter according to the address assigned by the network administrator. |
|                | Gateway           | 192.168.0.1   | Set this parameter according to the address assigned by the network administrator. |

- Step 3** Connect the network port on your PC to the FE port on the SMU.



## NOTICE

The SMU has only one FE port. Remove the existing network cable from the FE port before you perform step 3 and reconnect the network cable after you finish setting the parameters.

**Step 4** Set the PC IP address in the same network segment as the SMU IP address set in step 2.

Assume that the SMU IP address is 192.168.0.10 and its subnet mask is 255.255.255.0. Set the PC IP address to 192.168.0.11 and its subnet mask to 255.255.255.0.

**Step 5** Enter the SMU IP address in the address box on the PC. Log in to the WebUI on the login page shown in [Figure 6-1](#).



### NOTE

The default user name is **admin**, and the default password is **001**.

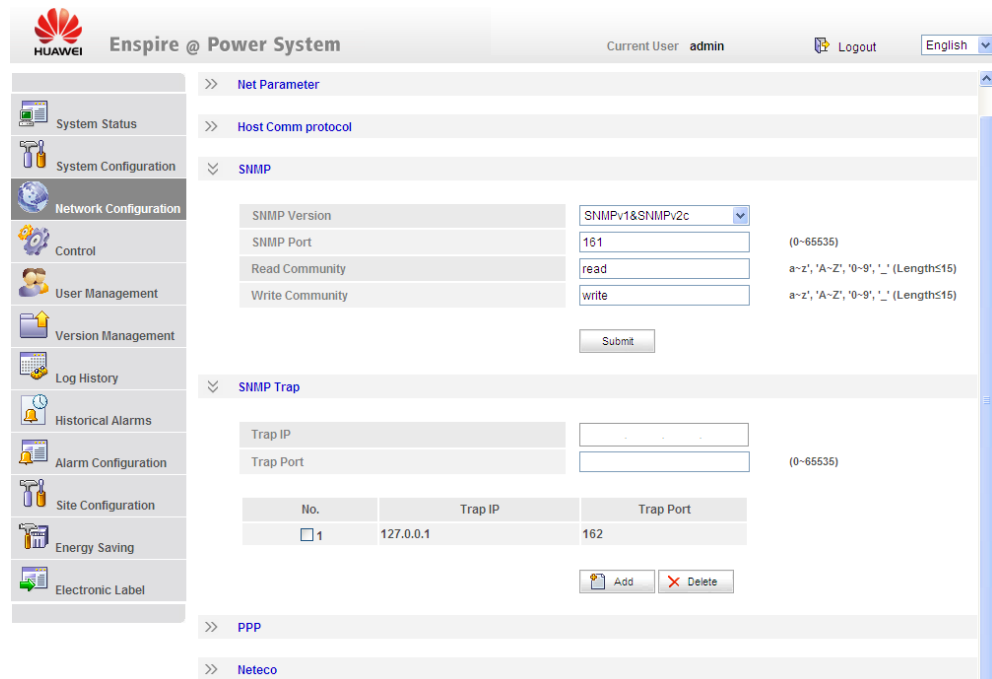
**Figure 6-1** WebUI login page



**Step 6** On the **Network Configuration** page, select **SNMP**.

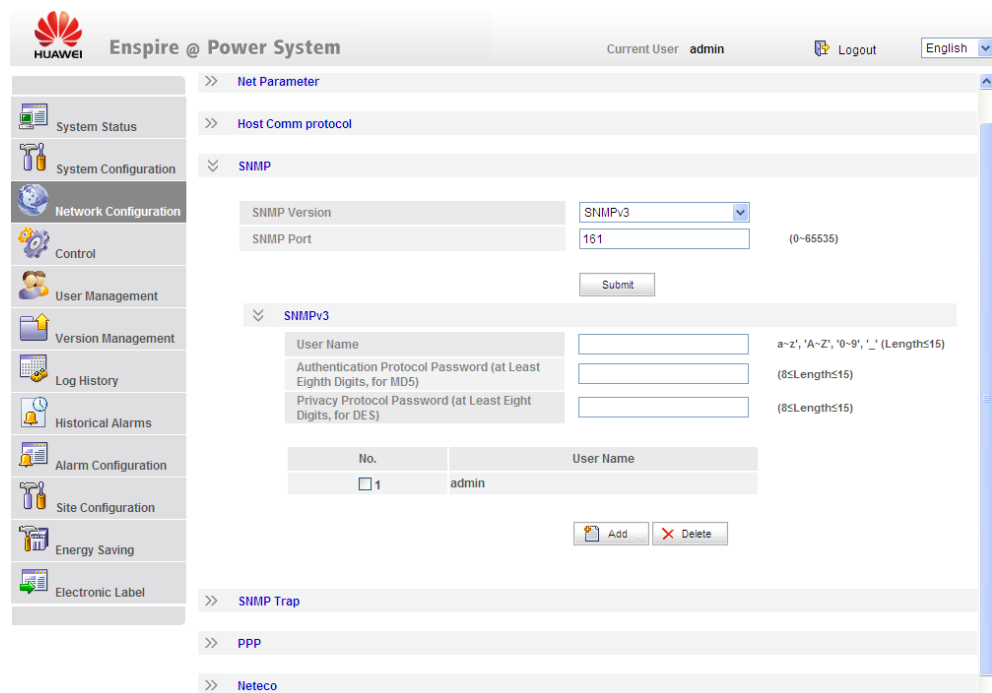
1. If the SNMP version is SNMPv1 or SNMPv2c, set **SNMP Port**, **Read Community**, and **Write Community**, as shown in [Figure 6-2](#).

