

UPS5000-E-(60 kVA-125 kVA)

# User Manual (Integrated UPS 3.0)

Issue 02

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## **About This Document**

## **Purpose**

This document describes the integrated uninterruptible power system UPS5000-E-(60 kVA-125 kVA) in terms of its features, performance, working principles, appearance, installation, and operation and maintenance (O&M). UPS in this document represents integrated UPS.

## **Intended Audience**

This document is intended for:

- Sales engineers
- Technical support engineers
- System engineers
- Hardware installation engineers
- Commissioning engineers
- Data configuration engineers
- Maintenance engineers

## **Symbol Conventions**

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

| Symbol           | Description  |  |
|------------------|--|--|
| <b>⚠</b> DANGER  | Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.    |  |
| <u>↑</u> WARNING | Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury. |  |

| Symbol   | Description  |  |
|----------|--|--|
| <u> </u> | Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.   |  |
| NOTICE   | Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results. |  |
|          | NOTICE is used to address practices not related to personal injury.  |  |
| □ NOTE   | Supplements the important information in the main text.  |  |
|          | NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.   |  |

## **Change History**

Updates between document issues are cumulative. Therefore, the latest document issue contains all updates made in previous versions.

## Issue 02 (2020-12-07)

Updated some monitoring.

## Issue 01 (2020-04-13)

This issue is the first official release.

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# 1 Safety Information

## 1.1 General Safety

#### Statement

Before installing, operating, and maintaining the equipment, read this document and observe all the safety instructions on the equipment and in this document.

The "NOTICE", "CAUTION", "WARNING", and "DANGER" statements in this document do not cover all the safety instructions. They are only supplements to the safety instructions. Huawei will not be liable for any consequence caused by the violation of general safety requirements or design, production, and usage safety standards.

Ensure that the equipment is used in environments that meet its design specifications. Otherwise, the equipment may become faulty, and the resulting equipment malfunction, component damage, personal injuries, or property damage are not covered under the warranty.

Follow local laws and regulations when installing, operating, or maintaining the equipment. The safety instructions in this document are only supplements to local laws and regulations.

Huawei will not be liable for any consequences of the following circumstances:

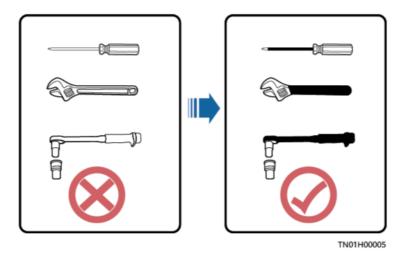
- Operation beyond the conditions specified in this document
- Installation or use in environments which are not specified in relevant international or national standards
- Unauthorized modifications to the product or software code or removal of the product
- Failure to follow the operation instructions and safety precautions on the product and in this document
- Equipment damage due to force majeure, such as earthquakes, fire, and
- Damage caused during transportation by the customer
- Storage conditions that do not meet the requirements specified in this document

## **General Requirements**

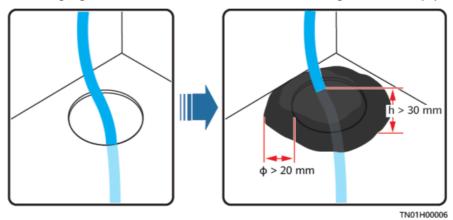
- Do not install, use, or operate outdoor equipment and cables (including but not limited to moving equipment, operating equipment and cables, inserting connectors to or removing connectors from signal ports connected to outdoor facilities, working at heights, and performing outdoor installation) in harsh weather conditions such as lightning, rain, snow, and level 6 or stronger wind.
- Before installing, operating, or maintaining the equipment, remove any conductive objects such as watches or metal jewelry like bracelets, bangles, and rings to avoid electric shock.
- When installing, operating, or maintaining the equipment, wear personal protective equipment such as insulation gloves, goggles, and safety clothing, helmet, and shoes, as shown in the following figure.



- Follow the specified procedures for installation, operation, and maintenance.
- Before handling a conductor surface or terminal, measure the contact point voltage and ensure that there is no risk of electric shock.
- After installing the equipment, remove idle packing materials such as cartons, foam, plastics, and cable ties from the equipment area.
- In the case of a fire, immediately leave the building or the equipment area, and turn on the fire alarm bell or make an emergency call. Do not enter the building on fire in any case.
- Do not stop using protective devices. Pay attention to the warnings, cautions, and related precautionary measures in this document and on the equipment.
   Promptly replace warning labels that have worn out.
- Keep irrelevant people away from the equipment. Only operators are allowed to access the equipment.
- Use insulated tools or tools with insulated handles, as shown in the following figure.



All cable holes should be sealed. Seal the used cable holes with firestop putty.
 Seal the unused cable holes with the caps delivered with the cabinet. The following figure shows the criteria for correct sealing with firestop putty.



- Do not scrawl, damage, or block any warning label on the equipment.
- When installing devices, use a torque wrench with a proper measurement range to tighten bolts. Ensure that the wrench is not skewed and the torque error does not exceed 10%.
- Do not work with power on during installation.
- Repaint any paint scratches caused during equipment transportation or installation in a timely manner. Equipment with scratches cannot be exposed to an outdoor environment for a long period of time.
- Before operations, ensure that the equipment is firmly secured to the floor or other solid objects, such as a wall or an installation rack.
- Do not use water to clean electrical components inside or outside of a cabinet.
- Do not change the structure or installation sequence of equipment without permission.
- Do not touch a running fan with your fingers, components, screws, tools, or boards before the fan is powered off or stops running.

## **Personal Safety**

- If there is a probability of personal injury or equipment damage during operations on the equipment, immediately stop the operations, report the case to the supervisor, and take feasible protective measures.
- To avoid electric shock, do not connect safety extra-low voltage (SELV) circuits to telecommunication network voltage (TNV) circuits.
- Do not power on the equipment before it is installed or confirmed by professionals.

## 1.2 Personnel Requirements

- Personnel who plan to install or maintain Huawei equipment must receive thorough training, understand all necessary safety precautions, and be able to correctly perform all operations.
- Only qualified professionals or trained personnel are allowed to install, operate, and maintain the equipment.
- Only qualified professionals are allowed to remove safety facilities and inspect the equipment.
- Personnel who will operate the equipment, including operators, trained personnel, and professionals, should possess the local national required qualifications in special operations such as high-voltage operations, working at heights, and operations of special equipment.
- Professionals: personnel who are trained or experienced in equipment operations and are clear of the sources and degree of various potential hazards in equipment installation, operation, maintenance
- Trained personnel: personnel who are technically trained, have required experience, are aware of possible hazards on themselves in certain operations, and are able to take protective measures to minimize the hazards on themselves and other people
- Operators: operation personnel who may come in contact with the equipment, except trained personnel and professionals
- Only professionals or authorized personnel are allowed to replace the equipment or components (including software).

## 1.3 Electrical Safety

## Grounding

- For the equipment that needs to be grounded, install the ground cable first
  when installing the equipment and remove the ground cable last when
  removing the equipment.
- Do not damage the ground conductor.
- Do not operate the equipment in the absence of a properly installed ground conductor
- Ensure that the equipment is connected permanently to the protective ground. Before operating the equipment, check its electrical connection to ensure that it is securely grounded.

## **General Requirements**

Use dedicated insulated tools when performing high-voltage operations.

#### AC and DC Power

#### **⚠** DANGER

Do not connect or disconnect power cables with power on. Transient contact between the core of the power cable and the conductor will generate electric arcs or sparks, which may cause fire or personal injury.

- If a "high electricity leakage" tag is attached on the equipment, ground the
  protective ground terminal on the equipment enclosure before connecting the
  AC power supply; otherwise, electric shock as a result of electricity leakage
  may occur.
- Before installing or removing a power cable, turn off the power switch.
- Before connecting a power cable, check that the label on the power cable is correct.
- If the equipment has multiple inputs, disconnect all the inputs before operating the equipment.
- A circuit breaker equipped with a residual current device (RCD) is not recommended.
- A damaged power cable must be replaced by the manufacturer, service agent, or professionals to avoid risks.
- High voltage operations and installation of AC-powered facilities must be performed by qualified personnel.

## Cabling

- When routing cables, ensure that a distance of at least 30 mm exists between the cables and heat-generating components or areas. This prevents damage to the insulation layer of the cables.
- Do not route cables behind the air intake and exhaust vents of the equipment.
- Ensure that cables meet the VW-1 or ZB flame spread rating requirements or higher.
- Bind cables of the same type together. When routing cables of different types, ensure that they are at least 30 mm away from each other.
- If an AC input power cable is connected to the cabinet from the top, bend the cable in a U shape outside the cabinet and then route it into the cabinet.
- When the temperature is low, violent impact or vibration may damage the plastic cable sheathing. To ensure safety, comply with the following requirements:
  - Cables can be laid or installed only when the temperature is higher than
     0°C. Handle cables with caution, especially at a low temperature.
  - Cables stored at subzero temperatures must be stored at room temperature for at least 24 hours before they are laid out.

- Do not perform any improper operations, for example, dropping cables directly from a vehicle.
- When selecting, connecting, and routing cables, follow local safety regulations and rules.

#### **ESD**

#### **NOTICE**

The static electricity generated by human bodies may damage the electrostaticsensitive components on boards, for example, the large-scale integrated (LSI) circuits.

- Wear ESD gloves or a well-grounded ESD wrist strap when touching the device or handling boards or application-specific integrated circuits (ASICs).
- When holding a board, hold its edge without touching any components. Do not touch the components with your bare hands.
- Package boards with ESD packaging materials before storing or transporting them.

Figure 1-1 Wearing an ESD wrist strap



## **Neutral-Ground Voltage**

It is recommended that the three-phase loads be equalized and the neutralground voltage be kept at less than 2 V to meet power distribution requirements.

## 1.4 Installation Environment Requirements

- To prevent fire due to high temperature, ensure that the ventilation vents or heat dissipation system are not blocked when the equipment is running.
- Install the equipment in an area far away from liquids. Do not install it under areas prone to condensation, such as under water pipes and air exhaust vents, or areas prone to water leakage, such as air conditioner vents, ventilation

- vents, or feeder windows of the equipment room. Ensure that no liquid enters the equipment to prevent faults or short circuits.
- If any liquid is detected inside the equipment, immediately disconnect the power supply and contact the administrator.
- Do not expose the equipment to flammable or explosive gas or smoke. Do not perform any operation on the equipment in such environments.
- Ensure that the equipment room provides good heat insulation, and the walls and floor are dampproof.
- Install a rat guard at the door of the equipment room.

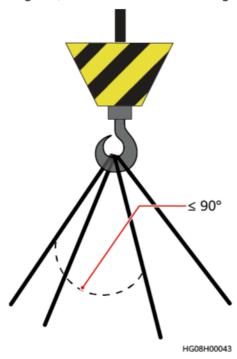
## Installation at Heights

- Working at heights refers to operations that are performed at least 2 meters above the ground.
- Do not work at heights if the steel pipes are wet or other potential danger exists. After the preceding conditions no longer exist, the safety director and relevant technical personnel need to check the involved equipment. Operators can begin working only after obtaining consent.
- When working at heights, comply with local relevant laws and regulations.
- Only trained and qualified personnel are allowed to work at heights.
- Before working at heights, check the climbing tools and safety gears such as safety helmets, safety belts, ladders, springboards, scaffolding, and lifting equipment. If they do not meet the requirements, take corrective measures or disallow working at heights.
- Wear personal protective equipment such as the safety helmet and safety belt or waist rope and fasten it to a solid structure. Do not mount it on an insecure moveable object or metal object with sharp edges. Make sure that the hooks will not slide off.
- Set a restricted area and eye-catching signs for working at heights to warn away irrelevant personnel.
- Carry the operation machinery and tools properly to prevent them from falling off and causing injuries.
- Personnel involving working at heights are not allowed to throw objects from the height to the ground, or vice versa. Objects should be transported by tough slings, hanging baskets, highline trolleys, or cranes.
- Ensure that guard rails and warning signs are set at the edges and openings of the area involving working at heights to prevent falls.
- Do not pile up scaffolding, springboards, or other sundries on the ground under the area involving working at heights. Do not allow people to stay or pass under the area involving working at heights.
- Inspect the scaffolding, springboards, and workbenches used for working at heights in advance to ensure that their structures are solid and not overloaded.
- Any violations must be promptly pointed out by the site manager or safety supervisor and the involved personnel should be prompted for correction.
   Personnel who fail to stop violations will be forbidden from working.

## 1.5 Mechanical Safety

## **Hoisting Devices**

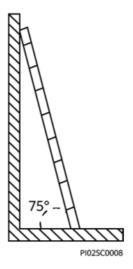
- Do not walk under hoisted objects.
- Only trained and qualified personnel should perform hoisting operations.
- Check that hoisting tools are available and in good condition.
- Before hoisting objects, ensure that hoisting tools are firmly secured onto a load-bearing object or wall.
- Ensure that the angle formed by two hoisting cables is no more than 90 degrees, as shown in the following figure.



 Do not drag steel ropes and hoisting tools or bump hoisted objects against hard objects during hoisting.

## **Using Ladders**

- Use wooden or fiberglass ladders when you need to perform live working at heights.
- When a step ladder is used, ensure that the pull ropes are secured and the ladder is held firm.
- Before using a ladder, check that it is intact and confirm its load bearing capacity. Do not overload it.
- Ensure that the ladder is securely positioned. The recommended angle for a ladder against the floor is 75 degrees, as shown in the following figure. An angle rule can be used to measure the angle. Ensure that the wider end of the ladder is at the bottom, or protective measures have been taken at the bottom to prevent the ladder from sliding.



- When climbing a ladder, take the following precautions to reduce risks and ensure safety:
  - Keep your body steady.
  - Do not climb higher than the fourth rung of the ladder from the top.
  - Ensure that your body's center of gravity does not shift outside the legs of the ladder.

## **Drilling Holes**

When drilling holes into a wall or floor, observe the following safety precautions:

#### NOTICE

Do not drill holes into the equipment. Doing so may affect the electromagnetic shielding of the equipment and damage components or cables inside. Metal shavings from drilling may short-circuit boards inside the equipment.

- Obtain the consent from the customer and subcontractor before drilling.
- Wear goggles and protective gloves when drilling holes.
- When drilling holes, protect the equipment from shavings. After drilling, clean up any shavings that have accumulated inside or outside the equipment.

## **Moving Heavy Objects**

## **A** DANGER

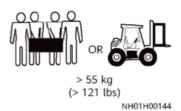
When removing a heavy or unstable component from a cabinet, be aware of unstable or heavy objects on the cabinet.

Be cautious to avoid injury when moving heavy objects.









- When moving the equipment by hand, wear protective gloves to prevent injuries.
- Move or lift the equipment by holding its handles or lower edges. Do not hold
  the handles of modules (such as power supply units, fans, and boards) that
  are installed in the equipment because they cannot support the weight of the
  equipment.
- Avoid scratching the cabinet surface or damaging cabinet components and cables during equipment transportation.
- When transporting the equipment using a forklift truck, ensure that the forks
  are properly positioned to ensure that the equipment does not topple. Before
  moving the equipment, secure it to the forklift truck using ropes. When
  moving the equipment, assign dedicated personnel to take care of it.
- Choose railways, sea, or a road with good condition for transportation to ensure equipment safety. Avoid tilt or jolt during transportation.
- Move a cabinet with caution. Any bumping or falling may damage the equipment.

## 1.6 Device Running Safety

The UPS is used for commercial and industrial purposes only. It cannot be used as a power supply for life support devices.

For power supply systems that are critical to significant economic interests or public order, such as the national computing center, military command system, emergency command center, railway signal system and control center, civil aviation and air traffic control center, airport command center, financial clearing center, and transaction center, the Tier 4 or 3 power architecture specified in TIA-942 must be used. That is, two power supplies must be used to supply power to loads.

Ensure that the equipment is used in an environment that meets the product design specifications (including power grid, temperature, and humidity). Otherwise, the equipment may become faulty, and the resulting equipment malfunction and component damage are not covered under the warranty.

The UPS operating environment must meet the requirements for the climate indicator, mechanically active substance indicator, and chemically active substance indicator in ETSI EN 300 019-1 class 3.6.

#### **NOTICE**

- This is a category C3 UPS product for commercial and industrial application in the second environment installation restrictions or additional measures may be needed to prevent disturbances.
- After unpacking the UPS, you are advised to power on the UPS as soon as
  possible. If you temporarily do not use the UPS, take appropriate measures to
  prevent moisture, dust, and foreign matter from entering the UPS.
- After unpacking batteries, you are advised to connect the battery supply as soon as possible. If you temporarily do not use the batteries, store them in a dry and clean environment. If batteries are stored for more than 90 days, charge them in time. Otherwise, the battery lifespan may be affected.
- Install the UPS in an area far away from liquids. Do not install it under areas
  prone to water leakage, such as air conditioner vents, ventilation vents, or
  feeder windows of the equipment room. Ensure that no liquid enters the UPS
  to prevent short circuits. Ensure that there is no condensation inside the
  equipment or equipment room.
- If any liquid is detected inside the equipment, immediately disconnect the power supply and contact the administrator.

#### **⚠** DANGER

- Do not expose the equipment to flammable or explosive gas or smoke. Do not perform any operation on the equipment in such environments.
- During installation and maintenance, ensure that sundries do not enter the UPS. Otherwise, equipment damage, load power derating, power failure, and personal injury may occur.

If the valid mains voltage exceeds 320 V AC, the UPS may be damaged.

A UPS can be used to serve resistive-capacitive loads, resistive loads, and micro-inductive loads. It is recommended that a UPS not be used for pure capacitive loads, pure inductive loads, and half-wave rectification loads. A UPS does not apply to regeneration loads.

Any operation on any electrical device in an environment that has inflammable air can cause extreme danger. Strictly obey the operating environmental requirements specified in related user manuals when using or storing the device.

The UPS can be configured with a backfeed protection dry contact to work with an external automatic circuit breaker, preventing the voltage from flowing back to input terminals over static bypass circuits. If the installation and maintenance personnel do not need backfeed protection, paste labels on external mains and bypass input switches, informing that the UPS is connected to a backfeed protection card. Disconnect the backfeed protection card from the UPS before operating the UPS.

Do not use the UPS in the following places:

- Environments that are close to flammable or explosive materials, dust, corrosive gases or dust, conductive or magnetic dust, abnormal vibration, or collision
- Rooms or outdoor environments where temperature and humidity are not controlled (with high temperature, low temperature, moisture, direct sunlight, or heat sources)
- Non-confined environments near the ocean (0-3.7 km) and indoor or semiindoor environments where the temperature and humidity are not controllable, such as simple equipment rooms, civil houses, garages, corridors, and direct ventilation cabinets near the sea; or houses with only roofs, railway station platforms, gymnasiums, and aquariums
- Environments that are conducive for the growth of microorganisms such as fungus or mildew
- Environments where rodents (such as mice) and insects exist

## 1.7 Battery Safety

## **Basic Requirements**

Before operating batteries, carefully read the safety precautions for battery handling and master the correct battery connection methods.

#### **DANGER**

- Do not expose batteries at high temperatures or around heat-generating devices, such as sunlight, fire sources, transformers, and heaters. Excessive heat exposure may cause the batteries to explode.
- Do not burn batteries. Otherwise, the batteries may explode.
- To avoid leakage, overheating, fire, or explosions, do not disassemble, alter, or damage batteries, for example, insert sundries into batteries or immerse batteries in water or other liquids.
- Wear goggles, rubber gloves, and protective clothing to prevent skin contact
  with electrolyte in the case of electrolyte overflow. If a battery leaks, protect
  the skin or eyes from the leaking liquid. If the skin or eyes come in contact
  with the leaking liquid, wash it immediately with clean water and go to the
  hospital for medical treatment.
- Use dedicated insulated tools.
- Move batteries in the required direction. Do not place a battery upside down or tilt it.
- Keep the battery loop disconnected during installation and maintenance.
- Use batteries of specified models. Using batteries of other models may damage the batteries.
- Dispose of waste batteries in accordance with local laws and regulations. Do not dispose of batteries as household waste. If a battery is disposed of improperly, it may explode.

• The site must be equipped with qualified fire extinguishing facilities, such as firefighting sands and powder fire extinguishers.

#### NOTICE

To ensure battery safety and battery management accuracy, use batteries provided with the UPS by Huawei. Huawei is not responsible for any battery faults caused by batteries not provided by Huawei.

## **Battery Installation**

Before installing batteries, observe the following safety precautions:

- Install batteries in a well-ventilated, dry, and cool environment that is far away from heat sources, flammable materials, moistures, extensive infrared radiation, organic solvents, and corrosive gases. Take fire prevention measures.
- Place and secure batteries horizontally.
- Note the polarities when installing batteries. Do not short-circuit the positive and negative poles of the same battery or battery string. Otherwise, the battery may be short-circuited.
- Check battery connections periodically, ensuring that all bolts are securely tightened.
- When installing batteries, do not place installation tools on the batteries.

## **Battery Short Circuit**

## **▲ DANGER**

Battery short circuits can generate high instantaneous current and release a great amount of energy, which may cause equipment damage or personal injury.

To avoid battery short-circuit, do not maintain batteries with power on.

#### Flammable Gas

#### NOTICE

- Do not use unsealed lead-acid batteries.
- To prevent fire or corrosion, ensure that flammable gas (such as hydrogen) is properly exhausted for lead-acid batteries.

Lead-acid batteries emit flammable gas when used. Ensure that batteries are kept in a well-ventilated area and take preventive measures against fire.

## **Battery Leakage**

#### **NOTICE**

Battery overheating causes deformation, damage, and electrolyte spillage.

## **↑** WARNING

When the electrolyte overflows, absorb and neutralize the electrolyte immediately. When moving or handling a battery whose electrolyte leaks, note that the leaking electrolyte may hurt human bodies.

- If the battery temperature exceeds 60°C, check for and promptly handle any leakage.
- Electrolyte overflow may damage the equipment. It will corrode metal parts and boards, and ultimately damage the boards.
- If the electrolyte overflows, follow the instructions of the battery manufacturer or neutralize the electrolyte by using sodium bicarbonate (NaHCO<sub>3</sub>) or sodium carbonate (Na<sub>2</sub>CO<sub>3</sub>).

## Lithium Battery

The safety precautions for lithium batteries are similar to those for lead-acid batteries except that you also need to note the precautions described in this section.

## **↑** WARNING

There is a risk of explosion if a battery is replaced with an incorrect model.

- A battery can be replaced only with a battery of the same or similar model recommended by the manufacturer.
- When handling a lithium battery, do not place it upside down, tilt it, or bump it with other objects.
- Keep the lithium battery loop disconnected during installation and maintenance.
- Do not charge a battery when the ambient temperature is below the lower limit of the operating temperature (charging is forbidden at 0°C). Lowtemperature charging may cause crystallization, which will result in a short circuit inside the battery.
- Use batteries within the allowed temperature range; otherwise, the battery performance and safety will be compromised.
- Do not throw a lithium battery in fire.
- When maintenance is complete, return the waste lithium battery to the maintenance office.

## 1.8 Others

- Exercise caution when manually shutting down the UPS inverter for transferring to bypass mode, or when adjusting the UPS output voltage level or frequency. Doing so may affect the power supply to equipment.
- Exercise caution when setting battery parameters. Incorrect settings will affect the power supply and battery lifespan.

# 2 Overview

## 2.1 Model Description

Figure 2-1 UPS model number

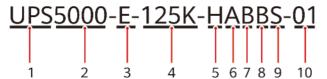


Table 2-1 Model number details

| No. | Item                       | Description                  |  |
|-----|----------------------------|------------------------------|--|
| 1   | Product category           | UPS                          |  |
| 2   | UPS family                 | 5000                         |  |
| 3   | UPS subcategory            | E                            |  |
| 4   | Output capacity            | 60K: 60 kVA<br>125K: 125 kVA |  |
| 5   | Voltage level              | H: 380/400/415 V             |  |
| 6   | Smart cooling product type | A: air cooled                |  |
| 7   | Input switch type          | B: MCCB<br>S: ATS            |  |
| 8   | Output type                | B: branch power distribution |  |
| 9   | Configuration type         | S: standard configuration    |  |
| 10  | Version                    | 01                           |  |

#### □ NOTE

If **Requisite modules** is set to 5, the maximum output capability of each module is 25 kVA/25 kW.

This document describes the following UPS models:

- UPS5000-E-60K-HABBS
  - The models provide two configurations: 30 kVA and 60 kVA.
- UPS5000-E-60K-HASBS
  - The models provide two configurations: 30 kVA and 60 kVA.
- UPS5000-E-125K-HABBS-01
  - The models provide three configurations: 90 kVA, 120 kVA, and 125 kVA.
- UPS5000-E-125K-HASBS-01
  - The models provide three configurations: 90 kVA, 120 kVA, and 125 kVA.

## 2.2 Working Principle

#### 

- - indicates an input mode.
- indicates the energy flow direction.

## 2.2.1 Conceptual Diagram

The UPS5000 is an online product. It uses a modular design, which facilitates maintenance and capacity expansion. The UPS5000 uses the digital signal processing (DSP) intelligent control technology. Its power module consists of a rectifier and inverter. The UPS5000 converts inputs into pure, high-quality sine wave outputs by using the high-frequency switching technology.

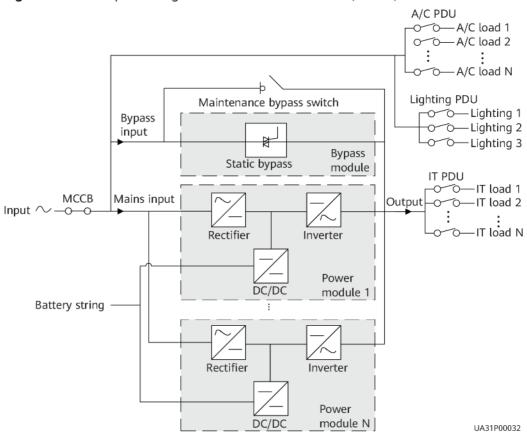


Figure 2-2 Conceptual diagram in air cooled scenario (MCCB)

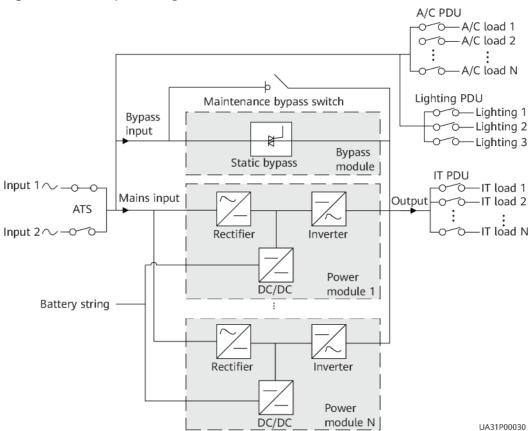


Figure 2-3 Conceptual diagram in air cooled scenario (ATS)

## 2.2.2 Working Modes

### 2.2.2.1 Normal Mode

In normal mode, the rectifier converts AC power into DC power, then the inverter converts DC power into high-precision AC outputs. The conversions protect loads from interference such as input harmonics, glitches, and voltage transients.

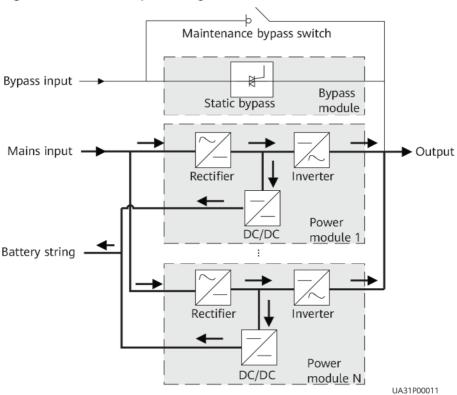


Figure 2-4 UPS conceptual diagram in normal mode

## 2.2.2.2 Bypass Mode

The UPS automatically transfers to bypass mode upon detecting power module overtemperature, overload, or other faults that may cause the inverter to shut down. The bypass power supply is not protected by the UPS which means it may be affected by mains outage, and incorrect AC voltage or frequency.

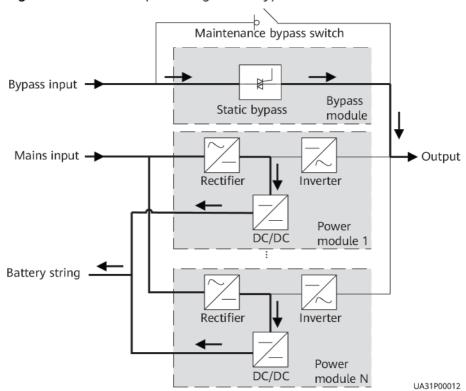


Figure 2-5 UPS conceptual diagram in bypass mode

## 2.2.2.3 Battery Mode

If the mains input is abnormal or the rectifier becomes abnormal, the UPS transfers to battery mode. The power module obtains DC power from batteries, and the power is converted into AC output by the inverter.

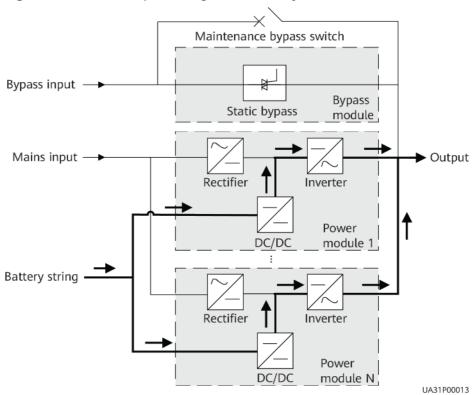


Figure 2-6 UPS conceptual diagram in battery mode

## 2.2.2.4 Maintenance Bypass Mode

When the UPS works in maintenance bypass mode, the current flows through the maintenance bypass instead of the power module. You can maintain the circuit inside the cabinet.

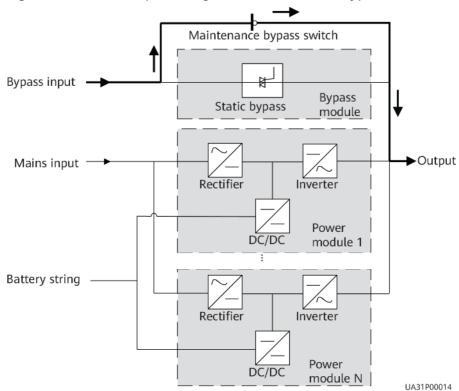


Figure 2-7 UPS conceptual diagram in maintenance bypass mode

## 2.2.2.5 ECO Mode

The economic control operation (ECO) mode is an economical working mode, which can be configured on the user interface. In ECO mode, when the bypass input is within the ECO voltage and frequency ranges and other ECO power supply conditions are met, the UPS works in bypass mode and the inverter is in standby state. When the bypass voltage is outside the ECO voltage range, the UPS transfers from bypass mode to normal mode. In bypass mode or normal mode, the rectifier keeps working and charges batteries using a charger. The ECO mode delivers a high efficiency.

