

UPS5000-H-1200 kVA

User Manual (100 kVA Power Modules)

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About This Document

Purpose

This document describes the UPS5000-H-1200 kVA in terms of its features, performance specifications, working principles, appearance, structure, installation, and operation and maintenance (O&M).

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

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

Change History

Changes between document issues are cumulative. The latest document issue contains all updates made in previous issues.

Issue 01 (2020-07-15)

This issue is the first 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.

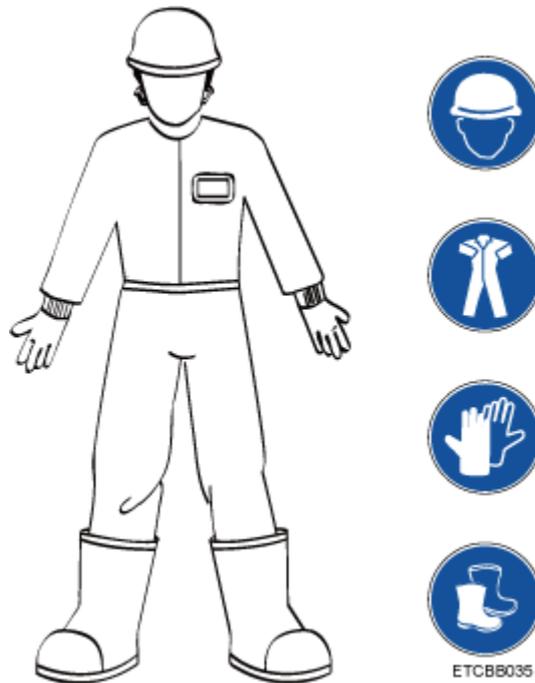
Huawei will not be liable for any consequences of the following circumstances:

- 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 storms
- Damage caused during transportation by the customer
- Storage conditions that do not meet the requirements specified in this document

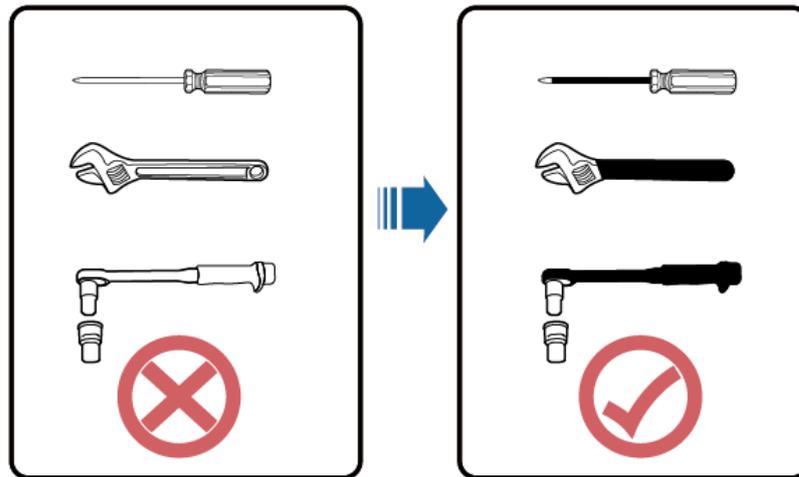
General Requirements

- 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.

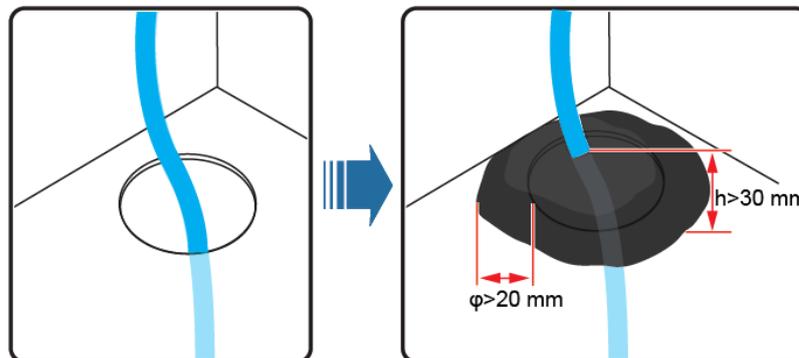


- Follow the specified procedures for installation, operation, and maintenance.
- Before handling a conductor surface or terminal, measure the contact point voltage and ensure that there is no risk of electric shock.
- After installing the equipment, remove idle packing materials such as cartons, foam, 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.



TN01H00005

- 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.



TN01H00006

- Do not scrawl, damage, or block any warning label on the equipment.
- Tighten the screws using tools when installing the equipment.
- 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 flame spread rating requirements.
- 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.

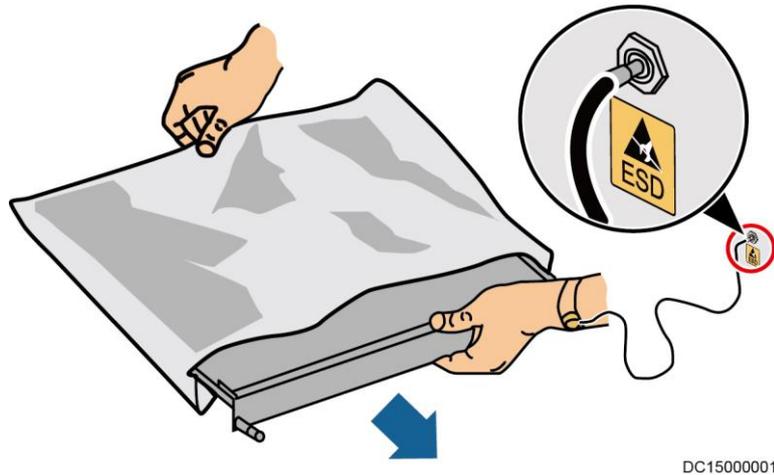
ESD

NOTICE

The static electricity generated by human bodies may damage the electrostatic-sensitive 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 neutral-ground 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.

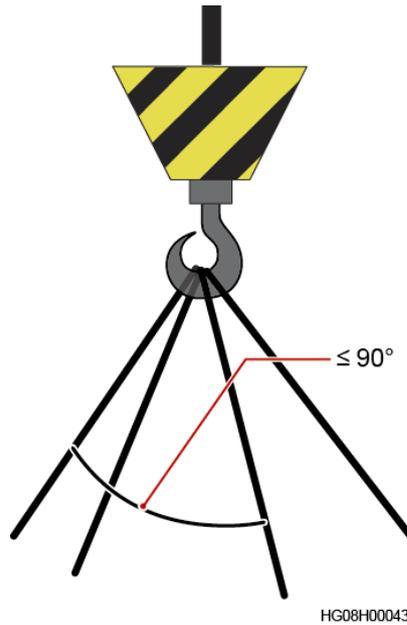
Installation at Heights

- 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

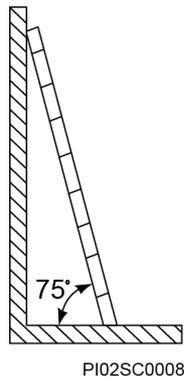
- Do not walk under hoisted objects.
- Only trained and qualified personnel should perform hoisting operations.
- Check that hoisting tools are available and in good condition.
- Before hoisting objects, ensure that hoisting tools are firmly secured onto a load-bearing object or wall.
- Ensure that the 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.

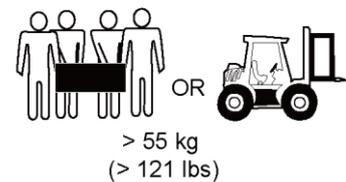
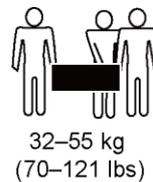
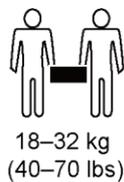
- Obtain the consent from the customer, subcontractor, and Huawei before drilling.
- Wear goggles and protective gloves when drilling holes.
- When drilling holes, protect the equipment from shavings. After drilling, clean up any shavings that have accumulated inside or outside the equipment.

Moving Heavy Objects

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.



NH01H00144

- 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 semi-indoor 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 (NaHCO₃) or sodium carbonate (Na₂CO₃).

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). Low-temperature 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

UPS5000-H-1200K-NT

1 2 3 4 5

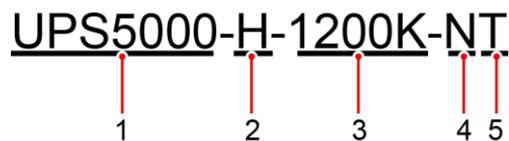


Table 2-1 Model number description

No.	Item	Description
1	Product category	UPS5000
2	Product subcategory	H: high power and high density
3	Rated capacity	Output capacity in full configuration: 1200 kVA
4	Switch configuration	N: no switch
5	Cabling	T: Cables can only be routed in from the top.

2.2 Product Positioning and Features

2.2.1 Positioning

The UPS5000-H is a high-end modular UPS launched by Huawei. It adopts online double conversion and modular redundancy design for components. Based on the digital signal processing (DSP) technology, the UPS5000-H features high efficiency and power density.

The UPS5000-H provides reliable, efficient, and simple solutions. It supplies reliable and high-quality power to:

- Large-sized data centers of governments and enterprises
- ISP data centers
- Internet data centers
- DR data centers
- Cloud data centers
- Infrastructures, large-sized control equipment rooms, and railways

2.2.2 Highlights

High Reliability and Redundancy

- The power module, monitoring module, bypass module, and control module use modular design and support hot swap. It is quite easy to replace, install, expand, and maintain the modules.
- The control module and power module use redundancy design, which ensures high system reliability.
- The iPower fault warning function is supported. If a battery, capacitor, fan, or any other key component fails, a warning is generated to prevent the fault from escalating.

High Power Density

The power density of power modules can reach 100 kW/3 U, which is the highest in the industry.

High Space Usage

Space is efficiently used. The UPS saves space for placing more IT equipment and reduces the footprint by 50% compared with traditional solutions of combining cabinets.

Easy Management and Monitoring

The UPS is configured with an SNMP card, which reduces the management cost and features simple and flexible configurations. Huawei NetEco 6000 easily implements remote centralized management.

2.2.3 Features

High Reliability

- UPS power and control modules use redundant design. No single-point fault occurs.
- The UPS supports a wide input voltage range of 139–485 V AC (line voltage) to adapt to poor power grids.
- The load power is not derated for linear and non-linear loads whose PF is greater than 0.5. The UPS perfectly matches all kinds of loads.
- The UPS passes reliability tests which focus on high temperature, high humidity, and dust adaptation. The impact of environment on the UPS reliability is reduced.

High Efficiency

- High efficiency is ensured even with a low load rate. If the load rate is extremely low, the intelligent rotation hibernation technology ensures redundancy and improves the UPS efficiency.
- Space is efficiently used. The UPS saves space for placing more IT equipment and reduces the footprint by 50% compared with traditional solutions.

High Loading Capability

The UPS has an output power factor (PF) of 1.0, which is suitable for linear and non-linear loads with a PF greater than 0.5. This allows the UPS to connect to more loads and reduces customer investments.

Easy O&M

- Power, bypass, and control modules are hot swappable. A common engineer can finish maintenance within 5 minutes.
- Smooth capacity expansion is supported. The initial investment on the UPS is reduced and the UPS operating efficiency is improved.
- The power supply and distribution status is monitored in real time. Core parameters of the UPS power supply and distribution system are automatically inspected, so manual inspection is not required.

2.3 Application Scenarios

The UPS5000-H is suitable for power systems in various indoor scenarios, including large-sized data centers or communications centers, equipment rooms of large-sized enterprises, equipment rooms of financial systems, industrial automated equipment, and scheduling centers.

Figure 2-2 Typical application scenario of a single UPS

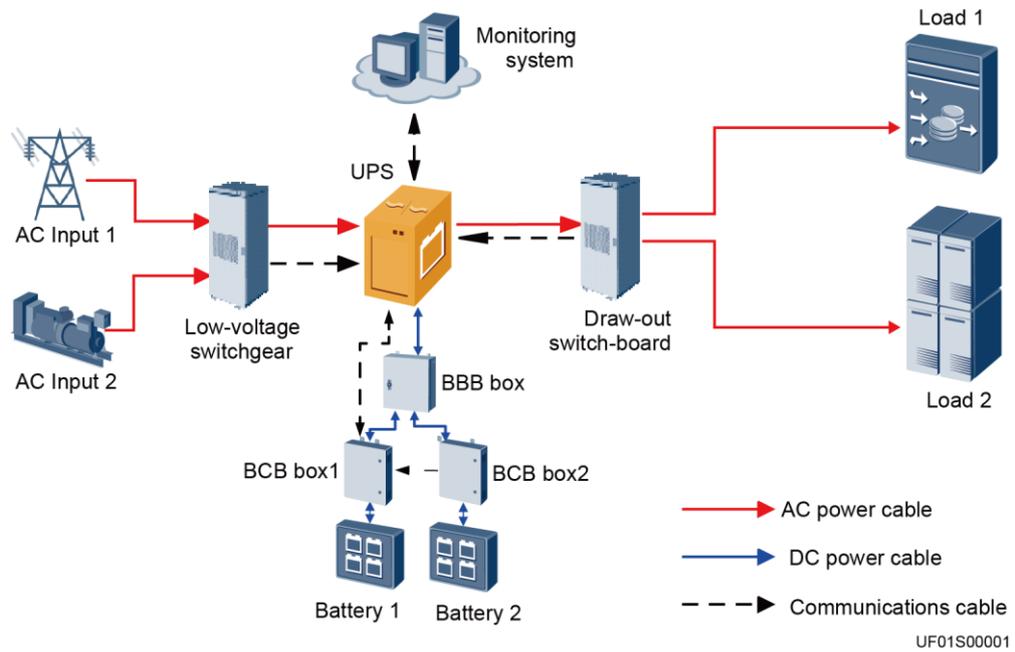


Figure 2-3 Typical application scenario of 1+1 parallel system

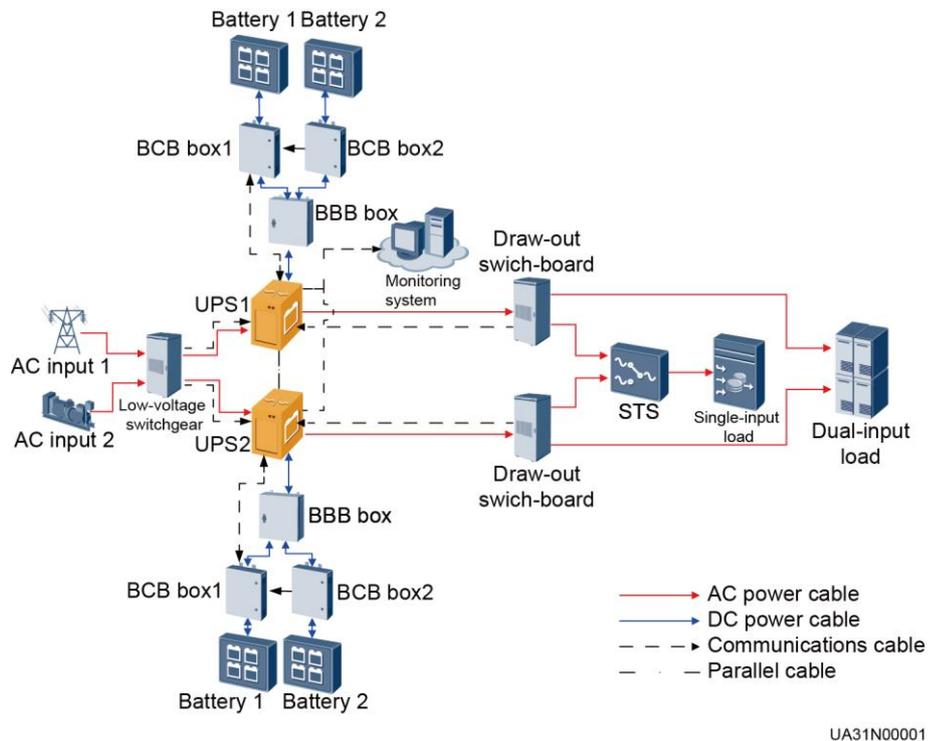
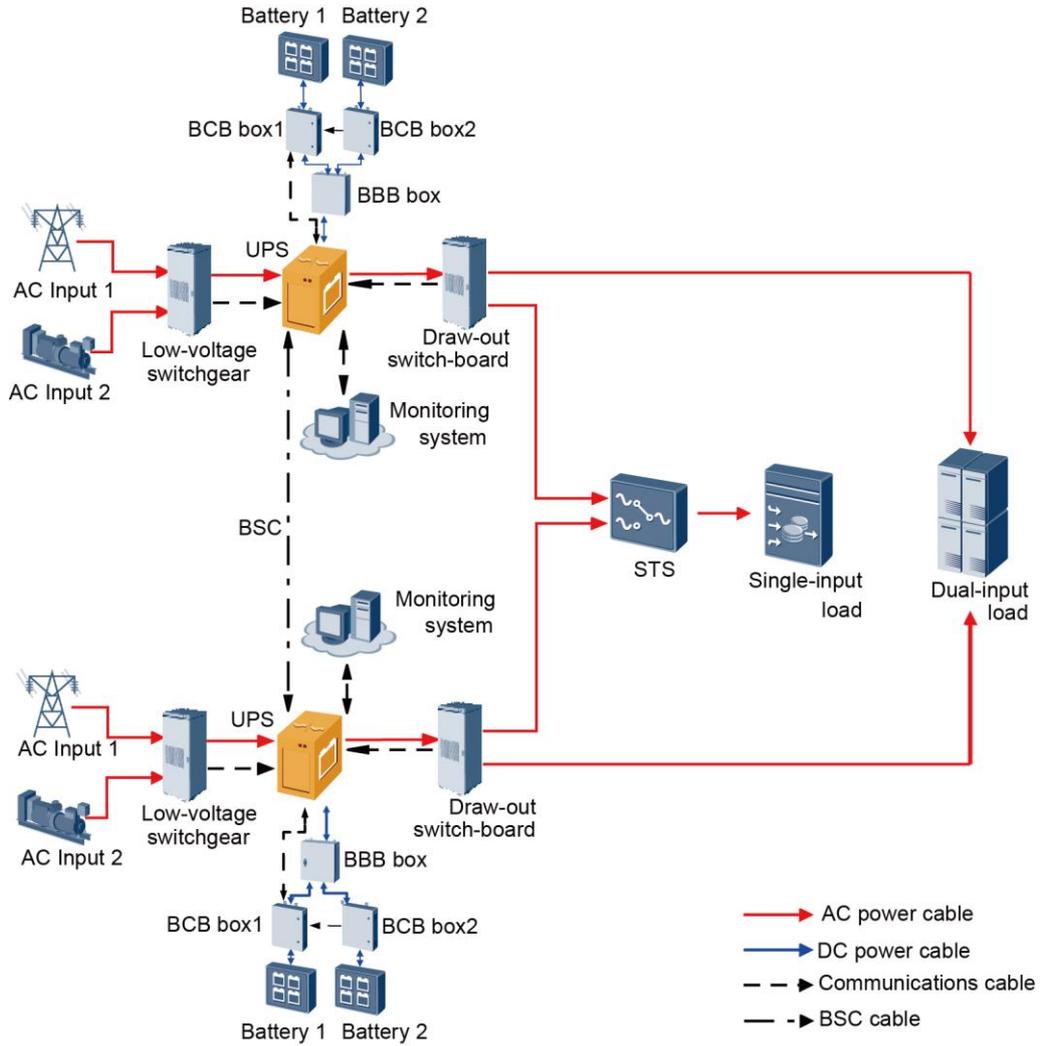


Figure 2-4 Typical application scenario of a dual-bus system



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2.4 Working Principle

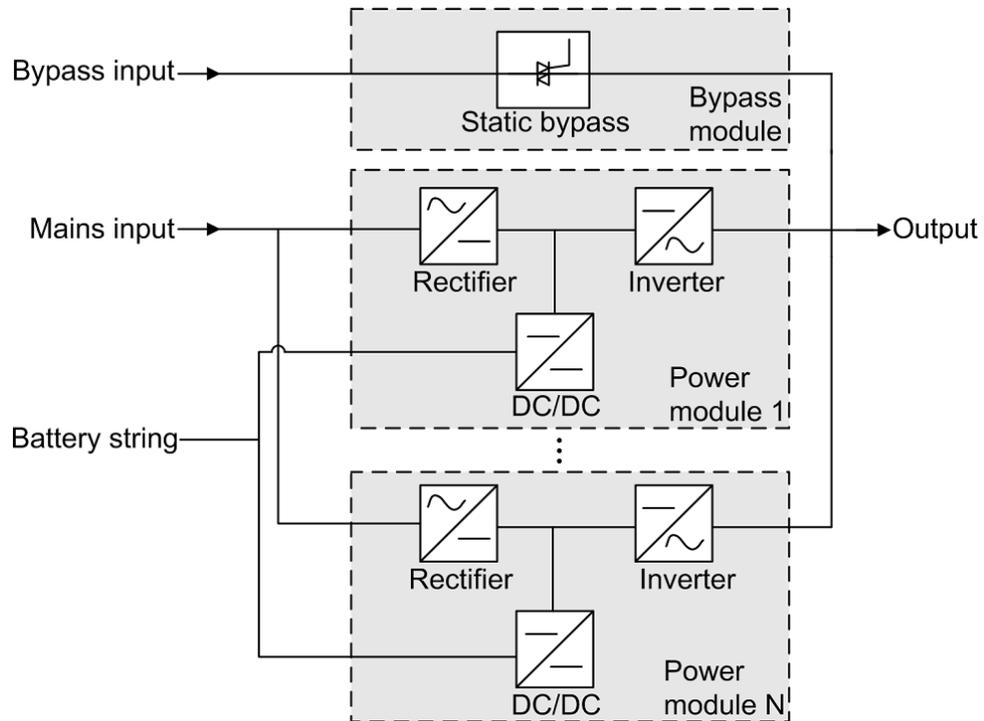
NOTE

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

2.4.1 Conceptual Diagram

The UPS is an online product. It uses modular design, which facilitates maintenance and capacity expansion. The UPS uses the DSP technology for intelligent control. The power module consists of a rectifier, inverter, and DC/DC converter. The UPS converts inputs into pure high-quality sine wave outputs by using the high-frequency switching technology.