**Figure 6-2** SNMPv1 and SNMPv2c parameters



2. If the SNMP version is SNMPv3, set **User Name**, **Authentication Protocol Password**, and **Privacy Protocol Password**, as shown in Figure 6-3.

**Figure 6-3** SNMPv3 parameters



**Step 7** Set the SNMP trap destination address and trap port.

**Step 8** Upload the MIB libraries **HUAWEI-MIB.mib** and **HUAWEI-SITE-MONITOR-MIB.mib** to the NMS.

----End

## 6.9 Connecting the Battery Supply

### Prerequisites



#### NOTICE

To avoid damage to batteries, switch on the battery circuit breaker only after correctly setting the battery parameters.

---

### Procedure

**Step 1** Switch off the AC circuit breaker for the upper-level device, and then switch on the battery circuit breaker on PDU.

**Step 2** Switch on the AC circuit breaker for the upper-level device, and then switch on the load circuit breakers on PDU.

**Step 3** Check whether the battery voltage and system output voltage are the same as the voltages displayed on the SMU LCD. If not, ask the technical support personnel to rectify the fault.

**Step 4** Set the battery and load circuit breakers based on the site requirements.

**Step 5** Observe the power system for 15 minutes. If no alarm is generated on the SMU, the voltage and current for batteries and loads are normal. In this case, clean and leave the site.

----End

# 7 Maintenance

## 7.1 Routine Maintenance

Perform routine maintenance based on site requirements. The recommended maintenance interval is six months.

**Table 7-1** Routine maintenance checklist

| Item                              | Maintenance Task   |                    |   |  |
|-----------------------------------|--|--------------------|---|--|
|                                   | Check Whether  | Check Method       | Scenario for Repair   | Measures   |
| Electricity                       | The AC input voltage is normal.                                      | Multimeter         | The AC input voltage is outside the normal range.                                   | For details, see <a href="#">7.2 Rectifying Common Faults</a> and <a href="#">7.3 Identifying Faults</a> . |
|                                   | The output voltage is normal.  |                    | The BLVD or LLVD voltage does not fall between -42 V DC and -58 V DC.               |  |
| Preventive maintenance inspection | The indicators are normal.   | Visual observation | Alarms are generated.   |  |
| Grounding inspection              | The ground point properly connects to the ground bar in the cabinet. | Multimeter         | The resistance between the ground point and the ground bar is greater than 0.1 ohm. |  |

## 7.2 Rectifying Common Faults

### 7.2.1 Mains Failure

#### Possible Causes

- The AC input power cable is faulty.
- The upstream AC input circuit breaker is OFF.
- The power grid is faulty.

#### Measures

1. Check whether the AC input cable is loose. If so, secure the AC input cable.
2. Check whether the upstream AC input circuit breaker is OFF. If so, handle the fault which caused the AC input circuit breaker to turn OFF and then switch on the circuit breaker.
3. Check whether the AC input voltage is lower than 50 V AC. If so, handle the power grid fault.

### 7.2.2 AC Over Volt

#### Possible Causes

- The AC overvoltage alarm threshold is incorrectly set on the SMU.
- The power grid is faulty.

#### Measures

1. Check whether the AC overvoltage alarm threshold is correctly set. If not, set the threshold to the correct value.
2. Check whether the AC input voltage exceeds the AC overvoltage alarm threshold (280 V AC by default). If so, handle the AC input fault.