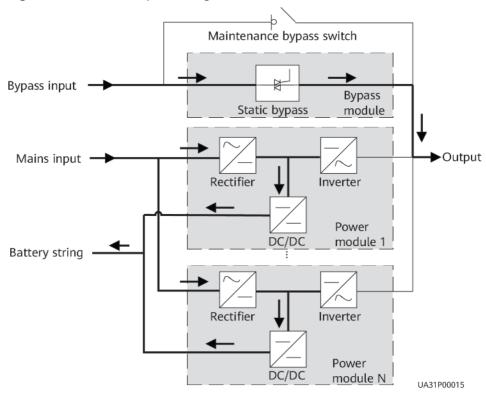


Figure 2-8 UPS conceptual diagram in ECO mode

Manual startup is required to ensure that the inverter is in standby state and the power flow has reached the inverter.

## 2.3 Product Introduction

## 2.3.1 Product Structure

#### 

- The appearance of the UPS5000-E-60K-HABBS (02312TVW, 02312TWB) is similar to that of the UPS5000-E-125K-HABBS-01 (02312TVY, 02312TWC).
- The appearance of the UPS5000-E-60K-HASBS (02312TVX) is similar to that of the UPS5000-E-125K-HASBS-01 (02312TWA).

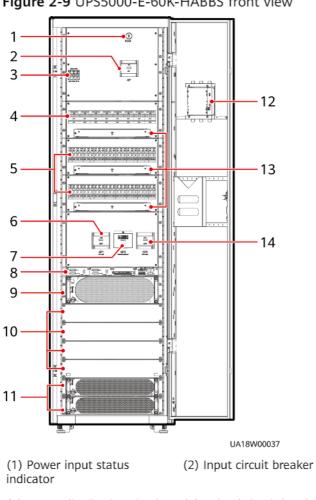


Figure 2-9 UPS5000-E-60K-HABBS front view

- (3) Lighting circuit breaker

- (4) Power distribution circuit breaker for the smart cooling product
- (5) IT load circuit breaker
- (6) UPS input circuit breaker

- (7) UPS maintenance bypass circuit breaker
- (8) Control module
- (9) Bypass module

- (10) Filler panel
- (11) Power module
- (12) Monitor display unit (MDU)

- (13) Power distribution monitoring board
- (14) UPS output circuit breaker

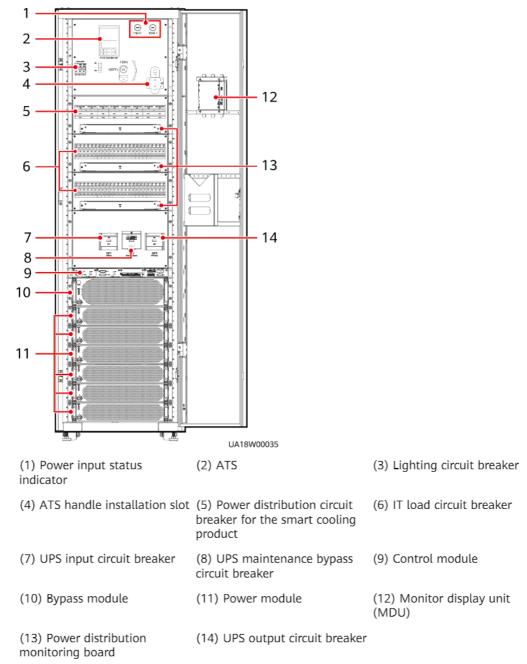
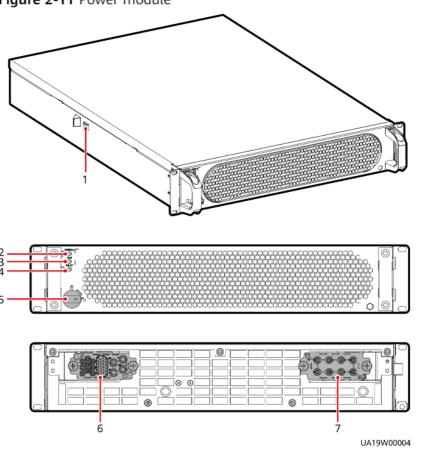


Figure 2-10 UPS5000-E-125K-HASBS-01 front view

## 2.3.2 Power Module

## **Appearance**

Figure 2-11 Power module



- (2) Run indicator
- (3) Alarm indicator
- (4) Fault indicator

(5) Ready switch

(1) Positioning lock

- (6) Output port
- (7) Input port

Table 2-2 Indicator description

| Indicator | Color | Status                           | Description   |
|-----------|-------|----------------------------------|---|
| Run       | Green | Steady on                        | The system is working in inverter mode.   |
| indicator |       | Blinking at<br>long<br>intervals | <ul> <li>The inverter is ready and in standby state (blinking at 0.5 Hz, on for 1s and off for 1s).</li> <li>The inverter is not started (blinking</li> </ul> |
|           |       |                                  | at 0.2 Hz, on for 2.5s and off for 2.5s).   |

| Indicator          | Color  | Status                            | Description  |
|--------------------|--------|-----------------------------------|--|
|                    |        | Blinking at<br>short<br>intervals | The module is not configured, the inverter or rectifier software is being upgraded, or the inverter software is being upgraded (blinking at 4 Hz, on for 0.125s and off for 0.125s). |
|                    |        | Off                               | The rectifier software is being upgraded.  |
| Alarm<br>indicator | Yellow | Steady on                         | A minor alarm is generated for the inverter or rectifier.  |
|                    |        | Off                               | There is no minor alarm for the inverter or rectifier, or the rectifier software is being upgraded.  |
| Fault indicator    | Red    | Steady on                         | A critical alarm is generated for the inverter or rectifier.   |
|                    |        | Off                               | There is no critical alarm for the inverter or rectifier, or the rectifier software is being upgraded.   |

## **Functions**

The power module consists of a PFC rectifier and inverter. The power module performs AC-DC or DC-DC conversion on the mains and battery inputs, and stabilizes the bus voltage. The inverter converts DC inputs into AC sine wave outputs.

## **Specifications**

- Dimensions (H x W x D): 86 mm x 442 mm x 620 mm
- Weight: < 21 kg
- Rated output capacity: 30 kVA/30 kW
- Power density: 20.64 W/inch<sup>3</sup>

# 2.3.3 Bypass Module

## **Appearance**

Figure 2-12 Bypass module

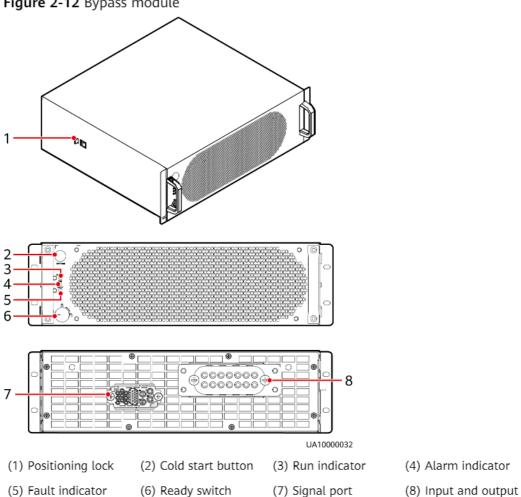


Table 2-3 Indicator description

| Indicator     | Color | Status                     | Description  |
|---------------|-------|----------------------------|--|
| Run indicator | Green | Steady on                  | The system is working in bypass mode.  |
|               |       | Blinking at long intervals | The bypass has no output (blinking at 0.2 Hz, on for 2.5s and off for 2.5s). |

ports

| Indicator       | Color  | Status                      | Description  |
|-----------------|--------|-----------------------------|--|
|                 |        | Blinking at short intervals | The bypass is not configured or the DSP software is being upgraded (blinking at 4 Hz, on for 0.125s and off for 0.125s). |
|                 |        | Off                         | The bypass software is being upgraded.   |
| Alarm indicator | Yellow | Steady on                   | A minor alarm is generated for the bypass.   |
|                 |        | Off                         | There is no minor alarm for the bypass, or the software is being upgraded.   |
| Fault indicator | Red    | Steady on                   | A critical alarm is generated for the bypass.  |
|                 |        | Off                         | There is no critical alarm for the bypass, or the software is being upgraded.  |

#### **Functions**

The bypass module supplies power in the following cases:

If the UPS is set to ECO mode and the bypass voltage is within the specified range, the UPS works in bypass mode.

If the power module overload times out, the UPS transfers to bypass mode.

Both the active and standby ECMs are abnormal.

The system fails to run properly and transfers to bypass mode.

A manual operation is performed to transfer to bypass mode.

## Specifications

• Dimensions (H x W x D): 130 mm x 420 mm x 500 mm

Weight: 19 kg

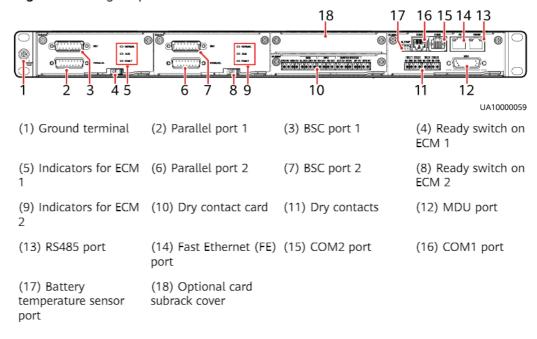
Rated output capacity: 200 kVA

# 2.3.4 Control Module

#### 2.3.4.1 Overview

In a standard configuration, the control module consists of two ECMs, one dry contact card, and one monitoring interface card (from left to right). The four cards are hot swappable. One subrack is reserved above the dry contact card. A backfeed protection card or dry contact extended card can be inserted into this subrack.

Figure 2-13 Signal panel on the control module



#### □ NOTE

Ports are protected by a security mechanism.

#### 2.3.4.2 ECM

The control module consists of two ECMs that work in active/standby mode. Each card provides two ports, that is, a BSC port in the upper part and a reserved parallel port in the lower part.

Figure 2-14 ECM

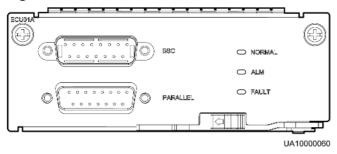


Table 2-4 Ports on the ECM

| Silk Screen | Description  |
|-------------|--|
| PARALLEL    | The PARALLEL port transmits parallel signals.  |
| BSC         | The BSC port is used in a dual-bus system to synchronize output frequencies and phases between UPS systems, ensuring that two buses can switch with each other.  BSC cables are hot-swappable. |

Table 2-5 Indicator description

| Indicator | Color  | Status                | Description   |
|-----------|--------|-----------------------|---|
| NORMAL    | Green  | Steady on             | This ECM is the active ECM.   |
|           |        | Blinking at 0.5<br>Hz | This ECM is the standby ECM and it is ready.                                |
|           |        | Off                   | This ECM is not ready or the software of this ECM is being upgraded.        |
|           |        | Blinking at 4<br>Hz   | The software of the ECM is being upgraded or not configured.                |
| ALM       | Yellow | Steady on             | The ECM has a minor alarm, but it does not need to be replaced.             |
|           |        | Off                   | The ECM has no minor alarm or the software of the ECM is being upgraded.    |
| FAULT     | Red    | Steady on             | The ECM has a critical alarm.   |
|           |        | Off                   | The ECM has no critical alarm or the software of the ECM is being upgraded. |

# 2.3.4.3 Dry Contact Card

The dry contact card allows the UPS to detect and manage the switch status of the battery system (including the external battery switch) and implement remote emergency power-off (EPO).

Figure 2-15 Dry contact card

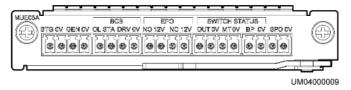


Table 2-6 Ports on the dry contact card

| Silk<br>Screen           | Description   | Status   | Initial Status |
|--------------------------|---|--|----------------|
| BTG                      | Port for detecting battery grounding faults   | Connected:     battery     grounding fault   | Disconnected   |
| 0V                       | Port for signal ground  | Disconnected:     no battery     grounding fault   |                |
| GEN                      | Port for detecting diesel generator (D.G.) mode   | Connected: D.G. mode   | Disconnected   |
| 0V                       | Port for signal ground  | Disconnected:<br>non-D.G. mode   |                |
| BCB_OL                   | Port for detecting the<br>BCB box   | <ul> <li>Grounded: BCB<br/>box connected</li> <li>Disconnected:<br/>BCB box not<br/>connected</li> </ul>                   | Grounded       |
| BCB_STA                  | Port for monitoring the battery switch  | <ul> <li>Connected:         battery switch         ON</li> <li>Disconnected:         battery switch         OFF</li> </ul> | Disconnected   |
| BCB_DRV                  | Controls battery circuit<br>breaker trip. When the<br>voltage is +12 V, the<br>circuit breaker trips. | <ul><li>0 V: battery<br/>switch not<br/>tripped</li><li>12 V: battery</li></ul>  | 0 V            |
| BCB_0V                   | Port for signal ground  | switch tripped   |                |
| EPO_NO                   | Emergency power-off<br>(EPO) port   | If the normally open (NO) port is  | Disconnected   |
| EPO_12V                  | +12 V   | connected to the EPO_12V port, EPO is triggered.   |                |
| EPO_NC                   | EPO port  | If the normally  | Connected      |
| EPO_12V                  | +12 V   | closed (NC) port is<br>disconnected from<br>the EPO_12V port,<br>EPO is triggered.   |                |
| SWITCH<br>STATUS_<br>OUT | Port for monitoring the UPS output circuit breaker  | Connected:<br>circuit breaker<br>ON  | Connected      |

| Silk<br>Screen          | Description  | Status   | Initial Status |
|-------------------------|--|--|----------------|
| SWITCH<br>STATUS_<br>0V | Port for signal ground   | Disconnected:<br>circuit breaker<br>OFF                        |                |
| SWITCH<br>STATUS_<br>MT | Port for monitoring the maintenance circuit breaker            | Disconnected:<br>circuit breaker<br>ON                         | Disconnected   |
| SWITCH<br>STATUS_<br>0V | Port for signal ground   | <ul> <li>Connected:<br/>circuit breaker<br/>OFF</li> </ul>     |                |
| SWITCH<br>STATUS_<br>BP | Port for monitoring the bypass input circuit breaker           | Connected:<br>circuit breaker<br>ON                            | Connected      |
| SWITCH<br>STATUS_<br>0V | Port for signal ground   | <ul> <li>Disconnected:<br/>circuit breaker<br/>OFF</li> </ul>  |                |
| SPD                     | Port for monitoring the input AC surge protective device (SPD) | <ul><li>Connected: SPD enabled</li><li>Disconnected:</li></ul> | Connected      |
| 0V                      | Port for signal ground   | SPD disabled   |                |

#### 

- The dry contact interface card takes effect only after it is set on the monitoring system. Set the unused dry contact signal to the unused status.
- Set the EPO port to NO or NC as required.
- When multiple UPSs are paralleled, all dry contact signals to be used need to connect to each UPS.
- Single cables require dual-insulated twisted cables. If the length of a power cable is within 25–50 m, its cross-sectional area must be 0.5 mm<sup>2</sup> to 1.5 mm<sup>2</sup>.

# 2.3.4.4 Monitoring Interface Card

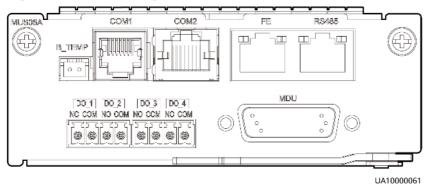
#### NOTICE

- Only once being set will dry contact signals take effect. Set unused dry contact signals to the unused state on the LCD.
- In a parallel system, ensure that used dry contacts properly connect to each UPS.

The monitoring interface card provides external ports as well as monitoring and control functions for the MDU. The ports include the ambient temperature and

humidity sensor port, FE port, battery temperature monitoring port, and network management port. MDU functions include monitoring of the UPS, allowing users to set parameters, command delivery, information reports, and UPS key information and parameters displayed on the LCD.

Figure 2-16 Monitoring interface card



#### 

The maximum voltage and current of ports DO\_1 to DO\_4 are 30 V DC, 1 A or 60 V DC, 0.5 A respectively.

Table 2-7 Ports on the monitoring interface card

| Port                                  | Silk Screen | Description  |  |
|---------------------------------------|-------------|--|--|
| DO_1                                  | NO          | • DO_1, DO_2, DO_3, and DO_4 indicate  |  |
|                                       | СОМ         | alarm outputs. Their default values are<br>Critical alarm, Minor alarm, Bypass mode,   |  |
| DO_2                                  | NO          | and Battery mode, respectively.  |  |
|                                       | СОМ         | <ul> <li>It can be set to Disable, Critical alarm,</li> <li>Minor alarm, Bypass mode, Battery</li> </ul>                     |  |
| DO_3                                  | NO          | mode, Low batt. volt., Low battery SOC,<br>Abnormal mains, Sys maint breaker   |  |
|                                       | СОМ         | enable, Sys outp breaker enable, Maint.<br>breaker closed, No power supplied,  |  |
| DO_4                                  | NO          | Mains supplies power, ECO mode,  |  |
|                                       | СОМ         | <ul> <li>Battery test, and Batt. Volt. Below Thre</li> <li>Configure power segment settings based on backup time.</li> </ul> |  |
| DB26                                  | MDU         | Provides FE, RS485, I2C, and CAN signals.  |  |
| Battery<br>temperature<br>sensor port | B_TEMP      | Connects to an indoor battery temperature sensor.  |  |
| Southbound communications port 1      | COM1        | <ul><li>Supported protocol: Modbus-RTU.</li><li>Connects to a southbound device.</li></ul>                                   |  |

| Port                             | Silk Screen | Description   |
|----------------------------------|-------------|---|
| Southbound communications port 2 | COM2        | <ul><li>Supported protocol: Modbus-RTU.</li><li>In use.</li></ul>   |
| Communications port              | FE          | <ul> <li>Supported protocols: Modbus-TCP, HTTPS, and SNMP (reserved).</li> <li>Connects to a Huawei northbound device.</li> </ul> |
| Communications port              | RS485       | Supported protocol: Modbus-RTU.   |

#### 

- Signal cables must be double-insulated twisted cables. If the cable length is 25–50 m, the cross-sectional area must be 0.5–1.5 mm<sup>2</sup>.
- RS485 cables and FE cables must be shielded cables.

Figure 2-17 and Figure 2-18 are recommended wiring methods for DO ports.

Figure 2-17 Wiring method 1

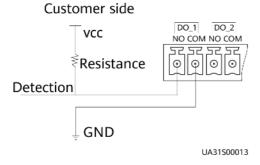


Figure 2-18 Wiring method 2

Customer side

#### 

Figure 2-19 and Table 2-8 describe the COM1 pin definitions.

UA31S00014

Figure 2-19 COM1 pins

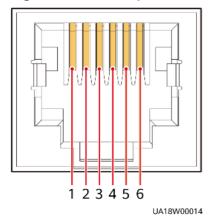


Table 2-8 COM1 pin definition

| Pin | Description |
|-----|-------------|
| 1   | GND         |
| 2   | N/A         |
| 3   | RS485-      |
| 4   | RS485+      |
| 5   | N/A         |
| 6   | 12V_PORT    |

Figure 2-20 and Table 2-9 describe the COM2 pin definitions.

Figure 2-20 COM2 pins

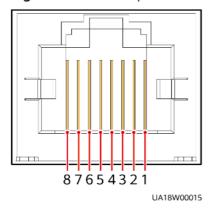


Table 2-9 COM2 pin definition

| Pin | Description |
|-----|-------------|
| 1   | RS485+      |

| Pin | Description |
|-----|-------------|
| 2   | RS485-      |
| 3   | N/A         |
| 4   | RS485+      |
| 5   | RS485-      |
| 6   | GND         |
| 7   | CANH0       |
| 8   | CANL0       |

Figure 2-21 and Table 2-10 describe the RS485 pin definitions.

Figure 2-21 RS485 pins

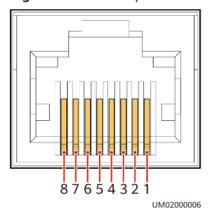


Table 2-10 RS485 pin definition

| Pin | Description |
|-----|-------------|
| 1   | RS485_T+    |
| 2   | RS485_T-    |
| 3   | N/A         |
| 4   | RS485_R+    |
| 5   | RS485_R-    |
| 6   | GND         |
| 7   | N/A         |
| 8   | N/A         |

#### ∩ NOTE

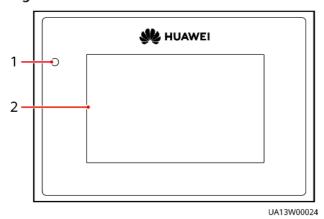
If cables are prepared onsite, follow the three methods below:

- Connect pin 1 and pin 2. Pin 1 connects to RS485+ and pin 2 connects to RS485-.
- Connect pin 4 and pin 5. Pin 4 connects to RS485+ and pin 5 connects to RS485-.
- Connect pins 1, 2, 4, and 5. Twist cables to pin 1 and pin 4 into one cable and then connect it to RS485+. Twist cables to pin 2 and pin 5 into one cable and then connect it to RS485-.

## 2.3.5 MDU

#### **Appearance**

Figure 2-22 MDU



(1) Status indicator

(2) LCD touchscreen

Table 2-11 Status indicator

| Status | Color  | Meaning  |
|--------|--------|--|
| On     | Red    | A critical alarm has been generated, and the buzzer sounds continuously. |
|        | Yellow | A minor alarm has been generated, and the buzzer buzzes at 2 Hz.         |
|        | Green  | The UPS is running properly or a warning has been generated.             |
| Off    | N/A    | The MDU is powered off.  |

#### □ NOTE

The indicator on the MDU panel is yellow when the bypass supplies power in non-ECO mode.

Figure 2-23 MDU ports

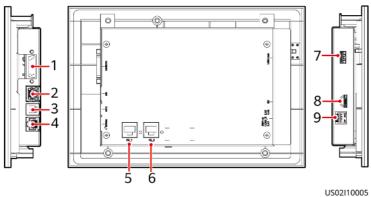


Table 2-12 Description of MDU ports

| No. | Port Name        | Description   |  |
|-----|------------------|---|--|
| 1   | MUS05A<br>(DB26) | Connects to the MDU and monitoring interface card   |  |
| 2   | GE               | Connects to a Huawei northbound device.   |  |
| 3   | CAN              | Reserved  |  |
| 4   | RS485_1          | Reserved  |  |
| 5   | FE_1             | Reserved  |  |
| 6   | FE_2             | Reserved  |  |
| 7   | USB Host         | <ul> <li>After installing the WiFi module, locally connect to the UPS over the Service Expert app. Obtain the initial startup password during deployment. View or obtain UPS running information during preventive maintenance.</li> <li>NOTE         <ul> <li>Only Huawei service engineers or authorized service engineers are allowed to use the WiFi module. To ensure security, remove the WiFi module immediately after use.</li> </ul> </li> <li>Insert the USB flash drive, import and export the configuration file, export run logs, and upgrade software.</li> </ul> |  |
| 8   | SD               | Reserved  |  |
| 9   | DIP switch       | Implements specific functions by using the DIP switch and specific buttons; controls the CAN communication build-out resistor in a parallel system  |  |

#### **Functions**

The monitor display unit (MDU) allows for general UPS operations, parameter setting, viewing of running status and alarms, and so on.

### **Specifications**

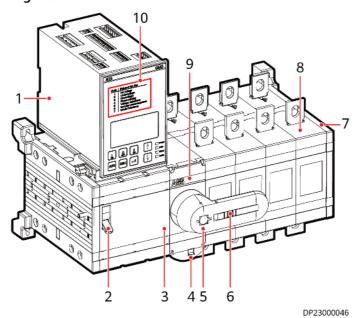
Dimensions (H x W x D): 175 mm x 264 mm x 40 mm

# 2.4 Automatic Transfer Switch (ATS)

# 2.4.1 ATS Appearance

**Figure 2-24** shows an ABB AC transfer switch (ATS). Be familiar with and configure the ATS before powering on the system.

Figure 2-24 ATS



- (1) Controller
- (2) Electric/Manual mode selection handle
- (3) Electric operating mechanism

- (4) Handle locking latch
- (5) Manual handle
- (6) Handle buckle

- (7) Position for auxiliary contacts
- (8) Transfer switch
- (9) Operating mechanism

- (10) Alarm ID description
- ATS controller

The ATS logic control unit monitors the ATS in real time and configures the ATS system parameters.

• Electric/Manual mode selection handle

If you flip the electric/manual mode selection handle upwards to the M position, it is electric mode. If you flip the handle downwards to the Man. position, it is manual mode.

#### **NOTICE**

Before you power on the UPS, check that the handle is in the M position.

#### ATS handle slot

Before you insert the handle into the ATS handle slot, flip the electric/manual mode selection handle to the Man. position. After you insert the handle, the ATS controller starts manual mode.

#### Handle locking latch

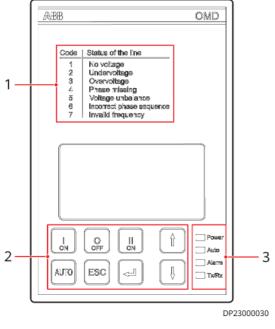
When the ATS changes from manual mode to electric mode, pull out the ATS handle. Before you pull out the handle, turn the handle locking latch downwards.

After you pull out the handle, flip the electric/manual mode selection handle upwards to the M position.

## 2.4.2 ATS Controller

Figure 2-25 shows an ATS controller.





- (1) Alarm ID description
- (2) Controller buttons
- (3) ATS status indicator

Table 2-13 describes the alarm IDs of the ATS controller in detail.

Table 2-13 Alarm ID description

| Alarm ID | Power<br>Supply<br>Status      | Description  |
|----------|--------------------------------|--|
| 1        | No voltage                     | The supply voltage is less than 10% of the rated voltage.  |
| 2        | Undervoltag<br>e               | The supply voltage is less than the undervoltage threshold.  |
| 3        | Overvoltage                    | The supply voltage is greater than the overvoltage threshold.  |
| 4        | Phase<br>missing               | A phase of the power supply is open.   |
| 5        | Voltage<br>unbalance           | The difference between the minimum and maximum phase voltages of the power supply exceeds the percentage of the overvoltage or undervoltage threshold. |
| 6        | Incorrect<br>phase<br>sequence | The phase sequence of the power supply is incorrect.   |
| 7        | Invalid<br>frequency           | The supply frequency exceeds the threshold.  |

Table 2-14 describes the buttons on the ATS controller.

Table 2-14 Buttons on the ATS controller

| Button   | Name  | Description   |
|----------|-------|---|
| ON       | ION   | In button control mode, if the ATS is flipped to I, the I switch is on, and the II switch is off.                           |
| II<br>ON | II ON | In button control mode, if the ATS is flipped to II, the II switch is on, and the I switch is off.                          |
| OFF      | OFF   | In button control mode, if the ATS is flipped to OFF, both the I and II switches are off, and the ATS works in manual mode. |
| AUTO     | AUTO  | Sets the ATS controller to the automatic or button control mode and clears alarms.  |
| ESC      | ESC   | Return to the previous step.  |

| Button | Name  | Description                                |
|--------|-------|--|
|        | Enter | Confirm settings.                          |
|        | Up    | Scroll upwards or go to the previous page. |
|        | Down  | Scroll downwards or go to the next page.   |

Table 2-15 describes the indicators on the ATS controller.

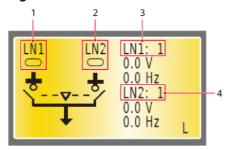
**Table 2-15** Indicators on the ATS controller

| Indicator | Name                        | Description   |
|-----------|-----------------------------|---|
| Alarm     | Alarm<br>indicator          | <ul> <li>On: The ATS generates an alarm, logic switching fails, switches I and II are ON at the same time, or the handle is inserted.</li> <li>Blinking: The switch logic generates an alarm.</li> <li>Off: No alarm is generated.</li> <li>The alarm status can be cleared using the AUTO button.</li> </ul> |
| Auto      | Control<br>indicator        | <ul> <li>On: The ATS is in automatic control mode.</li> <li>Blinking: The ATS is being tested.</li> <li>Off: The ATS is in button control mode.</li> </ul>  |
| Power     | Run indicator               | <ul> <li>On: The ATS is powered on.</li> <li>Blinking: The ATS is in standby mode.</li> <li>Off: The ATS is powered off. The controller is in standby state for at least 1 minute.</li> </ul>   |
| Tx/Rx     | Communicatio<br>n indicator | On: The ATS controller is sending data.   |

The home screen of the 8D controller displays status for the LN1 and LN2 power supplies, electric generator, delay, and LLVD.

- Figure 2-26 shows the power status of LN1 and LN2. Table 2-13 describes the power status alarms.
- Figure 2-27 shows the generator status.
- Figure 2-28 shows the delay status.
- Figure 2-29 shows the LLVD status.

Figure 2-26 Status of the LN1 and LN2 power supplies



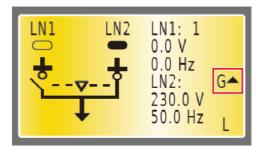
- (1) LN1 power status
- (3) LN1 power alarm ID

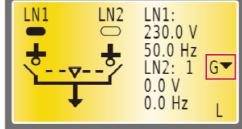
- (2) LN2 power status
- (4) LN2 power alarm ID

#### □ NOTE

If LN1 and LN2 power indicators are hollow, there is an alarm. Locate the fault based on the alarm ID and **Table 2-13** or the alarm ID description on the 8D controller, and rectify the fault.

Figure 2-27 Generator status

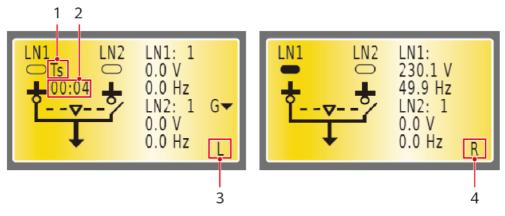




#### □ NOTE

- If the screen displays the letter G, the mains-generator mode is in use. If the screen does not display the letter G, the mains-mains mode is in use.
- If the letter G and an upward arrow are displayed, the generator is working.
- If the letter G and a downward arrow are displayed, the generator is idle.
- If the letter G blinks, an alarm has been generated for the generator.

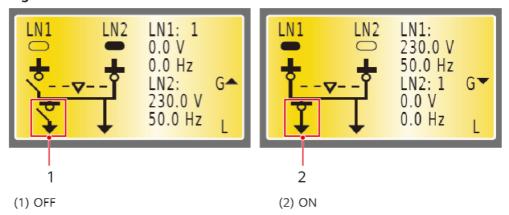
Figure 2-28 Delay status



- (1) Delay name
- (3) Local control mode

- (2) Remaining time
- (4) Remote control mode

Figure 2-29 LLVD status



#### **NOTICE**

Note that the LLVD status (ON/OFF) in the menu is consistent with the input data. For example: If the input data (DI 11 by default) is active, the LLVD is on. If the input data is invalid, the LLVD is off.

# 2.4.3 ATS (8D) Operation Description

The ATS (8D) supports three operation modes, including manual mode, automatic mode, and button mode. This section describes the operation modes in detail.