Figure 2-5 Conceptual diagram

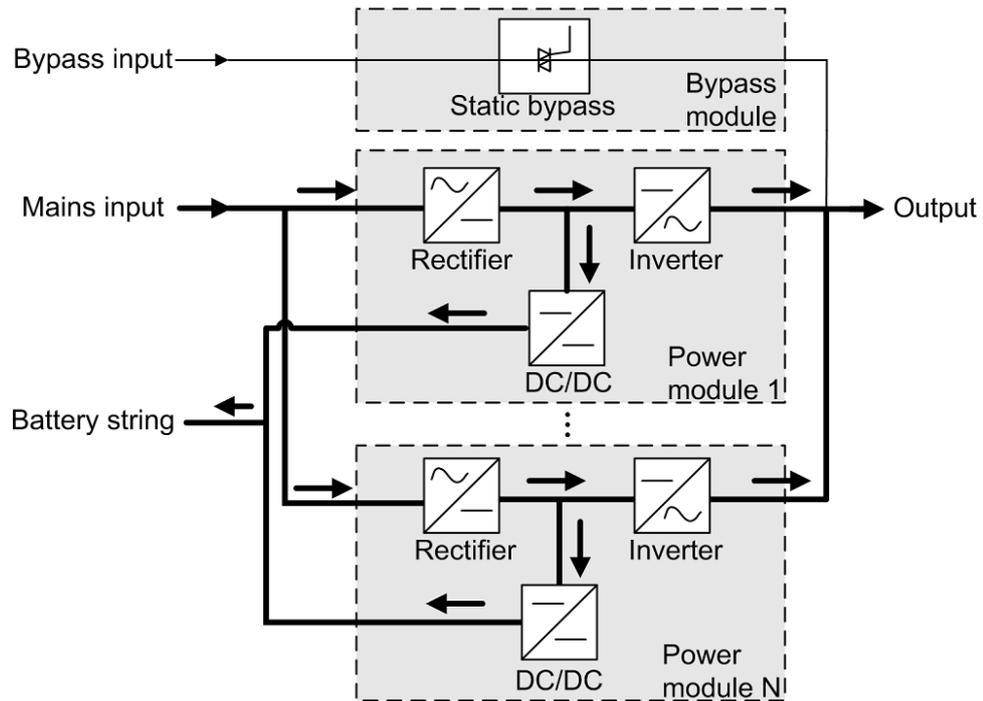


2.4.2 Working Modes

2.4.2.1 Normal Mode

In normal mode, the rectifier converts AC power into DC power. Then the inverter converts DC power into AC output. At the same time, the rectifier charges batteries over a charger. The two conversions ensure high-precision and high-quality output voltages, protecting loads from interferences such as input harmonics, glitches, and voltage transients.

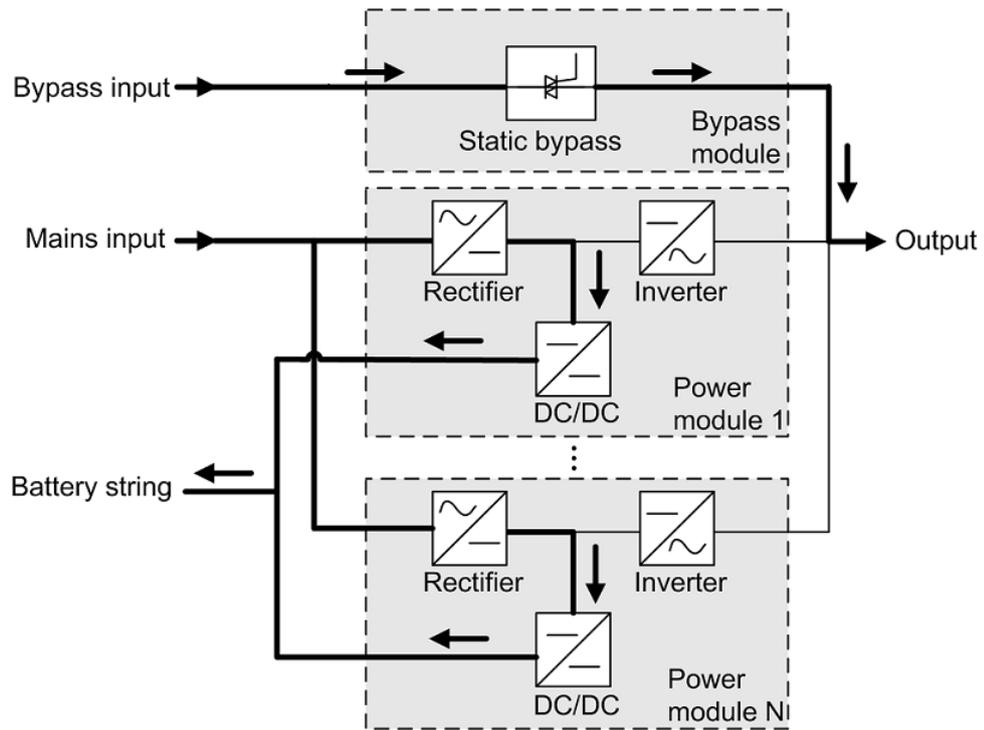
Figure 2-6 UPS conceptual diagram in normal mode



2.4.2.2 Bypass Mode

When the UPS detects that the power module experiences overtemperature, overload, or other faults that may shut down the inverter, the UPS automatically transfers to bypass mode. At the same time, the rectifier is started and charges batteries over a charger. In bypass mode, loads are powered by the bypass module. The bypass power supply is not protected by the UPS and therefore is prone to the mains outage, abnormal AC voltage waveform, or abnormal frequency.

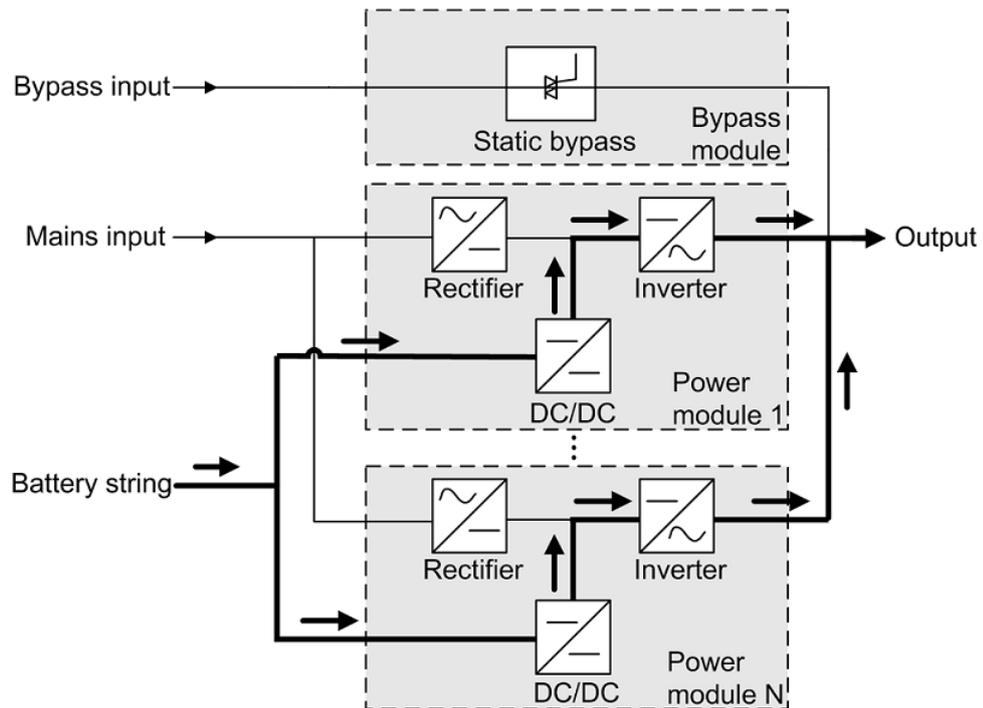
Figure 2-7 UPS conceptual diagram in bypass mode



2.4.2.3 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.

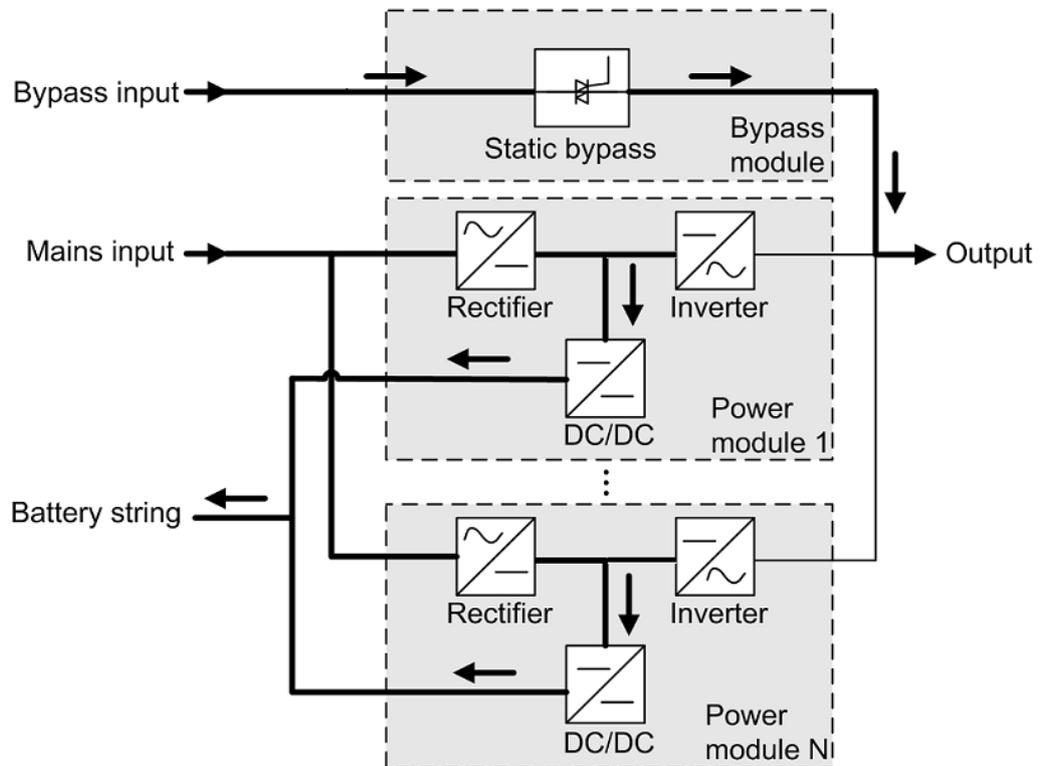
Figure 2-8 UPS conceptual diagram in battery mode



2.4.2.4 ECO Mode

The economic control operation (ECO) mode is an economical working mode, which can be configured on the LCD or web user interface (WebUI). 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 source voltage is outside the ECO voltage range, the UPS transfers from bypass mode to inverter mode. In bypass mode or inverter mode, the rectifier keeps working and charges batteries using a charger. The ECO mode delivers a high efficiency.

Figure 2-9 UPS conceptual diagram in ECO mode



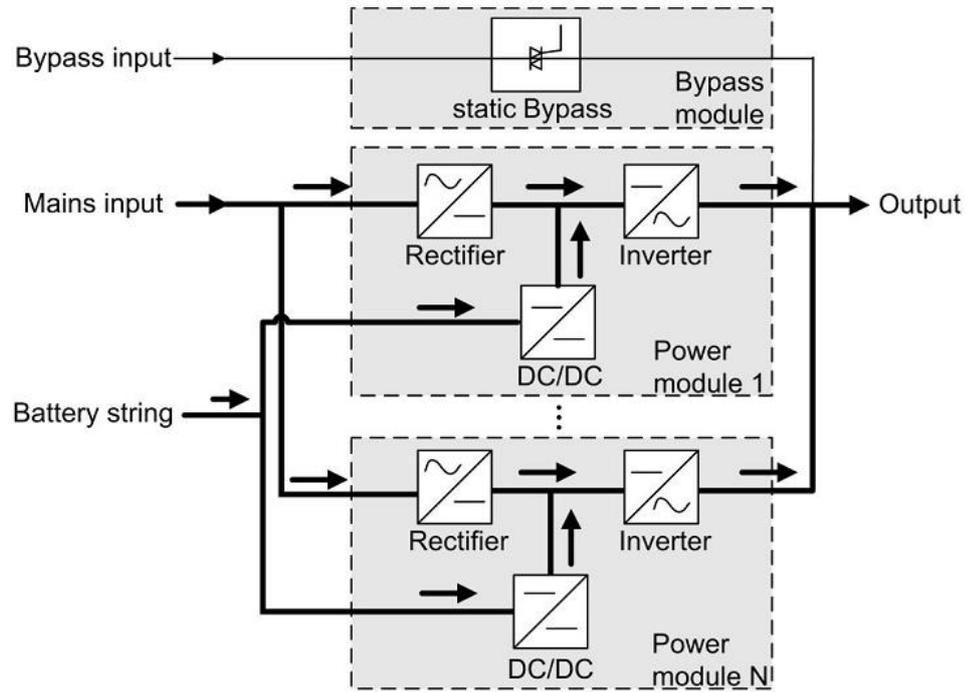
NOTE

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

2.4.2.5 Joint Power Mode

If the UPS works properly and the AC input power of the rectifiers is insufficient, the UPS transfers to joint power mode. In this case, the power module obtains energy from both the mains and batteries, and the energy is converted into AC outputs over the inverter.

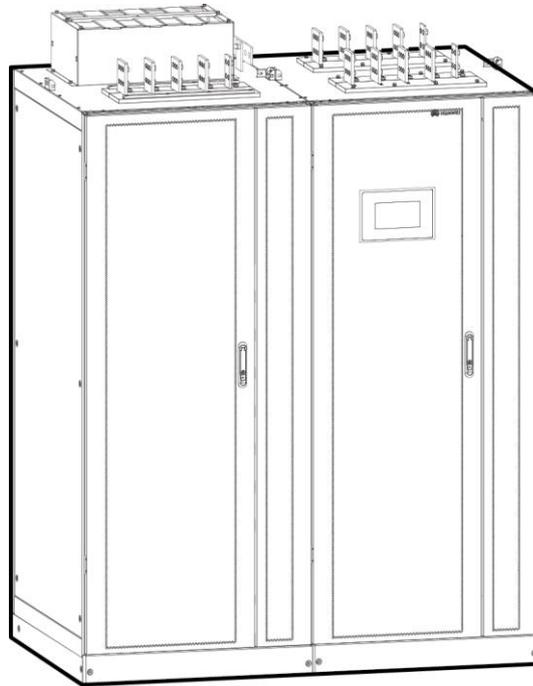
Figure 2-10 Conceptual diagram in joint power mode



2.5 System Components

2.5.1 Appearance

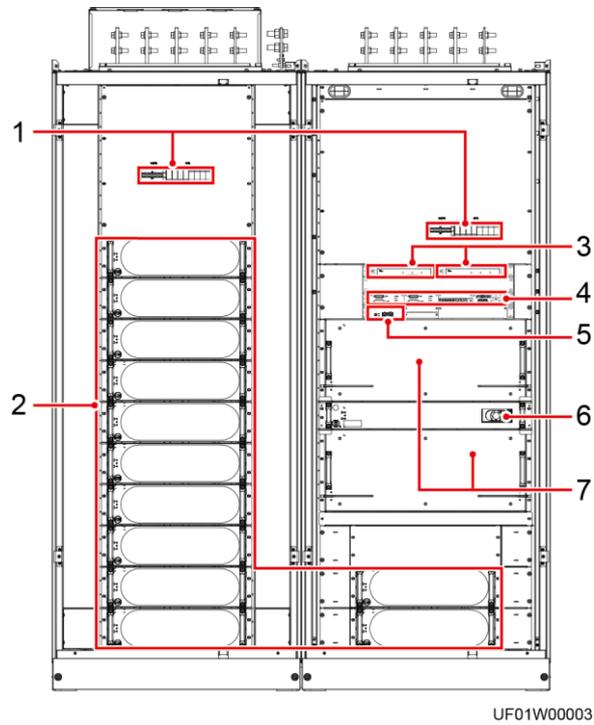
Figure 2-11 Appearance



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2.5.2 Structure

Figure 2-12 Structure with the door open



(1) Surge protective devices (SPDs) and SPD switches

(2) Power modules

(3) Surge protection boxes

(4) Control module

(5) Intelligent detection card

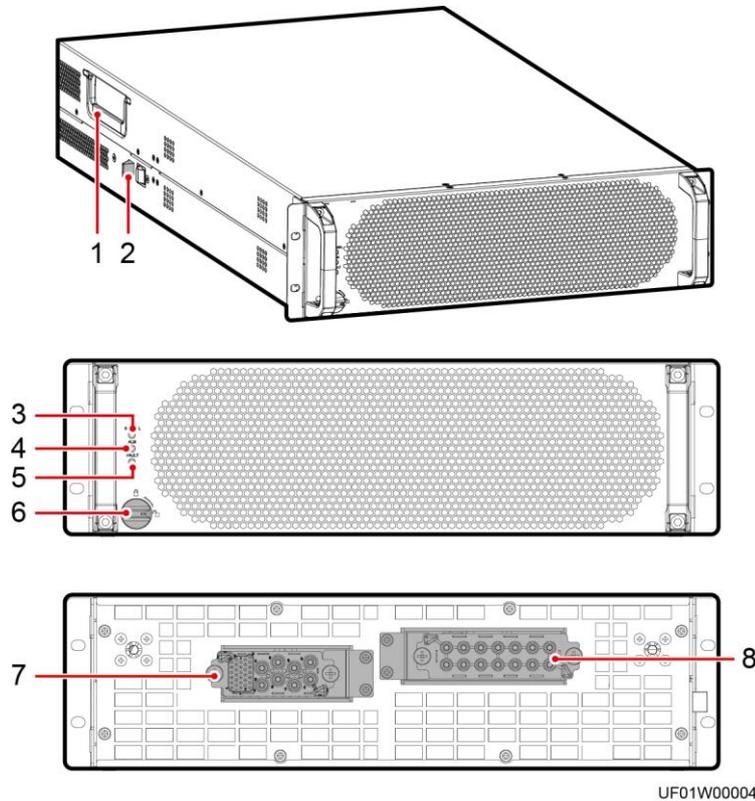
(6) Bypass control module

(7) Bypass modules

2.5.3 Power Module

Appearance

Figure 2-13 Power module



- (1) Handle (2) Positioning lock (3) Running indicator (4) Alarm indicator
(5) Fault indicator (6) Ready switch (7) Output ports (8) Input ports

Table 2-2 Indicator description

Indicator	Color	Status	Description
Running indicator	Green	Steady on	The system is working in inverter mode.
		Blinking at long intervals	<ul style="list-style-type: none"> The inverter is ready and in standby state (blinking at 0.5 Hz, on for 1s and off for 1s). The inverter is not started (blinking at 0.2 Hz, on for 2.5s and off for 2.5s).
		Blinking at short intervals	The module is not configured, the inverter software and rectifier software are being upgraded, or the inverter software is being upgraded (blinking at 4 Hz, on for 0.125s and off for 0.125s).

Indicator	Color	Status	Description
		Off	The software is being upgraded.
Alarm 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 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 software is being upgraded.

Functions

The main power module consists of a power factor correction (PFC) rectifier and inverter. It performs AC/DC or DC/DC conversion on the mains and battery inputs, and stabilizes the bus voltage. The inverter (DC/AC) converts the inputs into sine wave outputs.

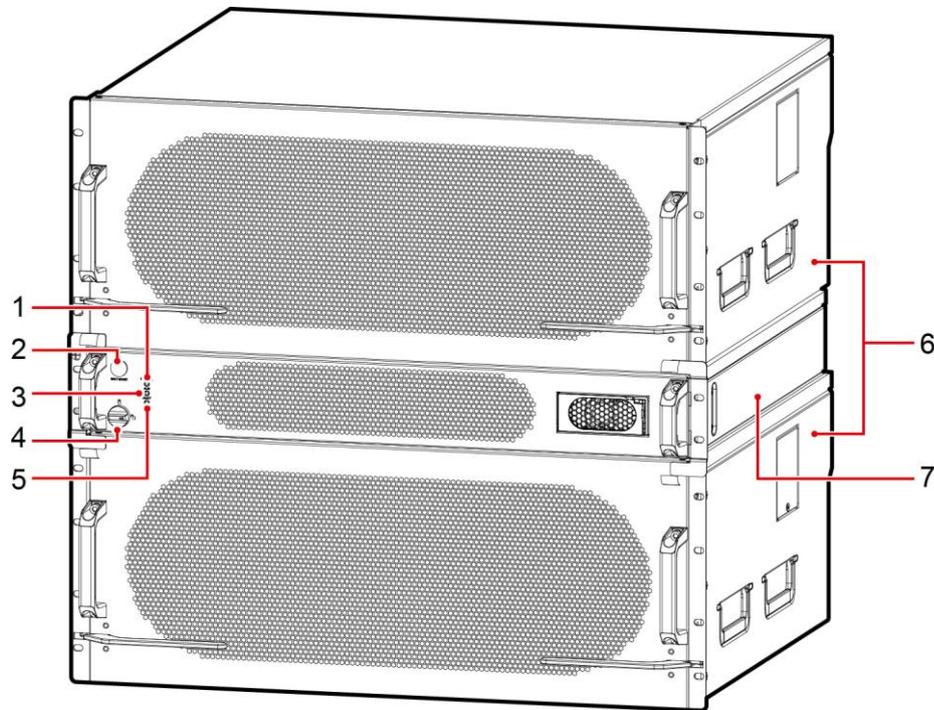
Specifications

- Dimensions (H x W x D): 130 mm x 442 mm x 750 mm
- Weight: < 55 kg
- Rated output capacity: 100 kVA/100 kW

2.5.4 Bypass Module

Appearance

Figure 2-14 Bypass module



UF01W00001

- | | | | |
|-----------------------|-------------------------------|---------------------------|------------------|
| (1) Running indicator | (2) Battery cold start button | (3) Alarm indicator | (4) Ready switch |
| (5) Fault indicator | (6) Bypass modules | (7) Bypass control module | |

Table 2-3 Indicator description

Indicator	Color	Status	Description
Running 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).
		Blinking at short intervals	The bypass is not configured or the 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	Yellow	Steady on	A minor alarm is generated for the bypass.

Indicator	Color	Status	Description
indicator		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 UPS works in bypass mode under the following circumstances:

The ECO mode is used and the bypass voltage is within the specified range.

The power module overload times out.

In inverter mode, both the active and standby energy control modules (ECMs) of the bypass unit are faulty.