### 7.2.3 AC Under Volt

#### Possible Causes

- The AC undervoltage alarm threshold is incorrectly set on the SMU.
- The power grid is faulty.

#### Measures

1. Check whether the AC undervoltage alarm threshold is correctly set. If not, set the threshold to the correct value.
2. Check whether the AC input voltage is below the AC undervoltage alarm threshold (180 V AC by default). If so, handle the AC input fault.

## 7.2.4 DC Over Volt

### Possible Causes

- The DC overvoltage alarm threshold is incorrectly set on the SMU.
- The power system voltage has been manually set to a very high value.
- Rectifiers are faulty.

### Measures

1. Check whether the DC overvoltage alarm threshold (58 V DC by default) is correctly set. If not, set the threshold to the correct value.
2. Check whether the system voltage has been manually set to a very high value. If so, check with other maintenance personnel whether the voltage can be changed to a normal value.
3. Remove the rectifiers one by one and check whether the alarm is cleared. If the alarm still exists, reinstall the rectifier. If the alarm is cleared, replace the rectifier.

## 7.2.5 DC Under Volt

### Possible Causes

- An AC power failure has occurred.
- The DC undervoltage alarm threshold is incorrectly set on the SMU.
- The system configuration is incorrect.
- The power system voltage has been manually set to a very low value.
- Rectifiers are faulty.

### Measures

1. Check whether an AC power failure has occurred. If so, rectify the fault to restore the AC power supply.
2. Check whether the DC undervoltage alarm threshold (45 V DC by default) is correctly set. If not, set the threshold to the correct value.
3. Check whether the load current is greater than the present power system capacity. If so, expand the power system capacity or reduce the load power.
4. Check whether the system voltage has been manually set to a very low value. If so, check with other maintenance personnel whether the voltage can be changed to a normal value.
5. Check whether faulty rectifiers have resulted in insufficient power system capacity for the loads. If so, replace the faulty rectifiers.

## 7.2.6 Amb. Over Temp



### NOTE

This alarm is generated only for the power system that has ambient temperature sensors installed.

### Possible Causes

- The ambient overtemperature alarm threshold is not set properly on the SMU.

- The temperature control system is faulty in the cabinet where the ambient temperature sensor is located.
- The ambient temperature sensor is faulty.

## Measures

1. Check whether the ambient temperature alarm threshold (50 °C by default) is properly set on the SMU. If no, adjust it based on site requirements.
2. Check whether the temperature control system in the cabinet is faulty. If yes, rectify the fault. The alarm is cleared when the cabinet temperature falls within the allowed range.
3. Check whether the ambient temperature sensor is faulty. If yes, replace the temperature sensor.

## 7.2.7 Amb. Under Temp



### NOTE

This alarm is generated only for the power system that has ambient temperature sensors installed.

## Possible Causes

- The ambient undertemperature alarm threshold is not set properly on the SMU.
- The temperature control system is faulty in the cabinet where the ambient temperature sensor is located.
- The ambient temperature sensor is faulty.

## Measures

1. Check whether the ambient undertemperature alarm threshold (0 °C by default) is properly set on the SMU. If no, adjust it based on site requirements.
2. Check whether the temperature control system in the cabinet is faulty. If yes, rectify the fault. The alarm is cleared when the cabinet temperature falls within the allowed range.
3. Check whether the ambient temperature sensor is faulty. If yes, replace the ambient temperature sensor.

## 7.2.8 Batt Over Temp



### NOTE

This alarm is generated only for the power system that has battery temperature sensor installed.

## Possible Causes

- The battery overtemperature alarm threshold is not set properly on the SMU.
- The battery temperature controlling system is faulty.
- The battery temperature sensor is faulty.

## Measures

1. Check whether the battery overtemperature alarm threshold (50 °C by default) is properly set. If no, adjust it to a proper value.
2. Check whether the battery temperature controlling system is faulty. If yes, rectify the fault. The alarm is cleared when the battery temperature falls within the allowed range.



3. Check whether the battery temperature sensor is faulty. If yes, replace the temperature sensor.

## 7.2.9 Batt Under Temp



### NOTE

This alarm is generated only for the power system that has battery temperature sensor installed.

### Possible Causes

- The battery undertemperature alarm threshold is not set properly on the SMU.
- The battery temperature controlling system is faulty.
- The battery temperature sensor is faulty.

### Measures

1. Check whether the battery undertemperature alarm threshold (0 °C by default) is properly set. If no, adjust it to a proper value.
2. Check whether the battery temperature controlling system is faulty. If yes, rectify the fault. The alarm is cleared when the battery temperature falls within the allowed range.
3. Check whether the battery temperature sensor is faulty. If yes, replace the temperature sensor.