#### **NOTICE**

- Do not open any cover of the ATS. Even if the power supply is disconnected, hazardous external control voltage may still exist inside the product.
- Do not adjust the control cable when the ATS or external control cable is electrified.

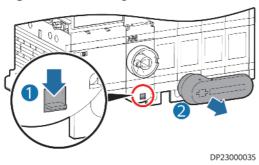
#### ∩ NOTE

- Before powering on the ATS, operate the handle to switch on and off the ATS for one to three times. Ensure that the primary and secondary contacts of the ATS work smoothly.
- Verify that the phase sequences of the two power inputs to the ATS are correct using a phase sequence table.

#### **Automatic Mode**

- **Step 1** Turn on the circuit breakers of the ATS operation mechanism (Q1 and Q2 in the left lower part at the rear of the cabinet) to power on the ATS operation mechanism.
- **Step 2** Check whether the 8D controller has alarms. If an alarm exists, rectify the fault
- **Step 3** Press down the locking latch on the switch panel and pull out the handle.

Figure 2-30 Pulling out the handle



#### NOTICE

If the handle is not pulled out, the automatic mode will be disabled.

**Step 4** Flip the Motor/Manual selection lever to the Motor



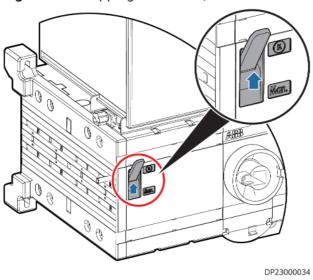


Figure 2-31 Flipping the Motor/Manual selection lever

- **Step 5** Check whether the Power LED and Auto LED indicators are on, as shown by (1) in **Figure 2-32**. If the Auto LED indicator is on, the controller is in the automatic operation mode.
- **Step 6** If the Auto LED indicator is off, press the Auto button once. Then the controller enters the automatic operation mode, as shown in **Figure 2-32**.

Figure 2-32 Automatic mode



----End

#### Manual Mode

- **Step 1** Turn on the circuit breakers of the ATS operation mechanism (Q1 and Q2 in the left lower part at the rear of the cabinet) to power on the ATS operation mechanism.
- **Step 2** Check whether the 8D controller has alarms. If an alarm exists, rectify the fault first.
- **Step 3** Flip the Motor/Manual selection lever to the Man. position.

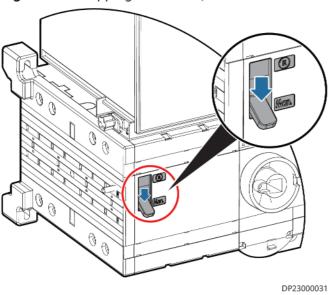
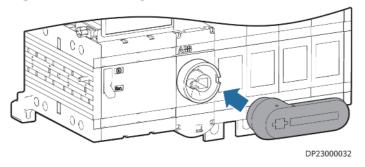


Figure 2-33 Flipping the Motor/Manual selection lever

**Step 4** Insert the handle into the switch panel.

Figure 2-34 Inserting the handle

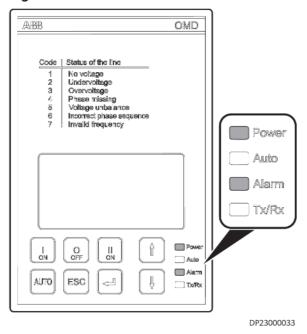


#### NOTICE

The automatic operation will be disabled after the handle is inserted into the switch panel.

**Step 5** The Alarm LED and Power LED indicators go on at the same time when the handle is inserted.

Figure 2-35 Alarm



#### 

After the handle is inserted, the controller automatically switches to the button operation mode. After the handle is removed, the controller remains in the button operation mode, and the Alarm LED indicator goes out.

**Step 6** Turn the handle to a desired position (I, O, or II).

----End

#### **Button Mode**

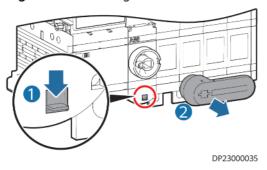
When the controller is working in the button mode, a user can control the ATS switch using the I, O, and II buttons on the controller panel. In the button mode, the OMD800 controller can control the generator.

#### **NOTICE**

Do not simultaneously press and hold down any two of the I, II, and O buttons on the controller panel. Ensure that the interval between two commands is 5s at least. If another command is issued before the previous one is executed, the protection fuse (F1) under the motor operation mechanism may be blown.

- **Step 1** Turn on the circuit breakers of the ATS operation mechanism (Q1 and Q2 in the left lower part at the rear of the cabinet) to power on the ATS operation mechanism.
- **Step 2** Check whether the 8D controller has alarms. If an alarm exists, rectify the fault first.
- **Step 3** Press down the locking latch on the switch panel and pull out the handle.

Figure 2-36 Pulling out the handle



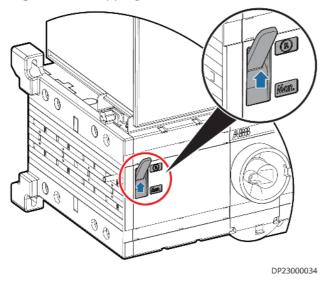
#### **NOTICE**

If the handle is not pulled out, the automatic mode will be disabled.

**Step 4** Flip the Motor/Manual selection lever to the Motor position.







Step 5 Check whether the Power LED indicator is on, as shown by (1) in Figure 2-38.

**Step 6** Check whether the Auto LED indicator is on.

- If the Auto LED indicator is off, the controller is working in the button mode, as shown by (3) in Figure 2-38.
- If the Auto LED indicator is on, press the Auto button once. Then the Auto LED indicator turns off, and the controller enters the button mode, as shown by (2) in Figure 2-38.

Figure 2-38 Button mode



----End

# 2.5 Optional Components

Table 2-16 Optional components

| Component | Model          | Function  |  |  |  |
|-----------|----------------|---|--|--|--|
| BSC       | 5m/10m/15m/60m | Transmits bus synchronization signals in a dual-bus system. |  |  |  |

# 3 Installation

# 3.1 Installation Preparations

## 3.1.1 Tools and Instruments



Insulate installation tools to prevent electric shocks.

Prepare the following tools and meters indicated in Table 3-1 for installation.

Table 3-1 Tools and meters

| Tools and Meters                          |                             |                |                              |  |  |  |
|---|-----------------------------|----------------|------------------------------|--|--|--|
| Electric pallet truck Manual pallet truck |                             | Ladder         | Rubber mallet                |  |  |  |
|   |                             |                |                              |  |  |  |
| Hammer drill and drill bit Φ16            | Hand-held<br>electric drill | Alloy hole saw | Heat gun                     |  |  |  |
|   |                             |                |                              |  |  |  |
| Diagonal pliers                           |                             | Wire stripper  | Electric hydraulic<br>pliers |  |  |  |

| Tools and Meters                                |   |                       |   |  |  |
|---|---|-----------------------|---|--|--|
|   |   |                       |   |  |  |
| Clamp meter                                     | Multimeter  | Cable tie             | Level instrument  |  |  |
|   |   |                       |   |  |  |
| Polyvinyl chloride<br>(PVC) insulation<br>tape  | Cotton cloth                                      | Label                 | Electrician's knife   |  |  |
|   |   |                       |   |  |  |
| Electrostatic<br>discharge (ESD)<br>gloves      | Protective gloves                                 | Insulated gloves      | Insulation protective shoes   |  |  |
|   | Lunius.   |                       | Ettle Control of the |  |  |
| Torque<br>screwdriver                           | Cable cutter                                      | Brush                 | Flat-head<br>screwdriver<br>(2–5 mm)  |  |  |
| ***************************************         |   |                       |   |  |  |
| Phillips<br>screwdriver<br>(M3/M4/M5/M6/<br>M8) | Insulated torque<br>wrench<br>(M6/M8/M12/<br>M16) | Heat shrink<br>tubing | Insulated<br>adjustable wrench  |  |  |
|   |   |                       |   |  |  |

#### 

**Table 3-1** lists only the common tools for installation and cable connection. For more dedicated tools required, see the corresponding component manuals. Prepare tools based on site requirements.

## 3.1.2 Site

## 3.1.2.1 UPS Weight and Dimensions

Table 3-2 Weight

| Model                       | Number of<br>Modules | Number of<br>Redundant<br>Modules | Weight |
|-----------------------------|----------------------|-----------------------------------|--------|
| UPS5000-E-60K-HABBS         | 2                    | 0                                 | 352 kg |
| UPS5000-E-60K-HASBS         | 3                    | 1                                 | 390 kg |
| UPS5000-E-125K-<br>HABBS-01 | 5                    | 0                                 | 435 kg |
| UPS5000-E-125K-<br>HASBS-01 | 6                    | 1                                 | 453 kg |

Figure 3-1 Dimensions (unit: mm) 495 449.4 16] 4 831.4 1050 980 983 - o Bottom view Base and mounting holes 1 1958 2000 1 Front view Side view 25 1100 600 Top view UA060E0049 (1) Front door (2) Foot (3) Caster (4) Bottom plate (5) Rear door (6) Base mounting (7) Side post (8) Beam hole

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#### 3.1.2.2 Installation Environment

- Do not install the UPS in high temperature, low temperature, or damp environments.
- Install the UPS away from water sources, heat sources, and flammable or explosive materials. Keep the UPS away from direct sunlight, dust, volatile gases, corrosive materials, and air dense with salt particles.
- Do not install the UPS in environments with conductive metal scraps in the air.
- The optimal operating temperatures for valve-regulated lead-acid batteries (VRLA batteries) are 20–30°C. Operating temperatures higher than 30°C shorten the battery lifespan and operating temperatures lower than 20°C reduce the battery backup time.

#### 3.1.2.3 Installation Clearances

Reserve sufficient space around the cabinet for operation and ventilation:

- Reserve a clearance of at least 800 mm from the front of the cabinet.
- Reserve a clearance of at least 800 mm from the rear of the cabinet.
- Reserve a clearance of at least 500 mm from the top of the cabinet.

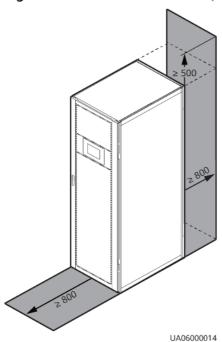


Figure 3-2 Reserved clearances (unit: mm)

# 3.1.3 Preparing Power Cables

#### NOTICE

The UPS can generate large leakage currents. A circuit breaker equipped with an RCD is not recommended.

**Table 3-3** Recommended cross-sectional areas for power cables

| Item             |  | UPS5000-<br>E-125K<br>(ATS)    | UPS5000-<br>E-125K<br>(MCCB)                             | UPS5000-<br>E-60K (ATS) | UPS5000-<br>E-60K<br>(MCCB) |                      |
|------------------|--|--------------------------------|--|-------------------------|-----------------------------|----------------------|
| Input I          | Input I current (A                           | ut I current (A)               |  | 385                     | 204                         | 204                  |
|                  | Recommended ci<br>breaker                    | Recommended circuit<br>breaker |  | Three-pole,<br>400 A    | Three-pole,<br>250 A        | Three-pole,<br>250 A |
|                  | Recommended                                  | L1                             | 4 x 185  | 4 x 185                 | 4 x 95                      | 4 x 95               |
|                  | cross-sectional<br>area (mm²)                | L2                             |  |                         |                             |                      |
|                  |  | L3                             |  |                         |                             |                      |
|                  |  | N                              |  |                         |                             |                      |
|                  |  | PE                             | 95   | 95                      | 50                          | 50                   |
| Input II         | Input II current (                           | Input II current (A)           |  | N/A                     | 184                         | N/A                  |
|                  | Recommended circuit breaker                  |                                | Three-pole,<br>400 A                                     | N/A                     | Three-pole,<br>250 A        | N/A                  |
|                  | Recommended<br>cross-sectional<br>area (mm²) | L1                             | 4 x 185  | N/A                     | 4 x 95                      | N/A                  |
|                  |  | L2                             |  |                         |                             |                      |
|                  |  | L3                             |  |                         |                             |                      |
|                  |  | N                              |  |                         |                             |                      |
|                  |  | PE                             | 95   |                         | 50                          |                      |
| Battery<br>(VRLA | Maximum discha<br>current (A)                | irge                           | 328  | 328                     | 158                         | 158                  |
| battery)         | Recommended                                  | +                              | 2 x 95   | 2 x 95                  | 95                          | 95                   |
|                  | cross-sectional<br>area (mm²)                | N                              | 2 x 95   | 2 x 95                  | 95                          | 95                   |
|                  | , ,  | -                              | 2 x 95   | 2 x 95                  | 95                          | 95                   |
|                  | PE   |                                | 95   | 95                      | 50                          | 50                   |
| Battery<br>input | Maximum discha<br>current (A)                | irge                           | 322  | 322                     | 155                         | 155                  |
| (SmartLi)        | Recommended cross-<br>sectional area         |                                | For details, see IEC-60364-5-52 and SmartLi User Manual. |                         |                             | ser Manual.          |

#### □ NOTE

The rated voltage of the SmartLi is  $512\ V$ . The voltage is  $408\ V$  at the maximum discharge current.

Table 3-4 Recommended cross-sectional areas for output cables

| Item  | Cable Specifications |         |
|---|----------------------|---------|
| Smart cooling product (40 A)                        | L1                   | 5 x 6   |
| Recommended cross-sectional area (mm <sup>2</sup> ) | L2                   |         |
| ······ /  | L3                   |         |
|   | N                    |         |
|   | PE                   |         |
| Smart cooling product (63 A)                        | L1                   | 5 x 10  |
| Recommended cross-sectional area (mm <sup>2</sup> ) | L2                   |         |
| (11111)   | L3                   |         |
|   | N                    |         |
|   | PE                   |         |
| Lighting system                                     | L                    | 3 x 2.5 |
| Recommended cross-sectional area (mm <sup>2</sup> ) | N                    |         |
| (11111)   | PE                   |         |
| IT load (40 A)                                      | L                    | 3 x 6   |
| Recommended cross-sectional area (mm <sup>2</sup> ) | N                    |         |
| ()  | PE                   |         |
| IT load (63 A)                                      | L                    | 3 x 10  |
| Recommended cross-sectional area (mm <sup>2</sup> ) | N                    |         |
| ····· /   | PE                   |         |

#### ∩ NOTE

When selecting, connecting, and routing power cables, follow local safety regulations and rules.

When the external conditions such as cable layout or ambient temperatures change, perform verification in accordance with the IEC-60364-5-52 or the local regulations.

The currents listed in the table "Recommended cross-sectional areas for power cables" are measured at a rated voltage of 380 V; if the rated voltage is 400 V, multiply the currents by 0.95; if the rated voltage is 415 V, multiply the currents by 0.92.

When the primary loads are non-linear loads, increase the cross-sectional areas of the neutral wires 1.5–1.7 times.

The recommended cables are applicable only when the following requirements are met:

- The cables are routed over a ladder or bracket in a single layer (E or F in IEC60364-5-523).
- The ambient temperature is 30°C.
- The AC voltage loss is less than 3%, and the DC voltage loss is less than 1%.
- Single- or multi-core 90°C soft power cables with copper conductors are used.
- It is recommended that AC power cables be no longer than 30 m and DC power cables be no longer than 40 m.

**Table 3-5** Power cable terminal requirements

| Port<br>Description | Connection<br>Mode      | Bolt<br>Specifications | Bolt Hole<br>Diameter        | Bolt<br>Length | Torque  |
|---------------------|-------------------------|------------------------|------------------------------|----------------|---------|
| AC input            | Crimped OT/DT terminals | M12                    | 13.5 mm                      | 45 mm          | 46 N·m  |
| Battery input       | Crimped OT/DT terminals | M10                    | Rivet threaded hole diameter | 30 mm          | 26 N·m  |
| PE                  | Crimped OT/DT terminals | M12                    | Rivet threaded hole diameter | 45 mm          | 46 N·m  |
| Safe grounding      | Crimped OT/DT terminals | M6                     | Rivet threaded hole diameter | 16 mm          | 4.5 N·m |

# 3.1.4 Unpacking and Checking

#### Context

#### NOTICE

- Only trained personnel are allowed to move the UPS. Use a pallet truck to transport the UPS box secured to a wooden support to the installation position.
- Visually inspect the UPS appearance for shipping damage. If it is damaged, notify the carrier immediately.
- To prevent the UPS from falling over, secure it to a pallet truck using ropes before moving it.
- To prevent shocks or falls, move the UPS gently. After placing the UPS in the installation position, unpack it and take care to prevent scratches. Keep the UPS steady during unpacking.
- Check that the fittings comply with the packing list. If some fittings are missing
  or do not comply with the packing list, record the information and contact your
  local Huawei office immediately.
- If the UPS installation environment is in poor condition and the UPS will be stored for a long time after it is unpacked, wrap the UPS with the original plastic coat to prevent dust.

#### **Procedure**

- **Step 1** Use a pallet truck to transport the UPS to the installation position.
- **Step 2** Remove the UPS outer packing.
- **Step 3** After verifying that the UPS is intact, remove the L-shaped brackets securing the cabinet and the pallet.

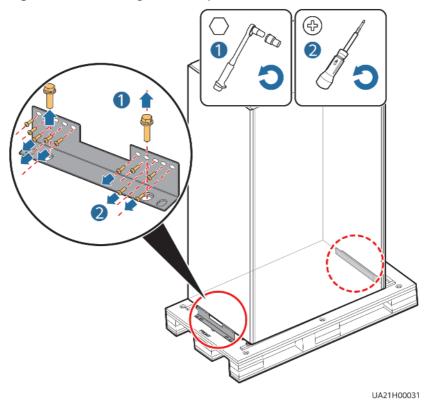


Figure 3-3 Removing the L-shaped bracket

**Step 4** Insert the two sliding plates under the pallet.

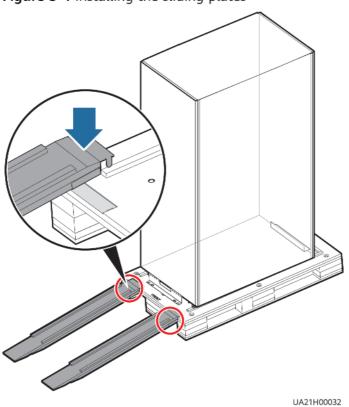
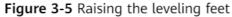
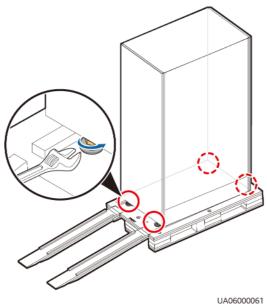


Figure 3-4 Installing the sliding plates

**Step 5** Raise the four anchor bolts to the highest position using an adjustable wrench.





**Step 6** Move the UPS over its castors near the installation position.

----End

# 3.2 Installing a Single UPS

# 3.2.1 Installing the Cabinet

#### **Secured Installation**

**Step 1** Determine the position for installing the cabinet. Mark mounting holes based on the drawings or marking-off template.

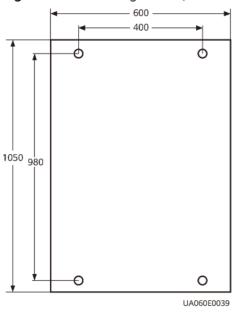


Figure 3-6 Mounting holes (unit: mm)

**Step 2** Use a hammer drill to drill holes for installing expansion bolts and then install expansion bolts in the holes.

Figure 3-7 Expansion bolt composition



#### **NOTICE**

Knock the expansion bolts into the holes until the expansion tube completely fits into the hole. The expansion sleeves must be completely buried under the ground to facilitate subsequent installation.

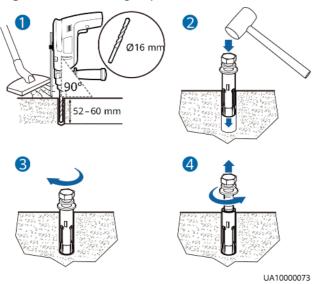


Figure 3-8 Installing expansion bolts (unit: mm)

- 1. Drill holes in the ground by using a hammer drill. The hole depth is 52 mm to 60 mm.
- 2. Partially tighten the expansion bolt and vertically insert it into the hole. Knock the expansion bolt using a rubber mallet until the expansion sleeve is fully inserted into the hole.
- 3. Partially tighten the expansion bolt.
- 4. Remove the bolt, spring washer, and flat washer.
- **Step 3** Move the UPS over its castors to the installation position.
- **Step 4** If the castors of the UPS need to be lifted from the ground, perform steps **Step 1** to **Step 2** in **Non-Secured Installation**.
- **Step 5** Open the front and rear doors.
- **Step 6** Insert four M12x115 expansion bolts into the expansion bolt holes in the floor, and tighten the expansion bolts.

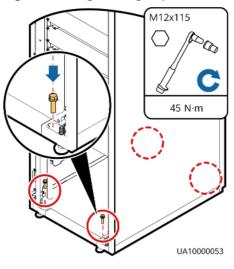


Figure 3-9 Tightening expansion bolts

# Non-Secured Installation

**Step 1** Lower the four anchor bolts at the bottom of the cabinet by using a wrench until all the four castors at the bottom hang in the air, the anchor bolts bear the whole cabinet weight.

#### **NOTICE**

- 1. Wrench an anchor bolt clockwise to elevate a cabinet, or wrench an anchor bolt anticlockwise to lower it. The cabinet feet can be adjusted within a range of 0–8 mm.
- 2. To prevent cabinet tilting, adjust the four anchor bolts instead of one anchor bolt.
- 3. Use a measuring tape for measurement when leveling the cabinet to ensure that the height between the cabinet top and the ground is 2000 mm + 3 mm.
- 4. Do not remove anchor bolts. Otherwise, you need to rework them for use.
- **Step 2** Check the cabinet levelness using a level. If the cabinet is not leveled, adjust the anchor bolts.

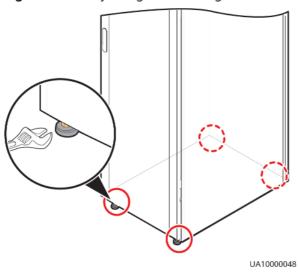


Figure 3-10 Adjusting the leveling feet

# Installing the UPS on an ESD Floor

A support is required when the UPS is installed on an ESD floor. The support height depends on the height between the ground and the ESD floor.

- **Step 1** Lift the cabinet onto the support and align the mounting holes on the cabinet with those on the support.
- **Step 2** Level the UPS by adjusting the anchor bolts and using a level.

# **NOTICE**

- Wrench an anchor bolt clockwise to elevate a cabinet, or wrench an anchor bolt anticlockwise to lower it. The cabinet feet can be adjusted within a range of 0–8 mm.
- To prevent cabinet tilting, adjust the four anchor bolts instead of one anchor bolt.
- Use a measuring tape for measurement when leveling the cabinet to ensure that the height between the cabinet top and the ground is 2000 mm + 3 mm.
- Do not remove anchor bolts. Otherwise, you need to rework them for use.
- **Step 3** Insert four M12 bolt assemblies into the mounting holes for the UPS and support. Partially tighten the bolts.

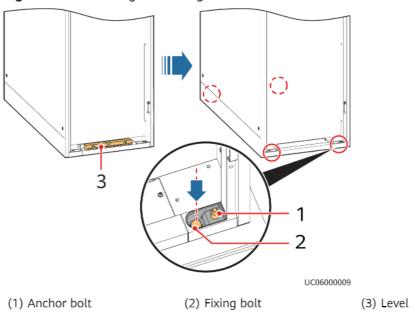


Figure 3-11 Leveling and fixing bolts

# 3.2.2 Installing an Enclosure Frame

# Context

An enclosure frame is used to increase the depth of a UPS to 1200 mm, and can also be used to route cables in and out from the bottom. Its BOM number is 21242025.



Figure 3-12 Installed enclosure frame

(1) Enclosure frame

# **Procedure**

**Step 1** Use eight M5 tapping screws to secure the enclosure frame accessories to the enclosure frame.

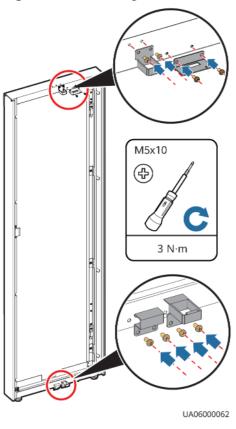


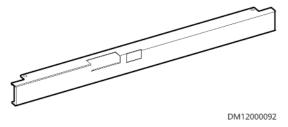
Figure 3-13 Securing the enclosure frame accessories

**Step 2** Use four M5 tapping screws to secure one upper sealing plate to the enclosure frame.

# **NOTICE**

There are two upper sealing plates, and the one used in this step has a gap.

Figure 3-14 Upper sealing plate



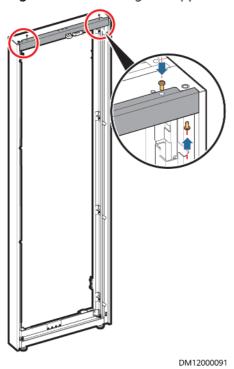


Figure 3-15 Securing the upper sealing plate

Step 3 Open the UPS rear door, and remove it.

# **NOTICE**

When removing the cabinet rear door, remove the ground cable between the cabinet and the rear door from the cabinet.

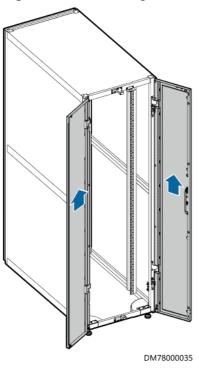


Figure 3-16 Removing the cabinet rear door

**Step 4** Remove the hinges and connecting kits from the UPS rear door and remove the ground cable.

# **NOTICE**

Put aside the hinges and connecting kits as they are needed in follow-up installation processes.

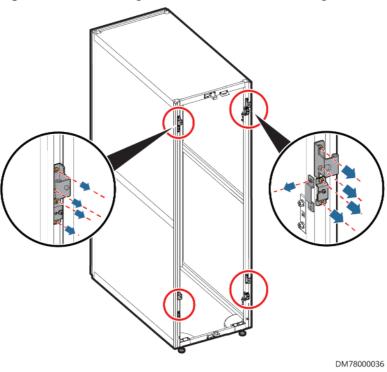


Figure 3-17 Removing the UPS rear door mounting kit

- **Step 5** Move the enclosure frame to the cabinet rear door, and adjust the enclosure frame so that the enclosure frame top is flush with the cabinet top.
- **Step 6** Secure the enclosure frame to the UPS using eight M5 tapping screws.

# **NOTICE**

- Align the upper and lower holes before tightening screws.
- The enclosure frame side with anchor bolts should face the cabinet bottom.

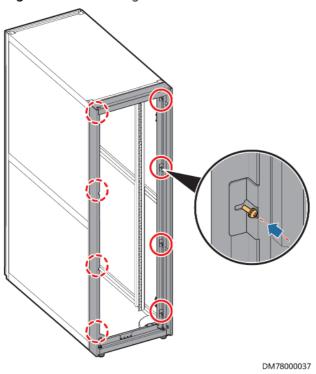


Figure 3-18 Securing the enclosure frame

- **Step 7** Install the hinges and connecting kits removed in **Step 4** at the corresponding positions on the enclosure frame.
- **Step 8** Install fixing plates for cable ties.

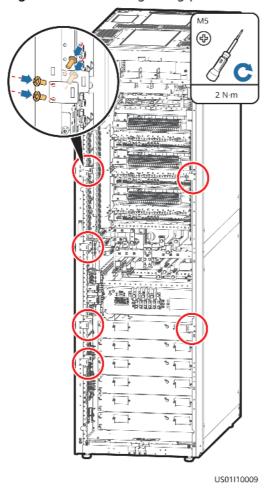


Figure 3-19 Installing fixing plates for cable ties

**Step 9** Install the UPS rear door on the enclosure frame.

# **NOTICE**

After installing the UPS rear door, ensure that ground cables are properly connected to the cabinet and UPS rear door.

----End

# 3.2.3 Installing Batteries

# **Installing Lead-Acid Batteries**

#### **A** DANGER

- Before installing batteries, read through the battery safety precautions and install batteries as instructed in the delivered battery installation guide.
- Install the batteries from the lower layer to the upper layer to ensure the system is secure and balanced.

Install a battery rack and batteries. For details, see the battery installation guide delivered along with the batteries.

# 3.2.4 UPS Cable Connection Reference

# Context

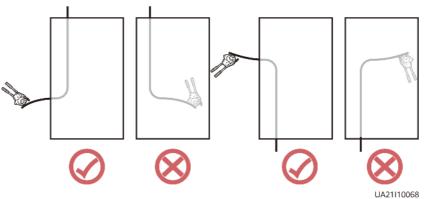
# **MARNING**

- Keep away from cabinets when preparing cables to prevent cable scraps from entering the cabinets. Cable scraps may cause ignition during power-on and result in personal injury and device damage.
- After installing cables, clean the cabinet top, bottom, copper bar wiring
  positions, and other positions. Ensure that there is no dust or scraps inside and
  around cabinets.
- Prepare terminals onsite. The length of the copper wire should be the same as that of the part of the terminal that covers the conductor.

# Procedure

- **Step 1** Route a cable into the cabinet and bind it to a nearby beam.
- **Step 2** Pull the cable to the copper bar to which the cable is to be connected, determine the cable length, and mark the cable at the position where the cable is to be cut.
- **Step 3** Pull the marked cable out of the cabinet, cut the cable from the marked position, strip the cable, and crimp a terminal.

Figure 3-20 Preparing a cable terminal outside the cabinet



#### 

Choose an appropriate cabling route based on the actual situation. The figure is for reference only.

- **Step 4** Connect the cable with a crimped terminal to the corresponding copper bar.
- **Step 5** Clean foreign matter inside the cabinet.

----End

# 3.2.5 Routing Power Cables

# 3.2.5.1 Routing Cables from the Top

#### Context

# **NOTICE**

- The basic rule for routing cables is: from inside out and from bottom up.
- When connecting the mains input power cable, strip the outer layer of the 5wire cable, wrap each wire in the stripped section using corrugated pipes, and secure the corrugated pipes using insulation tape to prevent sliding.

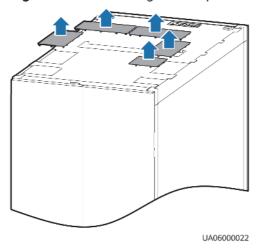
# **Procedure**

**Step 1** Remove five rodent-proof meshes and cable hole protection panels from the top of the cabinet.

#### 

You can drill holes in the removed covers as required before reinstalling them on the cabinet.