The system runs abnormally.

The UPS is transferred to bypass mode manually.

Specifications

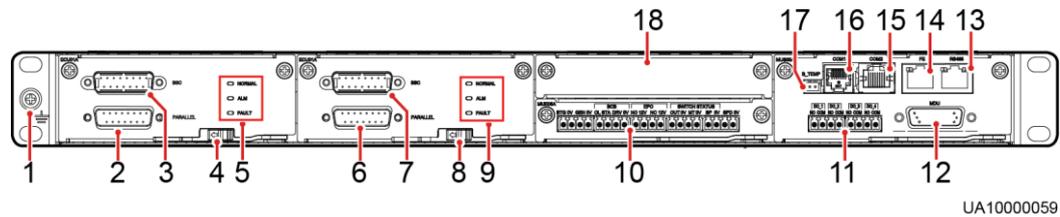
- Dimensions (H x W x D):
 - Bypass module: 263.5 mm x 642 mm x 668 mm
 - Bypass control module: 86.1 mm x 642 mm x 600 mm
- Weight:
 - Bypass module: < 90 kg
 - Bypass control module: < 16 kg

2.5.5 Control Module

2.5.5.1 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 2-15 Signal panel on the control module



UA10000059

- | | | | |
|--------------------------------------|----------------------------------|-------------------|---------------------------|
| (1) Ground terminal | (2) Parallel port 1 | (3) BSC port 1 | (4) Ready switch on ECM 1 |
| (5) Indicators for ECM 1 | (6) Parallel port 2 | (7) BSC port 2 | (8) Ready switch on ECM 2 |
| (9) Indicators for ECM 2 | (10) Dry contact card | (11) Dry contacts | (12) MDU port |
| (13) RS485 port | (14) Fast Ethernet (FE) port | (15) COM2 port | (16) COM1 port |
| (17) Battery temperature sensor port | (18) Optional card subrack cover | | |

NOTE

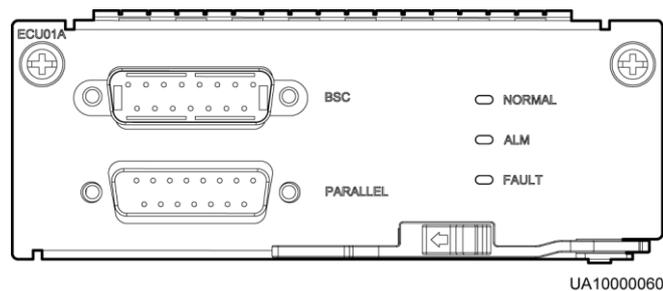
Ports are protected by a security mechanism.

2.5.5.2 ECM

Appearance

The control module consists of one active ECM and one standby ECM.

Figure 2-16 ECM



UA10000060

Table 2-4 ECM functions

Silk Screen	Description
PARALLEL	The PARALLEL port transmits parallel signals between racks.
BSC	The BSC port is used in a dual-bus system to synchronize output

Silk Screen	Description
	frequencies and phases between UPS systems, ensuring that two buses can switch with each other. BSC cables are hot-swappable.

 **NOTE**

No parallel cable is required for a single UPS.

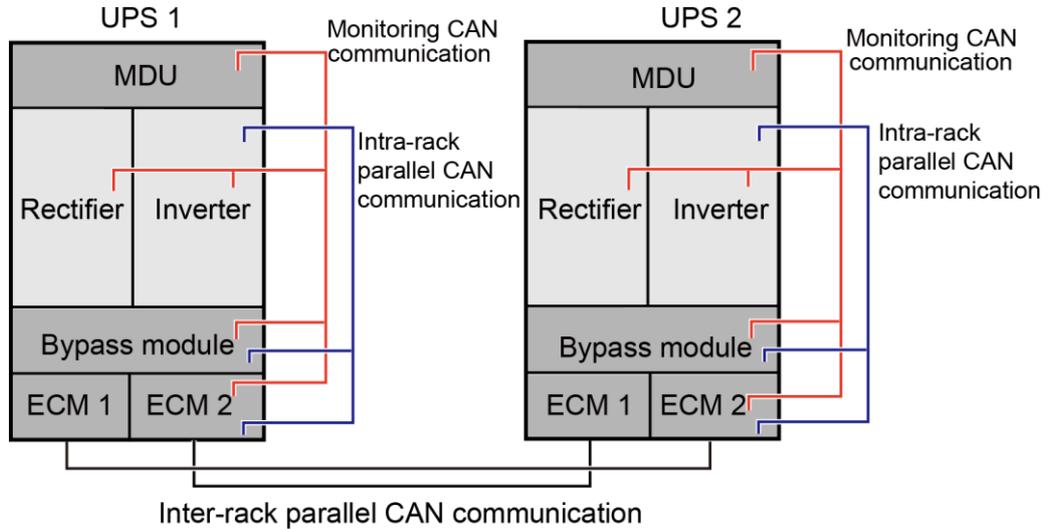
Table 2-5 Indicator description

Indicator	Color	Status	Description
NORMAL	Green	Steady on	This ECM is the active ECM.
		Blinking at 0.5 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 Hz	The ECM software 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.

Functions

- As a control interface for the entire system, the ECM communicates with each module and provides a bus for communication between the dry contact card and the system control card. The ECM ensures equalized output currents between modules so that load power is equally shared.
- The ECM provides module working status information to the monitoring system.
- The ECM controls the running of a single UPS and a parallel system, and reports the UPS status information to other monitoring modules.
- The system provides three types of CAN communication: monitoring CAN communication, intra-rack parallel CAN communication, and inter-rack parallel CAN communication.

Figure 2-17 Logical connections for CAN communication



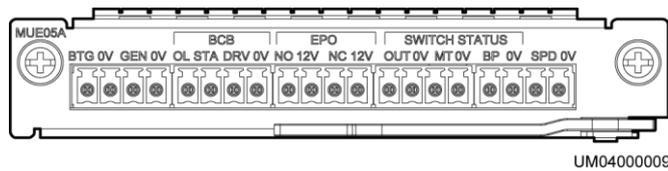
Specifications

- Hot-swappable
- 1 U high

2.5.5.3 Dry Contact Card

Appearance

Figure 2-18 Dry contact card



NOTICE

For dry contact outputs, the rated DC voltage and current are 24 V DC and 0.6 A and the maximum values are 30 V DC and 1.0 A. The rated AC voltage and current are 24 V AC and 0.6 A and the maximum values are 30 V AC and 1.0 A. During cable connection, ensure that the voltage and current do not exceed these maximum values.

Table 2-6 Functions of control signal ports on the dry contact card

Silk Screen	Signal Description	Status Description	Initial Status
BTG	Port for monitoring battery grounding failures	<ul style="list-style-type: none"> • Closed: There is a battery grounding 	Open

Silk Screen	Signal Description	Status Description	Initial Status
0V	Port for signal ground	failure. <ul style="list-style-type: none"> Open: There is no battery grounding failure. 	
GEN	Port for detecting the diesel generator (DG) mode	<ul style="list-style-type: none"> Closed: DG mode Open: non-DG mode 	Open
0V	Port for signal ground		
BCB_OL	Port for monitoring the battery circuit breaker (BCB) box	<ul style="list-style-type: none"> Grounded: BCB box connected Disconnected: BCB box not connected 	Grounded
BCB_STA	Port for monitoring the BCB	<ul style="list-style-type: none"> Closed: The BCB is ON. Open: The BCB is OFF. 	Open
BCB_DRV	Port for controlling BCB trip. When the voltage is +12 V, the BCB trips.	<ul style="list-style-type: none"> 0 V: BCB not tripped 12 V: BCB tripped 	0 V
BCB_0V	Port for signal ground		
EPO_NO	If the normally open (NO) port is connected to the EPO_12V port, emergency power-off (EPO) is triggered.	Closing the EPO port triggers EPO.	Open
EPO_12V	+12 V		
EPO_NC	If the normally closed (NC) port is disconnected from the EPO_12V port, EPO is triggered.	Opening the EPO port triggers EPO.	Closed
EPO_12V	+12 V		
SWITCH STATUS_OUT	Port for monitoring the UPS output circuit breaker	<ul style="list-style-type: none"> Closed: The UPS output circuit breaker is ON. Open: The UPS output circuit breaker is OFF. 	Closed
SWITCH STATUS_0V	Port for signal ground		
SWITCH STATUS_MT	Port for monitoring the maintenance switch	<ul style="list-style-type: none"> Open: The maintenance switch is ON. Closed: The maintenance switch is OFF. 	Open
SWITCH STATUS_0V	Port for signal ground		

Silk Screen	Signal Description	Status Description	Initial Status
SWITCH STATUS_BP	Port for monitoring the bypass input circuit breaker	<ul style="list-style-type: none"> Closed: The bypass input circuit breaker is ON. Open: The bypass input circuit breaker is OFF. 	Closed
SWITCH STATUS_0V	Port for signal ground		
SPD	Port for monitoring the input AC SPD	<ul style="list-style-type: none"> Closed: The input AC SPD is normal. Open: The input AC SPD fails. 	Closed
0V	Port for signal ground		

 **NOTE**

- A dry contact card port takes effect only after you set it in the software. You need to disable unused dry contact signals.
- Set the EPO port to NO or NC as required.
- If multiple UPSs are connected in parallel, connect all used dry contact signals to each UPS.
- Signal cables must be double-insulated twisted cables. If the cable length is within 25–50 m, the cross-sectional area must be 0.5–1.5 mm².

Functions

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 EPO.

Specifications

- Hot-swappable
- 0.5 U high

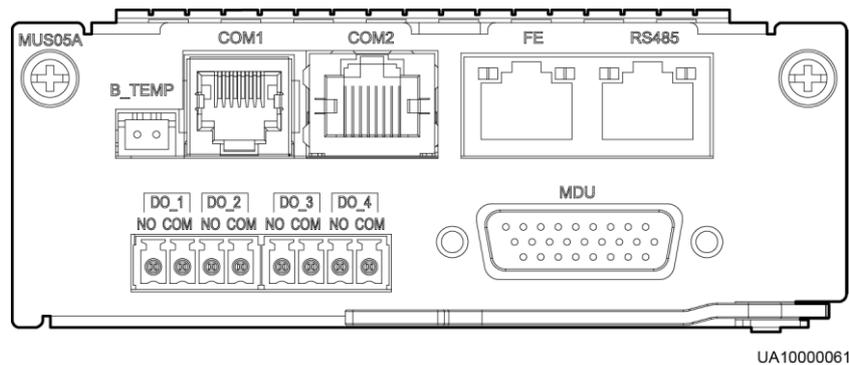
2.5.5.4 Monitoring Interface Card

NOTICE

- The FE port resembles the RS485 port. Therefore, follow the silk screens when you connect communications cables. If you mistake the RS485 port as the FE port during cable connection, the WebUI communication fails. If you mistake the FE port as the RS485 port during cable connection, RS485 communication fails.
- Dry contact signals take effect after you set them. Disable unused dry contact signals on the monitoring system.
- When multiple UPSs are connected in parallel, all dry contact signals to be used need to connect to each UPS.

The monitoring interface card provides external ports as well as monitoring and control functions for the MDU. The monitoring interface card provides the ambient temperature and humidity sensor port, iBattery port, FE port, battery temperature monitoring port, and network management port. The MDU monitors the UPS, allows users to set parameters, delivers commands, reports system information, and displays key UPS information and parameters on the LCD.

Figure 2-19 Monitoring interface card



NOTE

DO_1 to DO_4 meet the maximum voltage and current requirements of 30 V DC/1 A or 60 V DC/0.5 A.

Table 2-7 Description of ports on the monitoring interface card

Port	Silk Screen	Description
DO_1	NO	<ul style="list-style-type: none"> • DO_1, DO_2, DO_3, and DO_4 indicate alarm outputs. The default values are Critical alarm, Minor alarm, Bypass mode, and Battery mode, respectively. • The value can be set to Disable, Critical alarm, Minor alarm, Bypass mode, Battery mode, Low batt. volt., Low battery SOC, Abnormal mains, Sys maint breaker enable, Sys outp breaker enable, Maint. breaker closed, No power supplied, Mains supplies power, ECO mode, Battery test, and Batt. Volt. Below Thres.
	COM	
DO_2	NO	
	COM	
DO_3	NO	
	COM	
DO_4	NO	

Port	Silk Screen	Description
	COM	<ul style="list-style-type: none"> Configure power segment settings based on backup time.
DB26	MDU	Supports FE, RS485, I2C, CAN, and other signals.
Battery temperature sensor port	B_TEMP	Connects to an indoor battery temperature sensor.
Southbound communications port 1	COM1	<ul style="list-style-type: none"> Supported protocol: Modbus-RTU Connects to an ambient temperature and humidity sensor over two wires.
Southbound communications port 2	COM2	<ul style="list-style-type: none"> Supported protocol: Modbus-RTU Connects to a southbound device, such as an iBattery.
Network port	FE	<ul style="list-style-type: none"> Supported protocols: Modbus-TCP, HTTPS, and SNMP Connects to the network port on a PC. Network port for connecting to the web service and for SNMP networking
Northbound communications port	RS485	<ul style="list-style-type: none"> Supported protocol: Modbus-RTU Connects to a northbound network management device or third-party network management device over two wires.

NOTE

- Signal cables must be double-insulated twisted cables. If the cable length is within 25–50 m, the cross-sectional area must be 0.5–1.5 mm².
- RS485 cables and FE cables must be shielded cables.

Figure 2-20 and Figure 2-21 are recommended wiring methods for DO ports.

Figure 2-20 Wiring method 1

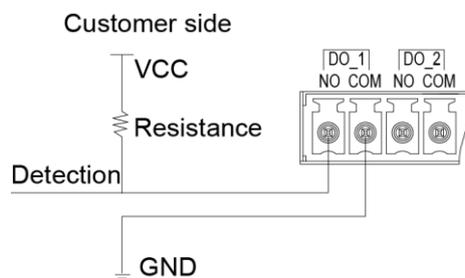


Figure 2-21 Wiring method 2

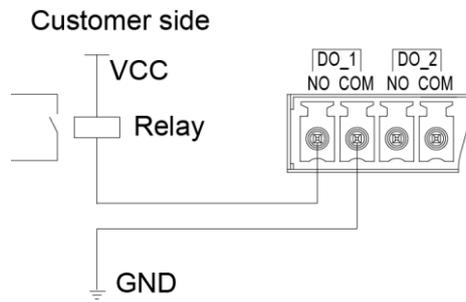


Figure 2-22 COM1 port pins

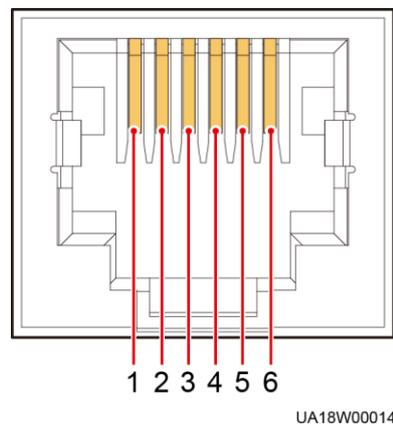
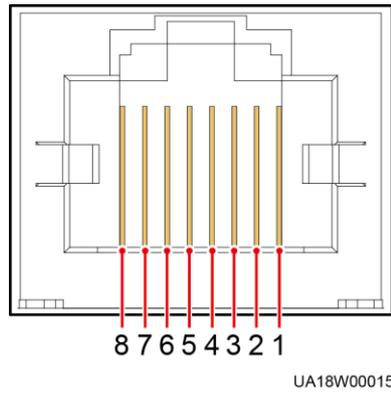


Table 2-8 Pin definitions for the COM1 port

Pin	Description
1	GND
2	-
3	RS485-
4	RS485+
5	-
6	12V_PORT

Figure 2-23 COM2 port pins

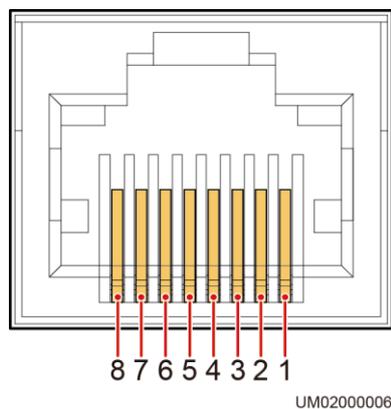


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Table 2-9 Pin definitions for the COM2 port

Pin	Description
1	RS485+
2	RS485-
3	-
4	RS485+
5	RS485-
6	GND
7	CANH0
8	CANL0

Figure 2-24 RS485 port pins



UM02000006

Table 2-10 Pin definitions for the RS485 port

Pin	Description
1	RS485_T+
2	RS485_T-
3	-
4	RS485_R+
5	RS485_R-
6	GND
7	-
8	-

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 and then connect it to RS485-.

2.5.6 Intelligent Detection Card

Appearance

Figure 2-25 Intelligent detection card

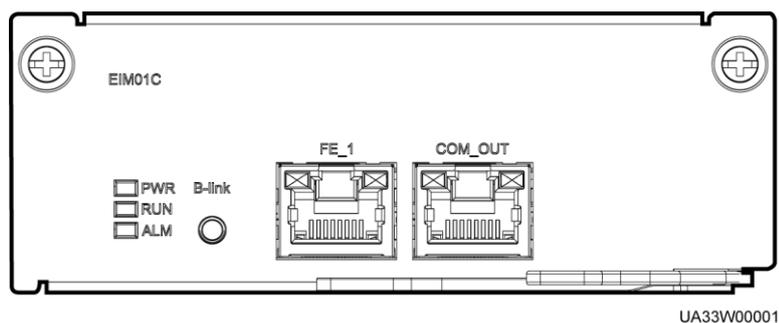


Table 2-11 Intelligent detection card function

Silk Screen	Description
FE_1	Reserved
COM_OUT	Reserved

Table 2-12 Indicator description

Indicator	Color	Status	Description
PWR	Green	Steady on	Indicates the CPU power status of the intelligent detection card. The indicator is steady on after the card is powered on and does not need to be controlled by the CPU.
		Off	Indicates that the intelligent detection card is powered off.
RUN	Green	Blinking at 0.5 Hz	The intelligent detection board is running properly.
		Blinking at 4 Hz	The communication is interrupted.
ALM	Red	Steady on	An alarm is generated.
		Off	No alarm is generated.

NOTE

- Signal cables must be double-insulated twisted cables. If the cable length is within 25–50 m, the cross-sectional area must be 0.5–1.5 mm².
- FE cables are shielded cables.

Figure 2-26 COM_OUT port pins

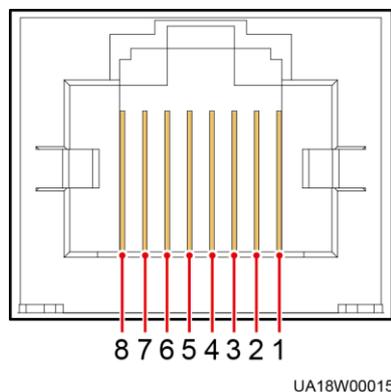


Table 2-13 Pin definitions for the COM_OUT port

Pin	Description
1	RS485+
2	RS485–
3	-
4	RS485+

Pin	Description
5	RS485-
6	-
7	CANH
8	CANL

Figure 2-27 FE_1 port pins

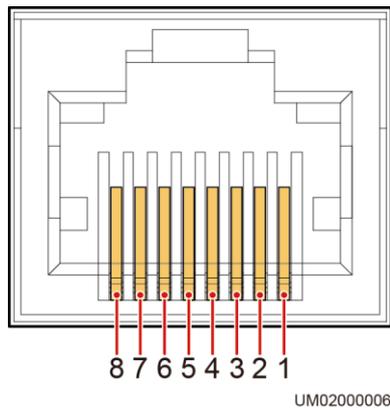


Table 2-14 Pin definitions for the FE_1 port

Pin	Description
1	FE4_TX+
2	FE4_TX-
3	FE4_RX+
4	-
5	-
6	FE4_RX-
7	-
8	-

Functions

In the integrated UPS solution, the intelligent detection card detects the temperatures of the copper bars, switches, and environments of the battery, bypass input, mains input, output, bypass input of the switch cabinet, mains input of the switch cabinet, and output of the switch

cabinet, and monitors the status of the mains input, bypass input, and output switches of the switch cabinet.

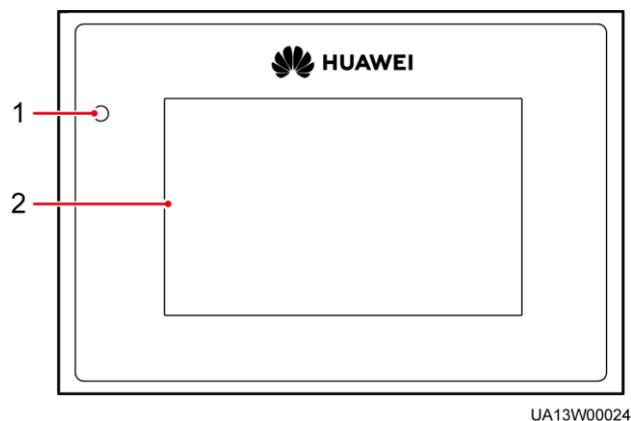
Specifications

- Hot-swappable
- 1 U high

2.5.7 MDU

Appearance

Figure 2-28 MDU



(1) Status indicator

(2) LCD touchscreen

Table 2-15 Indicator status

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 intermittently at 2 Hz.
	Green	The UPS is running properly or a warning has been generated.
Off	-	The MDU is powered off.

NOTE

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

Figure 2-29 MDU ports

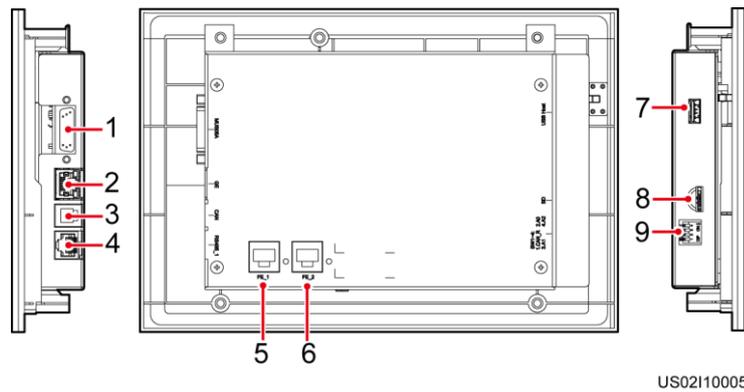


Table 2-16 MDU port description

No.	Port Name	Description
1	MUS05A (DB26)	Connects to the MDU and monitoring interface card.
2	GE	Network port
3	CAN	Reserved
4	RS485_1	Reserved
5	FE_1	Reserved
6	FE_2	Reserved
7	USB Host	<ul style="list-style-type: none"> 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 inspection. <p>NOTE 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.</p> <ul style="list-style-type: none"> Insert a USB flash drive to import and export configuration files, export run logs, and upgrade software.
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 MDU allows you to control UPS operations, view the running status and alarms, and set parameters.