## 7.2.10 Batt Chg. Overcur.

### Possible Causes

- Rectifier communication is interrupted.
- SMU connections are loose.
- The SMU is faulty.

### Measures

1. Check whether an alarm has been generated for interrupted rectifier communication. If so, remove the rectifier, reinstall it, and check whether the alarm is cleared. If the alarm still exists, replace the rectifier.
2. Remove the SMU, reinstall it, and check whether the alarm is cleared. If the alarm still exists, replace the SMU.

## 7.2.11 Load Loop Break

### Possible Causes

- The load circuit breaker has tripped or the load fuse has blown.
- The load circuit breaker or the fuse detection cable is disconnected.

### Measures

1. Check whether the load circuit breaker has tripped or the load fuse has blown. If so, locate and rectify the circuit fault, and then switch on the circuit breaker or replace the fuse.

2. Check whether the load circuit breaker or fuse detection cable is disconnected. If so, reconnect it.

## 7.2.12 Batt Loop Trip

### Possible Causes

- The battery circuit breaker or fuse detection cable is loosely connected.
- The battery circuit breaker has tripped or the battery fuse has blown.
- The contactor is faulty.

### Measures

1. Check whether the battery circuit breaker or fuse detection cable is loosely connected. If so, reconnect the cable.
2. Check whether the battery circuit breaker has tripped or the battery fuse has blown. If so, rectify the battery loop fault and then switch on the circuit breaker or replace the fuse.
3. Manually switch on or switch off the battery contactor and check whether the battery current changes accordingly. If not, replace the contactor.

## 7.2.13 Batt Off

### Possible Causes

- An AC power failure occurs.
- Batteries are manually disconnected.
- The battery disconnection voltage is set too high on the SMU.
- Rectifiers are faulty.
- The system configuration is not proper.

### Measures

1. Check whether an AC power failure occurs. If yes, resume the AC power supply.
2. Check whether batteries are manually disconnected. If yes, confirm the reason of the manual disconnection, and reconnect the batteries after the operation.
3. Check whether the battery disconnection voltage (43 V DC by default) is set too high on the SMU. If yes, adjust it to a proper value.
4. Check whether the power system capacity is insufficient for the loads due to rectifier failures. If yes, replace the faulty rectifier.
5. Check whether the load current is greater than the current power system capacity. If yes, expand the power system capacity or reduce the load power.

## 7.2.14 Door Alarm



### NOTE

This alarm is generated only for the power system that has door status sensor installed.

### Possible Causes

- The cabinet doors are open.
- The door status sensor is faulty.

## Measures

1. Close cabinet doors.
2. Check whether the door status sensor is faulty. If yes, replace the door status sensor.

### 7.2.15 Water Alarm



#### NOTE

This alarm is generated only for the power system that has a water sensor installed.

#### Possible Causes

- There is water inside the cabinet.
- The water sensor is faulty.

#### Measures

1. Check whether there is water inside the cabinet. If so, remove the water with dry cotton or other tools and then locate and rectify the fault.
2. Check whether the water sensor is faulty. If the water sensor is faulty, replace it.

### 7.2.16 Smoke Alarm



#### NOTE

This alarm is generated only for the power system that has a smoke sensor installed.

#### Possible Causes

- There is smoke inside the cabinet.
- The smoke sensor is faulty.

#### Measures

1. Check whether there is smoke inside the cabinet. If so, disconnect the power supply from the cabinet, handle the fault, and then restart the system and clear the alarm on the SMU.
2. Check whether the smoke sensor is faulty. If the smoke sensor is faulty, replace it.

### 7.2.17 Rect Fault

#### Possible Causes

- Rectifier connections are loose.
- A rectifier is faulty.

#### Measures

1. Check the Fault indicator on the rectifier panel. If it is steady red, remove the rectifier, and then reinstall it after the indicator turns off.
2. If the alarm persists, replace the rectifier.

## 7.2.18 Rect Protection

### Possible Causes

- The rectifier input voltage is too high.
- The rectifier input voltage is too low.
- The ambient temperature is too high.
- The rectifier is abnormal.

### Measures

1. Check whether the AC input voltage exceeds the upper threshold for rectifier working voltage. If so, locate and rectify the power supply fault and restore the power supply.
2. Check whether the AC input voltage is below the lower threshold for rectifier working voltage. If so, locate and rectify the power supply fault and restore the power supply.
3. Check whether the ambient temperature is higher than the maximum operating temperature of the rectifier. If so, locate and rectify the temperature control system fault.
4. Remove the rectifier that has generated the alarm and reinstall it after the indicator turns off. If the alarm persists, replace the rectifier.