Figure 3-21 Removing rodent-proof meshes



UA07H00011

Figure 3-22 Removing cable hole protection panels

**Step 2** Open the rear door, and remove the insulation panels at the rear of the cabinet.

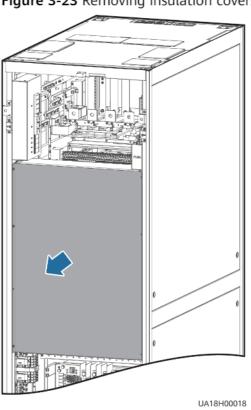


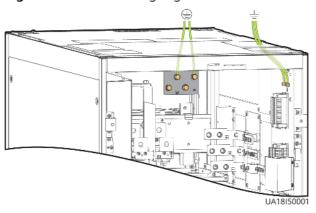
Figure 3-23 Removing insulation covers

**Step 3** Connect a ground cable to the UPS cabinet.

#### **NOTICE**

- Before connecting cables, check that all UPS input switches are OFF.
- Prepare terminals onsite. The length of the copper wire should be the same as that of the part of the terminal that covers the conductor.

Figure 3-24 Connecting a ground cable



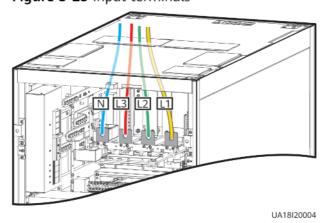
#### 

- Internal equipotential connection
- : Protection ground

**Step 4** Connect AC input power cables.

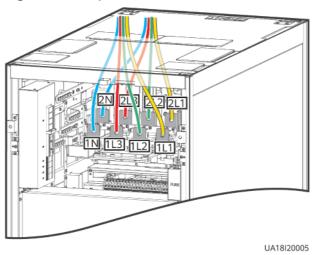
- MCCB cabinet input:
  - a. Connect AC input power cables to input terminals L1, L2, L3, and N on the UPS cabinet.

Figure 3-25 Input terminals



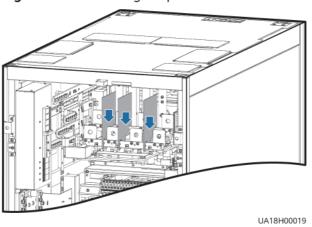
- ATS cabinet input:
  - a. Connect two AC input power cables to input terminals 1L1, 1L2, 1L3, 1N and 2L1, 2L2, 2L3, 2N on the UPS cabinet.

Figure 3-26 Input terminals



b. Take out PC boards from near the input copper bar, and install them based on the positions of the positioning holes.

Figure 3-27 Installing PC plates



**Step 5** Connect AC output power cables. (Connect output power cables to the customer terminal bars in the UPS cabinet, and connect N cables and PE cables to the N bar and PE bar on the left and right sides.)

# NOTICE

- Connect AC output power cables to the UPS from inside out and from top to bottom. Connect the PE cable, N cable, and L cable in sequence.
- The method for connecting AC output power cables is the same for the 60 kVA, and 125 kVA cabinets. The AC output power cable connection for the UPS5000-E-125K-HASBS-01 cabinet is used as an example.

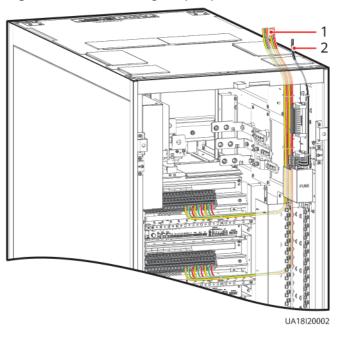


Figure 3-28 Connecting output power cables to customer terminals

(1) IT and smart cooling product output power  $\,$  (2) Lighting output power cables cables

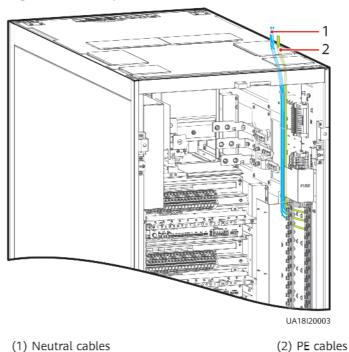


Figure 3-29 Output N cables and PE cables

# 

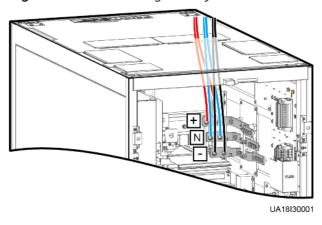
The number of cables in the figure is only for reference. The actual number of cables depends on the output loads.

Step 6 Connect battery cables.

# **⚠** DANGER

- The battery string voltage may cause serious injury. Observe safety precautions when connecting cables.
- Ensure that cables are correctly connected between battery strings and the battery switch, and between the battery switch and the UPS.

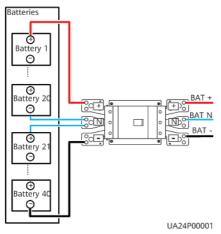
Figure 3-30 Connecting battery cables



Route a neutral wire from the middle of the positive and negative battery strings.

Take a battery string consisting of 40 batteries as an example. A neutral wire is routed from the middle of positive and negative battery strings, each consisting of 20 batteries.

Figure 3-31 Neutral wire



# **NOTICE**

When connecting the battery cables, wrap cables with corrugated pipes for protection, and reinstall the removed insulation panels at the rear of the cabinet.

----End

# 3.2.5.2 Routing at the Bottom

#### Context

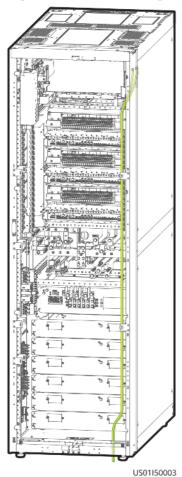
# **NOTICE**

- Cables can be routed in and out from the bottom only when an enclosure frame is configured for the cabinet.
- This section uses the ATS cabinet as an example. For details about cable connections in other cabinets, see the procedure in this section.
- Connect the inside cables first, and then the outside cables.

# **Procedure**

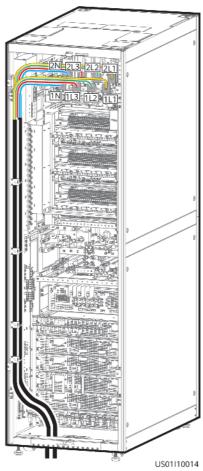
- **Step 1** Remove the cover plate from the cable hole at the bottom of the enclosure frame.
- **Step 2** Remove the insulation panels at the rear of the cabinet.
- **Step 3** Connect a ground cable to the safety ground of the UPS cabinet.

Figure 3-32 Connect a ground cable to the safety ground of the UPS cabinet



**Step 4** Connect two AC input power cables to input terminals 1L1, 1L2, 1L3, 1N and 2L1, 2L2, 2L3, 2N on the UPS cabinet.





**Step 5** Connect the battery cable and ground cable of the cabinet.

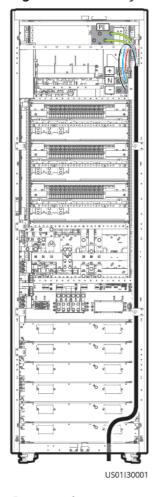


Figure 3-34 Battery cable and ground cable

**Step 6** Connect the output power cables.

2 2 3 US01110002

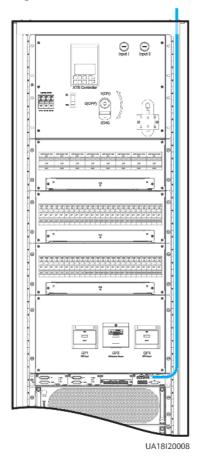
Figure 3-35 Output power cable

- (1) Lighting wiring terminal
- (2) Smart cooling product wiring terminal
- (3) IT wiring terminal

# 3.2.6 Connecting Communications Cables

# **Prerequisites**

Figure 3-36 Communications cable routing



# □ NOTE

- The following figure uses cable routing from the top as an example.
- The number and colors of communications cables are for reference only.

# 3.2.6.1 Connecting a Remote EPO Switch

# **NOTICE**

- Huawei does not provide an EPO switch and cable. Prepare them before installation. The 22 AWG cable is recommended. AWG is short for American wire gauge.
- To prevent problems, equip the EPO switch with a protective cover, and enclose the cable with a protective tube.

Connect the EPO switch to the dry contact card on the UPS.

#### ∩ NOTE

When the EPO switch is in the NC state, remove the jumper between EPO\_NC and EPO\_12V before connection. When you turn off the EPO switch, EPO is triggered. When the EPO switch is in the NO state, ensure that the jumper is connected between EPO\_NC and EPO 12V. When you turn on the EPO switch, EPO is triggered.

Figure 3-37 EPO NC connection

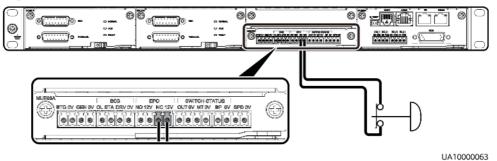
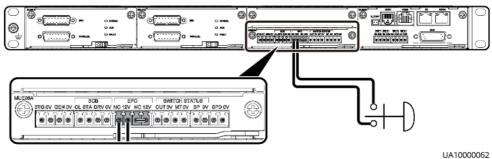


Figure 3-38 EPO NO connection

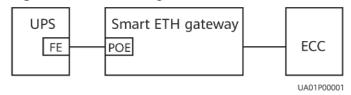


# 3.2.6.2 Connecting Communications Cables to Northbound Devices

# Procedure

**Step 1** Connect one end of the cable to the FE port on the UPS monitoring interface card, and connect the other end to any PoE port on the smart ETH gateway.

Figure 3-39 Connecting Communications Cables



----End

# 3.2.6.3 (Optional) Connecting SmartLi Communications Cables

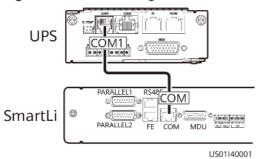
# **Prerequisites**

The battery type is lithium battery.

# **Procedure**

**Step 1** Connect one end of the cable to the COM1 port on the UPS monitoring interface card, and connect the other end to the COM port on the SmartLi monitoring interface unit.

Figure 3-40 Connecting Communications Cables



----End

# 3.2.6.4 Connecting Fire Protection and Generator Start/Stop Cables (ATS Input Cabinet)

# **Procedure**

**Step 1** Connect the fire protection and generator start/stop cables to the terminals on the XT2 terminal block.

**Table 3-6** Fire protection and generator start/stop cable connection

| Cable Connecting Position in the Device |                 | Cable Connecting Position in the UPS |
|---|-----------------|--------------------------------------|
| Fire protection                         | Fire Protection | XT2-4                                |
|   | Fire Protection | XT2-5                                |
| Generator start/                        | Generator Start | XT2-6                                |
| stop                                    | Generator Com   | XT2-7                                |
|   | Generator Stop  | XT2-8                                |

# □ NOTE

Here connecting one of the cables is used as an example. XT2-6 is a normally open contact, XT2-7 is a common contact, and XT2-8 is a normally closed contact.

UA18100001

**Figure 3-41** Connecting the fire protection and generator start/stop cables for the UPS

(1) XT2 terminal block

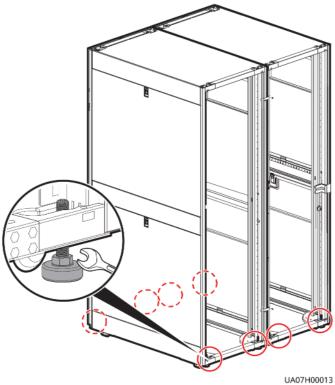
----End

# 3.3 (Optional) Combining Cabinets

# **Procedure**

**Step 1** Open the front and rear doors of the UPS. Wrench the anchor bolts using an wrench to adjust the UPS height, as shown in **Figure 3-42**. Use a level to level the UPS.

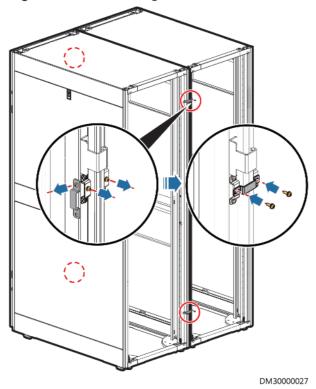
Figure 3-42 Leveling the feet



**Step 2** Remove the cabinet connecting kits from the rack, as shown in **Figure 3-43**.

**Step 3** Secure the connecting kits in the connection positions on the front door using screws, as shown in Figure 3-43.





- **Step 4** Use the same method to secure the connecting kits in the connection positions on the rear door.
- **Step 5** Repeat the procedure to combine other UPSs.

#### 

When combining cabinets, ensure that all the upper surfaces of the cabinets are on the same plane.

----End

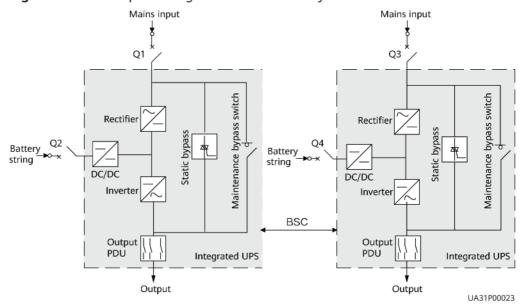
# 3.4 Installing a Double-Bus (2N) System

# 3.4.1 Connecting Power Cables

#### Procedure

- **Step 1** Ground each single UPS.
- **Step 2** Connect AC input and output power cables of each UPS.
- **Step 3** Connect battery power cables of each UPS.
- **Step 4** Connect cables to the dual-bus system.

Figure 3-44 Conceptual diagram of a dual-bus system



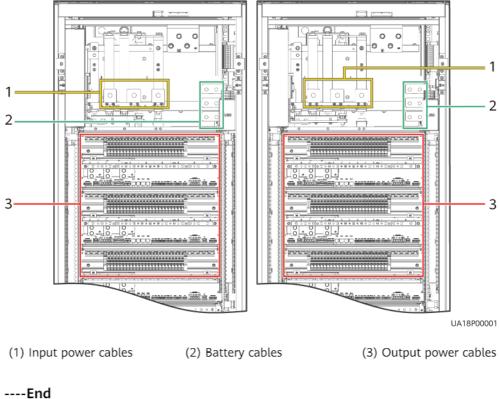


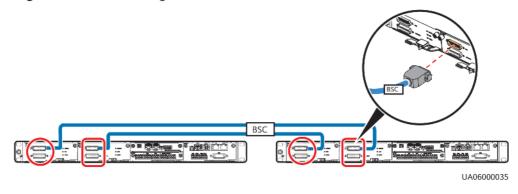
Figure 3-45 Cable connections to a dual-bus system

# 3.4.2 Connecting Signal Cables

# **Procedure**

- **Step 1** Connect signal cables to each single UPS in the dual-bus system by referring to the single UPS installation method.
- Step 2 Connect BSC cables between the master and slave systems of the dual-bus system.

Figure 3-46 Connecting BSC cables



----End

# 3.5 Installation Verification

# **CAUTION**

Check items 09 and 10 carefully. Otherwise, the UPS may break down.

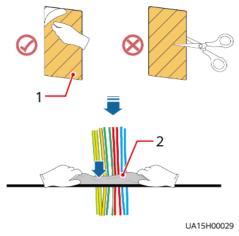
| No. | Item   | Expected Result  |
|-----|--|--|
| 01  | Consistency between system configurations and delivery configurations  | System configurations, including models and number of modules, comply with the contract.   |
| 02  | Cable layout   | Cables are routed properly and meet engineering requirements.  |
| 03  | Cable connections  | Input and output power cables and battery cables are securely connected and spring washers are flattened, prevent falling off and safety accidents. Ensure that there is no disconnection or potential risk. |
| 04  | Serial port connection<br>(security protection<br>mechanism supported) | Signal cables are connected properly and securely.   |
| 05  | Cable labels   | Both ends of each cable are labeled.<br>Labels are easy to understand.   |
| 06  | Ground cable connections   | The ground cable is securely connected to the equipment room ground bar. Measure the resistance between the UPS ground cable and the equipment room ground bar, which must be less than 0.1 ohm.             |
| 07  | Distances between cable ties   | Distances (recommended: 30 cm) between cable ties are the same, and no burr exists.  |
| 08  | Cable connections  | Cables are properly connected according to wiring diagrams.  |
| 09  | Live wire and neutral wire connections                                 | The connections are correct. Connect the input 1L1, 1L2, 1L3, 1N, 2L1, 2L2, 2L3, and 2N wires correctly. Connect the primary and secondary ATS power cables correctly  |

| No. | Item  | Expected Result  |
|-----|---|--|
| 10  | Input and output live wire phase sequences              | In single UPS mode, mains and bypass input and output live wires are connected in a correct sequence.                |
| 11  | Battery cable connection                                | Check that the voltages on the positive and negative battery terminals and battery N are correct using a multimeter. |
| 12  | Operating environment                                   | Clean the conductive air and other sundries.   |
| 13  | Copper busbar short circuit                             | Check that copper busbars are open-<br>circuited using a multimeter or an<br>insulation resistance tester.           |
| 14  | Surge protection switch state                           | The surge protection switch is turned on.  |
| 15  | Foreign matter cleaning inside the cabinet              | The inside and outside of the cabinet, and other operating components, are free from conductive dust.                |
|     |   | There is no foreign matter (such as copper wires and screws) on the top of the cabinet.                              |
|     | There is no foreign matter on the copper bar terminals. |  |
|     |   | There is no foreign matter around switch terminals.  |
|     |   | There is no foreign matter on the bottom plate of the cabinet.   |
|     |   | 5. There is no foreign matter on the rear module subrack.  |

# 

- In the scenarios where holes are drilled for routing cables or covers are removed for routing cables, after routing cables and checking cable connections, use sealing putty to fill in the gap between the cables and the cabinet.
- After verifying the installation, reinstall all the covers.
- Do not remove the dustproof cover before power-on to prevent dust inside the UPS.

Figure 3-47 Fill the holes with sealing putty



(1) Paper protective film

(2) Sealing putty

Figure 3-48 Dustproof cover



# 4 LCD Interface

# 4.1 Main Menu

# NOTICE

- User interfaces displayed in this document correspond to the MDU version V100R003C01SPC611 and are for reference only.
- The UPS5000-E-125K-HASBS-01 cabinet with the ATS input is used as an example.

The LCD screen is divided into three parts: **status bar**, **alarm bar** and **information area**.

Figure 4-1 Main Menu screen

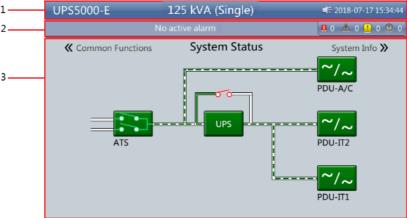


Table 4-1 Main screen description

| Number | Area                | Function  |
|--------|---------------------|---|
| 1      | Status bar          | Displays the UPS model, capacity, configuration, current date and time, Universal Serial Bus (USB) flash drive status, and buzzer status.                 |
| 2      | Alarm bar           | Displays active alarms in a scrolling list and the number of active alarms based on severity. Tap the alarm icon area to open the active alarm page.      |
| 3      | Information<br>area | Displays the power flow as well as the key information such as load and battery information. Tap the ATS, UPS, PDU-IT, and PDU-A/C icons to view details. |

Table 4-2 Functions of common buttons

| Button   | Function                          |
|----------|-----------------------------------|
| <b>A</b> | Returns to the main screen.       |
| 1        | Goes to the lower part of a page. |
| 1        | Goes to the upper part of a page. |
| 4        | Returns to the upper-level menu.  |
| Ð        | Logs out.                         |

# 4.2 System Info Screen

On the main screen, tap **System Info.** The **System Info** screen is displayed.

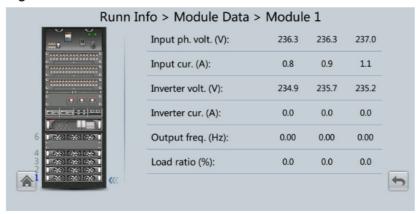
Figure 4-2 System Info Screen



# 4.2.1 Module Data Screen

On the **System Info**, tap the UPS picture. On the **Module Data** screen, select a module to view its running data. Indicates the selected module.

Figure 4-3 Module Data Screen



# 4.2.2 Running

On the **System Info.** screen, tap  $\stackrel{\text{def}}{=}$  to access the **Runn Info** screen. On this screen, you can query **AC Output**, **UPS Load**, **Mains Input**, and **Bypass Input**.

Figure 4-4 Runn Info screen 1

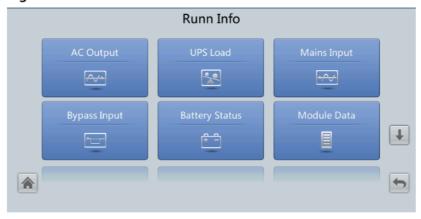


Figure 4-5 Runn Info screen 2



# 

If **Current equal. detection** in **System Info > Settings > Output Setting** is set to **Enable**, and the number of inverter modules is greater than or equal to 2, **Mod. Cur. Eql. Data** is displayed on the **Runn. Info.** screen.

Table 4-3 AC output

| Item              | Description   |
|-------------------|---|
| Phase voltage (V) | AC output phase voltage                                     |
| Line voltage (V)  | AC output line voltage                                      |
| Phase current (A) | AC output phase current                                     |
| Frequency (Hz)    | AC output frequency   |
| Power factor      | Proportion of output active power to output apparent power. |

Table 4-4 UPS load

| Item                            | Description   |
|---------------------------------|---|
| Active power (kW)               | Output active power of each phase on the UPS.   |
| Apparent power (kVA)            | Output apparent power of each phase on the UPS.   |
| Reactive power (kvar)           | Output reactive power of each phase on the UPS, that is, square root of the difference between the square of output apparent power and the square of output active power. |
| Load ratio (%)                  | Load ratio of each phase on the UPS, that is, proportion of actual power to rated power.  |
| Crest factor                    | Proportion of the peak value of load current to the valid value.  |
| Hist. Max. Load Ratio (%)       | Historical maximum load ratio of each phase on the UPS.   |
| Hist. Max. Active Power (kW)    | Historical maximum active power of each phase on the UPS.   |
| Hist. Max. Apparent Power (kVA) | Historical maximum apparent power of each phase on the UPS.   |

Table 4-5 Mains input

| Item              | Description   |  |
|-------------------|---|--|
| Phase voltage (V) | Mains input phase voltage   |  |
| Line voltage (V)  | Mains input line voltage  |  |
| Phase current (A) | Mains input phase current   |  |
| Frequency (Hz)    | Mains input frequency   |  |
| Power factor      | Proportion of the mains input active power to the mains input apparent power. |  |

Table 4-6 Bypass input

| Item              | Description   |  |
|-------------------|---|--|
| Phase voltage (V) | Bypass input phase voltage  |  |
| Line voltage (V)  | Bypass input line voltage   |  |
| Phase current (A) | Bypass input phase current  |  |
| Frequency (Hz)    | Bypass input frequency  |  |
| Power factor      | Proportion of the bypass input active power to the bypass input apparent power. |  |

Table 4-7 Battery status

| Item  | Description  |  |
|---|--|--|
| Battery Status                                  | Lead-acid battery: The value can be Not connected, Equalized charging, Float charging, Hibernating, discharging, or Not chg. or dis. |  |
|   | Lithium battery: The value can be Not connected, Float charging, discharging, or Not chg. or dis.                                    |  |
| Voltage (V)                                     | Voltage of the battery string.   |  |
| Current (A)                                     | Current of the battery string (the current is + when batteries are being charged and – when discharged).                             |  |
| Temperature (°C) (only for lead-acid batteries) | Battery operating temperature (A battery sensor is required. If the sensor is not installed, <b>N/A</b> is displayed).               |  |
| Backup time (min)                               | Battery backup time estimated at the current load.   |  |
| Remaining cap. (%)                              | Remaining battery capacity.  |  |

| Item   | Description      |
|--|------------------|
| SOH  | State of health. |
| Maximum Cell<br>Temperature (°C) (only for<br>lithium batteries) | -                |
| Min Cell Temperature (°C) (only for lithium batteries)           | -                |

### Table 4-8 Total runtime

| Item               | Description                                   |  |
|--------------------|---|--|
| Bypass runtime (h) | Time for which the UPS runs in bypass mode.   |  |
| Inv. runtime (h)   | Time for which the UPS runs in inverter mode. |  |

### □ NOTE

The value must be an integer. For example:

- If the value is less than 1, the value takes 0.
- If the value is greater than or equal to 1 and less than 2, the value takes 1.

Table 4-9 Environment data

| Item                     | Description  |
|--------------------------|--|
| Ambient temperature (°C) | Temperature measured by the ambient temperature and humidity sensor. (An ambient temperature and humidity sensor is required. If no sensor is connected, the ambient temperature sampled by the bypass module is displayed.) |
| Ambient humid. (%RH)     | Humidity measured by the ambient temperature and humidity sensor. If the sensor is not installed, <b>N/A</b> is displayed.   |

Table 4-10 ATS

| Item                  | Description             |  |
|-----------------------|-------------------------|--|
| LN1 Phase voltage (V) | LN1 input phase voltage |  |
| LN1 Line voltage (V)  | LN1 input line voltage  |  |
| LN1 Frequency (Hz)    | LN1 input frequency     |  |

| Item                  | Description             |
|-----------------------|-------------------------|
| LN1 Switch status     | LN1 switch status       |
| LN2 Phase voltage (V) | LN2 input phase voltage |
| LN2 Line voltage (V)  | LN2 input line voltage  |
| LN2 Frequency (Hz)    | LN2 input frequency     |
| LN2 Switch status     | LN2 switch status       |

Table 4-11 Cabinet Input

| Item                                | Description   |  |
|-------------------------------------|---|--|
| Phase voltage (V)                   | Cabinet input phase voltage   |  |
| Line voltage (V)                    | Cabinet input line voltage  |  |
| Phase current (A)                   | Cabinet input phase current   |  |
| Power factor                        | Proportion of the mains input active power to the cabinet input apparent power. |  |
| Frequency (Hz)                      | Cabinet input frequency   |  |
| Total energy (kWh)                  | Cabinet total energy  |  |
| Total active power (kW)             | N/A   |  |
| Total apparent power (kVA)          | N/A   |  |
| Total reactive power (kvar)         | N/A   |  |
| Load ratio (%)                      | N/A   |  |
| THDu (%)                            | N/A   |  |
| THDi (%)                            | N/A   |  |
| 5th/7th/11th THDu (%)               | N/A   |  |
| 5th/7th/11th THDi (%)               | N/A   |  |
| UPS output bar phase U/V temp. (°C) | N/A   |  |
| Main input bar L3 temp. (°C)        | N/A   |  |

- Module Data: reflects each data of a module.
- PDU Data-PDU-IT1/PDU-IT2/PDU-A/C: reflects the current, active power, and load ratio of each branch.

• **PDU Data-Query Electric Energy**: reflects the electric energy of each output branch and the main route.

#### ■ NOTE

- If you want to query the electricity consumed in the current month, set both the start date and end date to the current month. For example, the current month is March 2020. If you want to query the electricity consumed in March, set the start date and end date to 2020-03.
- If you want to query the electricity consumed in a past month, set the start date to the month to be queried, and set the end date to the next month. For example, if you need to query the electricity consumed in January 2020, set the start date to 2020-01 and end date to 2020-02. If you set both the start date and end date to 2020-01, a message will be displayed, indicating wrong query dates.

## 4.2.3 Alarms Screen

On the **System Info** screen, tap to enter the **Alarms** screen. On the **Alarms** screen, you can view active alarms and historical alarms, clear faults, and control the buzzer.

Figure 4-6 Alarms screen



### **Active Alarms**

Figure 4-7 Active Alarms screen



### **Historical Alarms**

Figure 4-8 Historical Alarms screen



#### **Buzzer Off**

Two buzzer menus are available, that is, Buzzer On and Buzzer Off.

- If the buzzer is muted, **Buzzer On** is displayed on the operation screen.
- If the buzzer is enabled, **Buzzer Off** is displayed on the operation screen.

If you enable the buzzer, the buzzer buzzes when a critical alarm, a minor alarm, or a certain warning is generated. If you mute the buzzer, it never buzzes.

### **Twinkle**

After you tap **Twinkle**, the UPS reports the address information to the FusionModule APP. The icon of the corresponding integrated UPS in the device layout diagram on the APP will blink for 10s.

# 4.2.4 Settings Screen

On the **System Info** screen, tap  $\stackrel{\text{def}}{=}$ . The **Settings** screen is displayed.





Figure 4-10 Settings screen 2



# **Comm Settings**

Figure 4-11 Comm settings (lead-acid battery)

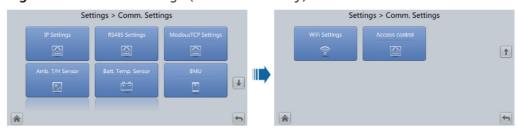
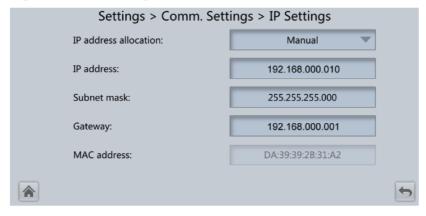


Figure 4-12 Comm settings (lithium battery)



Figure 4-13 IP settings



IP address allocation

- If the MDU is directly connected to a computer, the IP address can only be allocated manually. The IP addresses of the MDU and computer must be in the same network segment, and must be different.
- If the MDU is connected to a computer through a LAN switch or router with the DHCP function, the IP address can be allocated manually or automatically. Manual allocation is used by default.
  - Manual: Check that their IP addresses are two different values on the same network segment. Set the UPS IP address to be in the same subnet as the PC IP address. Perform the bitwise AND operation for the UPS IP address and the PC IP address with the subnet mask respectively. If the operation results are the same, the two IP addresses are in the same subnet.

AND operation rule: 1 AND 1 = 1, 1 AND 0 = 0, 0 AND 1 = 0, 0 AND 0 = 0. That is when the corresponding bits are both 1, the result is 1. In other cases, the result is 0.

| •                                |   |   |  |
|----------------------------------|---|---|--|
| N/A                              | PC IP address<br>(182.98.225.125)       | UPS IP address<br>(182.98.225.112)      |  |
| PC IP address/UPS IP address     | 10110110.01100010.1<br>1100001.01111101 | 10110110.01100010.1<br>1100001.01110000 |  |
| Subnet mask<br>(255.255.255.192) | 11111111.11111111.1<br>1111111.11000000 | 11111111.11111111.1<br>1111111.11000000 |  |
| Bitwise AND operation result     | 10110110.01100010.1<br>1100001.01000000 | 10110110.01100010.1<br>1100001.01000000 |  |

Table 4-12 Bitwise AND operation example

 Automatic: The MDU automatically searches for available IP addresses in the connected network. Ensure that the MDU and PC are on the same network segment.