Specifications

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

2.6 Typical Configurations

Table 2-17 Typical UPS configurations

Configuration	Application Scenario
Single UPS	Supplies power to common loads.
1+1 parallel system	Supplies power to large-sized data centers or important loads. It features high reliability and strong transient overload resistance capability.
Dual-bus system	Supplies power to important loads in large- and medium-sized equipment rooms, data centers, and other places that require high reliability. In addition to advantages of common parallel systems, the dual-bus system is free from bottleneck failures, but its configuration is complex.

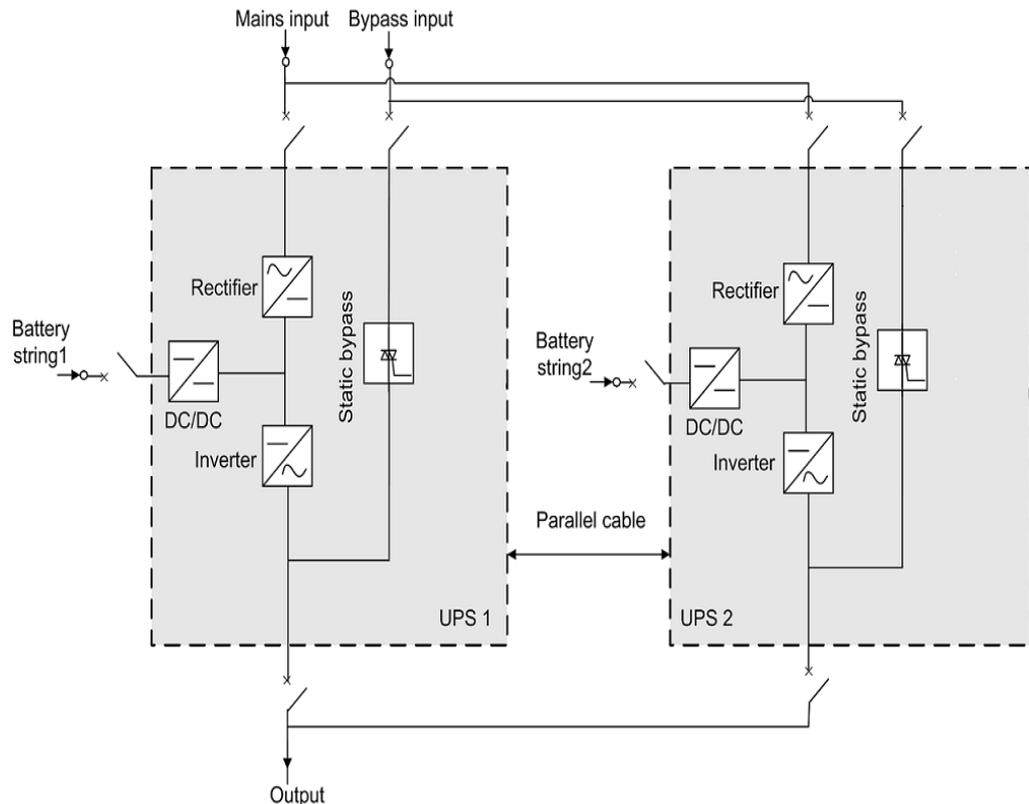
2.6.1 Single UPS

This series uses a modular design in which multiple power modules are connected in parallel to deliver a high loading capacity. If a single power module is faulty, the other power modules continue working. When the load power is small, even a single UPS can provide redundant capacity, which ensures high reliability.

2.6.2 1+1 Parallel System

In a 1+1 parallel system, mains input, bypass input, and AC output terminals of UPSs are connected in parallel. ECMs on different UPSs are connected over parallel cables to synchronize UPS outputs to supply power to loads. If one UPS fails, another UPS continues supplying power to loads, which ensures system reliability.

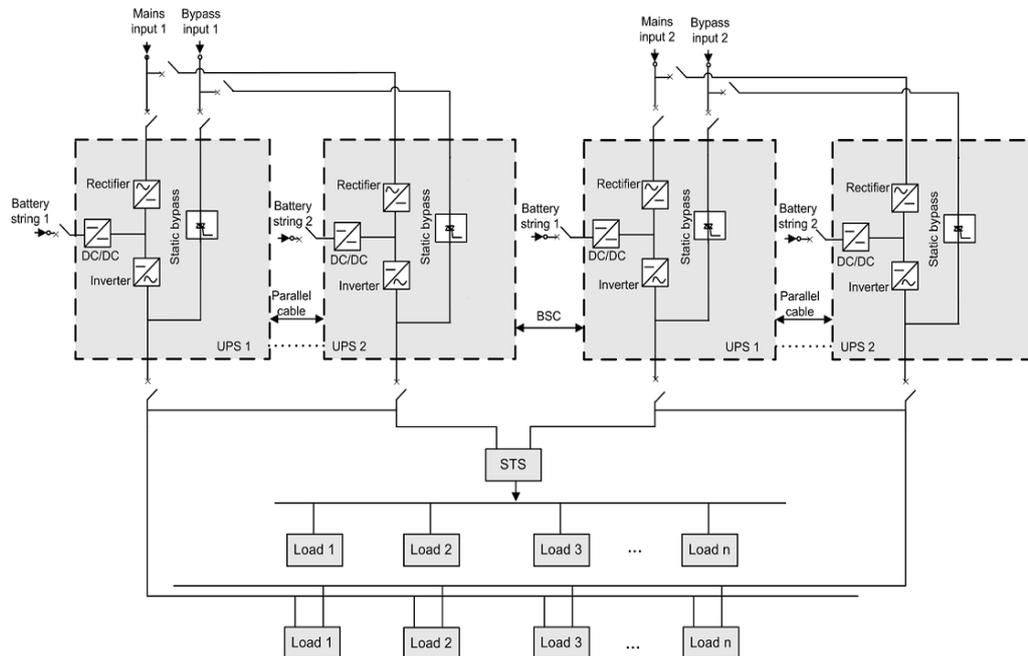
Figure 2-30 Conceptual diagram of a 1+1 parallel system



2.6.3 Dual-Bus System

A dual-bus system consists of two independent 1.2 MW systems. Each 1.2 MW system consists of one or two 1.2 MW UPSs. One of the two UPS systems is a master system, and the other is a slave system. The dual-bus system is highly reliable and is suitable for loads with multiple input terminals. You can install an optional static transfer switch (STS) to start a bus synchronization controller (BSC) provided in standard configuration. The UPS systems work in inverter mode or bypass mode.

Figure 2-31 Conceptual diagram of a dual-bus system



2.7 Optional Components

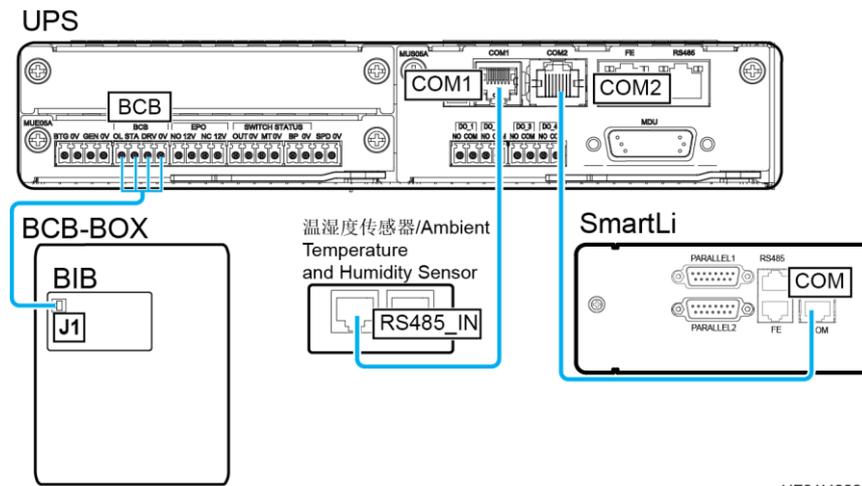
Optional Component	Model	Function
BCB-BOX	<ul style="list-style-type: none"> PDU8000-0400DCV8-BX A001 PDU8000-0630DCV8-BX A001 PDU8000-0800DCV8-BX A001 	Controls the connection between battery strings and the UPS, and supports overload protection, short circuit protection, and remote trip control.
Dry contact extended card	-	Provides extended monitoring ports: five relay output ports and five input ports.
Backfeed protection card	-	Detects mains and bypass backfeed and provides protection.
ECM extended subrack	-	Installed when the UPS is equipped with a backfeed protection card and dry contact extended card. The position for installing the surge protection box subrack and ECM extended subrack is the same, and therefore the two types of subracks cannot be used simultaneously.

Optional Component	Model	Function
Ambient temperature and humidity sensor	-	Monitors ambient temperature and humidity.
BSC cable	5 m/10 m/15 m/60 m	Transmits bus synchronization signals in a dual-bus system.
Parallel cable	5 m/10 m/15 m	Connects UPSs in parallel.
Top air-flow cabinet	-	Applies to the top air-flow scenario. The fan speed can be adjusted.

NOTE

The ECM extended subrack does not support onsite installation. If you require this optional component, inform Huawei when you purchase the UPS so that Huawei can install the subrack before delivery.

Figure 2-32 Signal cable connections for optional components



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3 Installation

3.1 Installation Preparations

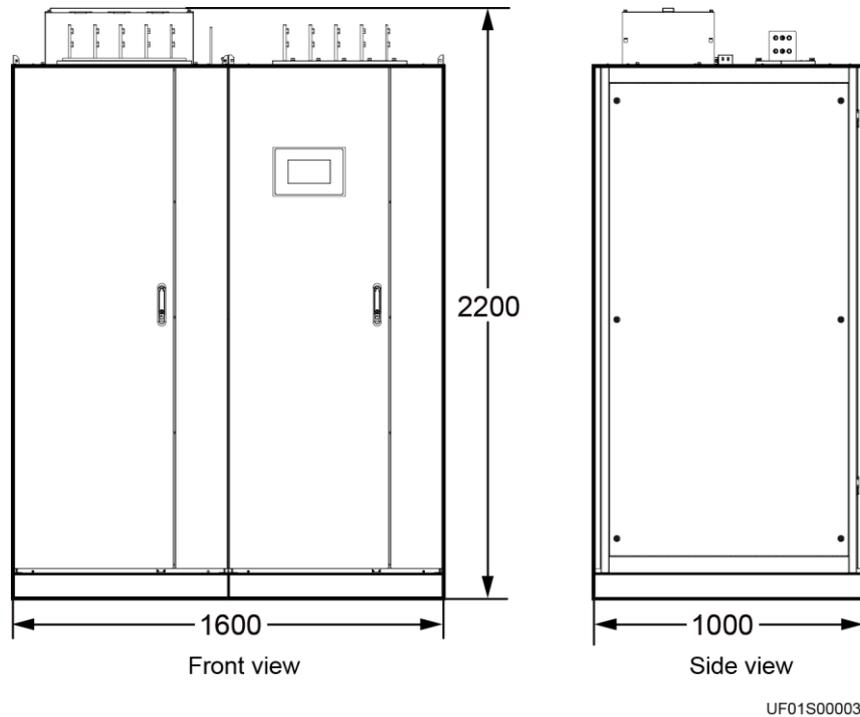
3.1.1 Site

3.1.1.1 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.

3.1.1.2 Installation Clearances

Figure 3-1 Cabinet dimensions (unit: mm)



Reserve the following clearances around the cabinet to facilitate operations and ventilation:

- Reserve a clearance of at least 950 mm from the front of the cabinet for ventilation and operations.
- Reserve a clearance of at least 500 mm from the top of the cabinet for operations.
- Reserve a clearance of at least 500 mm from the rear of the cabinet for ventilation.
 - Reserve a clearance of at least 800 mm if you need to perform operations at the rear of the cabinet.
 - If the top air-flow cabinet is configured, no space is reserved at the rear.

3.1.2 Tools and Instruments

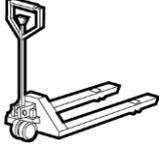
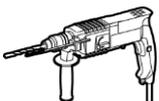
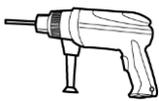
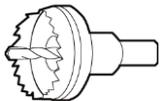
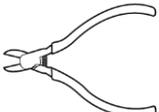
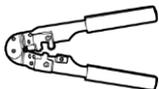
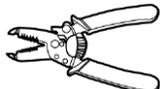
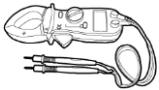
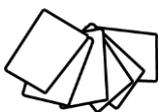
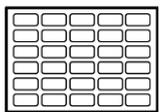
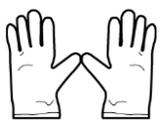
⚠ CAUTION

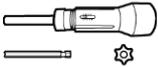
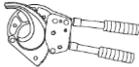
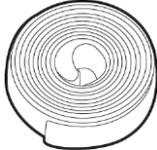
Insulate installation tools to prevent electric shocks.

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

Tools and Meters			
			
Hammer drill and drill bit $\Phi 16$	Hand-held electric drill	Alloy hole saw	Heat gun
			
Diagonal pliers	Crimping tools	Wire stripper	Electric hydraulic pliers
			
Clamp meter	Multimeter	Cable tie	Level instrument
			
Polyvinyl chloride (PVC) insulation tape	Cotton cloth	Label	Electrician's knife
			
Electrostatic discharge (ESD) gloves	Protective gloves	Insulated gloves	Insulation protective shoes
			
Torque screwdriver	Cable cutter	Brush	Flat-head screwdriver (2–5 mm)

Tools and Meters			
			
Phillips screwdriver (M3/M4/M5/M6/M8)	Insulated torque wrench (M6/M8/M12/M16)	Heat shrink tubing	Insulated adjustable wrench
			

 **NOTE**

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.

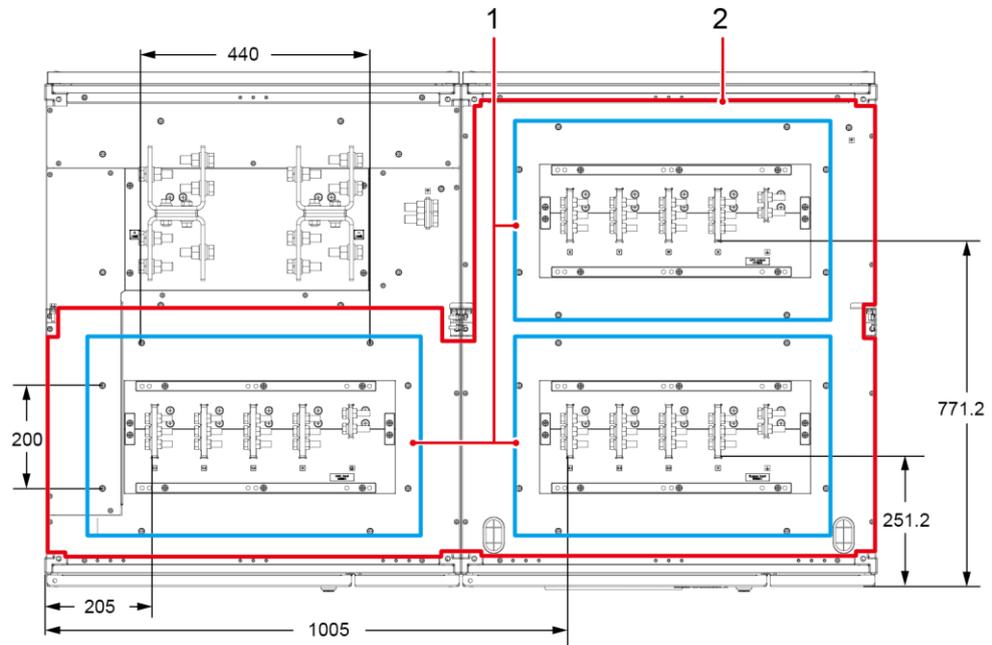
3.1.3 Preparing Power Cables and Copper Bars

NOTICE

- The UPS can generate large leakage currents. A circuit breaker equipped with a residual current device (RCD) is not recommended.
- Copper bars need to be prepared for the mains input, bypass input, and output, and cannot be directly connected using cables.

Prepare mains input, bypass input, and output copper bars based on the following drawings and current requirements.

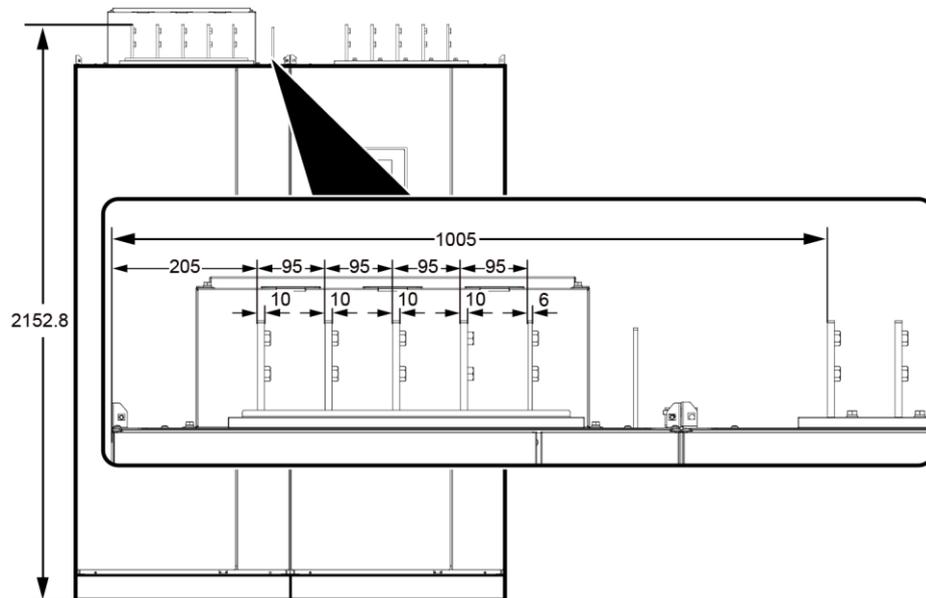
Figure 3-2 Top view of the distance between copper bars on the top (unit: mm)



UF01S00004

- (1) The areas marked by the line boxes are the recommended areas for installing connector boxes.
- (2) The area marked by the line box is reserved for the dense busway.

Figure 3-3 Front view of the distance between copper bars on the top (unit: mm)



UF01S00005

Figure 3-4 Copper bar specifications (unit: mm)

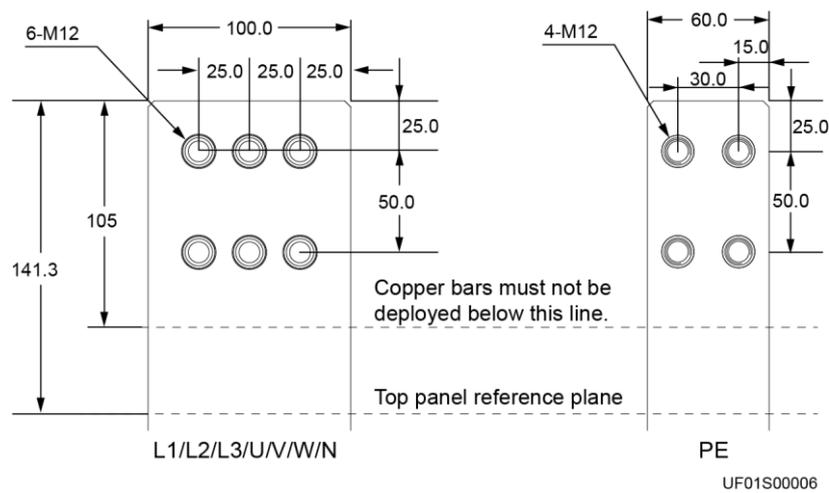


Table 3-2 Recommended cross-sectional areas for power cables

Item		Specifications
Mains input	Mains input current	2229 A
Bypass input	Bypass input current	1823 A
Output	Output current	1823 A
Battery input (lead-acid battery)	Nominal battery discharge current	2632A
	Maximum battery discharge current	3185A
	Recommended cable cross-sectional area	+
-		
Battery input (SmartLi)	Nominal battery discharge current	2467 A
	Maximum battery discharge current	3096 A
	Recommended cable cross-sectional area	For details, see the IEC-60364-5-52 specifications and <i>SmartLi User Manual</i> .
Equipotential ground point	Recommended cable cross-sectional area	16 mm ²

NOTE

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

- The currents listed in the table are measured at a rated voltage of 380 V.
- When selecting, connecting, and routing power cables, follow local safety regulations and rules.

- When the external conditions such as the cable layout or ambient temperatures change, perform verification in accordance with the IEC-60364-5-52 or local regulations.
- 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 to 1.5–1.7 times.
- The nominal battery discharge current refers to the current of forty 12 V batteries at 480 V in standard configuration.
- The maximum battery discharge current refers to the current when forty 12 V batteries in standard configuration, that is, two hundred and forty 2 V battery cells (1.67 V/cell), stop discharging.
- The battery cable specifications are selected based on 40 batteries by default and compatible with application scenarios with 30–50 batteries.
- When the mains input and bypass input share a power source, configure mains input power cables as input power cables. In addition, cables recommended in the table apply only when the following requirements are met:
 - Routing mode: The cables are routed over a tray or bracket in a single layer (E in IEC 60364-5-52). The distance between cables should be greater than twice the cable diameter. Routing mode: The cables are routed over a tray or bracket in a single layer (E multi-core and G single-core in IEC 60364-5-52).
 - The ambient temperature is 30°C.
 - The AC voltage loss is less than 3%, and the DC voltage loss is less than 1%.
 - The 90°C flexible cables with copper conductors are used.
 - It is recommended that AC power cables be no longer than 30 meters and DC power cables be no longer than 50 meters.

NOTICE

When connecting power cables, comply with the tightening torque listed in Table 3-3 to ensure secure connections and prevent safety risks.