## 7.2.19 Single Rect Fault

### Possible Causes

- The subrack or slot connector is faulty.
- A rectifier is faulty.
- The SMU is faulty.

### Measures

1. Remove the rectifier and check whether the slot connector is damaged or deformed. If so, repair or replace the slot connector or the entire subrack.
2. Reinstall the rectifier. If the alarm persists, replace the rectifier.
3. Restart the SMU. If the alarm persists, replace the SMU.

## 7.2.20 Multi-Rect. Fault

### Possible Causes

- The subrack or slot connectors are faulty.
- Rectifiers are faulty.
- The SMU is faulty.

### Measures

1. Remove the rectifiers and check whether the slot connectors are damaged or deformed. If so, repair or replace the slot connectors or the entire subrack.
2. Reinstall the rectifiers. If the alarm persists, replace the rectifiers.
3. Restart the SMU. If the alarm persists, replace the SMU.

## 7.2.21 Rect Comm Fault

### Possible Causes

- A rectifier has been removed.
- Rectifier connections are loose.
- A rectifier is faulty.

### Measures

1. Check whether a rectifier has been removed. If so, reinstall it.
2. If the rectifier is in position, remove the rectifier and reinstall it.
3. If the alarm persists, replace the rectifier.

## 7.3 Identifying Faults

### 7.3.1 Identifying Rectifier Faults

**Table 7-2** Identifying rectifier faults

| Symptom   | Possible Cause  | Corrective Measures   |
|---|---|---|
| The Run indicator (green) is off.               | There is no AC input, or the rectifier is faulty.   | Check whether the AC input is normal. If the AC input is normal, replace the rectifier. If the AC input is normal and the green indicators on all rectifiers are off, replace the AC/DC power distribution subrack.   |
| The Run indicator (green) is blinking (0.5 Hz). | The rectifier is being queried manually.  | Exit the query status. The Run indicator becomes steady on again.   |
| The Run indicator (green) is blinking (4 Hz).   | Software is being loaded.   | After software finishes loading, the indicator will stop blinking, without any user action required.  |
| The Alarm indicator (yellow) is steady on.      | <ul style="list-style-type: none"> <li>• The rectifier is protecting itself against overtemperature.</li> <li>• The rectifier is protecting itself against AC input overvoltage or undervoltage.</li> <li>• The rectifier is faulty.</li> </ul> | <ul style="list-style-type: none"> <li>• If the ambient temperature is higher than the upper threshold, lower the ambient temperature.</li> <li>• If the air intake or exhaust vent is blocked, remove the blockage.</li> <li>• If the AC input is abnormal, ask maintenance personnel for the mains supply to rectify</li> </ul> |

| Symptom                                   | Possible Cause  | Corrective Measures  |
|---|---|--|
|   |   | <p>the fault.</p> <ul style="list-style-type: none"> <li>If the fault persists, the rectifier may be faulty. Replace the faulty rectifier.</li> </ul>  |
| The Alarm indicator (yellow) is blinking. | Communication between the rectifier and the SMU is interrupted. | Clean the edge connector of the faulty rectifier. If the Alarm indicator is still blinking, check the SMU and the AC/DC power distribution subrack.  |
| The Fault indicator (red) is steady on.   | The rectifier is protecting itself against output overvoltage.  | <ul style="list-style-type: none"> <li>If a single rectifier is locked, remove the rectifier that is indicating the fault, and then power on the rectifier after the indicator turns off. If overvoltage still occurs, replace the rectifier.</li> <li>If multiple rectifiers are locked, remove all rectifiers and reinstall them one by one to locate the faulty rectifiers. Replace the faulty rectifiers.</li> </ul> |
|   | The rectifier has no output due to an internal fault.           | Replace the faulty rectifier.  |

## 7.3.2 Identifying SMU Faults

Table 7-3 Identifying SMU faults

| Symptom                                     | Cause  | Corrective Measures   |
|---|--|---|
| The Run indicator (green) is off.           | There is no input.                               | <ul style="list-style-type: none"> <li>Check whether the green indicators on rectifiers are steady on. If so, the input to the power subrack is normal.</li> <li>Reseat the SMU. If the fault persists, replace the SMU.</li> </ul> |
| The Run indicator (green) is blinking fast. | The SMU has failed to communicate with the host. | Check whether communication between the SMU and the host is normal.   |

| Symptom                                 | Cause   | Corrective Measures  |
|---|---|--|
| The Alarm indicator (red) is steady on. | A major or critical alarm has been generated. | Query the active alarm on the host or SMU LCD to identify the fault. |