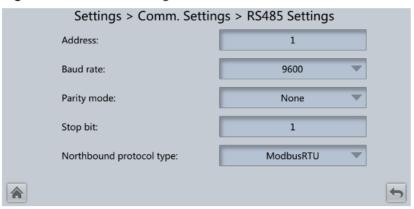
### 

After you restart the device, **IP address allocation** changes back to **Manual**. The IP address is set to the IP address set previously.

| Item        | Description   | Default Value | Value Range                     |
|-------------|---|---------------|---------------------------------|
| IP address  | Specifies the IP address for the Ethernet.  NOTICE Ensure that the UPS IP address is unique on the network segment. Otherwise, the monitoring display function may not function properly. | 192.168.0.10  | 1.0.0.0–<br>223.255.255.25<br>5 |
| Subnet mask | Specifies the subnet mask of the Ethernet.  | 255.255.255.0 | 0.0.0.0-<br>255.255.255.25<br>5 |

| Item        | Description  | Default Value | Value Range                     |
|-------------|--|---------------|---------------------------------|
| Gateway     | Specifies the Ethernet gateway.  | 192.168.0.1   | 1.0.0.0-<br>223.255.255.25<br>5 |
| MAC address | Defines the physical address of network equipment and is not configurable. | N/A           | N/A                             |

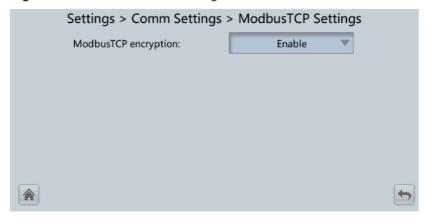
Figure 4-14 RS485 settings



| Item        | Description  | Default Value | Value Range            |
|-------------|--|---------------|------------------------|
| Address     | This serial port address is allocated by the user.   | 1             | 1-254                  |
| Baud rate   | Select a baud rate to match the user's network management conditions onsite.   | 9600          | 9600, 19200,<br>115200 |
| Parity mode | Verify the validity of RS485 communication characters. When a device node adopts RS485 communication, ensure that the parity modes for the device nodes are set to the same mode.                | None          | None, Odd,<br>Even     |
| Stop bit    | Stop bit in the Modbus communication frame format. When the UPS is connected over the serial port Modbus, set this parameter based on the frame format that the upstream device Modbus supports. | 1             | 1-2                    |

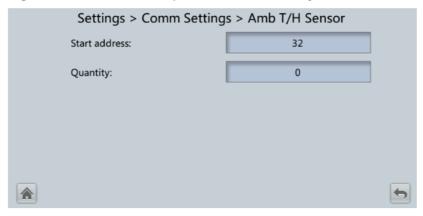
| Item | Description                       | Default Value | Value Range       |
|------|-----------------------------------|---------------|-------------------|
| 1    | Set the northbound protocol type. | ModbusRTU     | ModbusRTU,<br>YDN |

Figure 4-15 Modbus TCP settings



| Item                    | Description   | Default Value | Value Range        |
|-------------------------|---|---------------|--------------------|
| ModbusTCP<br>encryption | If Modbus TCP is used for communication, communication links do not implement encryption or implement encryption based on the selected encryption mode. | Enable        | Disable,<br>Enable |

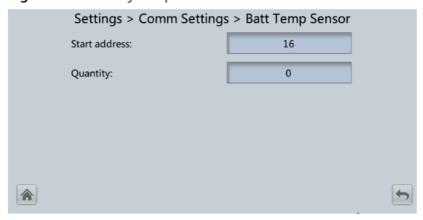
Figure 4-16 Ambient temperature and humidity sensor



| Item          | Description | Default Value | Value Range |
|---------------|-------------|---------------|-------------|
| Start address | N/A         | 32            | 32-44       |

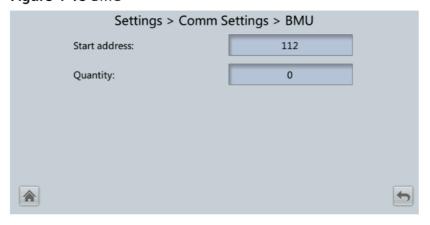
| Item     | Description   | Default Value | Value Range |
|----------|---|---------------|-------------|
| Quantity | Number of cascaded ambient temperature and humidity sensors | 0             | 0-4         |

Figure 4-17 Battery temperature sensor



| Item          | Description                                    | Default Value | Value Range |
|---------------|--|---------------|-------------|
| Start address | N/A  | 16            | 16–28       |
| Quantity      | Number of cascaded battery temperature sensors | 0             | 0-4         |

Figure 4-18 BMU



| Item          | Description             | Default Value | Value Range |
|---------------|-------------------------|---------------|-------------|
| Start address | N/A                     | 112           | N/A         |
| Quantity      | Number of cascaded BMUs | 0             | 0-12        |

Settings > Comm. Settings > WiFi Settings

Connect:

Enable

UPS\_WIFI\_2237D0

Password:

Figure 4-19 WiFi communication settings

| Item     | Description  | Default Value   | Value Range        |
|----------|--|---|--------------------|
| Connect  | If this parameter is set to <b>Enable</b> , you can implement the WiFi function by connecting to the USB WiFi module.  | Disable   | Disable,<br>Enable |
| SSID     | When using the mobile app for site setup or inspection, set WiFi SSID after connecting a WiFi module over a USB port to identify the WiFi device to which the mobile phone is connected. | UPS_WIFI +<br>Last six<br>characters of<br>the MAC<br>address | N/A                |
| Password | The password for accessing WiFi.   | Changeme  | N/A                |

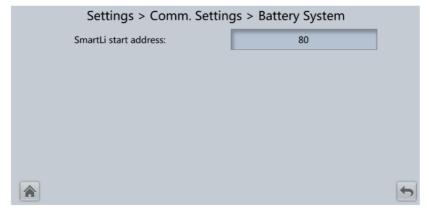
Figure 4-20 Access control



| Item      | Description   | Default<br>Value | Value Range                               |
|-----------|---|------------------|---|
| SSH       | Refers to a secure encrypted transmission protocol used to access the UPS with a terminal tool.                 | Enable           | Disable,<br>Enable                        |
|           | <b>Disable</b> : The SSH port is disabled and cannot be accessed.   |                  |   |
|           | <b>Enable</b> : The SSH port is enabled and can be accessed.  |                  |   |
| HTTPS     | Refers to a secure transmission protocol used to access the UPS through a browser.                              | Enable           | Disable,<br>Enable, Read-<br>only         |
|           | <b>Disable</b> : The HTTPS services are unavailable.  |                  |   |
|           | Read-only: Only operator users are allowed to access the services and have only the read permission.            |                  |   |
|           | <b>Enable</b> : All functions are available.  |                  |   |
| ModbusTCP | Refers to an Ethernet-based Modbus protocol used to connect to the NetEco.  Disable: The Modbus TCP             | Enable           | Disable,<br>Enable, Read-<br>only, NetEco |
|           | services are unavailable.   |                  |   |
|           | <b>Read-only</b> : Only the read permission is enabled. Settings are not allowed.                               |                  |   |
|           | NetEco: The read permission and the write permission on related parameters supported by the NetEco are enabled. |                  |   |
|           | <b>Enable</b> : All functions are available.  |                  |   |

| Item      | Description   | Default<br>Value | Value Range                               |
|-----------|---|------------------|---|
| SNMP      | Refers to the Simple Network<br>Management Protocol used to<br>connect to the NetEco.                           | Enable           | Disable,<br>Enable, Read-<br>only, NetEco |
|           | <b>Disable</b> : The SNMP services are unavailable.   |                  |   |
|           | <b>Read-only</b> : Only the read permission is enabled. Settings are not allowed.                               |                  |   |
|           | NetEco: The read permission and the write permission on related parameters supported by the NetEco are enabled. |                  |   |
|           | <b>Enable</b> : All functions are available.  |                  |   |
| ModbusRTU | Refers to a Modbus protocol based on the RS485 bus, which is used to connect to the NetEco.                     | Enable           | Disable,<br>Enable, Read-<br>only, NetEco |
|           | <b>Disable</b> : The Modbus RTU services are unavailable.   |                  |   |
|           | <b>Read-only</b> : Only the read permission is enabled. Settings are not allowed.                               |                  |   |
|           | NetEco: The read permission and the write permission on related parameters supported by the NetEco are enabled. |                  |   |
|           | <b>Enable</b> : All functions are available.  |                  |   |

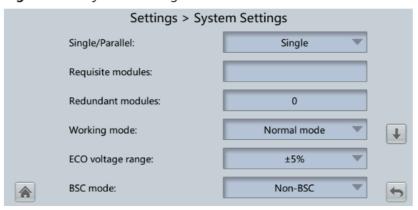
Figure 4-21 Battery system



| Item                  | Description  | Default<br>Value | Value<br>Range |
|-----------------------|--|------------------|----------------|
| SmartLi start address | SmartLi communication<br>address when the UPS queries<br>SmartLi data. | 80               | -              |

# **System Settings**

Figure 4-22 System settings 1



#### ∩ NOTE

If the value of **Requisite modules** is changed from 4 or less to 5, start the inverter after ensuring that the newly inserted modules are ready and then set **Requisite modules** on the LCD.

Figure 4-23 System settings 2

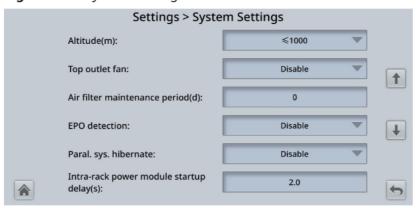
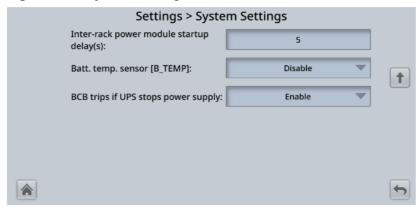


Figure 4-24 System settings 3



### 

If the battery type is lead-acid battery, you can set **Batt. temp. sensor** [B\_TEMP].

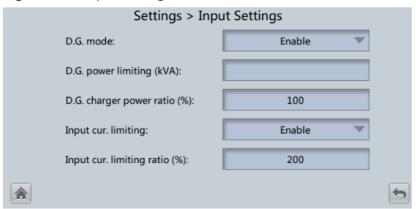
| Item                 | Description  | Default Value | Value Range  |
|----------------------|--|---------------|--|
| Single/<br>Parallel  | Only a single UPS is supported.  | N/A           | N/A  |
| Requisite modules    | Matches the system capacity.   | N/A           | N/A  |
| Redundant<br>modules | Set this parameter based on load capacity and redundancy requirements.   | 0             | N/A  |
| Working<br>mode      | UPS working mode   | Normal mode   | Normal mode,<br>ECO, Self-load<br>mode,<br>Converter<br>mode |
| ECO voltage range    | In ECO mode, when the difference between the bypass voltage and the rated voltage is greater than this value, the system determines that the ECO voltage is abnormal and transfers to normal mode. | ±5%           | ±5%, ±6%,<br>±7%, ±8%,<br>±9%, ±10%                          |

| Item                                    | Description   | Default Value | Value Range  |
|---|---|---------------|--|
| BSC mode                                | <ul> <li>Set this parameter to Standard BSC for a dualbus system.</li> <li>After setting this parameter to Standard BSC, you need to set the two UPS systems in the dual-bus system to BSC master system and BSC slave system respectively in the BSC master/slave system setting. (The two UPS systems cannot be BSC master systems or BSC slave systems at the same time. If you need to change the settings in the future, perform operations under the guidance of maintenance engineers.)</li> <li>NOTE         <ul> <li>Ensure that the BSC signal cable between the BSC master and slave systems is properly connected and that BSC-related hardware is properly installed.</li> </ul> </li> </ul> | Non-BSC       | Non-BSC,<br>Standard BSC   |
| Altitude (m)                            | Set this parameter based on<br>the altitude of the place<br>where the rack is used.   | ≤ 1000        | ≤ 1000, 1000-<br>2000, 2000-<br>3000, 3000-<br>4000, 4000-<br>5000 |
| Top outlet fan                          | Enable this parameter if a top outlet fan is configured. Then the fan running status can be checked.  | Disable       | Disable,<br>Enable   |
| Air filter<br>maintenance<br>period (d) | Specifies the rack air filter maintenance interval. If it is set to <b>0</b> , there is no reminder.  | 0             | 0-365  |
| EPO<br>detection                        | Specifies whether to enable EPO. EPO is performed only when this parameter is enabled and the EPO switch is triggered.  When EPO detection is changed from Disable to Enable, check that the EPO cable is connected correctly.  | Disable       | Disable,<br>Enable   |

| Item   | Description  | Default Value   | Value Range        |
|--|--|---|--------------------|
| Paral. sys.<br>hibernate                         | When the customer load is light, set parallel hibernation to alternate modules in hibernation, which can prolong their service life and improve the system efficiency.   | Disable   | Disable,<br>Enable |
| Module cycle<br>hiber. period<br>(d)             | N/A  | 30  | 1–100              |
| Intra-rack<br>power<br>module start<br>delay (s) | These two parameters enable the UPS to control the interval that each rack (or module) transfers from battery mode to normal mode, which reduces the impact on the generator or power grid. In the case of battery undervoltage, the system automatically shortens the delay for transferring to normal mode to 1/8 of the normal delay to accelerate the transfer and prevent battery | The default value of this parameter depends on the default number of power modules. The default value is 2.0, 1.0, and 0.5 for 1–5, 6–10, and 10–20 power modules respectively. | 0.5-120.0          |
| Inter-rack<br>power<br>module start<br>delay (s) | overdischarge. The start delay of a module in a rack varies depending on the rack number and module number. #1 module in rack 1 does not have a start delay.   | 5   | 2–120              |
| Batt. temp.<br>sensor<br>[B_TEMP]                | The short-distance battery temperature sensor monitors the ambient temperature near batteries, and ensures that batteries work reliably and securely.  | Disable   | Disable,<br>Enable |
| BCB trips if<br>UPS stops<br>power supply        | Indicates whether the BCB trips when the system stops supplying power and the output power is off.   | Enable  | Disable,<br>Enable |

## **Input Settings**

Figure 4-25 Input settings



| Item                                | Description  | Default Value                | Value Range          |
|-------------------------------------|--|------------------------------|----------------------|
| D.G. mode                           | Set this parameter to <b>Enable</b> when a D.G. connects to the input PDC. The UPS enters the D.G. mode when a D.G. is detected over dry contacts. | Disable                      | Disable,<br>Enable   |
| D.G. power limiting (kVA)           | Set these two parameters to control the valid input current and limiting input   | Depends on the actual model. | 0 kVA to 5000<br>kVA |
| D.G. charger<br>power ratio<br>(%)  | current, which prevents load impact and facilitates better cooperation between the UPS and the D.G.  | 100                          | 0%-100%              |
| Input cur.<br>limiting              | Specifies whether to enable or disable input current limiting to protect generators.   | Disable                      | Disable,<br>Enable   |
| Input cur.<br>limiting ratio<br>(%) | Limits the input current to protect the D.G.   | 200%                         | 50%-200%             |

## **Output Settings**

Figure 4-26 Output settings 1

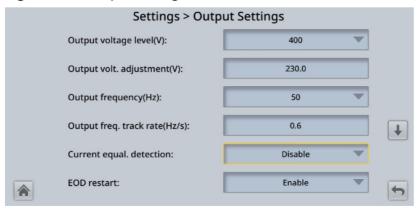
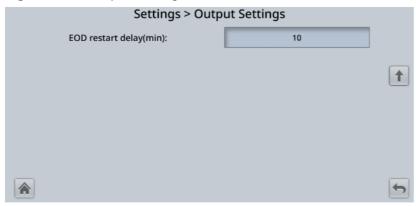


Figure 4-27 Output settings 2



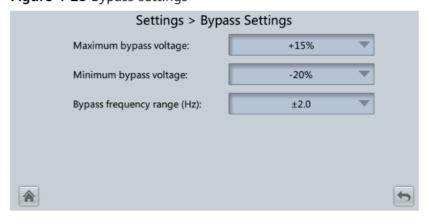
| Item                           | Description   | Default Value | Value Range   |
|--------------------------------|---|---------------|---------------|
| Output<br>voltage level<br>(V) | Specifies the system output voltage level. This parameter is configurable only after the inverter shuts down. After you change the voltage level, the upper limit of the bypass voltage restores to the default value. (If the voltage level is 380 V or 400 V, the default upper limit is +15%. If the voltage level is 415 V, the default upper limit is +10%.) | 400           | 380, 400, 415 |

| Item                                 | Description   | Default Value  | Value Range  |
|--------------------------------------|---|--|--|
| Output volt.<br>adjustment<br>(V)    | The output voltage can be slightly adjusted based on the onsite power distribution condition to ensure a minimum difference between the output voltage and the bypass voltage and facilitate uninterruptible power supply when the UPS transfers from normal mode to bypass mode.   | The default value is 220.0, 230.0, and 240.0 when the voltage level is 380 V, 400 V, and 415 V respectively. | 380 V: 209.0-<br>231.0<br>400 V: 218.5-<br>241.5<br>415 V: 228.0-<br>252.0 |
| Output<br>frequency<br>(Hz)          | Specifies the system output frequency level.  | 50 Hz  | 50 Hz, 60 Hz   |
| Output freq.<br>track rate<br>(Hz/s) | This parameter can be adjusted based on site requirements. If Output freq. track rate (Hz/s) is slow, the inverter frequency is different from the bypass frequency when the bypass frequency changes. If output is overloaded or the inverter is faulty, an interruption (less than 20 ms) occurs when the UPS transfers from normal mode to bypass mode. If Output freq. track rate (Hz/s) is fast, the inverter frequency is unstable. | 0.6 Hz/s   | 0.1 Hz/s to 2.0<br>Hz/s  |
| Current<br>equal.<br>detection       | Monitors the current differences between racks or modules. If this parameter is set to <b>Enable</b> , the <b>Mod. Cur. Eql. Data</b> can be viewed on the running information page.  | Disable  | Disable,<br>Enable   |

| Item                       | Description   | Default Value | Value Range        |
|----------------------------|---|---------------|--------------------|
| EOD restart                | If the mains is not functioning normally, the UPS will transfer to battery mode. When batteries reach the EOD threshold, the bypass is disabled, and EOD restart is Enable, the UPS will restart as soon as the mains resumes.  If EOD restart is disabled, clear the alarm manually or enable the restart function | Enable        | Disable,<br>Enable |
|                            | for the UPS.  |               |                    |
| EOD restart<br>delay (min) | If <b>EOD restart</b> is set to <b>Enable</b> , the UPS starts working after the time set for <b>EOD restart delay</b> when the input recovers from the power failure upon EOD.   | 10            | 1-1440             |

# **Bypass Settings**

Figure 4-28 Bypass settings



| Item                              | Description  | Default Value   | Value Range  |
|-----------------------------------|--|---|--|
| Maximum<br>bypass<br>voltage      | When the difference between the bypass voltage and the rated voltage exceeds the upper threshold for the bypass voltage, the system determines that the bypass voltage is not normal and that the bypass is unavailable. | +15%. • When the volume 400 V, the value +10%, +15%, default value • When the volume 415 V, the value | lue range is<br>+20%, and<br>efault value is<br>tage level is<br>lue range is<br>and +20%. The<br>is +15%.<br>tage level is<br>lue range is<br>5%. The default |
| Minimum<br>bypass<br>voltage      | When the difference between the bypass voltage and the rated voltage exceeds the upper threshold for the bypass voltage, the system determines that the bypass voltage is not normal and that the bypass is unavailable. | -20%  | -10%, -15%, -<br>20%, -30%, -<br>40%, -50%, -<br>60%   |
| Bypass<br>frequency<br>range (Hz) | When the difference between the bypass input frequency and the rated frequency is greater than the specified value, the system determines that the bypass frequency is abnormal, so the bypass is unavailable.           | ±2.0  | ±0.5, ±1.0,<br>±2.0, ±3.0,<br>±4.0, ±5.0, ±6.0   |

### **Battery Settings**

#### **NOTICE**

Battery parameter settings impact battery maintenance, battery lifespan, and UPS discharge time. When you set battery parameters, note the following:

- Battery string sharing is unavailable when Single/Parallel is set as Single.
- **Battery string sharing** affects the actual charge current and the estimated discharge time. An incorrect setting will cause a high or low charge current, which may damage the batteries. An incorrect estimated discharge time may cause a data backup fault.
- When you set parameters, ensure the following: Dis. cur. 0.1C EOD ≥ Dis. cur. 0.3C EOD ≥ Dis. cur. 0.5C EOD ≥ Dis. cur. 1.0C EOD.
- A cell consists of electrodes and electrolyte, which is the basic unit for the battery. Each cell has a nominal voltage of 2 V. A battery is a module consisting of single or multiple cells in a shell. Each battery has a nominal voltage of 2 V, 6 V, or 12 V.

Figure 4-29 Battery settings (lead-acid battery)

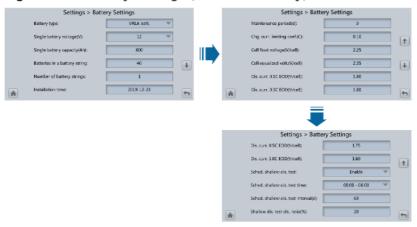


Figure 4-30 Battery settings (lithium battery)



| Item         | Description                             | Default Value | Value Range                  |
|--------------|---|---------------|------------------------------|
| Battery type | Type of batteries connected to the UPS. |               | VRLA batt.,<br>lithium batt. |

| Item                               | Description   | Default Value                           | Value Range                           |
|------------------------------------|---|---|---------------------------------------|
| Battery<br>capacity (Ah)           | Capacity of lithium batteries connected to the UPS (the value is automatically obtained).                         | -                                       | -                                     |
| Single battery<br>voltage (V)      | Specifies the voltage of each battery that is connected in the battery string in series.                          | 12 V                                    | 2, 6, 12                              |
| Single battery capacity (Ah)       | Specifies the capacity of each battery that is connected in the battery string in series.                         | Depends on the actual model.            | 5–9999                                |
| Batteries in a battery string      | Specifies the number of batteries in a battery string.  | The default value depends on the model. | The value range depends on the model. |
| Number of battery strings          | Specifies the number of battery strings connected in parallel.  | 1                                       | 1-6                                   |
| Installation<br>time               | A battery maintenance reminder is displayed when the maintenance time (counted from the installation time) comes. | N/A                                     | N/A                                   |
| Maintenance<br>period (d)          | Specifies the interval for reminding users of battery maintenance.  | 0                                       | 0-365                                 |
| Cell float<br>voltage (V/<br>cell) | Specifies the battery float charging voltage.   | 2.25                                    | 2.23-2.30                             |
| Cell equalized volt. (V/cell)      | Specifies the battery equalized charging voltage.   | 2.35                                    | 2.30-2.40                             |
| Dis. cur. 0.1C<br>EOD (V/cell)     | Specifies the EOD threshold when the discharging current  | 1.80                                    | 1.80-1.90                             |
| Dis. cur. 0.3C<br>EOD (V/cell)     | is 0.1C, 0.3C, 0.5C, and 1.0C respectively.   | 1.80                                    | 1.80-1.90                             |
| Dis. cur. 0.5C<br>EOD (V/cell)     |   | 1.75                                    | 1.75-1.85                             |
| Dis. cur. 1.0C<br>EOD (V/cell)     |   | 1.60                                    | 1.60-1.75                             |

| Item   | Description   | Default Value | Value Range   |
|--|---|---------------|---|
| Sched.<br>shallow dis.<br>test                 | When certain conditions are met, the charger shuts down, and batteries supply power to loads. The system records the battery discharge data as the reference for battery capacity and lifespan. | Disable       | Disable,<br>Enable  |
| Sched.<br>shallow dis.<br>test time            | Time for scheduled shallow discharge test.  | 00:00 - 06:00 | 00:00 - 06:00,<br>06:00 - 12:00,<br>12:00 - 18:00,<br>18:00 - 24:00 |
| Sched.<br>shallow dis.<br>test interval<br>(d) | Interval for scheduled shallow discharge test.  | 60            | 30-90   |
| Shallow dis.<br>test dis. ratio<br>(%)         | Set the proportion of the discharge capacity to the total discharge capacity. The value is configurable in any mode.  | 20            | 10-50   |
| Cell charge<br>voltage (V/<br>cell)            | Charge voltage of lithium batteries (the value is automatically obtained)   | -             | -   |
| Chg. cur.<br>limiting coef.<br>(C)             | Lithium battery: The charging current limit is a multiple of the battery capacity.  | 0.50          | 0.10 to 1.00  |
|  | Lead-acid battery: The charging current limit is a multiple of the battery capacity.  | 0.10          | 0.05 to 0.15  |

### **Dry Contact Set**

#### **NOTICE**

- Set only the dry contacts that are needed. Otherwise, the UPS may not run properly.
- When a dry contact card is disabled, its dry contact signals are disabled.
- After a dry contact card is enabled, its dry contact signals can be displayed on the LCD.
- Disable all the dry contacts for a dry contact card that is not connected and all the dry contacts that are not used to prevent false alarms.
- ( ) encloses a unit, and [ ] encloses silk screen.

Specify dry contact settings on the following cards:

- Dry contact card (MUE05A): provides dry contact signals for the battery grounding failure detector, D.G., BCB box, and PDCs.
- Backfeed protection board (MUE06A): provides backfeed protection signals.
   This board can be enabled or disabled.
- Monitoring interface card (MUS05A): provides four routes of configurable output dry contact signals.
- Dry contact extended card (MUE07A): provides five routes of input signals and five routes of output signals.

| Item                         | Description   |
|------------------------------|---|
| MUE05A connection            | Specifies the MUE05A connection status. Independent input signals can be enabled only when this parameter is set to <b>Enable</b> .                   |
| Batter ground fault [BTG]    | Enable or disable battery grounding fault detection.  |
| D.G. connection [GEN]        | Enable or disable D.G. connection detection.  |
| BCB connection [OL]          | Enable or disable BCB connection detection.   |
| Battery breaker [STA]        | Enable or disable battery circuit breaker status detection.   |
| PDC output breaker [OUT]     | Enable or disable PDC output circuit breaker status detection.  |
| PDC maintenance breaker [MT] | Enable or disable PDC maintenance circuit breaker status detection.   |
| BP/SYSMT Switch              | If the BP/SYSMT switch is set to <b>Enable</b> , the port has dry contact signal access. Using the port depends on the status of the BP/SYSMT switch. |

| Item   | Description   |
|--|---|
| BP/SYSMT switch function   | If the BP/SYSMT switch is set to <b>Enable</b> , this parameter is displayed on the screen. Set this parameter to determine whether the port is used to detect the status of the PDU bypass input switch, or system maintenance switch. |
| SPD/SYSOUT Switch  | If the SPD/SYSOUT switch is set to <b>Enable</b> , the port has dry contact signal access. How a user uses the port depends on the status of the SPD/SYSOUT switch.   |
| SPD/SYSOUT switch function   | If the SPD/SYSOUT switch is set to <b>Enable</b> , this parameter is displayed on the screen. Set this parameter to determine whether the port is used to detect the status of the PDU input surge protector, or system output switch.  |
| MUE06A connection  | Specifies the MUE06A connection status. If this parameter is set to <b>Enable</b> , the mains and bypass backfeed protection is enabled.  |
| MUS05A DO_1 Action,<br>MUS05A DO_2 Action,<br>MUS05A DO_3 Action,<br>MUS05A DO_4 Action                        | Controls the status of DO ports on the MUS05A dry contact card.   |
| MUE07A DO_1 Action,<br>MUE07A DO_2 Action,<br>MUE07A DO_3 Action,<br>MUE07A DO_4 Action,<br>MUE07A DO_5 Action | Controls the status of DO ports on the MUE07A extended dry contact card.  |
| MUS05A DO_1, MUS05A<br>DO_2, MUS05A DO_3,<br>MUS05A DO_4   | Corresponds to the signal of the output dry contact DO on the MUS05A.   |
| MUE07A DO_1, MUE07A<br>DO_2, MUE07A DO_3,<br>MUE07A DO_4, MUE07A<br>DO_5                                       | Corresponds to the signal of the output dry contact DO on the MUE07A.   |
| MUE07A DI_1, MUE07A DI_2,<br>MUE07A DI_3, MUE07A DI_4,<br>MUE07A DI_5  | Corresponds to the signal of the input dry contact DI on the MUE07A.  |

## **User Settings**

Figure 4-31 User settings



| Item                            | Description  | Default Value | Value Range  |
|---------------------------------|--|---------------|--|
| Language                        | Thirteen languages are supported   | English       | English, Chinese, Spanish, Dutch, French, German, Italian, Polish, Portuguese, Russian, Swedish, Turkish, Japanese |
| Password                        | N/A  | 000001        | N/A  |
| password<br>complexity<br>check | If the password complexity check is disabled, the user password is required to be a string of six to eight digits. If the password complexity check is enabled, the password is required to be a string of 6–20 characters and contain at least two types of characters. | Enable        | Disable,<br>Enable   |

### 

Set the date and time as required.

### Time Zone

Figure 4-32 Time zone



Set the local time zone.