Table 3-3 Power cable terminal requirements

Port Description	Connection Method	Bolt Specifications	Bolt Length	Torque
Mains input	Crimped DT terminals	M12	45 mm	47 N·m
Bypass input	Crimped DT terminals	M12	45 mm	47 N·m
Battery input	Crimped DT terminals	M16	55 mm	120 N·m
Output	Crimped DT terminals	M12	45 mm	47 N·m
PE	Crimped DT	M12	45 mm	47 N·m

Port Description	Connection Method	Bolt Specifications	Bolt Length	Torque
	terminals			
Equipotential ground point	Crimped DT terminals	M6	-	4.5 N·m

Table 3-4 Recommended input/output circuit breakers

Circuit Breaker Name	Specifications ^a
Mains input circuit breaker	2500 A/3P
Bypass input circuit breaker	2500 A/3P
Output circuit breaker	2500 A/3P
a: recommended model when the short-circuit current where the circuit breaker is located is less than 65 kA	

 **NOTE**

- The input circuit breakers recommended are for reference only.
- If multiple loads are connected, use recommended specifications for branch circuit breakers.
- The circuit breaker selection principle is to protect loads and cables, and the cascading principle is to achieve specific protection.

3.1.4 Unpacking

Context

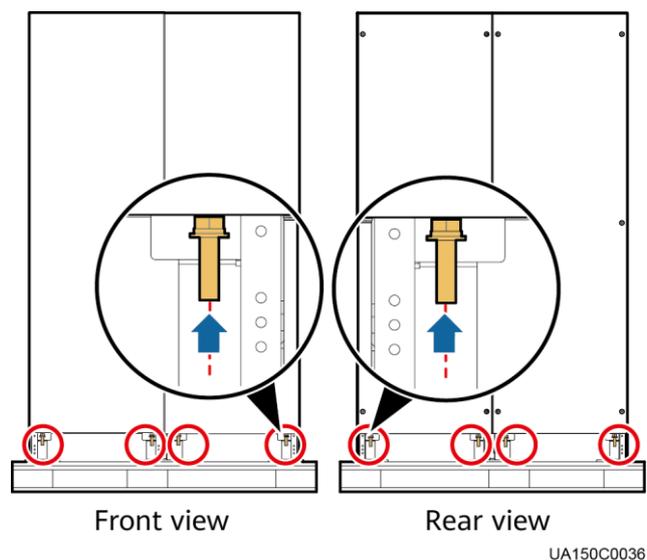
NOTICE

- Only trained personnel are allowed to move the UPS. Use a pallet truck to transport the UPS case secured to a wooden support to the installation position.
- To prevent the UPS from falling over, secure it to an electrical pallet truck using ropes before moving it.
- Move the UPS with caution to avoid bumping or toppling, which may damage the UPS. After placing the case in the installation position, unpack it with caution to prevent scratches. Keep the UPS steady during unpacking.
- If the UPS installation environment is in poor condition and the UPS needs to be stored for a long time after it is unpacked, take measures to prevent dust. It is recommended that the UPS be wrapped with the original plastic coat.

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 confirming that the UPS is intact, remove the bolts that secure the UPS to the pallet and remove the UPS from the pallet.

Figure 3-5 Removing the pallet from the UPS



----End

3.2 Single UPS Installation

When you install the UPS and connect cables, do not step on the front door baffle plate and the door support at the bottom of the cabinet to prevent paint flake-off and deformation. Otherwise, the front door will not be properly closed.

3.2.1 Installing a Cabinet

3.2.1.1 Installation on the Floor

Prerequisites

NOTICE

Ensure that the installation floor is flat.

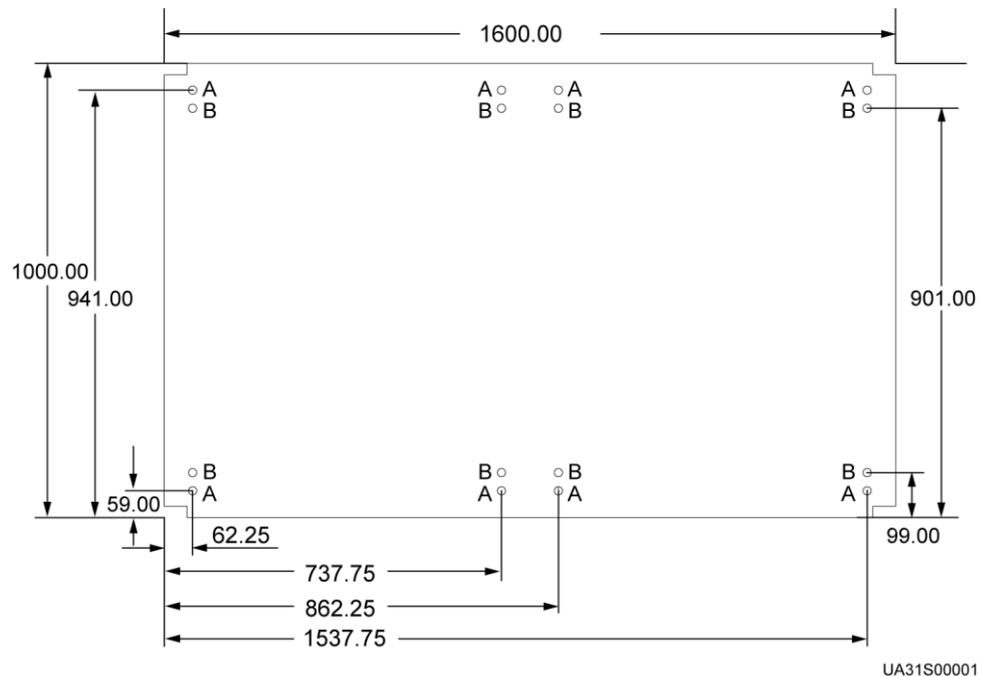
Procedure

Step 1 Determine the cabinet installation positions on the floor based on the holes in the marking-off template for floor installation.

NOTE

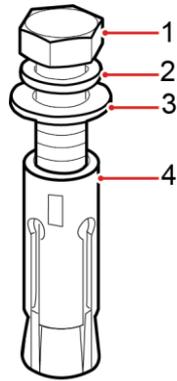
- A: mounting holes on the channel steel
- B: mounting holes on the floor

Figure 3-6 Hole dimensions (unit: mm)



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

Figure 3-7 Expansion bolt composition



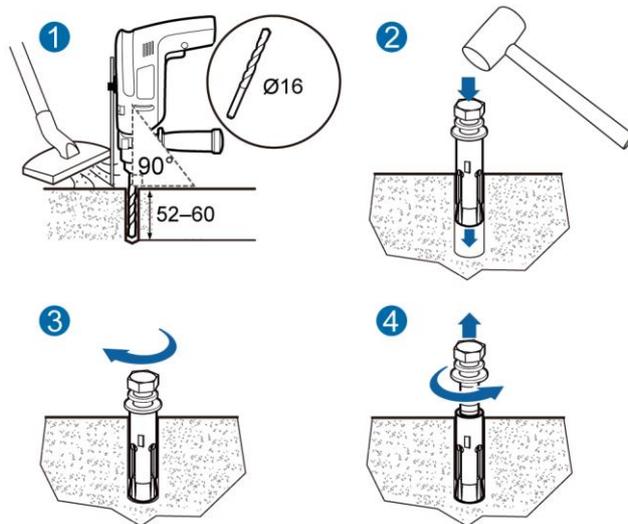
UA10000072

- (1) M12 bolt (2) Spring washer (3) Flat washer (4) Expansion sleeve

NOTICE

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

Figure 3-8 Installing an expansion bolt (unit: mm)

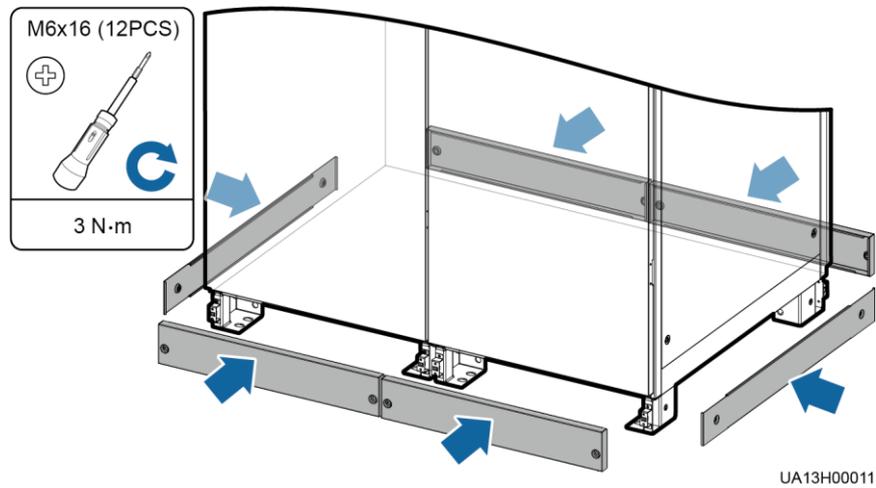


UA10000073

1. Drill a hole into the concrete floor using a hammer drill. The hole depth ranges from 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** Use M12x60 expansion bolts to secure the cabinets to the expansion bolt mounting holes on the floor.
- Step 4** Install anchor baffle plates.

Figure 3-9 Installing anchor baffle plates



----End

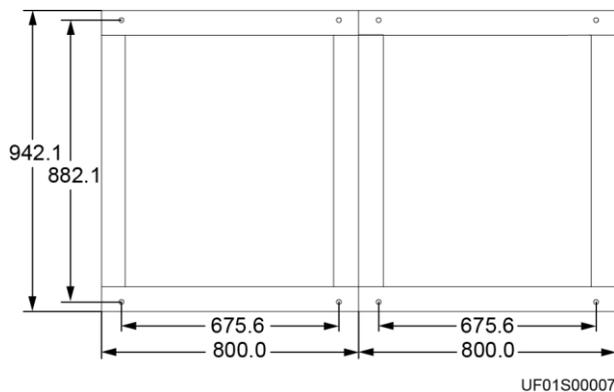
3.2.1.2 Channel Steel Installation

Prerequisites

NOTICE

- Huawei does not provide channel steel or expansion bolts used for securing channel steel.
- Ensure that the surface of channel steels is smooth.

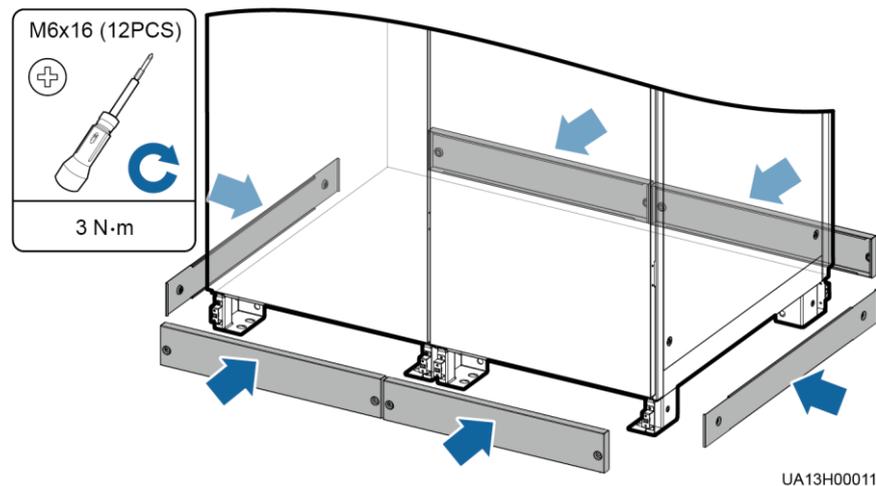
Figure 3-10 Recommended channel steel dimensions (unit: mm)



Procedure

- Step 1** Determine the cabinet installation positions on the channel steel based on holes in the marking-off template for channel steel installation.
- Step 2** Drill mounting holes on the channel steels using a hammer drill.
- Step 3** Use M12x60 common bolts to secure the UPS to the channel steel in sequence.
- Step 4** Install anchor baffle plates.

Figure 3-11 Installing anchor baffle plates



----End

3.2.2 UPS Cable Connection Reference

Context

WARNING

- 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.

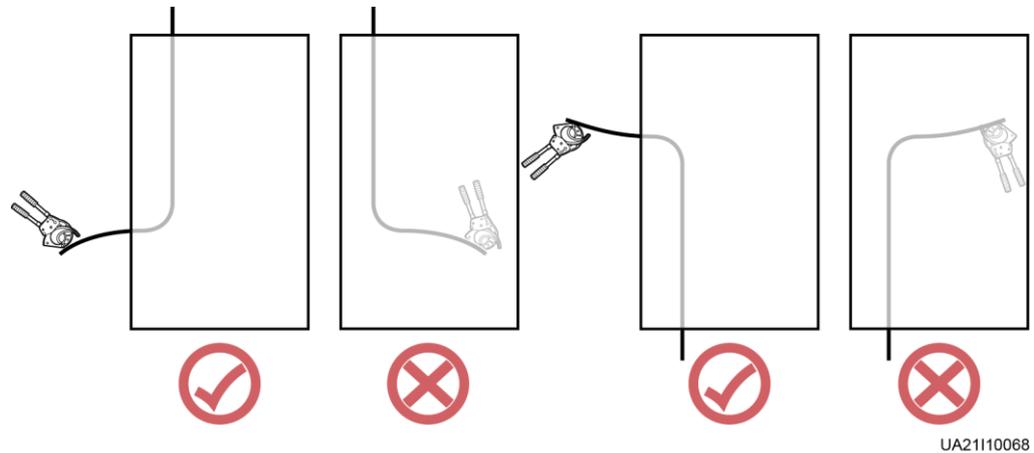
Procedure

- 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 3-12 Preparing a cable terminal outside the cabinet



NOTE

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.

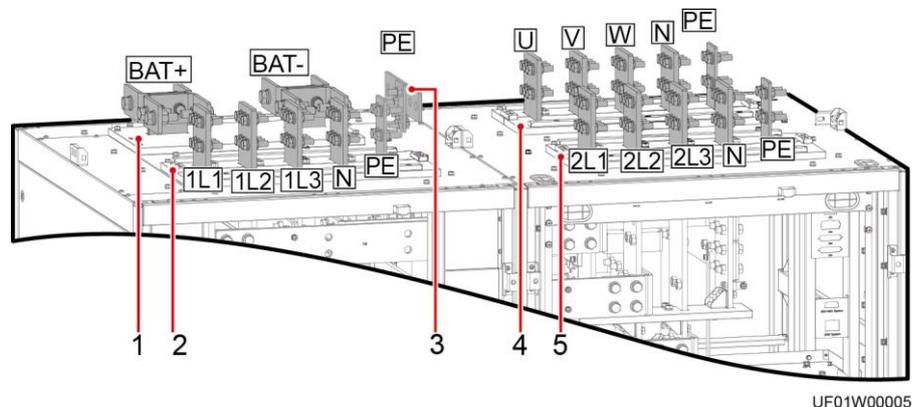
Step 5 Clean foreign matter inside the cabinet.

----End

3.2.3 Installing Cables and Copper Bars

Context

Figure 3-13 Copper bar positions



(1) Battery input

(2) Mains input

(3) Battery PE

UF01W00005

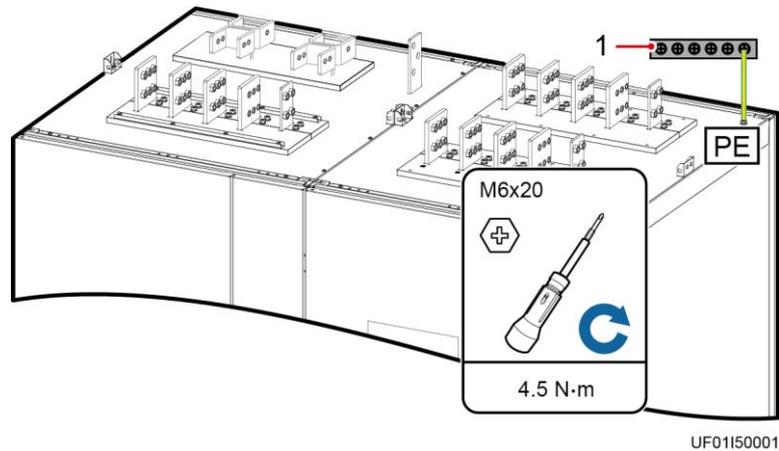
(4) UPS output

(5) Bypass input

Procedure

Step 1 Connect the equipotential ground point and the ground bar in the equipment room.

Figure 3-14 Connecting the equipotential ground point



(1) Ground bar in the equipment room

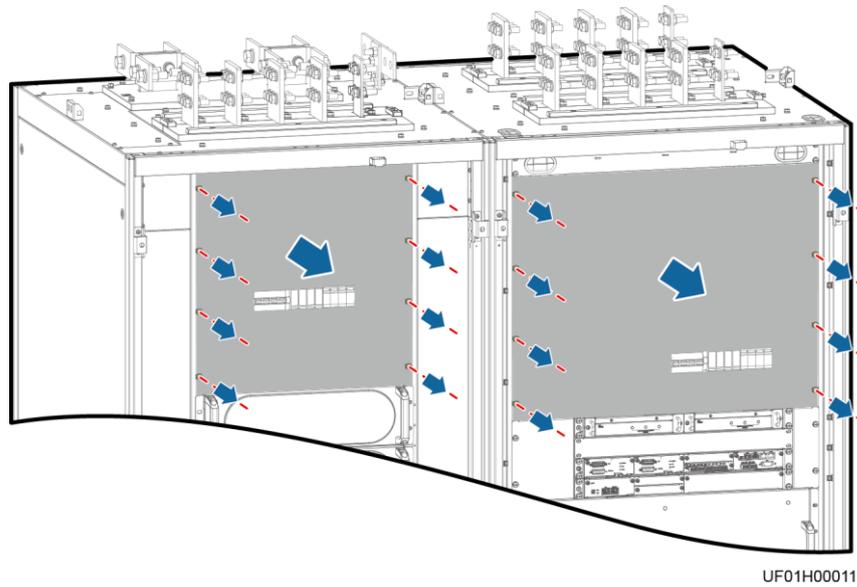
Step 2 (Optional) Remove the copper bars between the mains input and bypass input.

NOTICE

Perform this step only when the mains input and bypass input use different power sources.

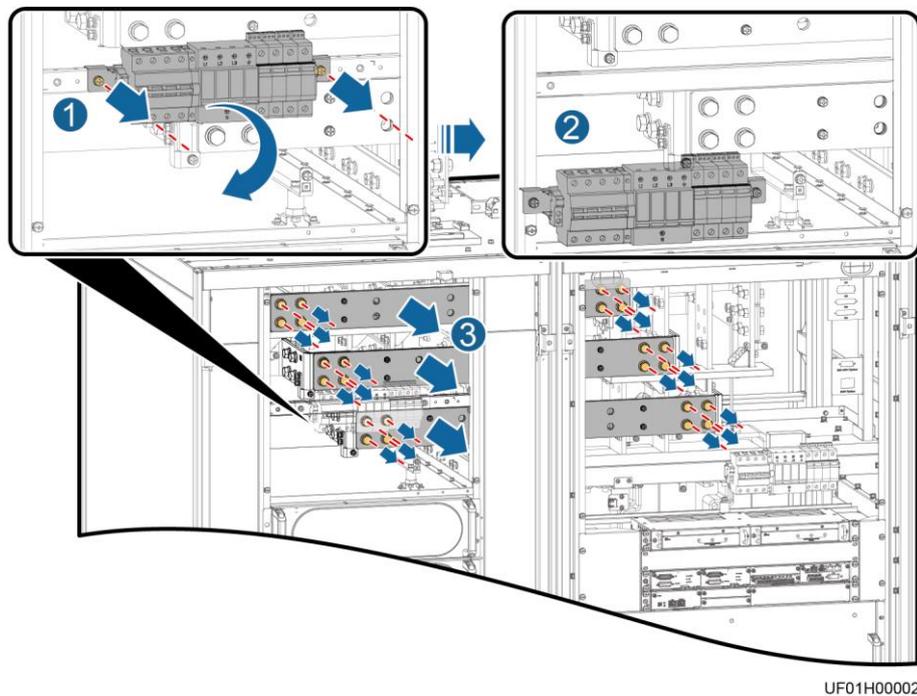
1. Remove the covers.

Figure 3-15 Removing the covers



2. Remove the screws that secure the guide rail of the SPD.
3. Place the SPD on the horizontal plate (without removing the cables).
4. Remove the copper bars.
5. Reinstall the SPD.

Figure 3-16 Removing copper bars

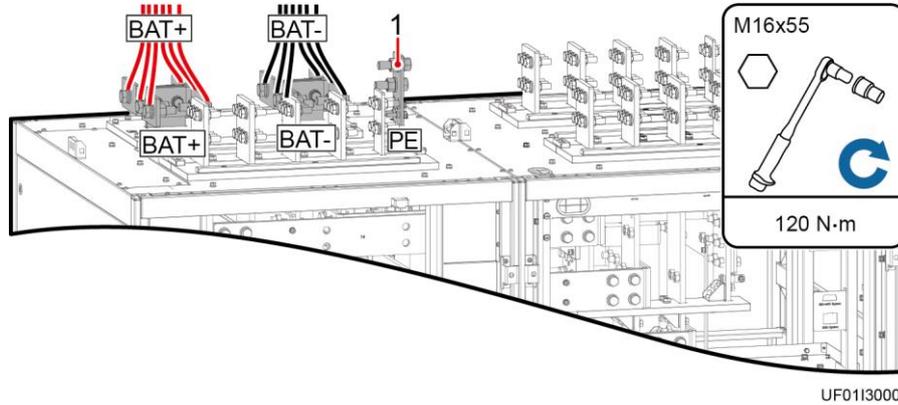


Step 3 Install battery cables.

NOTE

The number and colors of cables are for reference only.