## 7.4 Replacing Components



### NOTICE

- Performing maintenance or replacing components may interrupt power to the loads if battery reserve is insufficient. Ensure that the switches for primary loads are in the ON position and do not turn off the battery switch and the AC input switch at the same time.
  - Obtain prior written consent from the customer if load disconnection is required.
  - Do not perform maintenance on rainy days. Otherwise, rain water can enter the system and damage devices and components.
- 

### 7.4.1 Replacing a Rectifier

#### Prerequisites

- Protective gloves and the cabinet door key are available.
- The new rectifier is intact.



### CAUTION

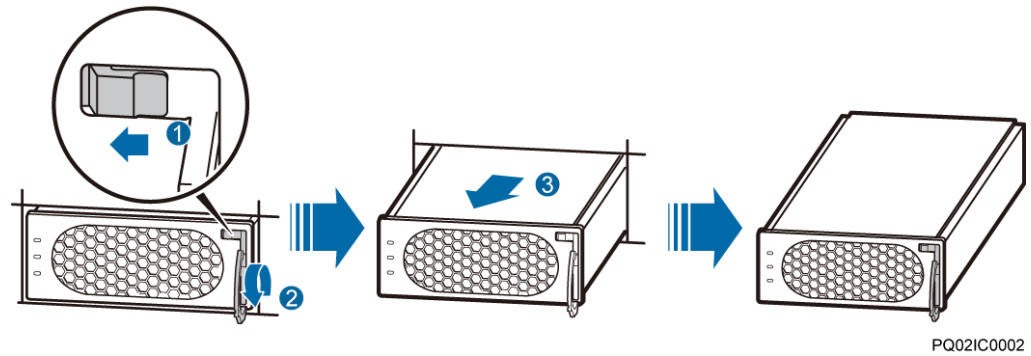
To prevent burns, exercise caution when removing a rectifier because the rectifier may be hot as a result of continuous operation.

---

#### Procedure

- Step 1** Wear protective gloves.
- Step 2** Push the locking latch on the right side of the panel towards the left.
- Step 3** Gently draw the handle outwards, and then remove the rectifier from the subrack, as shown in [Figure 7-1](#).

**Figure 7-1** Removing a rectifier

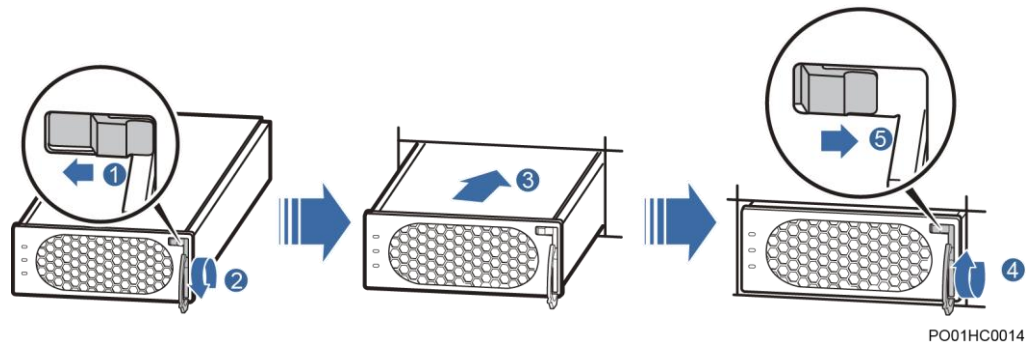


**Step 4** Push the locking latch on the new rectifier towards the left, and pull out the handle.

**Step 5** Place the new rectifier at the entry of the correct slot.

**Step 6** Gently slide the rectifier into the slot along the guide rails until it is engaged. Close the handle, and push the locking latch towards the right to lock the handle, as shown in [Figure 7-2](#).

**Figure 7-2** Installing a rectifier



**Step 7** Remove the protective gloves.

----End

## Follow-up Procedure

Pack the removed component and send it to the local Huawei warehouse.

## 7.4.2 Replacing an SMU

### Prerequisites

- You have obtained an ESD wrist strap, a pair of protective gloves, an ESD box or bag.
- The new rectifier is intact.