# **PDU Parameters Settings**

Figure 4-33 PDU parameters screen 1

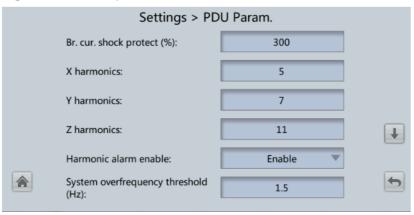


Figure 4-34 PDU parameters screen 2

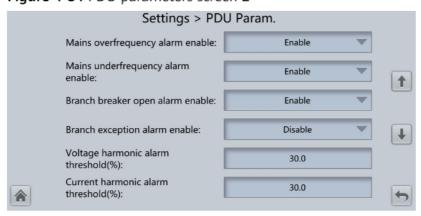


Figure 4-35 PDU parameters screen 3

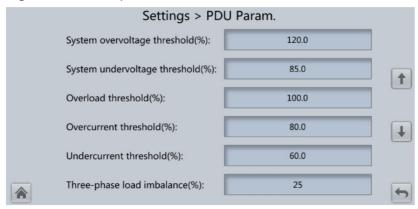


Figure 4-36 PDU parameters screen 4

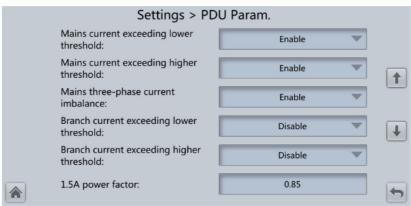
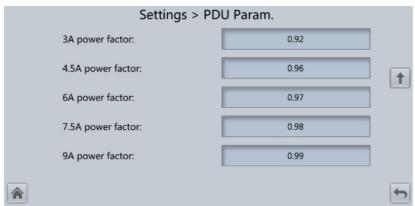


Figure 4-37 PDU parameters screen 4



| Item   | Description  | Default Value  | Value Range        |
|--|--|--|--------------------|
| Br. cur. shock<br>protect (%)                      | Branch current shock protection alarm threshold. When the ratio of the branch current to the rated branch current exceeds the value of Br. cur. shock protect (%), an alarm will be generated.   | 300  | 150-500            |
| X harmonics,<br>Y harmonics,<br>and Z<br>harmonics | The number of three categories of harmonics is displayed. The system displays the harmonics settings in <b>Cabinet Input</b> .   | X harmonics: 5<br>Y harmonics: 7<br>Z harmonics:<br>11 | 2-63               |
| Harmonic<br>alarm enable                           | Specifies whether harmonic alarming is enabled. When the system frequency is higher than the rated frequency plus the value of this parameter or is lower than the rated frequency minus the value of this parameter, an alarm is generated. | Disable  | Disable,<br>Enable |
| System<br>overfrequency<br>threshold<br>(Hz)       | System over/underfrequency alarm threshold. When the system frequency is higher than the rated frequency plus the value of this parameter or is lower than the rated frequency minus the value of this parameter, an alarm is generated.     | 1.5  | 1.0-10             |
| Mains<br>overfrequency<br>alarm enable             | If this parameter is set to <b>Enable</b> , an alarm is generated when the alarm condition is met.   | Enable   | Disable,<br>Enable |
| Mains<br>underfrequen<br>cy alarm<br>enable        | If this parameter is set to <b>Enable</b> , an alarm is generated when the alarm condition is met.   | Enable   | Disable,<br>Enable |

| Item  | Description  | Default Value | Value Range                          |
|---|--|---------------|--------------------------------------|
| Branch<br>breaker open<br>alarm enable        | If this parameter is set to <b>Enable</b> , the system generates an alarm when the branch circuit breaker is open. If this parameter is set to <b>Disable</b> , the system does not generate the branch circuit breaker open alarm under any condition. The default value is <b>Enable</b> .                 | Enable        | Disable,<br>Enable, User-<br>defined |
| Branch<br>exception<br>alarm enable           | f this parameter is set to <b>Enable</b> , the system generates an alarm when the branch circuit breaker is closed and no load is connected. If this parameter is set to <b>Disable</b> , the system does not generate the branch exception alarm under any condition. The default value is <b>Disable</b> . | Disable       | Disable,<br>Enable, User-<br>defined |
| Voltage<br>harmonic<br>alarm<br>threshold (%) | When harmonic alarming is enabled and the main route voltage harmonic value exceeds the alarm threshold specified by this parameter, the system generates an alarm.  | 30.0          | 5.0-30.0                             |
| Current<br>harmonic<br>alarm<br>threshold (%) | When harmonic alarming is enabled and the main route voltage harmonic value exceeds the alarm threshold specified by this parameter, the system generates an alarm.  | 30.0          | 5.0-30.0                             |
| System<br>overvoltage<br>threshold (%)        | When the main route voltage is higher than the rated voltage multiplied by the value of this parameter, the system generates an alarm.   | 120.0         | 105.0-125.0                          |
| System<br>undervoltage<br>threshold (%)       | When the main route voltage is lower than the rated voltage multiplied by the value of this parameter, the system generates an alarm.  | 85.0          | 75.0-95.0                            |

| Item                          | Description   | Default Value | Value Range |
|-------------------------------|---|---------------|-------------|
| Overload<br>threshold (%)     | Branch and main route current overload alarm threshold. When the branch current is lower than the rated branch current multiplied by the value of Br. cur. shock protect (%) and higher than the rated branch current multiplied by the value of Overload threshold (%), the system generates a branch overload alarm. When the main route current is higher than the rated main route current multiplied by the value of Overload threshold (%), the system generates a main route overload alarm. | 100.0         | 100.0-120.0 |
| Overcurrent<br>threshold (%)  | Branch and main route overcurrent threshold. When the main route or branch current is higher than the rated main route or branch current multiplied by the value of Overcurrent threshold (%) and lower than the value of rated current multiplied by the value of Overload threshold (%), the system generates an alarm.   | 80.0          | 80.0-100.0  |
| Undercurrent<br>threshold (%) | Branch and main route undercurrent threshold. When the main route or branch current is higher than the rated main route or branch current multiplied by the value of Undercurrent threshold (%) and lower than the value of rated current multiplied by the value of Overcurrent threshold (%), the system generates an alarm.  | 60.0          | 30.0-80.0   |

| Item  | Description  | Default Value | Value Range        |
|---|--|---------------|--------------------|
| Three-phase<br>load<br>imbalance                  | Main route current three- phase load imbalance alarm threshold. When the value obtained after the difference between the maximum and minimum main route three- phase currents is divided by the minimum current is higher than the value of Three-phase load imbalance, the system generates an alarm. | 25.0          | 5.0-50.0           |
| Mains three-<br>phase current<br>imbalance        | If this parameter is set to <b>Enable</b> , the system generates an alarm when the main route three-phase current is imbalanced. If this parameter is set to <b>Disable</b> , the system does not generate a main route three-phase current alarm under any condition.                                 | Enable        | Disable,<br>Enable |
| Mains current<br>exceeding<br>lower<br>threshold  | If this parameter is set to  Enable, the system generates an alarm when the main route current is lower than the Mains current exceeding lower threshold. If this parameter is set to Disable, the system does not generate a main route current alarm under any condition.                            | Enable        | Disable,<br>Enable |
| Mains current<br>exceeding<br>higher<br>threshold | If this parameter is set to  Enable, the system generates an alarm when the main route current is higher than the Mains current exceeding higher threshold. If this parameter is set to Disable, the system does not generate a main route current alarm under any condition.                          | Enable        | Disable,<br>Enable |

| Item  | Description   | Default Value | Value Range        |
|---|---|---------------|--------------------|
| Branch<br>current<br>exceeding<br>lower<br>threshold  | If this parameter is set to  Enable, the system generates an alarm when the branch route current is lower than the Branch current exceeding lower threshold. If this parameter is set to  Disable, the system does not generate a branch route current alarm under any condition.   | Disable       | Disable,<br>Enable |
| Branch<br>current<br>exceeding<br>higher<br>threshold | If this parameter is set to  Enable, the system generates an alarm when the branch route current is higher than the Branch current exceeding higher threshold. If this parameter is set to  Disable, the system does not generate a branch route current alarm under any condition. | Disable       | Disable,<br>Enable |
| Power factor  | This parameter is set according to the actual power factor of the air conditioner.  | N/A           | 0.00-1.00          |

After PDU parameters **Branch breaker open alarm enable** and **Branch exception alarm enable** are set to **User-defined**, the screen shown in **Figure 4-38** is displayed. Perform the following operations:

- 1. In the area shown by (2), select a load branch to be set.
- 2. In the area shown by (1), select output branches to be set.
- 3. In the area shown by (3), tap **Disable** or **Enable**.

### MOTE

The settings after **Branch exception alarm enable** is set to **User-defined** are similar to those after **Branch breaker open alarm enable** is set to **User-defined**. **Branch breaker open alarm enable** is used as an example.

(3/6): [Critical] Detection board communication failure / 2015-12-08 ( U 5 U 1 9 0 Settings > PDU Parameters > Branch breaker open alarm enable No. Branch 1 QF1--Enable QF13--Enable -1 QF2--Enable QF14--Enable QF3--Enable QF15--Enable PDU-IT1 4 QF4--Enable QF16--Enable QF5--Enable QF17--Enable QF6--Enable QF18--Enable QF7--Enable QF19--Enable QF8--Enable QF20--Enable

Figure 4-38 Custom settings

### **ATS Parameters**

Figure 4-39 ATS parameters screen



| Item                               | Description  | Default<br>Value | Value Range     |
|------------------------------------|--|------------------|-----------------|
| Backup power fault<br>alarm enable | Indicates whether to enable the backup power fault alarm. If this parameter is set to Enable, an alarm is generated when the alarm condition is met (the backup power supply is abnormal). | Disable          | Disable, Enable |

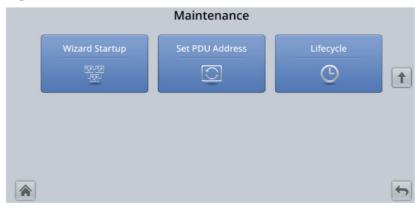
# 4.2.5 Maintenance Screen

On the **System Info** screen, tap **3**. After you log in, the **Maintenance** screen is displayed.

Figure 4-40 Maintenance screen 1



Figure 4-41 Maintenance screen 2



#### Battery Maint.

#### **NOTICE**

- Perform battery maintenance when no alarm is active on the UPS. Otherwise, the UPS may supply no power.
- A proportion of battery capacity will discharge during battery maintenance. This reduces the discharge time before the next charge.
- Do not perform battery maintenance when a D.G. is connected.

Battery maintenance includes **Forced Equalized Charging**, **Shallow Dis. Test**, and **Capacity Test**.

Maintenance > Battery Maint.

Forced Equalized Charging Start Stop

Shallow Dis. Test Start Stop

Capacity Test Start Stop

Figure 4-42 Battery Maint. (lead-acid battery)

Figure 4-43 Battery Maint. (lithium battery)



| Item                      | Description   |
|---------------------------|---|
| Forced Equalized Charging | Forcibly perform equalized charging on batteries.   |
| Shallow Dis. Test         | Partially discharge batteries. A shallow discharge test can be conducted to test the battery loop reliability and short-time discharge capacity when the batteries have not discharged for a long time. |
| Capacity Test             | Fully discharge batteries. A deep discharge test is conducted to obtain the battery discharge performance data.   |

#### **USB Operations**

You can export **Fault Data**, and perform **Upgrade Software**, **BSP Upgrade**, **Export Config.**, and **Import Config.** with USB.

Figure 4-44 USB Operations

#### Starting or Shutting Down the Inverter

| Item     | Description   |
|----------|---|
| Inv. ON  | The <b>Inv. ON</b> screen allows you to start the inverter manually.      |
| Inv. OFF | The <b>Inv. OFF</b> screen allows you to shut down the inverter manually. |

#### **ECM Switchover**

#### NOTICE

- Only professional personnel are allowed to use this function.
- Clear faults before performing ECM active/standby switchover.
- After an ECM is inserted, active and standby switchover is supported only after the ECM is configured and starts working properly (about 30 seconds).

If the ECM to be maintained is still working, perform ECM active/standby switchover on this screen (a dialog box is displayed for you to confirm this operation). After performing active/standby switchover, ensure that this ECM is in standby state (that is, the green indicator is blinking) and then maintain the ECM.

#### Wizard Startup

The wizard startup can be used to test the bypass, mains inverter, inverter/bypass switch, battery inverter, battery charging capability, battery switch tripping and so on.

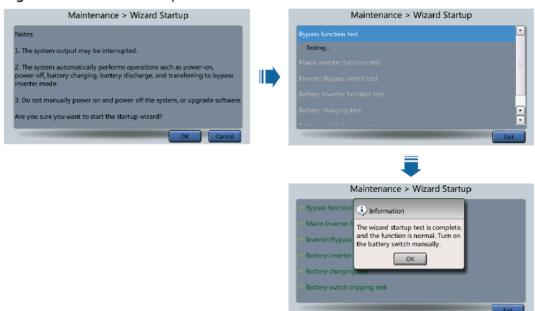
Perform operations as prompted.

#### **NOTICE**

Before starting the wizard, ensure that:

- The system is a single UPS system.
- No minor or critical alarm occurs.
- The UPS works in normal mode with a load ratio fluctuation less than 10%.
- The UPS generates no battery overtemperature, overvoltage, or overcurrent alarm. No generator is connected to the UPS.
- The mains, batteries, charger, and discharger are normal. No overload alarm is generated.
- SOC > 30%

#### Figure 4-45 Wizard startup



#### 

On the **System Info > Settings > Dry Contact Set** screen, set **MUE05A connection** to **Enable**, and set **BCB connection [OL]** to **Enable**. Wizard-based startup can be used to test the battery switch tripping function.

#### Set PDU Address

After you tap this icon, the UPS reallocates a CAN address to the power distribution board based on the actual address of the board.

## Lifecycle

On **Lifecycle**, you can view monitor information such as **First Power-on**, **Arrival Date**, and **Service Life**.

#### 4.2.6 About Screen

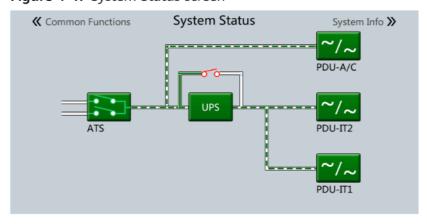
On the **System Info** screen, tap **About** on the **About** screen, you can view the UPS model, manufacturer name, monitoring version and power version. To view version details, tap **Version Info**.

Figure 4-46 About screen



## 4.3 System Status Screen

Figure 4-47 System Status screen



#### 

You can click the UPS, PDU-IT, and PDU-A/C icons in the energy flow diagram to view detailed information about them.

## 4.4 Common Functions Screen

On the main screen, tap **Common Functions**. On the **Common Functions** to query the AC output, load, and mains input information, start or shut down the inverter, control the buzzer, and query the historical alarms.

Figure 4-48 Common Functions screen 1

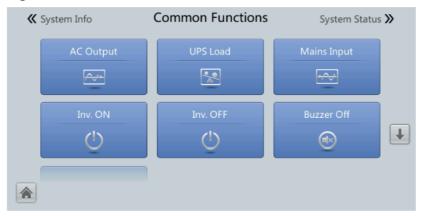
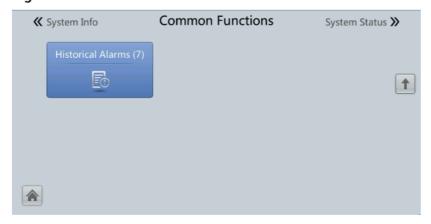


Figure 4-49 Common Functions screen 2



# 5 Operations

## 5.1 Check before commissioning

Before system commissioning, check the power system.

Table 5-1 Check before commissioning

| No. | Item   | Result     |
|-----|--|------------|
| 1   | All circuit breakers are OFF.  | □ Yes □ No |
| 2   | Use a multimeter to check that no short circuit occurs between any two phases of L1, L2, L3, N, and PE on the AC input side and that no short circuit occurs between any two of positive, negative, and N battery terminals. | □ Yes □ No |
| 3   | Positive and negative battery terminals are connected correctly. Check this item by viewing the color or label of the battery input cable.   | □ Yes □ No |
| 4   | The AC input voltage is within the rated input range.  | □ Yes □ No |
| 5   | The battery input voltage is within the rated range.   | □ Yes □ No |

## 5.2 (Optional) Commissioning the ATS Before Power-On

#### Context



Perform system commissioning and power-on strictly according to the system manual and ATS instructions. For any changes in operations and parameters, consult Huawei engineers. Otherwise, system commissioning or power-on may fail, or even the cabinet is damaged.

#### Procedure

- **Step 1** Switch on all SPD circuit breakers in the integrated UPS.
- **Step 2** Switch on the upstream power input circuit breaker for the integrated UPS to power on the UPS cabinet. If the Power indicator in the upper part of the integrated UPS lights up, the UPS cabinet is powered on properly.
- **Step 3** Turn on the circuit breakers of the ATS operation mechanism (Q1 and Q2 in the left lower part at the rear of the cabinet) to power on the ATS operation mechanism.
- **Step 4** Check whether the controller has alarms. If an alarm exists, rectify the fault first.
- **Step 5** Press the locking latch on the ATS panel, pull out the handle, and insert it into the slot.
- **Step 6** Check the ATS Motor/Manual selection lever, and flip it to the Motor mode.
- **Step 7** Check the AC input and configuration status of the ATS.

After the AC input is normal, the ATS controller starts. Check and set ATS parameters based on the AC input parameters.

#### ∩ NOTE

- A password is required to log in to the configurations page. Set the password by using the Up, Down, and Enter buttons. The initial password is **0001**.
- Language setting: Default screen > Main Menu > Device Configuration > Language.
- On the default screen, hold down . The main menu screen is displayed.

On the main menu screen, select system configuration and press The following table lists the system configuration attributes and values.

parameter based on site requirements.

The default value is

parameter based on site requirements.

Line 1-Switch I. Set the

Item Value Description Rated operating The default value is 110 V/57 V; 115 V/66 V; 120 380 V/220 V. Set the voltage V/70 V; 208 V/120 V; 220 parameter based on V/127 V; 230 V/132 V; 240 V/138 V; 227 V/160 V; 347 site requirements. V/200 V; 380 V/220 V; 400 V/230 V; 415 V/240 V; 440 V/254 V; 480 V/277 V The default value is 50 Rated frequency 50 Hz; 60 Hz Hz. Set the parameter based on site requirements. Number of Phases Single phase; three-phase The default value is four-wire; three-phase three-phase four-wire. LN1 three-wire Number of Phases The default value is Single phase; three-phase LN2 four-wire; three-phase three-phase four-wire. three-wire The default value is Secondary load Not Used; Opening Only; Opening And Closing Not Used. The default value is No No Generator; Generator In Generator Usage generator. Set the Use

Table 5-2 System configuration attributes and values

On the main menu screen, select device configuration and press
 On the device configuration screen, you can set thresholds for parameters.
 The following table lists the system configuration attributes and values.

Line 1-Switch I; Line 2-

Switch II; No Line Priority

**Table 5-3** System configuration attributes and values

Power supply

priority

| Item                  |                           | Value       | Description                                      |
|-----------------------|---------------------------|-------------|--|
| Voltage<br>Thresholds | Volt Threshold<br>Min LN1 | -30% to -5% | The step increase is ±1%. The                    |
|                       | Volt Threshold<br>Min LN2 | -30% to -5% | default settings<br>are –10% for<br>LN1 and LN2. |

| Item                    |                           | Value  | Description                                      |  |
|-------------------------|---------------------------|--|--|--|
|                         | Volt Threshold<br>Max LN1 | +5% to +30%  | The step increase is ±1%. The                    |  |
|                         | Volt Threshold<br>Max LN2 | +5% to +30%  | default settings<br>are +10% for<br>LN1 and LN2. |  |
| Frequency<br>Thresholds | Freq Threshold<br>Min LN1 | -10% to -1%  | The step increase is ±1%. The                    |  |
|                         | Freq Threshold<br>Min LN2 | -10% to -1%  | default settings<br>are -5% for LN1<br>and LN2.  |  |
|                         | Freq Threshold<br>Max LN1 | +1% to +10%  | The step increase is ±1%. The                    |  |
|                         | Freq Threshold<br>Max LN2 | +1% to +10%  | default settings<br>are +5% for LN1<br>and LN2.  |  |
| Modbus                  |                           | – Modbus<br>address  | There is no need to reset the                    |  |
|                         |                           | - Local /<br>Remote  | parameter.                                       |  |
| Language                |                           | English; Deutsch;<br>Francais;<br>Itatiano; Espanol;<br>Suomi; Russian;<br>Chinese | Set the parameter based on site requirements.    |  |

**Step 8** Set the ATS controller to auto mode.

----End

## 5.3 Powering On and Starting the UPS

## 5.3.1 Powering On the UPS

## **Prerequisites**

The surge protection switch is turned on.

Before powering on the UPS, Measure the voltage and frequency of the upstream power distribution switch of the UPS cabinet. Ensure that the phase voltage is within the range of 80-280 V AC and the frequency is within the range of 40-70 Hz.

#### **Procedure**

- **Step 1** (Skip this step in the case of ATS input.) Turn on the MCCB.
- **Step 2** Turn on the UPS input circuit breaker QF1.

The UPS is powered by the mains and initialization begins. The LCD displays the Huawei logo and an initialization progress bar.

----End

## 5.3.2 Initial Startup

#### NOTICE

- If the UPS is powered on for the first time, you need to obtain the startup password from the **Service Expert** app. Skip this step if the UPS is not powered on for the first time.
- The **Service Expert** app can be downloaded from **Google Play Store** and can run on Android.
- This document corresponds to the app version V100R001C00SPC111.

#### 5.3.2.1 Obtaining Startup Password

#### **Procedure**

- **Step 1** Download and install the **Service Expert** app.
- **Step 2** On the app home screen, tap **StartUp** to access the **Set Startup** screen.
  - Online Startup
    - a. Insert the WiFi module into the USB port on the MDU. Enable the mobile phone WLAN, search for the **UPS\_WIFI** signal, and connect to the WiFi signal. The password is **Changeme**.
    - b. Set the Site and Device Type as required, and connect the device. Set IP to 192.168.0.10, Port to 443, Username to admin, Password to Changeme, and click Login.
    - c. After login, tap **Power-on password activation** on the screen. A message is displayed, indicating whether to start the UPS. Tap **OK**.
  - Offline Startup
    - a. Set **Site** and **Device Type** as required, and tap **Offline Activation**.
    - Enter Bar code and Verification code obtained from the LCD on the Offline Activation screen. Tap Generate PWD to generate a startup password.
    - c. Enter the generated password in the password text box on the LCD to start the inverter.

----End

#### 5.3.2.2 Settings Wizard

#### **Procedure**

**Step 1** Set the language, time, network parameters, system parameters, and battery parameters on the **Settings Wizard** screen.

#### NOTICE

Set system parameters with caution because the settings determine normal UPS operation.

- Set **Single/Parallel** after double check. Incorrect setting may affect the normal UPS operation.
- Output voltage level refers to the line voltage level. Set it based on site requirements.
- Set **Output frequency** correctly; otherwise, loads may be affected and the UPS may not work properly.
- Battery parameter settings are critical to battery maintenance, battery lifespan, and UPS discharge time.

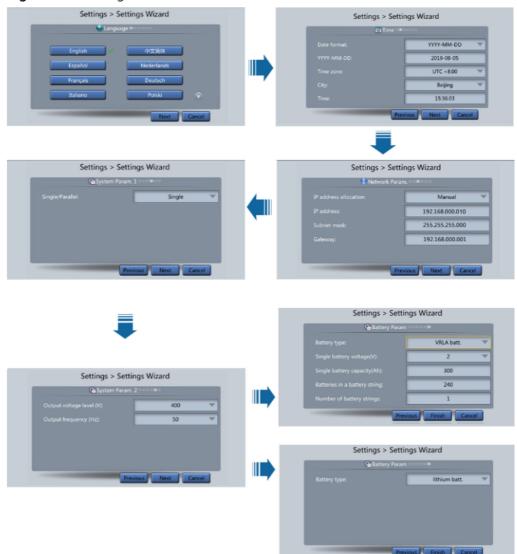


Figure 5-1 Settings Wizard

#### 

- Set the time and date correctly. Incorrect time and date will cause false fault analysis during maintenance or repair.
- After you set network parameters, connect the UPS to the network over a network cable, which enables you to remotely manage the UPS. If you do not need remote management, retain the default network parameter settings.
- **Step 2** After you set parameters on the **Settings Wizard** screen, the system displays the **Bypass mode** and **No battery** alarms, which do not need to be handled. If there is any other alarm, you need to rectify the fault.

#### 

- After you set parameters on the Settings Wizard screen, choose System Info > Settings
   System Setting. Check that System Capacity, Power module capacity, Requisite modules, and Redundant modules match the actual values.
- If dry contact signals are connected to the system, choose **System Info > Settings > Dry contacts Set** and check that the connected dry contacts have been enabled and that the disconnected dry contacts have been disabled.

- **Step 3** If the system has connected to the remote EPO switch, you need to choose **System Info > Settings > System Setting** and set **EPO detection** to **Enable**.
- **Step 4** View the system running diagram on the MDU to check that the UPS is working in bypass mode.

----End

## 5.3.3 Starting the Inverter

#### **UPS System User List**

Table 5-4 UPS system user list

| Default User           | Preset Password |        |
|------------------------|-----------------|--------|
| admin (administrator)  | LCD             | 000001 |
| operator (common user) | LCD             | 000001 |

#### Starting the UPS on the LCD

**Step 1** Choose **Common Functions** > **Inv. ON**.

You can also start the inverter by choosing **System Info > Maintenance > Inv. ON**.

- **Step 2** In the displayed login screen, select a user name and enter the password.
- **Step 3** In the displayed dialog box, tap **Yes** to start the inverter.

----End

## 5.3.4 Powering On Loads

After the inverter starts, the UPS works in normal mode. The **Bypass mode** alarm disappears. Check that the UPS has transferred to normal mode by viewing the system running status diagram.

#### Procedure

- **Step 1** After confirming that the battery strings are properly connected, turn on the battery string input switch. If there are multiple battery strings, turn on the switch for each battery string and then the general switch between battery strings and the UPS. After you turn on the battery string input switch, the **No battery** alarm disappears.
- Step 2 Turn on the UPS output circuit breaker QF3.

#### **NOTICE**

After the UPS is started for the first time, perform a battery capacity test to ensure that battery parameters are correctly displayed.

- **Step 3** (Optional) Turn on the lighting output circuit breaker on the integrated UPS and check whether the PWR indicator on the AC actuator lights up. Press down the lighting button to power on the light.
- **Step 4** Turn on the smart cooling product circuit breaker on the integrated UPS to power on the smart cooling products.
- **Step 5** Turn on the IT output circuit breakers on the integrated UPS, and then turn on the rPDUs of the network cabinet and IT cabinet to power on the equipment in the network cabinet and IT cabinet.

#### 

- Do not turn on the reserved circuit breakers.
- When turning on the circuit breakers, observe whether there is any abnormal phenomenon, such as sparks or unsmooth turning on/off.
- After turning on the IT output circuit breakers, check whether the corresponding branch open alarm has disappeared from the MDU.
- As for branch open alarms caused by reserved circuit breakers, you can mask these alarms on the UPS MDU. Path for masking alarms: System info. > Settings > PDU Param.>Branch breaker open alarm enable.
- **Step 6** If a dual-bus system is used, set BSC mode.

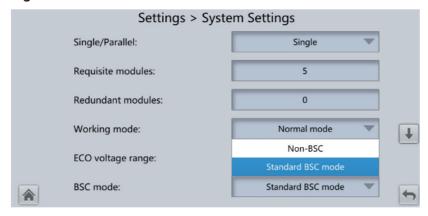
----End

## 5.4 (Optional) Setting BSC Mode

#### ∩ NOTE

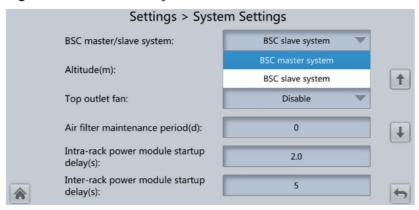
- The default value of **BSC mode** is **Non-BSC**. Set it to **Standard BSC mode** when the system is a dual-bus system.
- The dual-bus system consists of one master and one slave BSC system. You can specify
  one master and one slave BSC system during initial startup and change the settings
  under the guidance of maintenance engineers. Set the master and slave BSC systems to
  master and slave BSC modes respectively.
- Ensure that the BSC signal cable between the master and slave BSC systems is properly connected and that BSC-related hardware is properly installed.
- **Step 1** On the **System Info > Settings > System Settings** screen, set **BSC mode** to **Standard BSC mode**.

Figure 5-2 Standard BSC mode



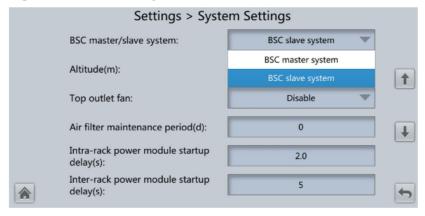
Step 2 Set the master BSC system. On the LCD of a UPS, choose System Info > Settings > System Settings and set BSC master/slave system to BSC master system.

Figure 5-3 BSC master system



Step 3 Set the slave BSC system. On the LCD of the other UPS, choose System Info > Settings > System Settings and set BSC master/slave system to BSC slave system.

Figure 5-4 BSC slave system



**Step 4** If no alarm is generated after settings, the UPS runs properly.

----End

## 5.5 Shutting Down and Powering Off the UPS

#### Context

#### **NOTICE**

After you shut down the inverter, if the bypass is normal, the UPS transfers to bypass mode; if the bypass is abnormal, the UPS supplies no power. Before you shut down the UPS, ensure that all loads have shut down.

#### Procedure

**Step 1** Shut down the inverter on the LCD.

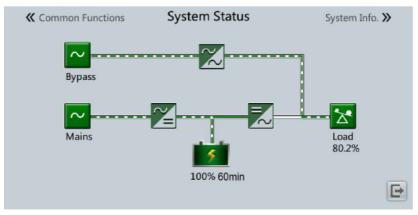
On the main screen, tap Common Functions. Tap Inv. OFF.

#### ∩ NOTE

To shut down the inverter on the **Maintenance** screen, tap **System Info > Maintenance**.

After the inverter shuts down, if the bypass is normal, the UPS transfers to bypass mode; if the bypass is not normal, the UPS supplies no power, and the loads shut down.

Figure 5-5 Bypass mode



#### 

After the inverter is shut down, the Bypass mode alarm is displayed on the LCD.

Figure 5-6 Abnormal bypass

#### ∩ NOTE

If the inverter needs to shut down to transfer the UPS to bypass mode, check that the UPS has not generated an alarm and perform **Step 1**.

- Step 2 After the inverter shuts down, turn off UPS output circuit breaker QF3.
- **Step 3** Turn off the battery string switch. If there are multiple battery strings, turn off the general switch between battery strings and the UPS and then the switch for each battery string.
- Step 4 Turn off UPS input circuit breaker QF1.
- **Step 5** Turn off the UPS input circuit breaker (for MCCB input) or disconnect the mains from the ATS (for ATS input).

----End

## 5.6 Starting the UPS in Battery Mode

#### Lead-Acid Battery Cold Start

- **Step 1** Use a multimeter to check that the sum of the absolute voltage of the negative battery string and the voltage of the positive battery string is greater than a certain value (1.6 x Number of cells) to ensure that the batteries are connected properly.
- **Step 2** Turn off UPS input circuit breaker QF1. Close the battery circuit breaker. If there are multiple battery strings, close the circuit breaker for each battery string and then the general circuit breaker between battery strings and the UPS.
- **Step 3** Use a multimeter to measure the positive and negative battery string voltages at the UPS battery input terminal. If the sum of the absolute voltage of the negative battery string and the voltage of the positive battery string is greater than a certain value (1.6 x Number of cells), the batteries are connected properly.
- **Step 4** Press and hold down the **BATT start** button on the bypass module for at least 2 seconds. The system automatically enters the battery cold start status. The LCD displays the Huawei logo and an initialization progress bar.

**Step 5** After LCD initialization is complete, start the inverter.

----End

#### Lithium Battery Cold Start

- **Step 1** Check that the cables between the UPS and the lithium battery cabinet are properly connected.
- **Step 2** Open the upstream mains input and bypass input switches.
- **Step 3** Power on the lithium battery cabinet. For details, see the user manual for the lithium battery cabinet.
- **Step 4** Use a multimeter to measure the voltages of the positive and negative battery strings connected to the UPS battery input terminals. If the measured values are consistent with the voltages displayed on the **System Status** screen of the lithium battery cabinet, the batteries are properly connected.
- **Step 5** Check that the green indicator on the battery control unit in the lithium battery cabinet blinks at 1 Hz or is steady on. Then, press and hold down the BATT START button on the bypass module for at least 2 seconds. The system automatically enters the battery cold start status. The LCD displays the Huawei logo and an initialization progress bar.
- **Step 6** After LCD initialization, start the inverter on the LCD.

----End

## 5.7 Transferring to Bypass Mode

#### **NOTICE**

Before shutting down the inverter, ensure that the bypass is normal. If the bypass is not normal, after the inverter is shut down, the UPS supplies no power, and the loads shut down.

Shut down the UPS inverter. Shut down the inverter on the LCD, and the UPS transfers to bypass mode.