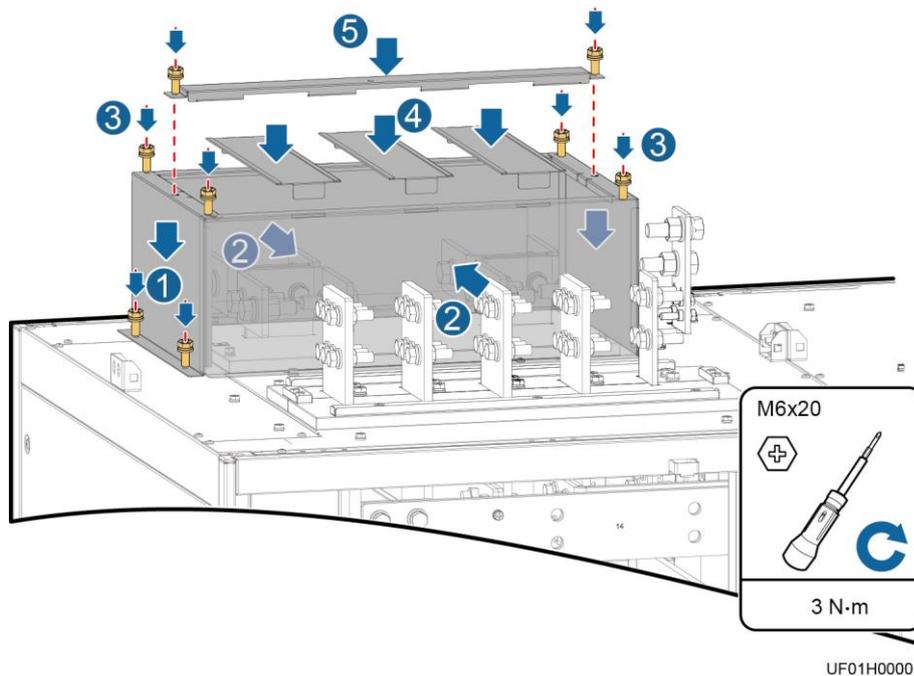
Figure 3-17 Installing battery cables



(1) Connect the ground cable of the battery string or its BBB box to the battery PE of the UPS or the ground bar in the equipment room based on the site survey.

Step 4 Install top supports and covers of the battery terminal protective covers.

Figure 3-18 Installing top supports and covers



Step 5 Connect input and output busbars based on the top copper bar position diagram.

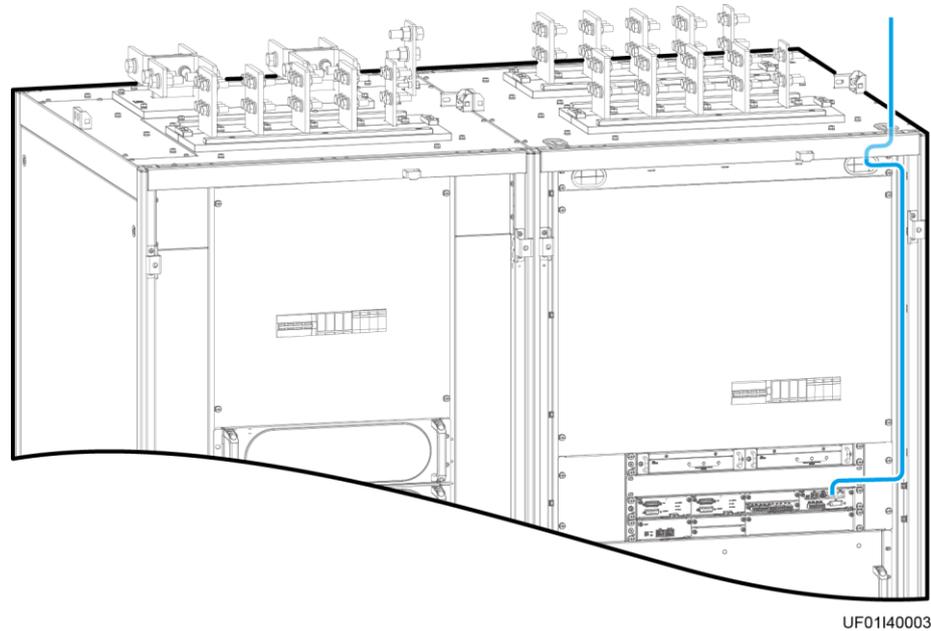
Table 3-5 Power cable terminal requirements

Port Description	Connection Method	Bolt Specifications	Bolt Length	Torque
Mains input/bypass input/output/PE	Crimped DT terminals	M12	45 mm	47 N·m

Step 6 Prepare and install a power distribution unit based on site requirements. (For details about the hole dimensions, see Figure 3-2.)

Step 7 Install a signal cable.

Figure 3-19 Installing a signal cable



----End

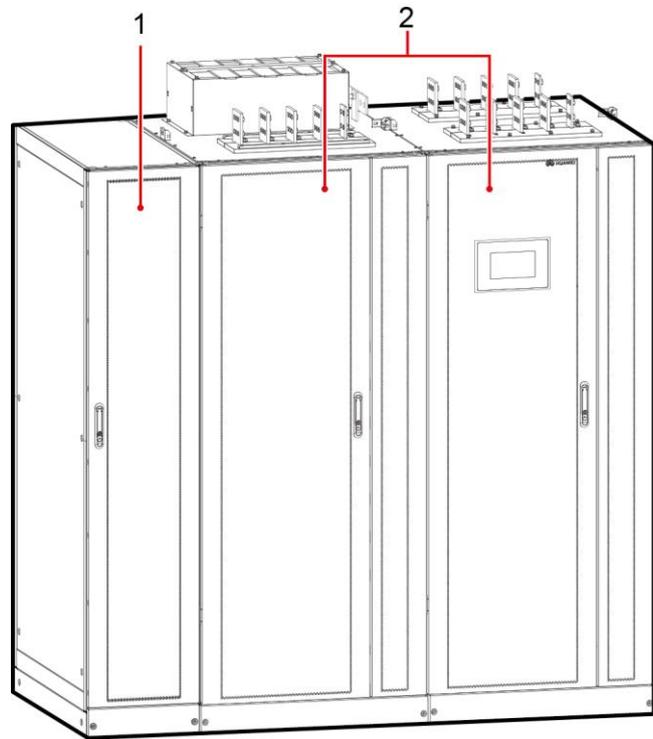
3.2.4 Installing Optional Components

3.2.4.1 Installing the Top Air-Flow Cabinet

Install the top air-flow cabinet when the UPS is installed against a wall.

Appearance

Figure 3-20 Appearance

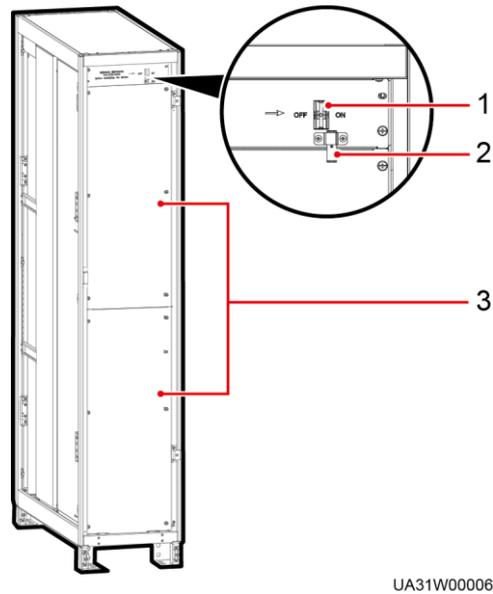


UF01W00006

(1) Top air-flow cabinet

(2) UPS

Figure 3-21 Top air-flow cabinet structure



UA31W00006

(1) Fan power switch

(2) Cover stopper

(3) Cover

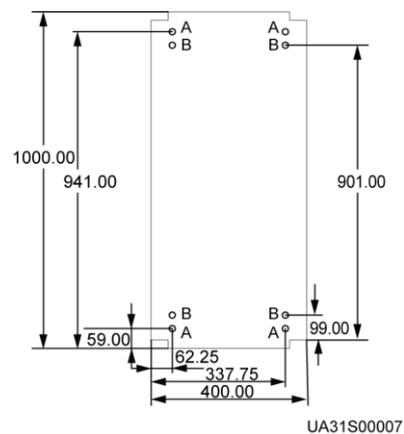
Installing Cabinets

Step 1 Determine the positions for installing cabinets on the mounting surface based on holes in the marking-off template.

NOTE

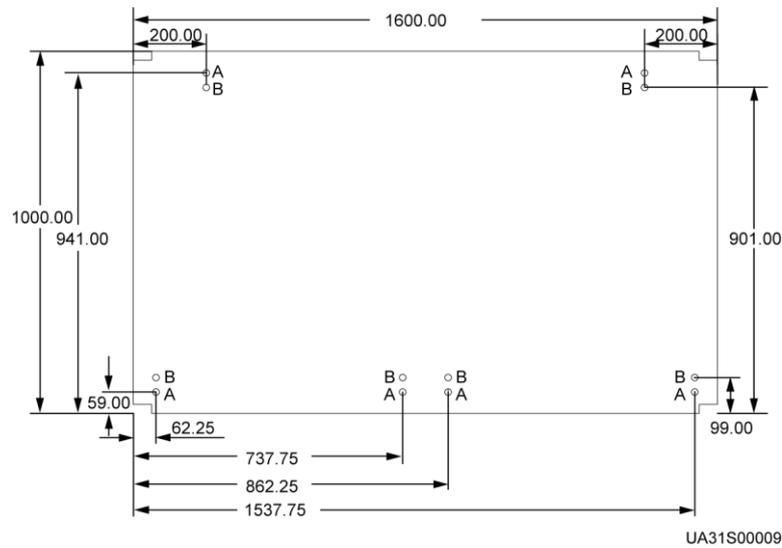
- A: mounting holes on the channel steel
- B: mounting holes on the floor

Figure 3-22 Fan unit hole dimensions (unit: mm)



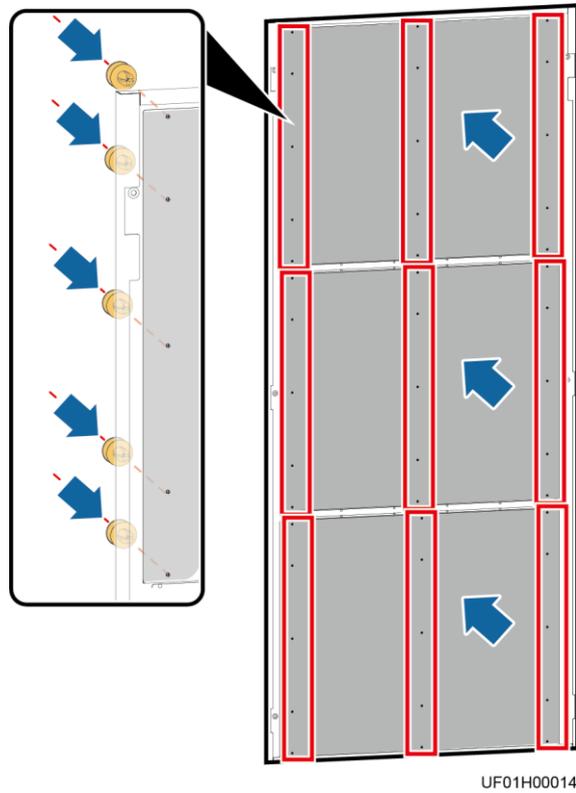
UA31S00007

Figure 3-23 UPS hole dimensions (unit: mm)



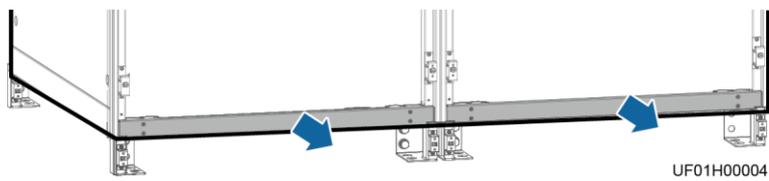
- Step 2** Use a hammer drill to drill holes for installing expansion bolts and then install expansion sleeves in the holes.
- Step 3** Remove the left panel and front panels from the UPS cabinets.
- Step 4** Install the accessories of the top air-flow cabinet.
1. Remove the rear door panels from the UPS cabinets.
 2. Secure the PC panel to the inner side of the rear door panel from the outer side of the rear door using plastic rivets.

Figure 3-24 Securing the PC panel



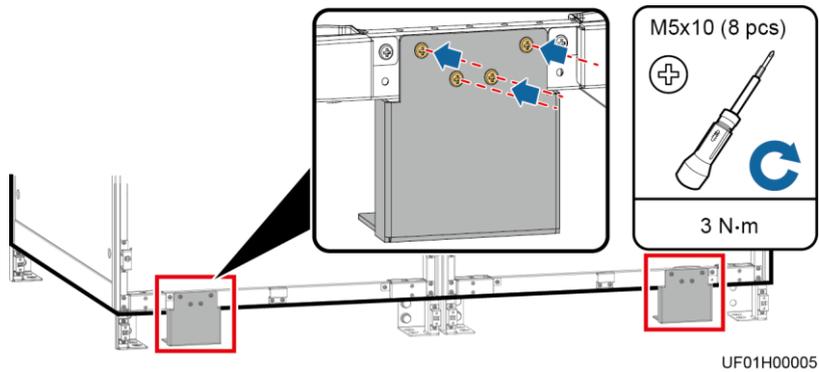
3. Remove the door sills from the rear of the UPS cabinets.

Figure 3-25 Removing door header sills (rear view of the cabinets)



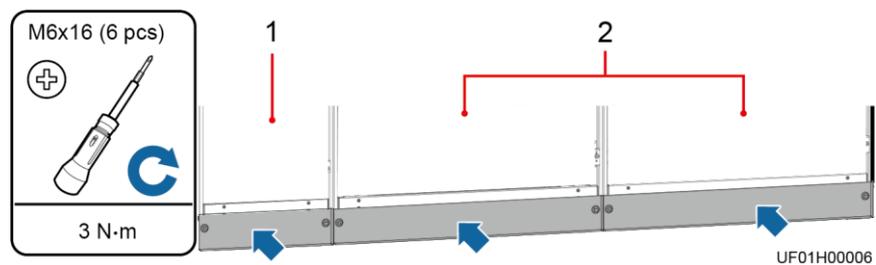
4. Install the accessories of the top air-flow cabinet.

Figure 3-26 Installing accessories of the top air-flow cabinet (rear view of the cabinets)



5. Reinstall the door sills and rear door panels.
6. Install anchor baffle plates at the rear of each cabinet.

Figure 3-27 Installing anchor baffle plates at the rear of each cabinet



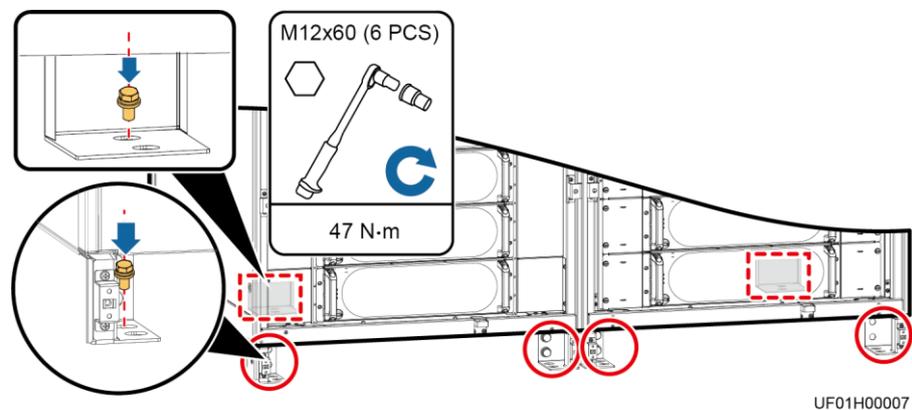
(1) Top air-flow cabinet

(2) UPS cabinets

Step 5 Secure the cabinets.

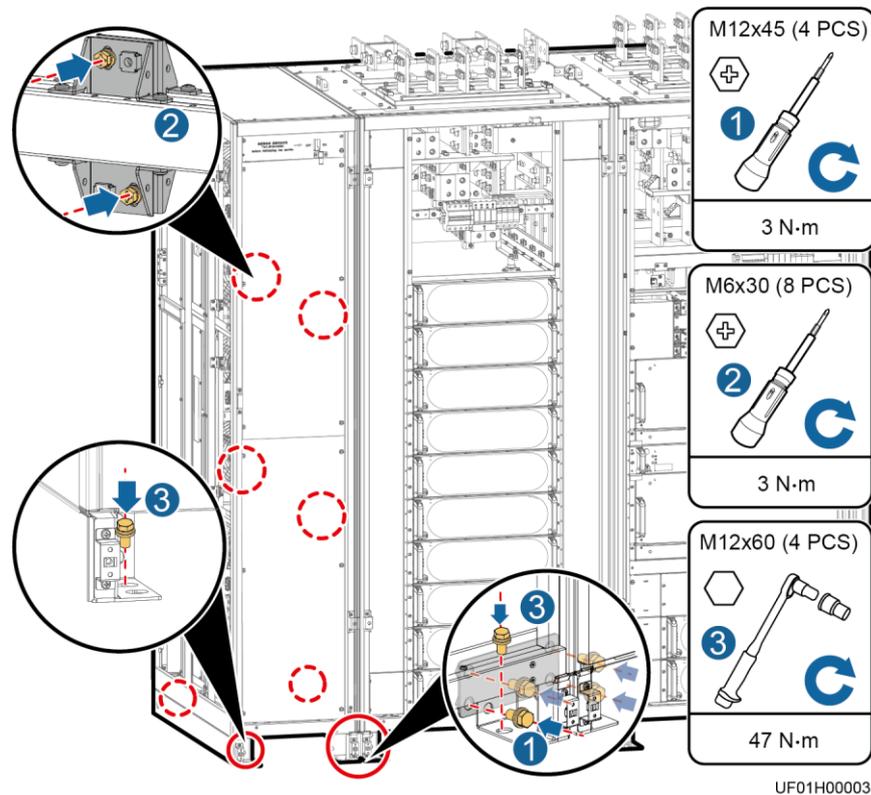
1. Use M12x60 expansion bolts to secure the UPS cabinets to the expansion bolt mounting holes on the floor.

Figure 3-28 Securing UPS cabinets



2. Combine the top air-flow cabinet with the UPS.
 - a. Install connecting kits from the bottom to the middle.
 - b. Remove the bottom cover from the top air-flow cabinet.
 - c. Tighten the anchor bolts.
 - d. Reinstall the bottom cover.

Figure 3-29 Combining the top air-flow cabinet with the UPS



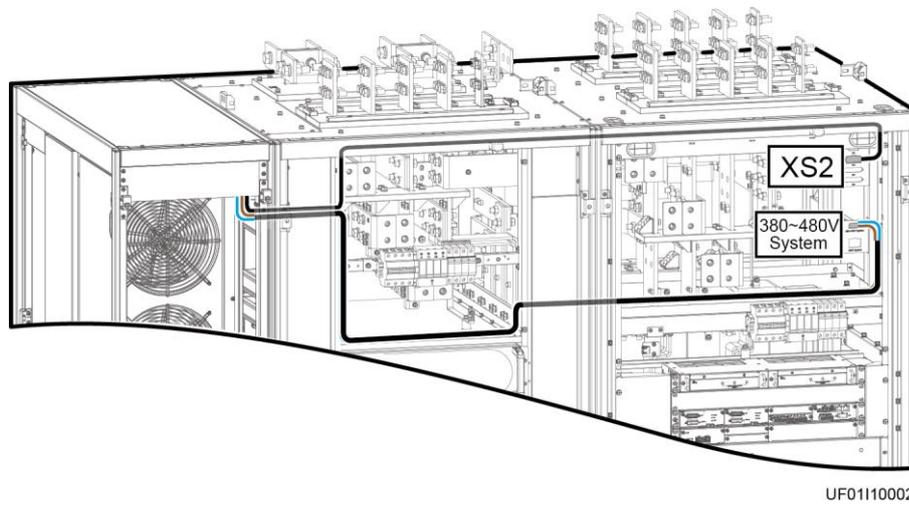
Step 6 Install the removed side panel on the side of the top air-flow cabinet.

Step 7 Install anchor baffle plates on the side and front of each cabinet.

Step 8 Install the cables.

1. Remove an accessory cover from the top of the top air-flow cabinet.
2. Connect the power cable to the 380~480V System port on the UPS and the signal cable to the XS2 port.

Figure 3-30 Power supply to the top air-flow cabinet



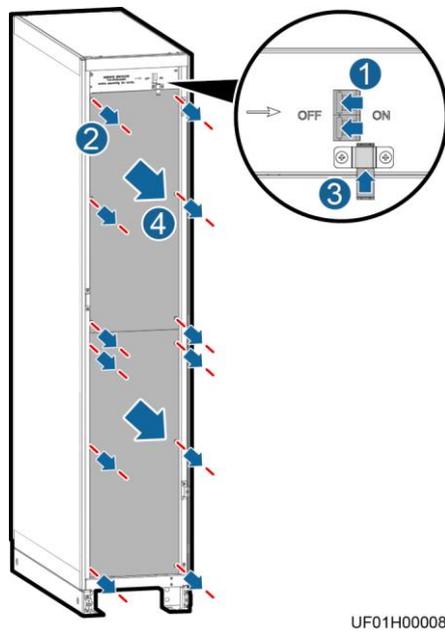
----End

Replacing Fans

If a fan is faulty, perform the following steps to replace it.

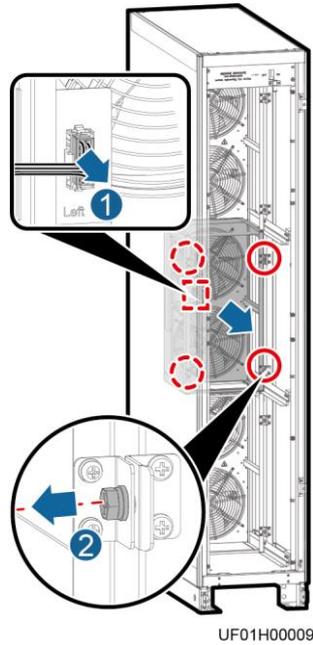
Step 1 Switch off the circuit breaker, remove the cover stoppers, and remove the covers.

Figure 3-31 Removing covers



Step 2 Remove the cables and fan assembly.