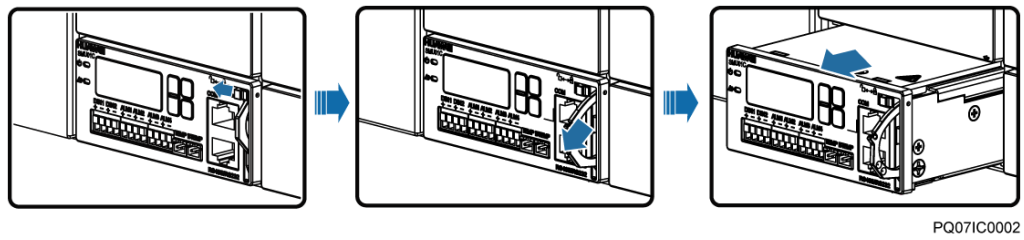
### Procedure

**Step 1** Push the locking latch towards the left.



**Step 2** Draw the handle outwards to remove the SMU, as shown in [Figure 7-3](#).

**Figure 7-3** Removing an SMU

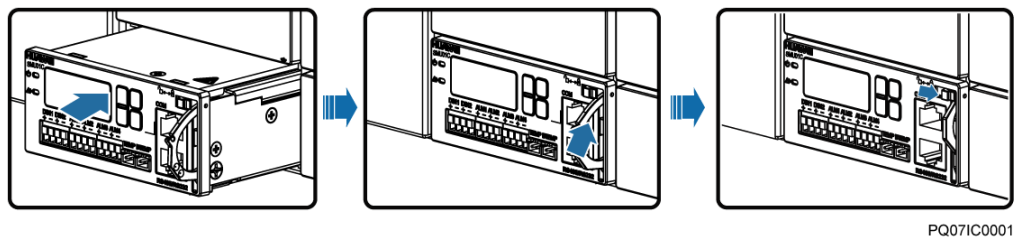


**Step 3** Insert a new SMU into the slot, push the locking latch towards the left, and pull out the handle.

**Step 4** Slide the SMU into the subrack slowly along the guide rail, push in the handle, and then push the locking latch towards the right.

**Step 5** Reset SMU parameters.

**Figure 7-4** Installing an SMU



----End

## Follow-up Procedure

Pack the removed component and have it sent to the local Huawei warehouse.

# A Technical specifications

**Table A-1** Technical specifications

| Category                 | Item                         | Specifications  |
|--------------------------|------------------------------|---|
| Environmental conditions | Operating temperature        | -40 °C to +65 °C  |
|                          | Storage temperature          | -40 °C to +70 °C  |
|                          | Transportation temperature   | -40 °C to +70 °C  |
|                          | Operating humidity           | 5% to 95% RH (non-condensing)   |
|                          | Storage humidity             | 5% to 95% RH (non-condensing)   |
|                          | Altitude                     | 0 m to 4000 m<br>When the altitude ranges from 2000 m to 4000 m, the operating temperature is derated by 1 °C for each additional 200 m.  |
| AC input                 | Input mode and input voltage | 220 V AC single-phase compatible with 220/380 V AC three-phase, four-wire <ul style="list-style-type: none"><li>• Input range: 85 V AC to 300 V AC (phase voltage)</li><li>• Rated input: 220 V AC to 240 V AC (phase voltage)</li></ul> 110 V AC dual-live-wire <ul style="list-style-type: none"><li>• Input range: 85 V AC to 300 V AC (line voltage)</li><li>• Rated input: 220 V AC to 240 V AC (line voltage)</li></ul> |
|                          | Input frequency              | 45 Hz to 65 Hz (rated frequency: 50/60 Hz)  |
|                          | Power factor                 | ≥ 0.99 (rated load)   |
| DC output                | Output voltage range         | -42 V DC to -58 V DC  |