#### 

If the inverter is shut down when the input voltage or frequency exceeds the specified threshold, the UPS supplies no power, and the loads shut down.

## 5.8 Setting ECO Mode

#### Context

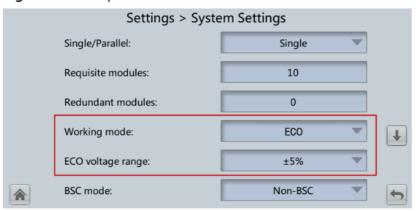
 The UPS is set to non-ECO mode by default. Set the UPS to ECO mode when energy saving is required.

- When the UPS works in ECO mode, the bypass module takes precedence over the power module in supplying power to loads. When the bypass module is disconnected, the UPS switches to the power module. The switchover time is less than 4 ms for typical working conditions and is no more than 20 ms for harsh working conditions.
- The ECO mode delivers a higher efficiency.
- To avoid frequent transfer between ECO mode and normal mode, do not set the ECO mode when the bypass input is unstable or is sensitive to load changes.
- ECO mode is not recommended when the load is less than 10%.
- Before transferring the UPS to ECO mode, ensure that the bypass module works properly.

#### Procedure

- Step 1 On the LCD, set System Info > Settings > System Settings > Working mode to ECO. The information indicating that the UPS works in ECO mode is displayed on the LCD.
- **Step 2** Set the ECO voltage range.

Figure 5-7 ECO parameters



**Step 3** (Optional) If you set ECO mode in bypass mode, manually start the UPS inverter.

#### NOTICE

After the inverter starts, the UPS still works in bypass mode and the inverter is on standby. If the bypass is not normal, the inverter supplies power immediately. If the inverter is not started, the UPS may be disconnected.

Figure 5-8 System status in ECO mode

----End

## 5.9 Testing Batteries

## 5.9.1 Lead-Acid Battery Test

#### 5.9.1.1 Forced Equalized Charging Test

#### Context

#### **NOTICE**

Before a forced equalized charging test, ensure that:

- The mains input is normal.
- Batteries are properly connected.
- Batteries are not in the equalized charging state.

#### **Procedure**

- **Step 1** On the home screen of the LCD, choose **System Info > Maintenance > Battery Maint**.
- **Step 2** Tap **Start** next to **Forced Equalized Charging** to start a forced equalized charging test.

Maintenance > Battery Maint.

Forced Equalized Charging Start Stop

Shallow Dis. Test Start Stop

Capacity Test Start Stop

Figure 5-9 Starting a forced equalized charging test

#### □ NOTE

The forced equalized charging test automatically stops in any of the following cases:

- The forced equalized charging test duration reaches the forced equalized charging protection time (12–24 h, 18 h by default).
- The UPS generates a battery overtemperature, overvoltage, or overcurrent alarm.
- An alarm is generated.

#### ----End

#### 5.9.1.2 Shallow Discharge Test

#### NOTICE

Before performing a shallow discharge test, ensure that:

- The UPS works in normal mode with a load ratio fluctuation less than 10%.
- The UPS generates no battery overtemperature, overvoltage, or overcurrent alarm. No generator is connected to the UPS.
- The mains, batteries, charger, and discharger are normal. No overload alarm is generated.

#### **Automatic Shallow Discharge Test**

- Step 1 On the home screen of the LCD, choose System Info > Settings > Battery Settings and set Sched. shallow dis. test to Enable.
- **Step 2** Set **Sched. shallow dis. test time** and **Sched. shallow dis. test interval** as required. After setting is complete, the system will perform automatic shallow discharge tests based on the settings.

----End

### Manual Shallow Discharge Test

**Step 1** On the home screen of the LCD, choose **System Info > Maintenance > Battery Maint**.

**Step 2** Tap **Start** next to **Shallow Dis. Test** to start a shallow discharge test.

Figure 5-10 Starting a shallow discharge test



#### 

When the battery test is complete, the test data is used as common test data. Record the data obtained from the latest five tests.

The shallow discharge test automatically stops in any of the following cases:

- The battery discharge capacity reaches the specified value (10%-50%, 20% by default).
- The discharge voltage reaches the warning threshold (calculated in real time).
- The load ratio fluctuation exceeds 10%.
- · An alarm is generated.

#### ----End

#### 5.9.1.3 Capacity Test

#### Context

#### **NOTICE**

Before a capacity test, ensure that:

- The UPS is working in normal mode; float charging or hibernation has lasted for 2 hours after the state of charge (SOC) reaches 100%; and the load ratio fluctuation is less than 10%.
- The UPS has generated no battery overtemperature, overvoltage, or overcurrent alarm. No generator is connected to the UPS.
- The mains, batteries, charger, and discharger are normal. No overload alarm is generated.

#### **Procedure**

**Step 1** On the home screen of the LCD, choose **System Info > Maintenance > Battery Maint**.

#### **Step 2** Tap **Start** next to **Capacity Test** to start a capacity test.

Figure 5-11 Starting a capacity test



#### 

The capacity test automatically stops in any of the following cases:

- The battery discharge voltage reaches the end of discharge (EOD) voltage plus 0.01 V.
- The load fluctuation exceeds 10%.
- · An alarm is generated.

When the battery discharge voltage reaches the EOD voltage plus 0.01 V, the test is complete. The test data is used as capacity test data. Save the capacity test data record with the largest discharge capacity in a month as the capacity test data for the month. A maximum of recent 36 capacity test records can be saved.

----End

## 5.9.2 Lithium Battery Test

#### 5.9.2.1 Shallow Discharge Test

#### **NOTICE**

Before performing a shallow discharge test, ensure that:

- The UPS is working in normal mode; float charging or hibernation has lasted for 2 hours after the state of charge (SOC) reaches 100%; and the load ratio fluctuation is less than 10%.
- The UPS generates no battery overtemperature, overvoltage, or overcurrent alarm. No generator is connected to the UPS.
- The mains, batteries, charger, and discharger are normal. No overload alarm is generated.
- The SmartLi has generated no alarms related to lithium batteries.

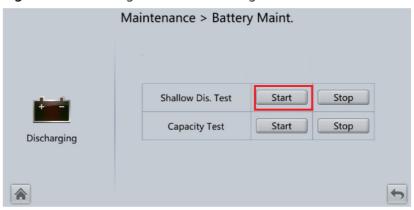
#### **Automatic Shallow Discharge Test**

- On the home screen of the UPS LCD, choose System Info > Settings > Battery Settings and set Sched. shallow dis. test to Enable.
- 2. Set Sched. shallow dis. test time and Sched. shallow dis. test interval as required. After setting is complete, the system will perform automatic shallow discharge tests based on the settings.

#### Manual Shallow Discharge Test

- On the home screen of the UPS LCD, choose System Info > Maintenance > Battery Maint.
- 2. Tap **Start** next to **Shallow Dis. Test** to start a shallow discharge test.

Figure 5-12 Starting a shallow discharge test



#### 

When the battery test is complete, the test data is used as common test data. Record the data obtained from the latest five tests.

The shallow discharge test automatically stops in any of the following cases:

- The battery discharge capacity reaches the specified value (10%–50%, 20% by default).
- The discharge voltage reaches the warning threshold (calculated in real time).
- The load ratio fluctuation exceeds 10%.
- · An alarm is generated.

## 5.9.2.2 Capacity Test

#### Context

#### **NOTICE**

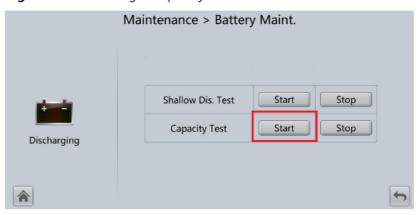
Before a capacity test, ensure that:

- The UPS is working in normal mode; float charging or hibernation has lasted for 2 hours after the state of charge (SOC) reaches 100%; and the load ratio fluctuation is less than 10%.
- The UPS has generated no battery overtemperature, overvoltage, or overcurrent alarm. No generator is connected to the UPS.
- The mains, batteries, charger, and discharger are normal. No overload alarm is generated.
- The SmartLi has generated no alarms related to lithium batteries.

#### **Procedure**

- **Step 1** On the home screen of the UPS LCD, choose **System Info > Maintenance > Battery Maint**.
- **Step 2** Tap **Start** next to **Capacity Test** to start a capacity test.





#### 

The capacity test automatically stops in any of the following cases:

- The minimum cell voltage reaches 2.65 V.
- The load fluctuation exceeds 10%.
- · An alarm is generated.

The test is complete when the minimum cell voltage reaches 2.65 V. A maximum of recent 36 capacity test records can be saved.

#### ----End

#### 5.10 Data Download

#### **Procedure**

- **Step 1** Insert a USB flash drive into the USB port on the MDU.
- **Step 2** On the main screen of the LCD, choose **System Info**. Tap **★**. The **Maintenance** screen is displayed.
- **Step 3** Choose **USB Operations** > **Fault Data**, and select a log download path, and download data.

----End

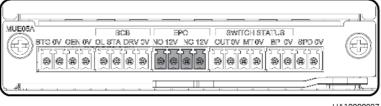
## 5.11 Performing EPO

#### **NOTICE**

- After the EPO button is turned on, the UPS supplies no power and the loads shut down.
- In maintenance bypass mode, the UPS continues to supply power even after the EPO button is turned on.

Press the external EPO switch that connects to the dry contact card or remove the 4-pin terminal on the EPO port of the dry contact card of the bypass unit.

Figure 5-14 EPO ports



UA10000097

After you press the EPO button, the **EPO** and **No power supplied** alarms are displayed on the LCD.

## 5.12 Clearing the EPO State

#### **Procedure**

**Step 1** Clear the EPO state. Ensure that the EPO button connected to the dry contact is not in the EPO state.

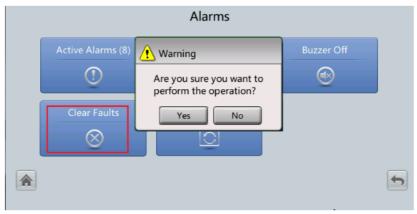
#### Step 2 Clear the EPO alarm.

Choose **System Info** from the main screen, tap . On the displayed **Alarms** screen, tap **Clear Faults**. In the displayed dialog box, tap **Yes**, The EPO alarm is cleared successfully.

Figure 5-15 Alarms screen



Figure 5-16 Clearing the alarm



**Step 3** View active alarms and ensure that the EPO alarm is cleared. If the input of the system bypass is normal, the UPS transfers to the bypass mode.

Choose **System Info** from the LCD main screen and tap . The **Alarms** screen is displayed. Tap **Active Alarms** and check whether the EPO alarm is cleared.

**Step 4** Start the inverter.

----End

## 5.13 Setting Hibernation Mode

#### **Prerequisites**

#### NOTICE

Before starting hibernation mode:

- Ensure that the load power is stable. If the system load power fluctuation is greater than the rated capacity of half a module (for example, the single-phase load power fluctuation is greater than 5 kVA for a 30 kVA module), the UPS may enter and exit from hibernation mode repeatedly.
- Check that the number of redundant power modules and racks are appropriate. If the number is insufficient, the UPS may not enter hibernation mode.

#### Context

When the load power is small and stable, you can shut down the inverters in some power modules so that these power modules enter hibernation mode and other power modules bear all the load power. This improves the system efficiency in the case of small load power and increases the power module service life.

#### **Procedure**

Step 1 On the main screen, tap System Info and . Choose Settings > System Settings, and set Paral. sys. hibernate to Enable.

If you have not logged in, enter a user name and password, and tap on the login screen displayed.

----End

## 5.14 Transferring to Maintenance Bypass Mode

#### Context

#### NOTICE

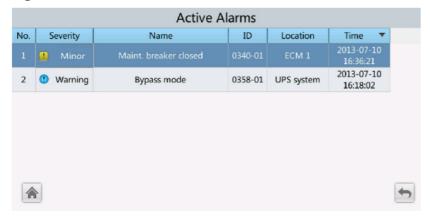
- Strictly observe the following procedure to transfer the UPS to maintenance bypass mode. Otherwise, loads may power off.
- In maintenance bypass mode, the mains supplies power to the loads directly over the maintenance bypass. If the mains is abnormal, the loads may power off.

#### **Procedure**

- **Step 1** Manually transfer the UPS to bypass mode.
- **Step 2** Remove the screws using a Phillips screwdriver, remove the barrier chip on the maintenance bypass switch, and turn on the maintenance bypass switch.

The Maint. breaker closed alarm is displayed in the alarm list.

Figure 5-17 Maint. breaker closed alarm



After the UPS transfers to maintenance bypass mode, the Maint. breaker closed and Bypass mode alarms are displayed on the LCD.

----End

## 5.15 Transferring from Maintenance Bypass Mode to Normal Mode

#### Context

#### NOTICE

Before you transfer the UPS from maintenance bypass mode to normal mode, ensure that the bypass input and output are normal.

#### **Procedure**

**Step 1** Turn off the maintenance bypass switch.

Press down the maintenance bypass switch to turn it off.

The **Maint**. **Breaker closed** alarm disappears from the alarm list. Check whether the UPS works in bypass mode by viewing the system running diagram on the ICD

**Step 2** Start the inverters.

----End

## 6 Routine Maintenance

### 6.1 UPS Maintenance

#### **NOTICE**

- Only trained personnel are allowed to perform maintenance. Before performing
  operations on the UPS, wear electrostatic discharge (ESD) clothes, ESD gloves,
  and an ESD wrist strap. Remove conductive objects such as jewelry or watches
  during operations to avoid electric shocks or burns.
- Use insulated tools when maintaining internal devices. Only trained personnel
  are allowed to perform maintenance. Customers are not allowed to maintain
  components behind protective covers that can be removed only using tools. If
  the components are to be maintained, contact Huawei technical support.
- Only maintenance engineers can maintain power modules and bypass modules.
- Maintain UPSs regularly based on the following requirements. Otherwise, the UPSs may fail to operate properly and the service life may be shortened.

## 6.1.1 Monthly Maintenance

Table 6-1 Monthly maintenance

| Check Item                | Expected Result   | Troubleshooting  |
|---------------------------|---|--|
| Operating environment     | <ul> <li>Ambient temperature: 0–40°C</li> <li>Humidity: 5%–95% RH (non-condensing)</li> <li>Rodent-proof measures have been taken for the equipment room.</li> <li>The equipment room is airtight.</li> </ul> | <ul> <li>If the humidity or temperature is abnormal, check the smart cooling product status.</li> <li>Put rodent-proof baffle plates at the door of the UPS equipment room.</li> <li>Check that the equipment room is airtight and not in a direct ventilation environment.</li> </ul> |
| Power grid<br>environment | <ul> <li>Input voltage: 380 V AC, 400 V AC, or 415 V AC (line voltage)</li> <li>Output voltage: 380 V AC, 400 V AC, or 415 V AC (tolerance ± 1%, line voltage)</li> <li>Frequency: 40-70 Hz</li> </ul>        | <ul> <li>If the input voltage is abnormal, check the power grid status and input cable connection.</li> <li>If the output voltage is abnormal, check the UPS running status and check whether an alarm is generated.</li> </ul>  |
| Information on the LCD    | The status icons on the LCD indicate that all units are operating properly, all operating parameters are within their normal ranges, and no fault or alarm information is displayed.                          | If an alarm is generated, rectify the fault by checking the device status and parameters.  |

## 6.1.2 Quarterly Maintenance

Table 6-2 Quarterly maintenance

| Check Item              | Expected Result   | Troubleshooting   |
|-------------------------|---|---|
| Cleanliness             | Wipe the cabinet surface using a white paper and the paper does not turn black.   | Remove the dust, especially from the air filter on the front door, or replace the air filter. |
| Parameter configuration | The configuration of the output voltage grade, frequency, number of batteries, and battery capacity meets requirements. | Reset the parameters.   |

| Check Item                                     | Expected Result   | Troubleshooting                                    |
|--|---|--|
| Status record                                  | Record the three-phase load rate and output power factor.   | If an exception occurs, check the load status.     |
| Shallow<br>discharge test<br>(recommende<br>d) | Conduct a shallow discharge test when the UPS is backed up to verify that the batteries can discharge normally. | If an alarm is generated, refer to the alarm list. |

## 6.1.3 Annual Maintenance

Table 6-3 Annual maintenance

| Check Item   | Expected Result   | Troubleshooting  |
|--|---|--|
| Grounding  | Check that the ground cables are connected securely.  | Tighten the screws.  |
| Power cables and<br>terminals (between the<br>UPS and the power<br>distribution cabinet) | The insulation layer of cables is intact and terminals are free from black marks and noticeable sparks.   | <ul><li>Replace the cables.</li><li>Secure the output terminals.</li></ul>   |
| Cables and circuit<br>breaker through-current<br>capacity                                | The circuit breakers and cables meet load requirements. The actual cable through-current capacity is greater than the circuit breaker specifications. | <ul> <li>Replace the circuit breaker.</li> <li>Replace the cable.</li> </ul> |

## 6.2 Lead-Acid Battery Maintenance

#### **NOTICE**

Before installing batteries, read through the battery user manuals and pay attention to safety precautions and connection methods provided by battery manufacture.

When installing and maintaining batteries, pay attention to the following points:

- Wrap tools with insulation tape to prevent electric shock.
- Protect your eyes with relevant devices and apply other protective measures.
- Wear insulated gloves and a protective coat in case of electrolyte overflow.
- When moving batteries, avoid handling the battery upside down, handle batteries gently, and pay attention to personal safety.
- Keep the battery switch off when installing or maintaining the batteries.

## 6.2.1 Precautions for Battery Maintenance

- Before battery maintenance, get the tools, such as handles, insulated. Do not place other objects on the top of batteries.
- Never use any organic solvent to clean batteries.
- Never try to remove the safety valve or pour anything into batteries.
- Never smoke or have an open flame around batteries.
- After battery discharge, charge the battery in time to maintain a good service life.
- Only professionals are allowed to perform the maintenance tasks.

## 6.2.2 Monthly Maintenance

Table 6-4 Monthly maintenance

| Item                           | Expected Result     | Troubleshooting  |
|--------------------------------|---------------------|--|
| Battery<br>management<br>alarm | alarm is generated. | Identify the cause of an alarm based on the alarm information. |

| Item                                   | Expected Result  | Troubleshooting   |
|--|--|---|
| Battery<br>appearance                  | <ol> <li>The surface is clean and tidy without stains.</li> <li>The battery terminals are intact.</li> <li>Batteries are free from damage and cracks.</li> <li>Batteries are free from acid leakage.</li> <li>Batteries are not deformed or bulged.</li> </ol>   | If the battery appearance is abnormal, contact Huawei technical support.  |
| Battery<br>operating<br>temperature    | <ol> <li>The ambient battery temperature is 25±5°C.</li> <li>The battery operating temperature is lower than battery temperature +20°C.</li> <li>Battery charge and discharge conditions meet the requirements specified in the battery specifications.</li> </ol>   | <ol> <li>Identify the cause of an abnormal battery operating temperature.</li> <li>If the fault persists, contact Huawei technical support.</li> </ol>  |
| Charge<br>voltage of<br>battery string | <ul> <li>Equalized charging voltage:         (2.35 V/cell ±1%) x Single         battery voltage/2 x Number         of batteries in a battery         string</li> <li>Float charging voltage:         (2.25 V/cell ±1%) x Single         battery voltage/2 x Number         of batteries in a battery         string</li> </ul> | <ol> <li>If the voltage drop between the battery string output terminals and the battery input terminals at the UPS side is greater than 1% of the battery string voltage, check whether the cable between the battery string and the UPS is excessively long, or the cable diameter is excessively small.</li> <li>Check whether the equalized charging voltage and float charging voltage are correctly set for the UPS.</li> <li>If the fault persists, contact Huawei technical support.</li> </ol> |

## 6.2.3 Quarterly Maintenance

Table 6-5 Quarterly maintenance

| Item  | Expected Result  | Troubleshooting   |
|---|--|---|
| Battery temperature<br>sensor measurement<br>accuracy | The difference between the temperature measured by the temperature sensor and the temperature displayed on the MDU is less than 3°C. | <ol> <li>Install the temperature sensor in the correct position.</li> <li>Replace the battery temperature sensor.</li> </ol>  |
| Battery management parameter settings                 | The settings of battery management parameters meet the requirements in the user manual.  | Set parameters correctly.   |
| Tightness of battery screws                           | The location of the signs marked on battery terminals indicating tight connections does not change.                                  | Take photos from multiple angles and contact Huawei technical support.  |
| Cables between batteries                              | No cable deteriorates and the insulation layer does not crack.   | Replace the faulty cable.   |
| Battery voltage                                       | <ul> <li>Equalized charging voltage: 2.35 V/cell ±0.02 V/cell</li> <li>Float charging voltage: 2.25 V/cell ±0.02 V/cell</li> </ul>   | <ol> <li>Check whether the equalized charging voltage and float charging voltage of a battery are normal.</li> <li>If the charging voltage of a battery exceeds the specifications requirement, perform a complete forcible equalized charging for the battery, and check again whether the voltage is normal.</li> <li>If the fault persists, contact Huawei technical support.</li> </ol> |

| Expected Result   | Troubleshooting  |
|---|--|
| Conduct a shallow discharge test when the UPS is backed up to verify that the batteries can discharge normally. | 1. If the batteries cannot discharge normally, locate the fault (for abnormal alarms, see the alarm list).  2. If the fault persists, contact Huawei |
|   | Conduct a shallow<br>discharge test when the<br>UPS is backed up to verify<br>that the batteries can   |

### 6.2.4 Annual Maintenance

Table 6-6 Annual maintenance

| Item                                 | Expected Result  | Troubleshooting   |
|--------------------------------------|--|---|
| Capacity Test                        | When the UPS is backed up, discharge a battery to the undervoltage alarm threshold, to refresh the capacity of the battery.  | <ol> <li>Locate the cause when an exception is identified.</li> <li>If the fault persists, contact Huawei technical support.</li> </ol> |
| Battery<br>connection<br>reliability | <ol> <li>Each battery terminal is connected reliably. (When battery strings are powered off, check the reliability of each terminal in the order from positive terminals to negative terminals.)</li> <li>The tightening torque of each battery screw meets the requirements of the battery manufacturer. (A torque wrench is used for checking the torque. After checking that the battery screws meet the requirements, mark the screws for later check.)</li> </ol> | <ol> <li>Rectify any abnormal connection.</li> <li>If the fault persists, contact Huawei technical support.</li> </ol>                  |

# 6.3 Power Distribution System Maintenance

#### **O&M Personnel Skill Requirements**

O&M personnel must be qualified power distribution system engineers who are familiar with the data center power supply and distribution system configurations and the operations for each core component.

### 6.3.1 Monthly Maintenance

Table 6-7 Monthly maintenance

| Item            | Expected Result   | Troubleshooting  |
|-----------------|---|--|
| Power indicator | Observe the indicator luminance, the indicators are on. | If the power supply is normal but an indicator is off or generates dim light, replace the indicator. |

### 6.3.2 Annual Maintenance

Table 6-8 Annual Maintenance

| Item                                      | Expected Result   | Troubleshooting  |
|---|---|--|
| PDC interior                              | Check whether there is dust on<br>the PDC panels, the white paper<br>that you use to wipe the PDC<br>panels is clean.                   | If the white paper becomes dirty, clean the PDC.   |
| Bolts between power cables and the busbar | The bolts are secured.  | Tighten a bolt if it is loose.   |
| Circuit breaker                           | Switch on or off the circuit breaker after powering off the device, the circuit breaker is switched on and off smoothly for five times. | If the circuit breaker jams,<br>maintain or replace it.  |
| PDC air-<br>tightness                     | Check cable holes and PDC sealing plates, there is no hole, and sealing plates have not shifted.  | If there is a hole or a sealing plate has shifted, seal the cable hole or reinstall the sealing plate. |
| Cable insulation                          | Measure the insulation resistance, the insulation resistance is greater than or equal to 5 megohms.                                     | If the cable insulation does not meet the requirement, replace the power cable.                        |

| Item   | Expected Result  | Troubleshooting   |
|--|--|---|
| PDC insulation                                       | Measure the insulation resistance, the insulation resistance is greater than or equal to 10 megohms. | If the insulation does not meet the requirement, check and maintain each component.                   |
| Insulation<br>resistance of<br>the secondary<br>loop | Measure the insulation resistance, the insulation resistance is greater than or equal to 2 megohms.  | If the insulation does not meet the requirement, check and maintain each component and signal cables. |

# **7** Troubleshooting

#### **↑** CAUTION

- If the UPS is faulty, alarm information is displayed on the LCD. Clear critical alarms before powering on the UPS again. Otherwise, the fault scope expands or the UPS is damaged.
- Do not clear alarms by reseating modules.
- Remove a faulty module after it is confirmed that the module needs replacing. After removing the module, do not insert it into the UPS again.

#### **NOTICE**

- After a UPS finishes troubleshooting and is started, if the LCD continues displaying alarm information, choose System Info > Alarms > Clear Faults to clear the alarm and then start the inverter.
- To restore battery discharge after batteries reach EOD, use one of the following methods: 1. Switch to another battery string. Ensure that each battery has a voltage greater than the EOD voltage and 11.3 V/cell. 2. Restore the mains power supply to start the inverter. Close the battery switch and charge batteries until each battery has a voltage greater than the EOD voltage and 11.3 V/cell.

If any unmentioned faults occur, see the alarm list chapter, or contact Huawei technical support.

**Table 7-1** Troubleshooting

| Case                         | Symptom   | Possible Cause   | Measure  |
|------------------------------|---|--|--|
| The rectifier is not normal. | The rectifier is not working, and the bus voltage is not boosted. | The mains voltage exceeds<br>the upper threshold 280 V<br>or is less than the lower<br>threshold 80 V. | Check whether the mains voltage exceeds the threshold. If yes, contact the electric power company. |

| Case   | Symptom  | Possible Cause                                       | Measure  |
|--|--|--|--|
|  |  | PFC soft-startup fails.                              | Replace the power module.  |
|  |  | The power module is faulty.                          | Replace the power module.  |
| The inverter is not normal.                  | The buzzer is activated, the Fault   | The UPS is overloaded or short-circuited.            | Reduce load or rectify short circuits.   |
|  | indicator is on, the inverter is faulty, and the UPS transfers to bypass mode.                                   | Inverter overtemperature occurs.                     | Install more smart cooling products or ventilation devices to ensure normal temperatures inside the equipment room.                    |
|  |  | The power module is faulty.                          | Replace the power module.  |
| The charger                                  | The buzzer is  | The charger fails.                                   | Replace the power module.  |
| generates an alarm.                          | activated, the Fault<br>indicator is on, and<br>the charging function  | The charger experiences overcurrent.                 | Replace the power module.  |
|  | fails.   | The charger experiences undervoltage.                | Check whether the configured number of batteries is correct. If the value is correct but the alarm persists, replace the power module. |
| The UPS works in bypass                      | n bypass normal, the UPS works in bypass mode and does not transfer to inverter                                  | Set the UPS working mode to ECO mode.                | Set the working mode correctly.  |
| mode and does not transfer to inverter mode. |  | The bypass transfer times reach the upper threshold. | Clear the bypass transfer times on the LCD.  |
| not normal. activ                            | The buzzer is activated, and the   | The bypass thyristor is damaged.                     | Replace the bypass module.   |
|  | Fault indicator is on.   | The bypass module experiences overtemperature.       | Reduce the load, or improve ventilation.   |
| The ATS is not normal.                       | After being powered on, the ATS automatically switches from ON to OFF or switches between ON and OFF repeatedly. | The input three-phase sequence is incorrect.         | Power off the ATS and check the phase sequence.  |

#### □ NOTE

For details about component replacement and maintenance involved in Troubleshooting and Alarm List, consult Huawei maintenance engineers.

# 8 Parts Replacement

## 8.1 Replacing a Fuse

#### **Prerequisites**

Spare fuses of the same model are available and functional.

#### Context

The fuse is located in the right door panel at the rear of the cabinet.

The following tables describe fuses.

Table 8-1 Fuses for models with ATS input

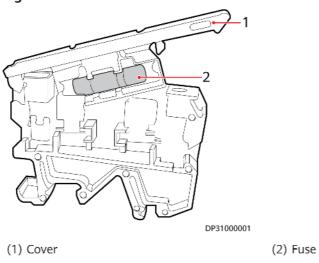
| Fuse No. | Description  |
|----------|--|
| FU1      | Fuse of indicator I                                    |
| FU2      | Fuse of indicator II                                   |
| FU3/4/5  | Main route input L1/L2/L3 fuses (AC INPUT VOLT SAMPLE) |
| FU6/7/8  | UPS output U/V/W fuses (IT INPUT VOLT SAMPLE)          |
| FU9/10   | Reserved   |

Table 8-2 Fuses for models with MCCB input

| Fuse No. | Description                      |
|----------|----------------------------------|
| FU1      | Fuse of L1 indicator for route I |
| FU2      | Fuse of L2 indicator for route I |

| Fuse No. | Description  |
|----------|--|
| FU3/4/5  | Main route input L1/L2/L3 fuses (AC INPUT VOLT SAMPLE) |
| FU6/7/8  | UPS output U/V/W fuses (IT INPUT VOLT SAMPLE)          |
| FU9      | Fuse of L3 indicator for route I                       |
| FU10     | Reserved   |

Figure 8-1 Fuse



#### **Procedure**

- **Step 1** Remove the protective panel.
- **Step 2** Locate the fuse terminal in the UPS according to the diagram.

UA18W00036

Figure 8-2 Fuse positions

- (1) Fuse
- **Step 3** Open the cover and remove the fuse.
- **Step 4** Install a new fuse, push the cover, and connect the fuse terminal.
- **Step 5** Reinstall the protective panel.

----End

# 8.2 Replacing an Indicator

#### **Prerequisites**

- The indicator is faulty.
- Spare indicators of the same model are available and functional.

#### **Tools and Materials**

- Phillips screwdriver
- Key to the UPS
- Protective gloves
- Multimeter
- Step ladder
- Spare indicator

#### Procedure

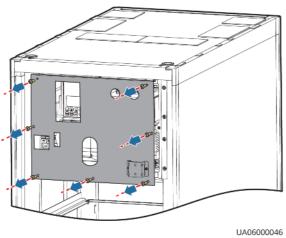
**Step 1** Remove the indicator fuse from the fuse terminal block at the rear of the cabinet to disconnect the circuit. For the MCCB input, the fuse is connected to #1 fuse base. For the ATS input, the fuses are connected to #1 and #2 fuse bases.

#### **Step 2** Remove the protective panel.

#### 

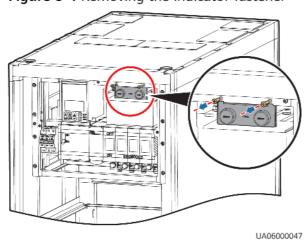
A cabinet with ATS input is used as an example.

Figure 8-3 Removing the protective panel



**Step 3** Remove the indicator fastener using a Phillips screwdriver.

Figure 8-4 Removing the indicator fastener



**Step 4** Replace the indicator if no voltage is detected by using a multimeter.

**Step 5** Loosen the screw at the rear of the indicator using a Phillips screwdriver, and remove the conducting wire.

#### 

When removing cables, clearly label the cables with its corresponding terminal ports to prevent incorrect connections.