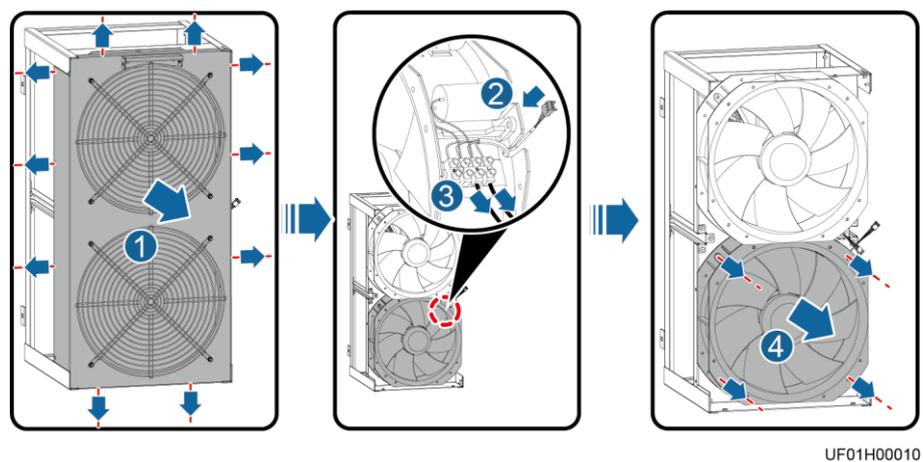
Figure 3-32 Removing the fan assembly



Step 3 Remove the fan.

1. Remove the fan cover.
2. Remove the terminal of the fan signal cable.
3. Remove the fan power cable and label it.
4. Remove the faulty fan.

Figure 3-33 Removing the faulty fan



Step 4 Install the new fan, and install the fan power cable and signal cable.

Step 5 Reinstall the fan cover.

Step 6 Reinstall the fan assembly and install cables.

Step 7 Reinstall the cover and switch on the circuit breaker.

Step 8 Clear the fault alarm.

----End

3.2.4.2 Connecting Cables Between the UPS and the SmartLi

Prerequisites

If the SmartLi is configured, perform the following steps to connect cables.

Procedure

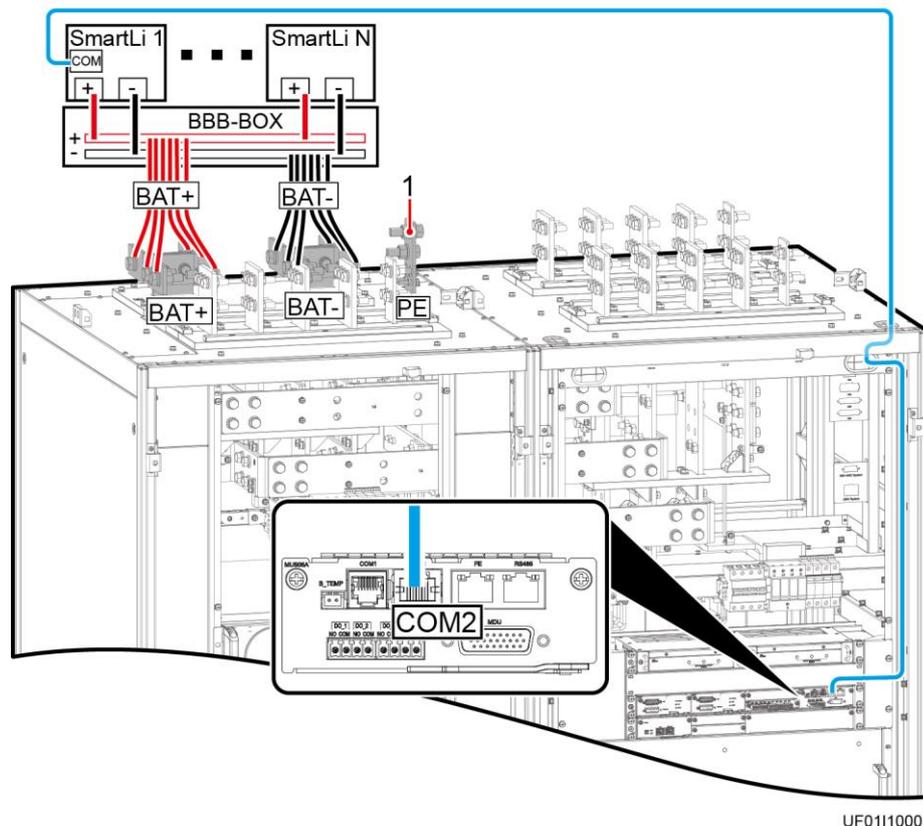
Step 1 Connect cables between the UPS and the SmartLi.

1. Connect battery cables to each SmartLi.
2. Connect the COM2 port on the monitoring interface card (MUS05A) in the control module to the COM port on the master SmartLi cabinet.

NOTE

The number and colors of cables are for reference only.

Figure 3-34 Cable connection diagram



(1) Connect the ground cable of the SmartLi to the battery PE of the UPS or the ground bar

in the equipment room based on the site survey.

----End

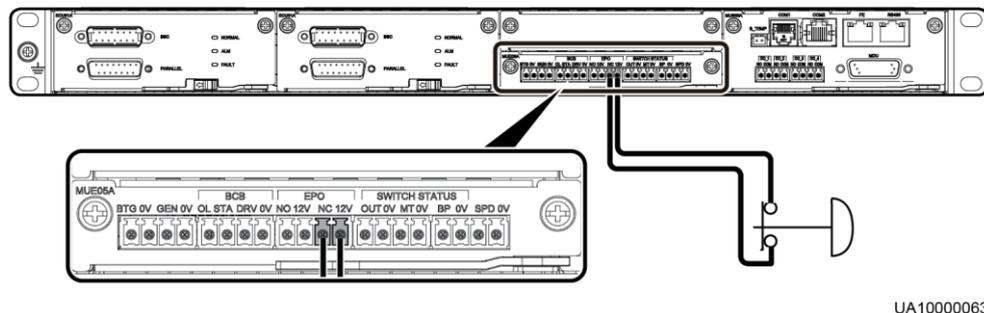
3.2.5 Remote EPO

NOTICE

- Huawei does not provide the EPO switch or cable. If the cable is required, the recommended cable is 22 AWG.
- Equip the EPO switch with a protective cover to prevent misoperations, and cover the cable with protective tubing.
- Triggering EPO will shut down the rectifier, inverter, charger, and static bypass, but does not disconnect the UPS mains input. To power off the UPS completely, open the front-end input switch when triggering EPO.

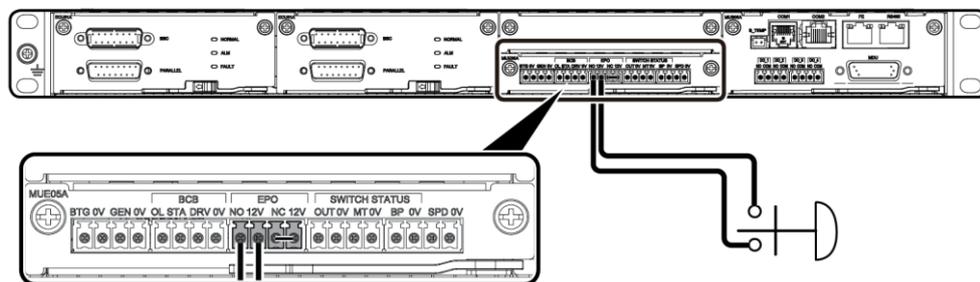
Connect the requisite EPO switch to UPS dry contacts.

Figure 3-35 Cable connection for an NC EPO switch



UA1000063

Figure 3-36 Cable connection for an NO EPO switch



UA1000062

NOTE

- When the EPO switch is in the NC state, remove the jumper between EPO_NC and EPO_12V before connection. When the EPO switch is turned off, 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 the EPO switch is turned on, EPO is triggered.

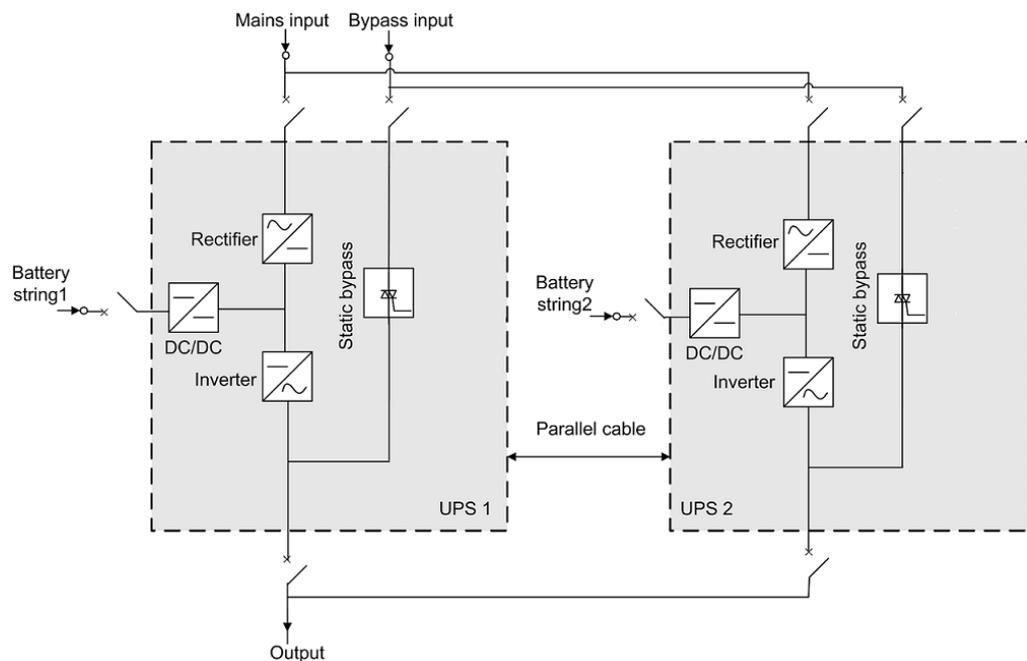
3.3 Parallel System Installation

3.3.1 Connecting Power Cables

Procedure

- Step 1** Ground each UPS in a parallel system separately, and connect power cables and battery cables.
- Step 2** Choose a parallel mode and connect cables to the parallel system based on site requirements.

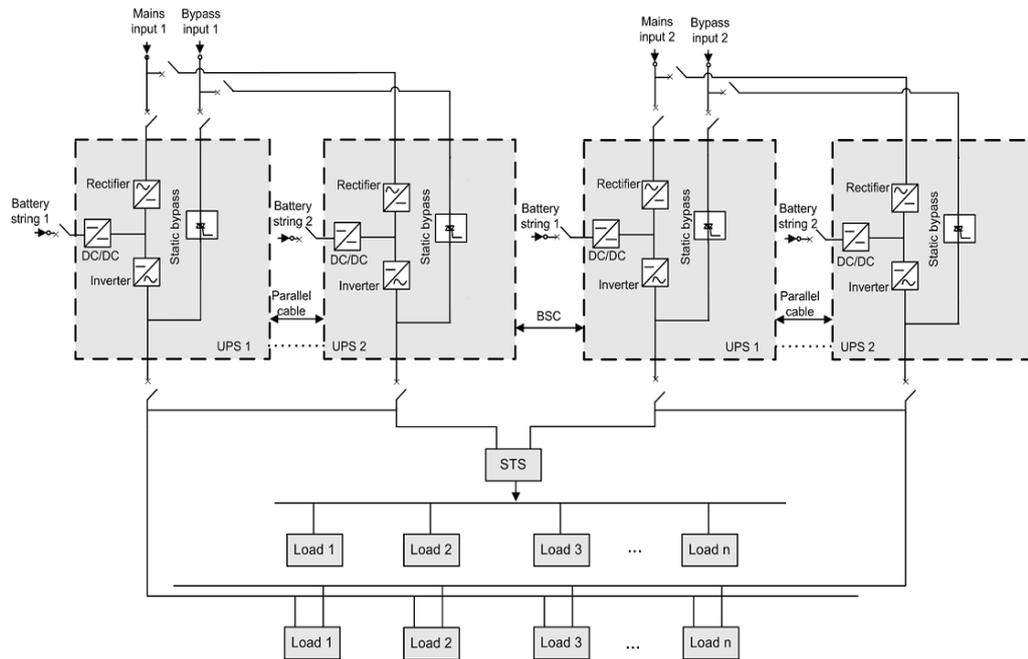
Figure 3-37 Conceptual diagram of a 1+1 parallel system



NOTICE

Connect power cables according to port silk screens.

Figure 3-38 Conceptual diagram of a dual-bus system



NOTICE

The length and specifications of power cables on each UPS should be the same to achieve current equalization in bypass mode. The power cables include bypass input power cables and UPS output power cables.

----End

3.3.2 Connecting Signal Cables

Connecting Signal Cables to a Parallel System

NOTICE

Figures show only the CM, which stands for the UPS.

Figure 3-39 Connecting signal cables in a 1+1 parallel system

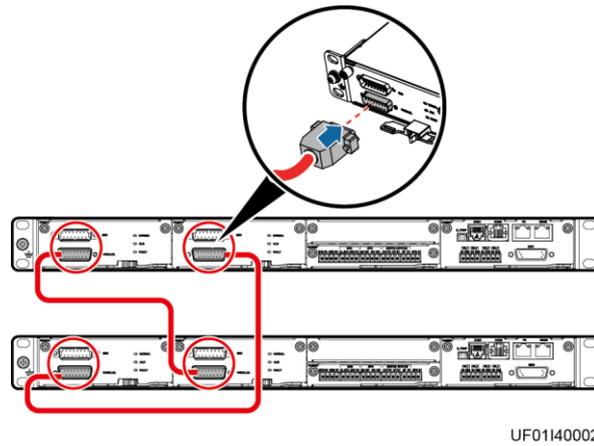
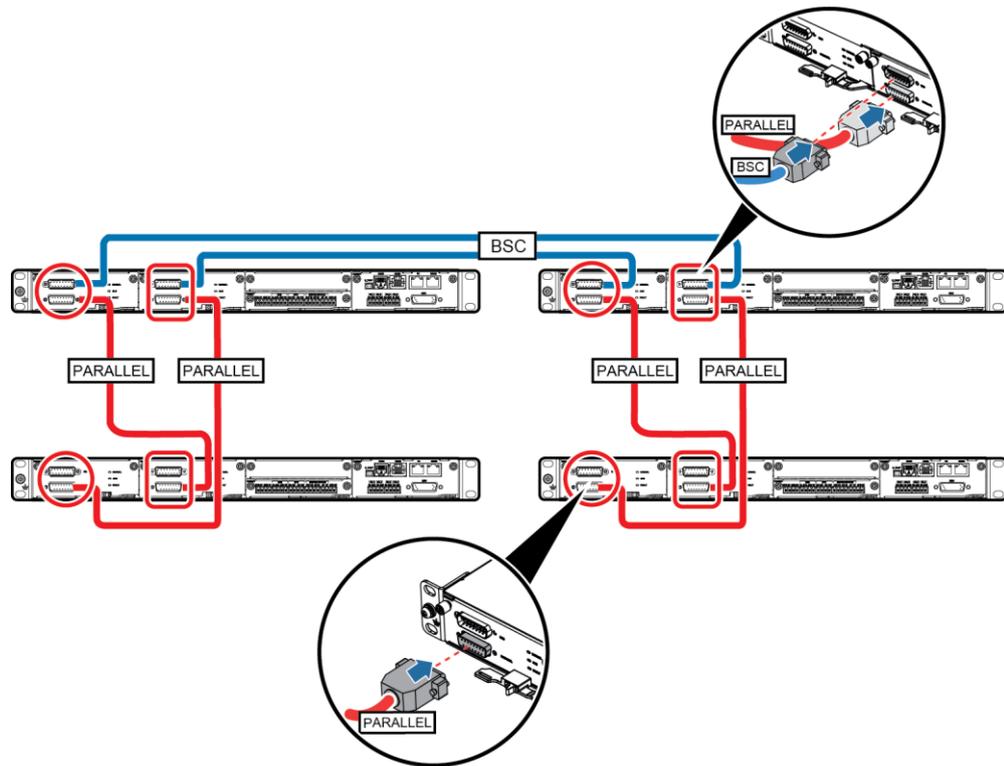


Figure 3-40 Connecting signal cables in a single UPS dual-bus system



Connecting Other Signal Cables

Connect signal cables for each UPS.

3.4 Verifying the Installation

Table 3-6 lists check items and acceptance criteria.

NOTICE

You need to carefully check items 08 and 09 listed in Table 3-6. If the check results of these two items do not meet the acceptance criteria, the UPS may be damaged.

Table 3-6 Check items and acceptance criteria

No.	Item	Acceptance Criteria
01	UPS installation	The UPS is securely installed and does not tilt due to vibration.
02	Neat arrangement	The UPS and its adjacent cabinets are neatly arranged and secured with connecting kits.
03	Layout of the busway and cables	The busway and cables are routed properly as required by the customer.
04	Labels on the busway and cables	Both ends of a busway and cable are labeled. Labels are concise and easy to understand.
05	Cable ties	Cable ties are secured evenly and no burr exists.
06	Cable and busbar connections	The input busbar, output busbar, and battery cables are securely connected. For the cables secured by screws, the spring washers are flattened.
07	Grounding	The resistance between the UPS ground bar and the equipment room ground bar is less than 0.1 ohm.
08	AC phase sequence	The mains input, bypass input, and output phase sequences are correct.
09	Battery cable connections	The battery strings are correctly connected to the UPS.
10	Foreign matter cleaning inside the cabinets	The inside and outside of the cabinets are free from conductive dust or other sundries. <ol style="list-style-type: none"> 1. There is no foreign matter (such as copper wires and screws) on the top of the cabinets. 2. There is no foreign matter on the copper bar terminals. 3. There is no foreign matter around switch terminals. 4. There is no foreign matter on the bottom plates of the cabinets.

No.	Item	Acceptance Criteria
		5. There is no foreign matter on the rear module subrack.

 **NOTE**

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

4 User Interface

NOTICE

User interfaces provided in this document correspond to the MDU version V500R021C00SPC100 and are for reference only.

4.1 LCD Interface

4.1.1 Main Menu

The LCD screen is divided into three parts: status bar, alarm bar, and information area. Figure 4-1 shows the default main menu. Table 4-1 describes the functions of the areas on the menu.

Figure 4-1 Main menu

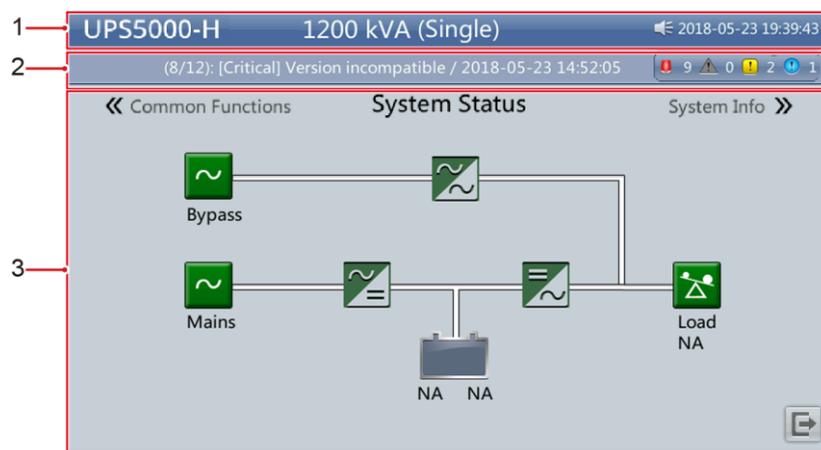


Table 4-1 Main menu description

No.	Area	Function
-----	------	----------

No.	Area	Function
1	Status bar	Provides the system model, capacity, configuration, current date and time, 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 to open the active alarm screen.
3	Information area	Displays the current power flow and key information about loads and batteries. Tap icons for Bypass , Mains , Battery , and Load to view details.

Table 4-2 describes the functions of common buttons.

Table 4-2 Functions of common buttons

Button	Function
	Returns to the main menu.
	Scrolls the page down.
	Scrolls the page up.
	Returns to the upper-level menu.
	Logs a user out.

4.1.2 System Info

On the main menu, tap **System Info** to access the **System Info** screen, as shown in Figure 4-2.

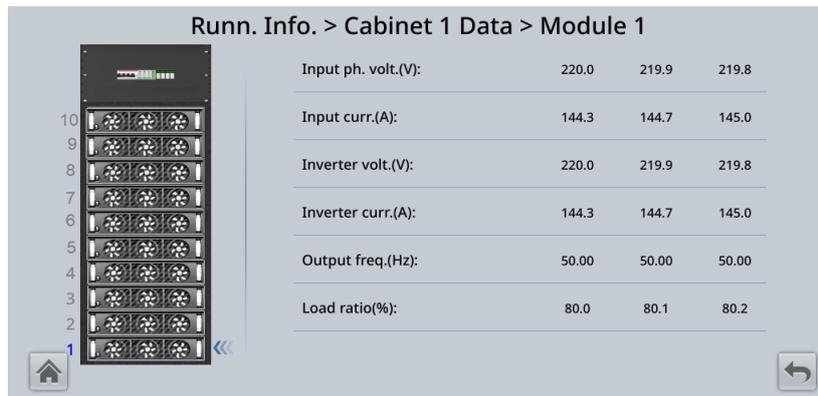
Figure 4-2 System Info



4.1.2.1 Module Data

On the **System Info** screen, tap the UPS picture. The **Cabinet N Data** screen is displayed. Select a module to view its running data. indicates the selected module, as shown in Figure 4-3.

Figure 4-3 Module data



4.1.2.2 Runn. Info.

On **System Info**, tap . The **Runn. Info.** screen is displayed.