| Category             | Item                                       | Specifications  |
|----------------------|--|---|
|                      | Default output voltage                     | -53.5 V DC  |
|                      | Maximum output power                       | 4800 W  |
|                      | Regulated voltage precision                | $\leq \pm 0.6\%$  |
|                      | Peak-to-peak noise voltage                 | $\leq 200$ mV (0 Hz to 20 MHz, rated input voltage and rated output load)   |
|                      | Others                                     | No damage is caused if a storage battery is connected reversely.  |
| AC input protection  | AC input overvoltage protection threshold  | Overvoltage protection is performed when the single-phase AC input voltage exceeds the AC input overvoltage protection threshold (300 V AC by default).   |
|                      | AC input overvoltage recovery threshold    | When the voltage is restored to 290 V AC, the output resumes.   |
|                      | AC input undervoltage protection threshold | Undervoltage protection is performed when the single-phase AC input voltage is below the AC input undervoltage protection threshold (85 V AC by default).   |
|                      | AC input undervoltage recovery threshold   | When the voltage is restored to 90 V AC, the output resumes.  |
| DC output protection | DC output overvoltage protection threshold | -58.5 V DC to -60.5 V DC  |
| Rectifier            | Efficiency                                 | <ul style="list-style-type: none"> <li>R4830G1: Highest efficiency: <math>\geq 96\%</math><br/><math>\geq 95\%</math> (230 V AC, 45%-80% load)</li> <li>R4830N2: Highest efficiency: <math>\geq 94\%</math><br/><math>\geq 93\%</math> (230 V AC, 30%-100% load)</li> <li>R4815G1: Highest efficiency: <math>\geq 96\%</math><br/><math>\geq 95\%</math> (220 V AC, 40%-100% load)</li> <li>R4815N1: Highest efficiency: <math>\geq 94\%</math><br/><math>\geq 93\%</math> (220 V AC, 30%-100% load)</li> </ul> |
|                      | Output Power                               | <ul style="list-style-type: none"> <li>R4830G1: 1600 W (input voltage range: 176-300 V AC), 800 W (input voltage range: 85-175 V AC, linearly derated)</li> <li>R4830N2: 1605 W (input voltage range: 176-300 V AC), 755 W (input voltage range: 85-175 V AC, linearly derated)</li> <li>R4815G1: 870 W (input voltage range: 176-300 V AC), 435 W (input</li> </ul>  |

| Category | Item                            | Specifications  |
|----------|---------------------------------|---|
|          |                                 | voltage range: 85-175 V AC, linearly derated)<br><ul style="list-style-type: none"> <li>R4815N1: 1000 W (input voltage range: 176-300 V AC), 470 W (input voltage range: 85-175 V AC, linearly derated)</li> </ul>  |
|          | Overvoltage protection          | Range: 58.5 V DC to 60.5 V DC<br>1. When the overvoltage occurs inside the rectifier due to a fault, the rectifier experiences a deadlock.<br>2. When the external voltage is higher than 63 V DC for more than 500 ms, the rectifier experiences a deadlock.   |
| EMC      | CE/RE                           | CISPR 22/EN 55022 Class B   |
|          | Harmonic                        | IEC 61000-3-12  |
|          | Fluctuation and blinking        | IEC 61000-3-3   |
|          | Electrostatic discharge (ESD)   | Enclosure port: contact discharge 6 kV, air discharge 8 kV (criterion B); signal port: contact discharge 2 kV (criterion R)   |
|          | Electrical fast transient (EFT) | Signal port: 1 kV; Power port: 2 kV criterion B   |
|          | Radiated susceptibility (RS)    | 10 V/m field strength criterion A   |
|          | Conducted susceptibility (CS)   | Signal port: 3 V; Power port: 10 V criterion A  |
|          | SURGE                           | AC power port: 2 kV in differential mode, 4 kV in common mode, 1.2/50 $\mu$ s waveform, criterion B<br>DC power port: 2 kV in differential mode, 4 kV in common mode, 1.2/50 $\mu$ s waveform, criterion B<br>Signal cables inside the cabinet: 1 kV in common mode, waveform 1.2/50 $\mu$ s, criterion B<br>Signal cables outside the cabinet: 2 kV in common mode, waveform 1.2/50 $\mu$ s, criterion B |
|          | DIP                             | IEC61000-4-11   |
| Others   | Safety and regulatory design    | Complies with IEC 60950-1/GB 4943 and passes the certification of the Conformance Européenne (CE) and   |

| Category  | Item                              | Specifications  |
|-----------|-----------------------------------|---|
|           |                                   | Technical Watch-Over Association (TUV).   |
|           | Mean time between failures (MTBF) | 250,000 hours (at 25 °C)  |
| Structure | Power system (H x W x D)          | 86.1 mm x 442 mm x 255 mm   |
|           | Weight                            | ≤ 10 kg (33.08 lb) (include 3 PCS rectifiers and 1 PCS SMU)   |
|           | Protection level                  | IP20  |
|           | Installation                      | Equipped with different types of mounting ears to adapt to 19-inch cabinets and European Telecommunications Standards Institute (ETSI) cabinets |
|           | Maintenance                       | Operated and maintained from the front  |
|           | Cooling                           | Fan-cooled  |

# B Acronyms and Abbreviations

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## A

**ACDB** alternating current distribution box

## I

**IP** Internet Protocol

## L

**LCD** liquid crystal display

## N

**NMS** network management system

## P

**PE** protective earth

## S

**SMU** site monitoring unit

## T

**TCP** Transmission Control Protocol

## U

**USB** Universal Serial Bus