2 2003

Figure 8-5 Replacing an Indicator

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- **Step 6** Remove the retaining ring from the indicator, and remove the indicator from the mounting hole.
- **Step 7** Put a new indicator in the mounting hole, secure the retaining ring, and connect the conducting wire.
- **Step 8** Install the new indicator in the fastener and reinstall the fastener in the cabinet.
- **Step 9** Reinstall the fuse so that the circuit is in closed state.
- **Step 10** Check that the new indicator works properly.
- **Step 11** Reinstall the protective panel.

----End

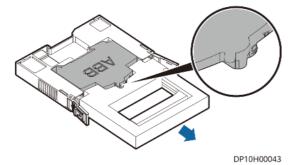
### 8.3 Replacing a Circuit Breaker

The UPS does not need to be powered off because the circuit breakers are hot swappable.

#### **Procedure**

- **Step 1** Turn off the faulty circuit breaker. Remove the protective cover from the circuit breaker.
- **Step 2** Push open the handles on both sides of the circuit breaker and remove the circuit breaker using an extracting kit.

Figure 8-6 Removing the circuit breaker

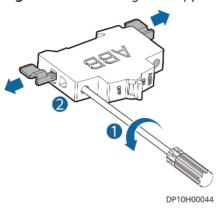


#### 

Remove and install the circuit breaker using an extracting kit. Do not operate barehanded.

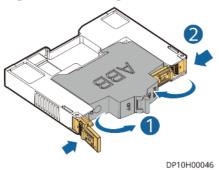
**Step 3** Remove the copper bar and install it on the new circuit breaker.

Figure 8-7 Removing the copper bar



**Step 4** Turn off the new circuit breaker, install a new circuit breaker using an extracting kit, and close the handle.

Figure 8-8 Closing the handle



**Step 5** Reinstall the protective cover for the circuit breaker and turn on the circuit breaker. Check that the load is operating properly.

----End

# 9 Technical Specification

Table 9-1 Physical specifications

| Item                   | Specifications  |
|------------------------|---|
| Cable routing mode     | Routed in and out from the top Routed in and out from the bottom (enclosure frame configured) |
| Protection level       | IP20  |
| Dimensions (H x W x D) | 2000 mm x 600 mm x 1100 mm<br>2000 mm x 600 mm x 1200 mm (enclosure frame<br>configured)      |
| Communication          | Supports dry contacts, RS485 serial port, and FE port.  |

Table 9-2 Environmental specifications

| Item                  | Specifications  |  |
|-----------------------|---|--|
| Operating temperature | 0°C to 40°C   |  |
| Storage temperature   | -40°C to +70°C  |  |
| Relative humidity     | 5%–95% RH (non-condensing)  |  |
| Altitude              | 0-1000 m (When the altitude is greater than 1000 m and less than 4000 m, the rated power should be derated. For details, see the IEC62040-3.) |  |

Table 9-3 Safety and EMC

| Item                | Specifications                                   |
|---------------------|--|
| Safety compliance   | EN62040-1, 2013                                  |
|                     | IEC62040-1, 2013                                 |
| Electromagnetic     | EN/IEC62040-2                                    |
| compatibility (EMC) | IEC61000-2-2                                     |
|                     | IEC61000-4-2                                     |
|                     | EN61000-4-6: EN/IEC62040-2 2nd Ed (IEC61000-4-6) |
|                     | EN61000-4-3: EN/IEC62040-2 2nd Ed (IEC61000-4-3) |
|                     | EN/IEC62040-2 2nd Ed (IEC61000-4-4)              |
|                     | EN/IEC62040-2 2nd Ed (IEC61000-4-5)              |
|                     | IEC61000-4-8                                     |
|                     | IEC61000-4-11                                    |

Table 9-4 Mains Input electrical specifications

| Item                  | Specifications  |  |  |  |
|-----------------------|---|--|--|--|
| Input system          | Three-phase, four-wire, and PE  |  |  |  |
| Rated input voltage   | 380 V AC/400 V AC/415 V AC (line voltage)   |  |  |  |
| Input voltage range   | <ul> <li>80–280 V AC (phase voltage)</li> <li>30–40°C environment: not derated when the voltage is 187–280 V; linearly derated to 40% load when the voltage is 187–80 V</li> <li>0–30°C environment: not derated when the voltage is 176–280 V; linearly derated to 40% load when the voltage is 176–80 V.</li> </ul> |  |  |  |
| Input frequency range | 40-70 Hz  |  |  |  |
| Rated frequency       | 50/60Hz   |  |  |  |
| Input power factor    | > 0.99 (full load); > 0.98 (half load)  |  |  |  |
| THDi                  | ≤ 3% (linear load; maximum: 3%); ≤ 5% (non-linear load; maximum: 5%)  |  |  |  |

**Table 9-5** Bypass Input electrical specifications

| Item                | Specifications                            |  |  |  |
|---------------------|---|--|--|--|
| Input system        | Three-phase, four-wire, and PE            |  |  |  |
| Rated input voltage | 380 V AC/400 V AC/415 V AC (line voltage) |  |  |  |

| Item                  | Specifications   |  |
|-----------------------|--|--|
| Input frequency range | 50/60 Hz ±6 Hz (adjustable with the tolerance of 0.5–6 Hz, ±2 Hz by default) |  |

**Table 9-6** Battery specifications

| Item                                     | Specifications   |  |
|--|--|--|
| Battery voltage                          | 360-528 V DC   |  |
|  | • 12 V battery: 30–44 batteries, 40 batteries by default; not derated when there are 36–44 batteries; power derated to 94% when there are 34 batteries; power derated to 80% when there are 32 or 30 batteries.  |  |
|  | 2 V battery: 180–264 batteries, 240 batteries by default; not derated when there are 216–264 batteries, power derated to 0.94 when there are 204–214 batteries; power derated to 0.8 when there are 180–202 batteries. The number of batteries in the positive battery string must be the same that of batteries in the negative battery string. |  |
| Battery management                       | Intelligent battery management   |  |
| Charger output power                     | (6250 W±200 W) x N. The maximum charge power of a power module is 6250 W±200 W (the maximum current is 10 A). N represents the number of power modules in the rack.  |  |
| Cold start                               | When a mains outage occurs, batteries can start the UPS to supply power to loads.  |  |
| Charging voltage (lead-<br>acid battery) | <ul> <li>Equalized charging voltage: 2.3–2.4 V/cell, 2.35 V/cell by default (30–42 batteries); 2.3–2.35 V/cell, 2.35 V/cell by default (44 batteries)</li> <li>Float charging voltage: 2.23–2.3 V/cell; 2.25 V/cell by default (30–44 batteries)</li> </ul>  |  |

#### NOTICE

The UPS supports the SmartLi. For details about related parameters, see the SmartLi user manual.

**Table 9-7** Output electrical specifications

| Item  | Specifications   |  |  |  |
|---|--|--|--|--|
| Output system                                   | Three-phase, four-wire, and PE   |  |  |  |
| Voltage   | 380 V AC/400 V AC/415 V AC (line voltage)  |  |  |  |
| Output voltage precision                        | ±1% (balanced load)  |  |  |  |
| Output power factor                             | 1  |  |  |  |
| Transfer time                                   | <ul> <li>Uninterruptible transfer: 0 ms</li> <li>Interruptible transfer: ≤ 20 ms</li> </ul>  |  |  |  |
| Output voltage imbalance                        | Voltage imbalance: ±3%; phase imbalance: 120±2°  |  |  |  |
| Overload capability                             | <ul> <li>Inverter overload capability:</li> <li>100% &lt; load ≤ 110%: transfer to bypass mode after 60 minutes</li> <li>110% &lt; load ≤ 125%: transfer to bypass mode after 10 minutes (tolerance ± 0.1 minute)</li> <li>125% &lt; load ≤ 150%: transfer to bypass mode after 1 minute</li> <li>Load &gt; 150% or a short circuit occurs: run for 200 ms</li> <li>Bypass overload capability:</li> <li>30°C environment: works for a long term at 135% load.</li> <li>40°C environment: works for a long term at 125% load.</li> <li>If the bypass single-phase or three-phase is 150%-200% overloaded, the bypass can keep working for 5 minutes.</li> <li>If the bypass single-phase or three-phase is more than 200% overloaded, the bypass can keep working for 1 minute.</li> <li>If the load exceeds 1000%, the bypass can keep working for 100 ms.</li> </ul> |  |  |  |
| Derating coefficient of output circuit breakers | <ul><li>40 A circuit breaker: 0.75</li><li>63 A circuit breaker: 0.7</li></ul>   |  |  |  |

Table 9-8 System electrical specifications

| Item              | Specifications    |  |
|-------------------|-------------------|--|
| System efficiency | 95% (linear load) |  |

| Item                               | Specifications |  |  |  |
|------------------------------------|----------------|--|--|--|
| Current equalization specification | 5%             |  |  |  |

# A PDC Silk Screen Description

The silk screen content is in the format of number of routes+symbol+switch sequence number. In the single-input scenario, the number of routes is omitted by default. For example, 1QF1 indicates the first switch of input I, 2QF1 indicates the first switch of the second input, and QF1 indicates the first switch in the single-input scenario.

Table A-1 Symbols

| Symbol | Name                          | Symbol | Name                        |
|--------|-------------------------------|--------|-----------------------------|
| QF     | Circuit breaker               | QFS    | SPD circuit breaker         |
| FS     | Surge protective device (SPD) | FU     | Fuse                        |
| ATS    | Automatic transfer switch     | МССВ   | Molded case circuit breaker |

# B Alarm List

#### □ NOTE

This table lists only common alarms. For more information, contact Huawei technical support.

| Alarm ID<br>(Alarm ID-<br>Cause ID) | Alarm Name                | Severity | Cause   | Solution  |
|-------------------------------------|---------------------------|----------|---|---|
| 0001-1                              | Mains voltage<br>abnormal | Minor    | <ul> <li>Cable connections are incorrect.</li> <li>The mains is not normal.</li> <li>The power module is faulty.</li> </ul> | <ol> <li>Check whether cables to mains are disconnected, loose, or incorrectly connected.</li> <li>If cable connections are correct, measure the mains voltage with a multimeter. If the mains voltage exceeds 280 V, the mains input is not normal; if the mains voltage is less than 272 V, the sampling circuit of the power module is not normal. Replace the faulty module.</li> </ol> |

| Alarm ID<br>(Alarm ID-<br>Cause ID) | Alarm Name              | Severity | Cause   | Solution   |
|-------------------------------------|-------------------------|----------|---|--|
| 0001-2                              |                         |          | <ul> <li>Cable connections are incorrect.</li> <li>The mains is not normal.</li> <li>The mains input fuse for the power module is blown.</li> </ul> | <ol> <li>Check whether cables to mains are disconnected, loose, or incorrectly connected.</li> <li>If cable connections are correct, measure the mains voltage with a multimeter. If the mains voltage is less than 80 V, the mains voltage is not normal; if the mains voltage exceeds 88 V, the power module sampling circuit or fuse may not be working properly. Replace the faulty module.</li> </ol> |
| 0001-3                              |                         |          | The mains is not normal.  | Check the mains.   |
| 0004-1                              | Mains ph.<br>Reversed   | Minor    | Cable connections are incorrect.  | Verify the cable connections.  |
| 0005-1                              | Mains neutral<br>absent | Minor    | Cable connections are incorrect.  | <ol> <li>Secure or connect the neutral wire to the cabinet if it is loose or disconnected.</li> <li>Check that the neutral wire to the power distribution system is normal.</li> </ol>   |
| 0006-1                              | Mains<br>undervoltage   | Minor    | <ul> <li>The mains is not normal.</li> <li>The power module sampling circuit is not normal.</li> </ul>  | Check whether the mains voltage ranges from 80 V (excluding 80 V) to 176 V. If no, the mains monitoring circuit for the power module is faulty. Replace the faulty module.   |
| 0010-1                              | Abnormal bypass voltage | Minor    | <ul> <li>The bypass voltage range is not correctly set.</li> <li>The bypass input voltage is not normal.</li> </ul>                                 | 1. Check the bypass input voltage or cable connections with a multimeter.  2. Check the voltage system and bypass voltage thresholds configured on the LCD.  |

| Alarm ID<br>(Alarm ID-<br>Cause ID) | Alarm Name                        | Severity | Cause   | Solution  |
|-------------------------------------|-----------------------------------|----------|---|---|
| 0010-2                              |                                   |          | <ul> <li>The bypass frequency range is not correctly set.</li> <li>The bypass input frequency is not normal.</li> </ul> | <ol> <li>Check the bypass input voltage or cable connections with a multimeter.</li> <li>Check the bypass input frequency. Check the rated frequency and frequency range configured on the LCD.</li> </ol>  |
| 0011-1                              | Bypass phase<br>reversed          | Minor    | The phase sequence of the three-phase bypass input is reversed.   | Check whether the cable phase sequence is correct using a multimeter. If no multimeter is available, exchange the positions of any two cables.  |
| 0012-1                              | Bypass neutral<br>absent          | Minor    | The neutral wire of bypass input is not installed properly.   | <ol> <li>Secure or connect the neutral wire to the cabinet if it is loose or disconnected.</li> <li>Check that the neutral wire to the power distribution system is normal.</li> </ol>  |
| 0020-1                              | Battery<br>connected<br>reversely | Critical | Batteries are not properly installed.   | <ol> <li>Check whether battery polarities are correctly installed by using a multimeter. If no, correct the installation.</li> <li>Check whether the battery input voltage of the UPS is normal. If yes, the battery sampling circuit of the power module is faulty. Replace the power module.</li> </ol> |
| 0021-1                              | Battery EOD                       | Critical | The battery voltage reaches the EOD voltage threshold due to continuous discharge.                                      | If the BCB box is configured, check whether the BCB box trips. If it trips, close the BCB box switch.   |

| Alarm ID<br>(Alarm ID-<br>Cause ID) | Alarm Name             | Severity | Cause  | Solution  |
|-------------------------------------|------------------------|----------|--|---|
| 0022-1                              | No battery             | Minor    | <ul> <li>There is no battery string.</li> <li>The battery string is not properly installed.</li> <li>The power module battery fuse is blown.</li> </ul>            | <ol> <li>Check that battery cables are correctly connected.</li> <li>Check that the battery terminal voltage is normal.</li> <li>Check that the battery fuse in the power module is intact.</li> </ol>  |
| 0025-1                              | Battery<br>overvoltage | Minor    | <ul> <li>The configured number of batteries is less than the actual number.</li> <li>The battery neutral wire is not installed properly.</li> </ul>                | <ol> <li>Check whether battery parameters are correctly set.</li> <li>If they are correctly set, certain batteries may be faulty.</li> <li>Check whether the battery neutral wire is correctly connected.</li> </ol>  |
| 0026-1                              | Low battery<br>voltage | Minor    | <ul> <li>Battery discharge results in low battery voltage.</li> <li>The battery neutral wire is not installed properly.</li> <li>The charger is faulty.</li> </ul> | <ol> <li>If the low battery voltage alarm is generated in battery mode, check whether the mains voltage recovers. If yes, charge batteries immediately.</li> <li>Check whether the battery neutral wire is correctly connected.</li> <li>If this alarm is generated in normal mode, check whether the battery switch is ON. If yes, the charger may be faulty. Replace the related power module.</li> </ol> |

| Alarm ID<br>(Alarm ID-<br>Cause ID) | Alarm Name                           | Severity | Cause  | Solution  |
|-------------------------------------|--------------------------------------|----------|--|---|
| 0530-1                              | Battery ground fault                 | Critical | <ul> <li>The battery string is not properly grounded.</li> <li>The battery ground monitoring cable is faulty.</li> <li>The dry contact board is faulty.</li> </ul>   | <ol> <li>Check whether the positive and negative terminals of the battery string are grounded or have sufficient resistance to the ground.</li> <li>Check whether the battery grounding failure detector is faulty by replacing it with a new one.</li> <li>If no battery grounding failure detector is available, check on the dry contact board whether the battery grounding failure detector is enabled. If yes, disable it and check whether the alarm is cleared. If the alarm persists, the dry contact board may be faulty. Replace the board.</li> </ol> |
| 0032-1                              | Battery<br>overvoltage<br>protection | Critical | <ul> <li>The battery voltage is greater than the upper threshold.</li> <li>The configured number of batteries is less than the actual number.</li> <li>The actual number of batteries does not meet requirements.</li> </ul> | <ol> <li>Check the battery voltage.</li> <li>Check that the configured number of batteries matches the actual number.</li> <li>Check that the actual number of batteries meets requirements.</li> </ol>   |
| 0036-2                              | Battery<br>maintenance<br>reminder   | Warning  | The time for maintenance arrives.  | Maintain the batteries.   |

| Alarm ID<br>(Alarm ID-<br>Cause ID) | Alarm Name              | Severity | Cause   | Solution  |
|-------------------------------------|-------------------------|----------|---|---|
| 0037-1                              | Battery<br>undervoltage | Critical | <ul> <li>The UPS has worked in battery mode for an extended amount of time.</li> <li>The charger is faulty.</li> </ul>                        | <ol> <li>Check whether the battery voltage is normal.</li> <li>Check whether the output is overloaded.</li> <li>Check whether any battery is damaged. If yes, replace the battery.</li> <li>Check whether any battery charger generates an alarm. If yes, replace the faulty module.</li> </ol> |
| 0040-7                              | Rectifier<br>abnormal   | Critical | <ul> <li>The fan for the power module is not functioning properly.</li> <li>The air channel for the power module is obstructed.</li> </ul>    | <ol> <li>Check that the air channel for the module is free from blockage.</li> <li>Check whether the fans are functioning properly. Replace the power module if the fans are faulty.</li> </ol>   |
| 0043-1                              | Fan abnormal            | Critical | <ul> <li>The fan for the power module is abnormal.</li> <li>The fan monitoring cable for the power module is not working properly.</li> </ul> | Replace the faulty power module.  |
| 0043-2                              |                         |          | The fan is faulty.  | Check the fan or replace the bypass module.   |
| 0043-3                              |                         |          | The fan is  | 1. Replace the fan.   |
| 0043-4                              |                         |          | faulty.  The fan monitoring cable is faulty.  | 2. Check the fan monitoring cable.  |
| 0047-1                              | Not ready               | Critical | The ready switch is OFF.  | Close the ready switch.   |

| Alarm ID<br>(Alarm ID-<br>Cause ID) | Alarm Name                            | Severity | Cause  | Solution   |
|-------------------------------------|---------------------------------------|----------|--|--|
| 0060-4                              | Inverter<br>abnormal                  | Critical | <ul> <li>A load short-circuit occurs.</li> <li>A short circuit occurs inside the module.         (This fault seldom occurs.)</li> </ul>  | <ol> <li>Check load cable distributions.</li> <li>If load cable distributions are normal, replace the power module.</li> </ol>   |
| 0061-2                              | Inverter alarm                        | Minor    | <ul> <li>The I2C bus is not normal.</li> <li>The E2PROM is faulty.</li> </ul>  | <ol> <li>Rectify the fault and check<br/>whether the alarm is<br/>cleared.</li> <li>If the alarm is generated<br/>again, replace the power<br/>module.</li> </ol>  |
| 0061-7                              | Inverter alarm                        | Minor    | The bypass waveform is not normal.   | <ul> <li>If not all modules generate the alarm, start the UPS, transfer it to normal mode, and replace the faulty module.</li> <li>If all modules generate the alarm, open the bypass input circuit breaker. After the inverter relay is closed, close the bypass input circuit breaker 10 seconds later.</li> </ul> |
| 0564-1                              | Overload timeout                      | Critical | <ul> <li>The load is excessive.</li> <li>Derating reduces the rated system power.</li> <li>The module is damaged.</li> </ul>   | <ol> <li>Check that there is no overload.</li> <li>Check that the module power is not derated due to a fan fault.</li> <li>If the alarm persists, replace the power module.</li> </ol>   |
| 0565-1                              | Load impact<br>transfer-to-<br>bypass | Minor    | <ul> <li>A large-power<br/>RCD load is<br/>instantly<br/>connected, or<br/>the output<br/>load short-<br/>circuits.</li> <li>The inverter<br/>bridge short-<br/>circuits.</li> </ul> | Check the load.     If the load is normal, replace the power module.   |

| Alarm ID<br>(Alarm ID-<br>Cause ID) | Alarm Name                        | Severity | Cause  | Solution   |
|-------------------------------------|-----------------------------------|----------|--|--|
| 0566-1                              | Output overload                   | Minor    | <ul> <li>The load is excessive.</li> <li>Derating reduces the rated system power.</li> <li>The module is damaged.</li> </ul>   | <ol> <li>Check that there is no overload.</li> <li>Check that the module power is not derated due to a fan fault.</li> <li>If the alarm persists, replace the power module.</li> </ol>                   |
| 0570-4                              | BPM module<br>abnormal            | Critical | <ul> <li>The bypass fan is not functioning properly, or the air channel is blocked.</li> <li>The ambient temperature exceeds the upper threshold.</li> <li>The load is excessive.</li> </ul> | <ol> <li>Check the bypass fan and air channel. If the fan is faulty, replace it.</li> <li>Check that the ambient temperature has not exceeded 40°C.</li> <li>Check that there is no overload.</li> </ol> |
| 0583-1                              | Inter-rack par.<br>cable abnormal | Critical | <ul> <li>The inter-rack parallel system CAN bus is disconnected or short-circuited.</li> <li>Only one rack works in a parallel system.</li> <li>An ECM is faulty.</li> </ul>                 | <ol> <li>Check the inter-rack parallel system CAN bus.</li> <li>Rectify the disconnection or short-circuit fault.</li> <li>Replace the ECM.</li> </ol>   |
| 0583-4                              |                                   |          | The inter-rack industrial frequency synchronization cable is broken.   | Replace the inter-rack parallel cable.   |
| 0583-5                              |                                   |          | The inter-rack carrier synchronization cable is broken.  |  |

| Alarm ID<br>(Alarm ID-<br>Cause ID) | Alarm Name                      | Severity | Cause   | Solution   |
|-------------------------------------|---------------------------------|----------|---|--|
| 0583-6                              |                                 |          | <ul> <li>The intra-rack<br/>INVBYP cable is<br/>broken.</li> <li>The parallel<br/>CAN bus is<br/>broken.</li> </ul> |  |
| 0584-2                              | Inter-rack par.<br>cable alarm  | Minor    | The inter-rack parallel cable is faulty.  | Replace the inter-rack parallel cable.   |
| 0584-4                              |                                 |          | The inter-rack industrial frequency synchronization cable is broken.  |  |
| 0085-1                              | EPO                             | Critical | The EPO button is pressed.  | Restore the EPO button status. Start the UPS after the alarm is cleared.   |
| 0086-1                              | Max. number of<br>BPM transfers | Minor    | The system frequently transfers to bypass mode due to overload timeout or load impact.                              | Check the load.  |
| 0087-1                              | System transfer-<br>to-bypass   | Warning  | The neighboring UPS is not normal, and transfers to bypass mode.  | Check the reason why the neighboring UPS transfers to bypass mode.   |
| 0088-1                              | Rack address<br>conflict        | Critical | The configured rack address conflicts with another one.   | Check the rack address setting.  |
| 0089-1                              | Rack output<br>overload         | Minor    | <ul> <li>The load is excessive.</li> <li>The rack capacity setting is not appropriate.</li> </ul>                   | <ul> <li>Check the load and remove<br/>some loads or expand the<br/>UPS power capacity if the<br/>UPS is overloaded.</li> <li>Check that the configured<br/>rack capacity meets<br/>requirements.</li> </ul> |

| Alarm ID<br>(Alarm ID-<br>Cause ID) | Alarm Name                       | Severity | Cause  | Solution  |
|-------------------------------------|----------------------------------|----------|--|---|
| 0090-1                              | Dry contact<br>board fault       | Critical | I2C<br>communication<br>with the dry<br>contact board<br>MUE05A fails. | Replace the dry contact board MUE05A.   |
| 0090-2                              |                                  |          | I2C<br>communication<br>with the dry<br>contact board<br>MUE06A fails. | Replace the dry contact board MUE06A.   |
| 0356-1                              | Battery Mode                     | Minor    | The UPS is working in battery mode.                                    | The running status is displayed. See details about how to handle other alarms.  |
| 0359-1                              | No power supplied                | Warning  | No power is supplied.  | The running status is displayed. See details about how to handle other alarms.  |
| 0332-1                              | Output disabled                  | Minor    | The output is disabled.  | The running status is displayed. See details about how to handle other alarms.  |
| 0334-1                              | BSC master<br>system             | Warning  | BSC master system.   | The running status is displayed. No further measures are required.  |
| 0334-2                              | BSC slave system                 |          | BSC slave system.  | The running status is displayed. No further measures are required.  |
| 0337-1                              | PDC bypass input<br>breaker open | Critical | The bypass input circuit breaker on the PDC is OFF.                    | The running status is displayed. No further measures are required.  |
| 0338-1                              | PDC output<br>breaker open       | Critical | The output circuit<br>breaker on the<br>PDC is OFF.                    | <ol> <li>Check that all UPS output circuit breakers are ON.</li> <li>On the LCD, check that PDC output breaker open alarm has disappeared. If the alarm persists, tap the Clear Fault button to clear the alarm.</li> </ol> |
| 0341-1                              | PDC Maint.<br>breaker closed     | Minor    | The maintenance circuit breaker on the PDC is ON.                      | The running status is displayed. No further measures are required.  |

| Alarm ID<br>(Alarm ID-<br>Cause ID) | Alarm Name                      | Severity | Cause  | Solution  |
|-------------------------------------|---------------------------------|----------|--|---|
| 0342-1                              | Mains input<br>breaker open     | Critical | The UPS input circuit breaker is OFF.  | The running status is displayed. No further measures are required.        |
| 0343-1                              | BPM input<br>breaker open       | Critical | The bypass input circuit breaker is OFF.   | The running status is displayed. No further measures are required.        |
| 0340-1                              | Maint. breaker<br>closed        | Minor    | The UPS maintenance circuit breaker is ON.   | The running status is displayed. No further measures are required.        |
| 0335-1                              | Generator<br>connected          | Warning  | The generator is connected.  | The running status is displayed. No further measures are required.        |
| 0362-1                              | BCB off                         | Minor    | BCB off  | The running status is displayed. No further measures are required.        |
| 0594-1                              | Insufficient<br>redundant racks | Minor    | <ul> <li>The load is excessive.</li> <li>The configured number of redundant racks is incorrect.</li> </ul>   | Reduce the load.     Decrease the configured number of redundant racks.   |
| 0095-1                              | Insuffi.<br>redundancy          | Minor    | <ul> <li>The load is excessive.</li> <li>The configured number of redundant modules is incorrect.</li> </ul> | Reduce the load.     Decrease the configured number of redundant modules. |

| Alarm ID<br>(Alarm ID-<br>Cause ID) | Alarm Name                   | Severity | Cause   | Solution   |
|-------------------------------------|------------------------------|----------|---|--|
| 0096-1                              | ECO volt.<br>Abnormal        | Minor    | <ul> <li>The ECO bypass voltage or frequency is out of the preset range.</li> <li>The ECO bypass voltage or frequency range is incorrectly set.</li> <li>The bypass input sequence is reverse or the neutral wire is disconnected.</li> </ul> | <ol> <li>Check the bypass input voltage and frequency.</li> <li>Check that the rated voltage, rated frequency, ECO bypass voltage range, and frequency range are correctly set.</li> <li>Check that the bypass cables and circuit breakers are correctly connected.</li> </ol> |
| 0098-1                              | Bypass current<br>not shared | Minor    | <ul> <li>The output and input circuit breakers are OFF.</li> <li>The length of the bypass input or output cables is incorrect.</li> <li>The bypass SCR open-circuits.</li> </ul>  | <ol> <li>Check that the output and bypass input circuit breakers on each rack are ON.</li> <li>Check that bypass input and output power cables on each rack meet the length requirements.</li> <li>Rectify any bypass SCR open-circuit.</li> </ol>                             |
| 0150-1                              | Inverter<br>asynchronous     | Minor    | <ul> <li>The bypass frequency changes fast.</li> <li>The output frequency track rate is incorrectly set.</li> </ul>   | <ol> <li>Check that the bypass output frequency does not change fast.</li> <li>Check that the Output freq. track rate is properly set.</li> </ol>  |
| 0101-1                              | BSC signal<br>abnormal       | Minor    | <ul> <li>The dual bus connector is loose.</li> <li>Parameters are set incorrectly.</li> </ul>   | Check the dual bus connector.     Check the parameter settings.  |

| Alarm ID<br>(Alarm ID-<br>Cause ID) | Alarm Name                     | Severity | Cause   | Solution   |
|-------------------------------------|--------------------------------|----------|---|--|
| 0102-1                              | Maint. breaker<br>misoperation | Critical | The user operation is incorrect.  | <ol> <li>Shut down the inverter and then close the maintenance circuit breaker.</li> <li>After maintenance, open the maintenance circuit breaker and then start the inverter.</li> </ol>   |
| 615                                 | ATS fault                      | Critical | <ul> <li>A manual operation is performed using the handle in ATS automatic mode.</li> <li>The ATS cable is loose.</li> <li>The ATS controller is faulty.</li> <li>The ATS is faulty.</li> </ul> | <ul> <li>Check whether a manual operation is performed using the handle in ATS automatic mode. If a manual operation is performed using the handle, set the working mode to manual on the MDU to clear the alarm.</li> <li>Check whether the green Phoenix terminal of the controller is connected properly. If not properly connected, power off the controller and reinstall the terminal.</li> <li>Replace the ATS controller.</li> <li>Power off and replace the ATS.</li> </ul> |
| 623                                 | ATS manual<br>mode alarm       | Minor    | The ATS working<br>mode is set to<br>manual.  | Check the ATS parameter settings on the MDU and set the working mode to automatic.   |
| 0380                                | In self-check                  | Warning  | The inverter is in self-check.  | Wait until the inverter self-<br>check is complete.  |

# C Acronyms and Abbreviations

Α

ATS AC transfer switch

AWG American wire gauge

В

**BSC** bus synchronization

controller

BCB-BOX battery circuit breaker

box

BBB-BOX battery bus bar box

C

CE Conformite Europeenne

D

**DSP** digital signal processing

Ε

**ECO** economic control

operation

**EPO** emergency power off

**ECM** energy control module

**EOD** end of discharge

I

**IEC** International

Electrotechnical Commission

L

**LCD** liquid crystal display

М

MDU monitor display unit

Р

**PE** protective earthing

**PDU** power distribution unit

R

RS485 Recommend Standard

485

S

**SOC** state of charge

**STS** static transfer switch

**SNMP** Simple Network

Management Protocol

Т

**THDi** total distortion of the

input current waveform

THDv total harmonic distortion

of output voltage

U

**UPS** uninterruptible power

system

**USB** Universal Serial Bus

٧

VRLA valve-regulated lead

acid battery