Figure 4-4 Runn. Info. screen 1

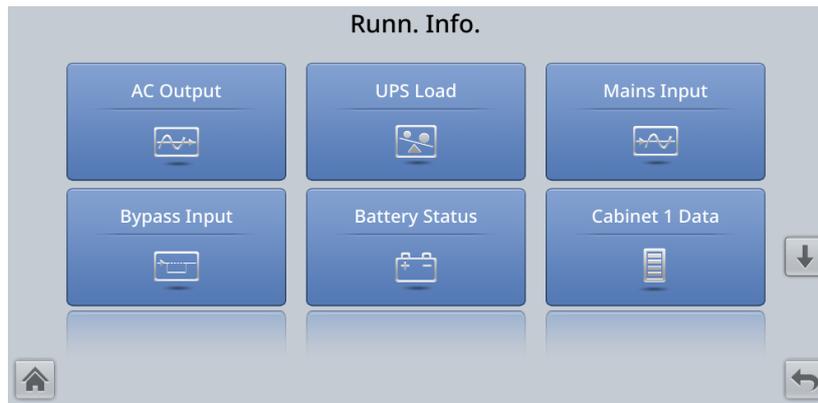
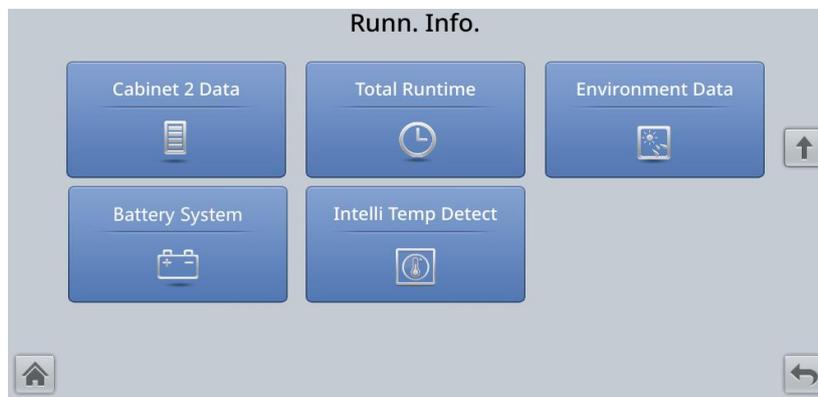


Figure 4-5 Runn. Info. screen 2



NOTE

- If lead-acid batteries are used and **Number of iBOXs** in **System Info > Settings > iBOX Settings > Basic Param.** is not 0, **Battery System** is displayed on the **Runn. Info.** screen.
- If **Current equalization detection** in **Monitoring > Running Parameter > Output Setting** on the WebUI 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
Load ratio(%)	Load rate of each phase on the UPS, that is, proportion of actual power to rated power
Current crest factor	Proportion of the peak value of load current to the valid value
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
Hist. max. load rate(%)	Historical maximum load rate 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)	Current operating temperature of the battery (A battery sensor is required. If no sensor is connected, N/A is displayed.)
Backup time (min)	Battery backup time estimated at the current load
Remaining cap. (%)	Remaining battery capacity
SOH	State of health
Maximum Cell Temperature (°C) (only for lithium batteries)	-
Min Cell Temperature (°C) (only for lithium batteries)	-

Table 4-8 Total Runtime

Item	Description
Bypass runtime (h)	Total time during which the UPS runs in bypass mode
Inv. runtime (h)	Total time during which the UPS runs in inverter mode

 **NOTE**

The value takes 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

Item	Description
	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 (An ambient temperature and humidity sensor is required. If no sensor is connected, N/A is displayed.)

- **Cabinet N Data:** displays data of a module.
- **Battery System > Battery String Summary:** displays the voltage, current, state of charge (SOC), and SOH of each battery string.
- **Battery System > Battery String N:** displays the temperature, voltage, internal resistance, current, SOC, and SOH of a single battery in the battery string.
- **Intelli Temp Detect:** displays the temperatures of the copper bars, switches, and environments of batteries, bypass input, mains input, output, bypass input of the switch cabinet, mains input of the switch cabinet, and output of the switch cabinet.

4.1.2.3 Alarms

On **System Info**, tap . The **Alarms** screen is displayed.

Figure 4-6 Alarms screen



Active Alarms

The alarm severity, alarm name, alarm ID, location, and generation time are displayed in the record.

Historical Alarms

The alarm severity, alarm name, alarm ID, location, generation time, and clearance time are displayed.

Buzzer Off

Two buzzer control items are available:

- Buzzer on
If the buzzer is enabled, the buzzer buzzes when a critical alarm, minor alarm, or warning is generated.
- Buzzer off
If the buzzer is disabled, the buzzer does not buzz.

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

Twinkle

When the UPS communicates with the northbound NMS, the function determines the position of the UPS in the NMS layout diagram.

4.1.2.4 Settings

On **System Info**, tap . The **Settings** screen is displayed.

Figure 4-7 Settings screen 1

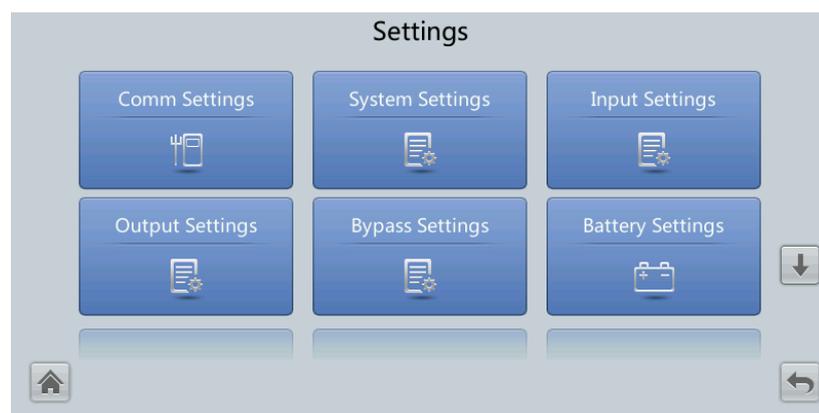


Figure 4-8 Settings screen 2



NOTE

If lead-acid batteries are used, **iBOX Settings** is displayed on the **Settings** screen.

Comm. Settings

Figure 4-9 Comm. Settings (lead-acid battery)

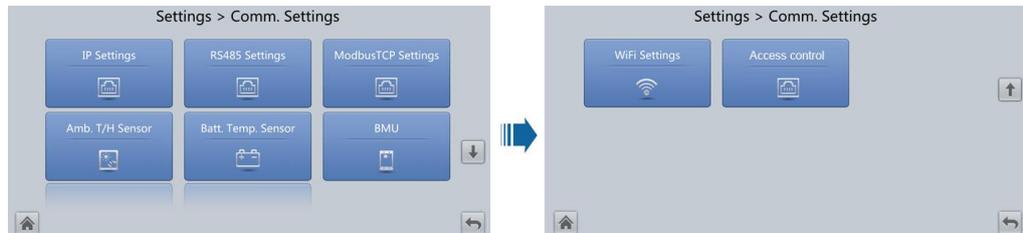


Figure 4-10 Comm. Settings (lithium battery)

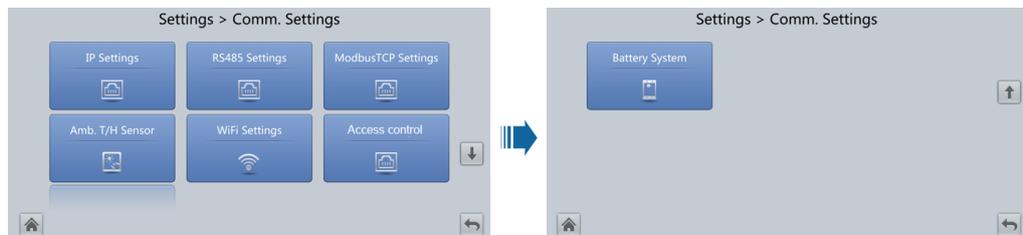
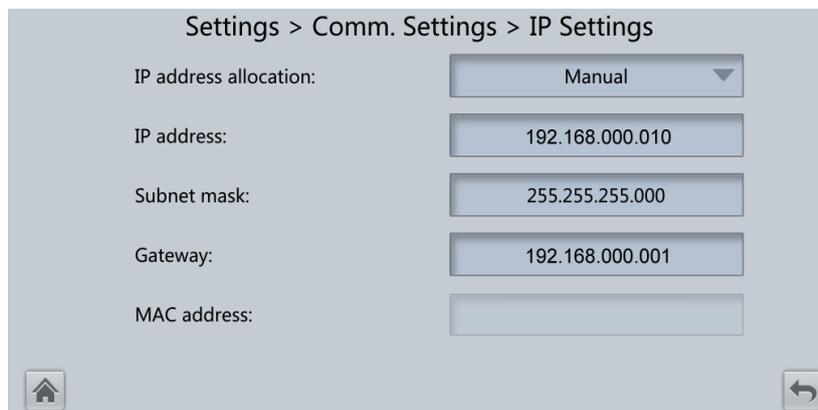


Figure 4-11 IP Settings



IP address allocation

- If the MDU is connected to a computer over a network cable, the IP address can only be allocated manually. The IP addresses of the MDU and computer must be on the same network segment, and must be different.
- If the MDU is connected to a computer over 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 the IP addresses of the MDU and computer are on the same network segment, and are different. Set the UPS IP address to be in the same subnet as the computer IP address. Perform the bitwise AND operation for the UPS IP address and the computer 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.

Table 4-10 Bitwise AND operation example

-	Computer IP Address (182.98.225.125)	UPS IP Address (182.98.225.112)
Computer IP address/UPS IP address	10110110.01100010.11100001.01111101	10110110.01100010.11100001.01111000
Subnet mask (255.255.255.192)	11111111.11111111.11111111.11000000	11111111.11111111.11111111.11000000
Bitwise AND operation result	10110110.01100010.11100001.01000000	10110110.01100010.11100001.01000000

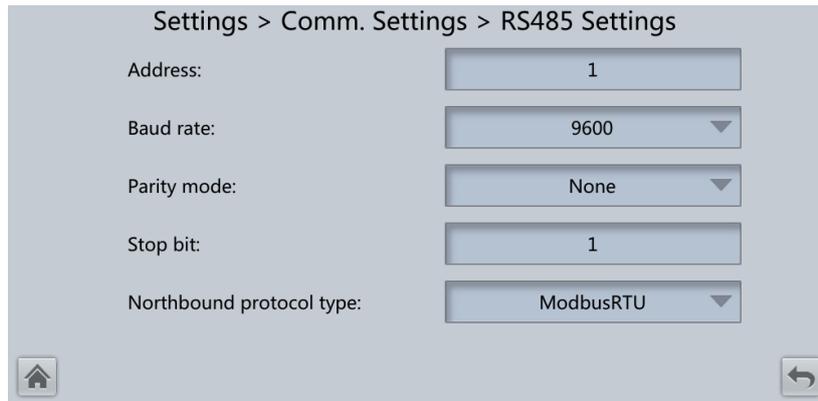
- **Automatic:** The MDU automatically searches for available IP addresses in the connected network. Ensure that the MDU and computer IP addresses are on the same network segment.

 **NOTE**

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

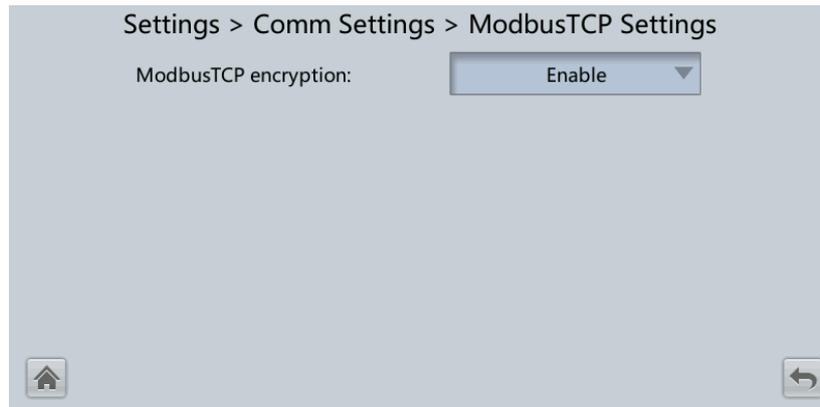
Item	Description	Default Value	Value Range
IP address	Specifies the IP address for the Ethernet. NOTICE Ensure that the UPS IP address is unique on the network segment. Otherwise, the LCD may not work properly.	192.168.0.10	1.0.0.0–223.255.255.255
Subnet mask	Specifies the subnet mask of the Ethernet.	255.255.255.0	0.0.0.0–255.255.255.255
Gateway	Specifies the Ethernet gateway.	192.168.0.1	1.0.0.0–223.255.255.255
MAC Address	Defines the physical address of network equipment and is not configurable.	N/A	N/A

Figure 4-12 RS485 Settings



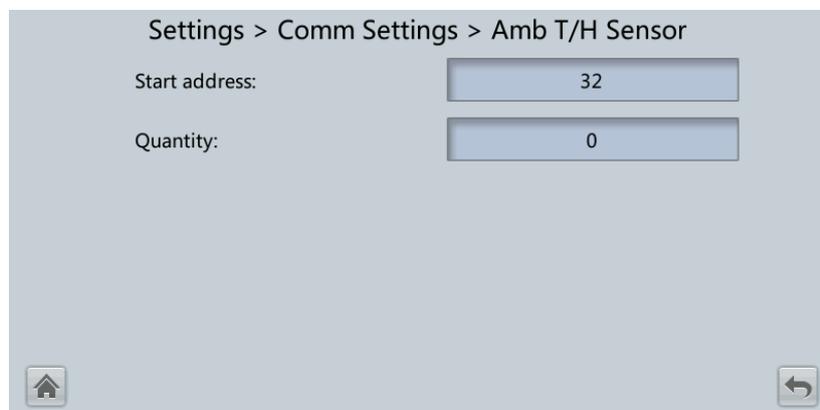
Item	Description	Default Value	Value Range
Address	This serial port address is allocated by the user.	1	1–254
Baud rate	Select a baud rate to match the user's network management conditions onsite.	9600	9600, 19200, 115200
Parity mode	Specifies the RS485 communication frame composition bit. When device nodes use RS485 communication, set the parity modes for the device nodes to the same mode.	None	None, Odd, Even
Stop bit	Specifies the 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
Northbound protocol type	Set the northbound protocol type.	ModbusRTU	ModbusRTU, YDN

Figure 4-13 ModbusTCP Settings



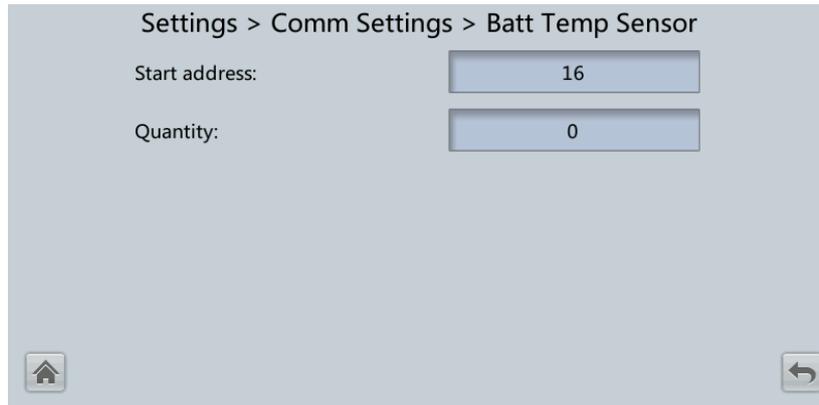
Item	Description	Default Value	Value Range
ModbusTCP encryption	If Modbus TCP is used for communication, communication links do not implement encryption or implement encryption based on the selected encryption mode.	Enable	Disable, Enable

Figure 4-14 Ambient temperature and humidity sensor



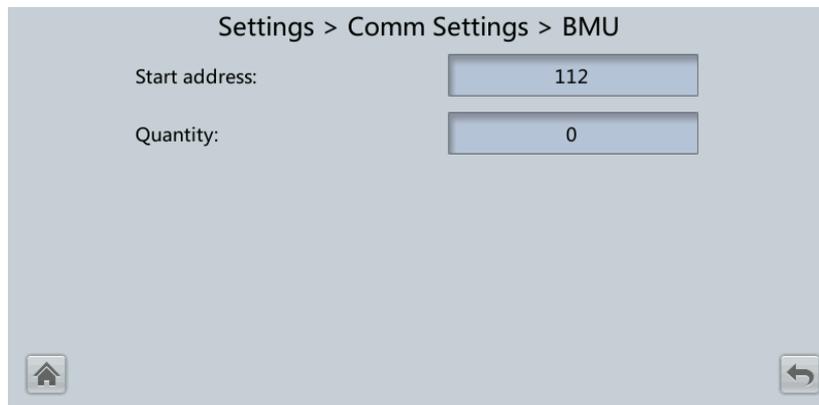
Item	Description	Default Value	Value Range
Start address	N/A	32	32–44
Quantity	Number of cascaded ambient temperature and humidity sensors	0	0–4

Figure 4-15 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 4-16 BMU



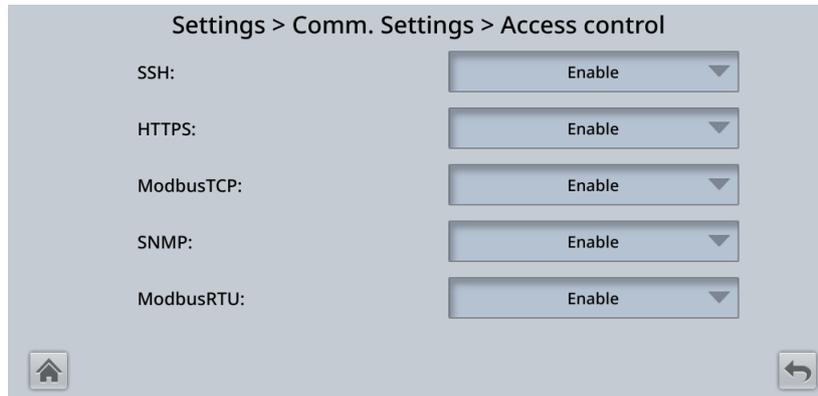
Item	Description	Default Value	Value Range
Start address	N/A	112	N/A
Quantity	Number of cascaded battery monitor units (BMUs)	0	0–12

Figure 4-17 WiFi Settings



Item	Description	Default Value	Value Range
SSID	When using the mobile app for site deployment 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 + Last six characters of the MAC address	N/A
Password	The password for accessing WiFi	Changeme	N/A

Figure 4-18 Access control



Item	Description	Default Value	Value Range
SSH	Refers to a secure encrypted transmission protocol used to access the UPS with a terminal tool. Disable: The SSH port is disabled	Enable	Disable, Enable

Item	Description	Default Value	Value Range
	and cannot be accessed. Enable: The SSH port is enabled and can be accessed.		
HTTPS	Refers to a secure transmission protocol used to access the UPS through a browser. Disable: The HTTPS services are unavailable. Read-only: Only operator users are allowed to access the services and have only the read permission. Enable: All functions are available.	Enable	Disable, Enable, Read-only
ModbusTCP	Refers to an Ethernet-based Modbus protocol used to connect to the NetEco. Disable: The Modbus TCP services are unavailable. Read-only: 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. Enable: All functions are available.	Enable	Disable, Enable, Read-only, NetEco
SNMP	Refers to the Simple Network Management Protocol used to connect to the NetEco. Disable: The SNMP services are unavailable. Read-only: 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. Enable: All functions are available.	Enable	Disable, Enable, Read-only, NetEco
ModbusRTU	Refers to a Modbus protocol based on the RS485 bus, which is used to connect to the NetEco. Disable: The Modbus RTU	Enable	Disable, Enable, Read-only, NetEco

Item	Description	Default Value	Value Range
	services are unavailable. Read-only: 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. Enable: All functions are available.		

Figure 4-19 Battery System



Item	Description	Default Value	Value Range
SmartLi start address	SmartLi communication address when the UPS queries SmartLi data	80	N/A

System Settings

Figure 4-20 System Settings screen 1

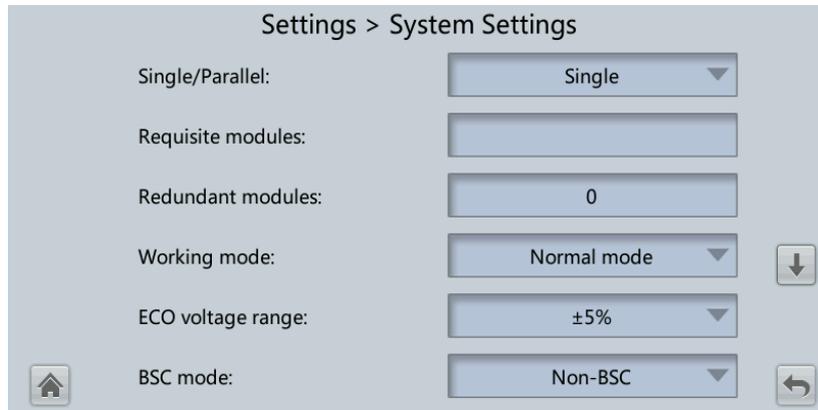
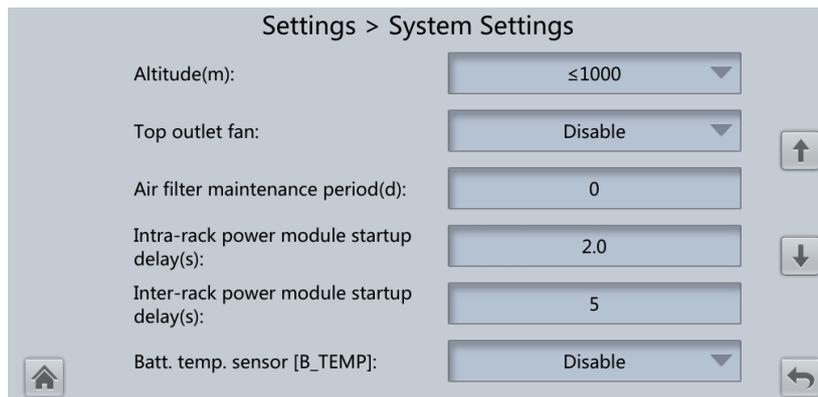


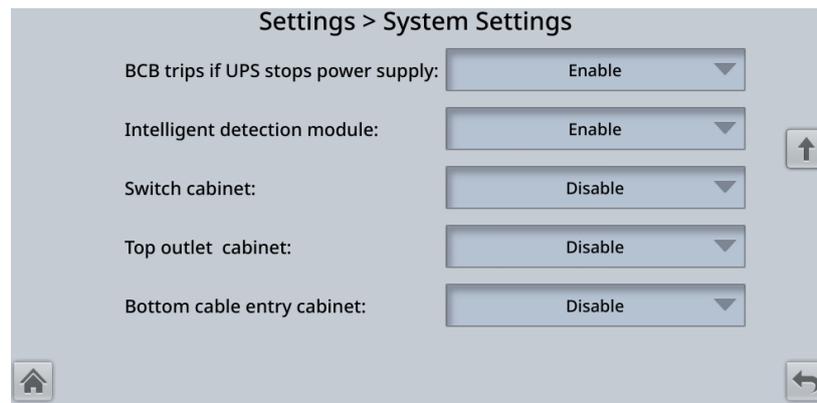
Figure 4-21 System Settings screen 2



NOTE

If lead-acid batteries are used, you can set **Batt. temp. sensor [B_TEMP]**.

Figure 4-22 System Settings screen 3



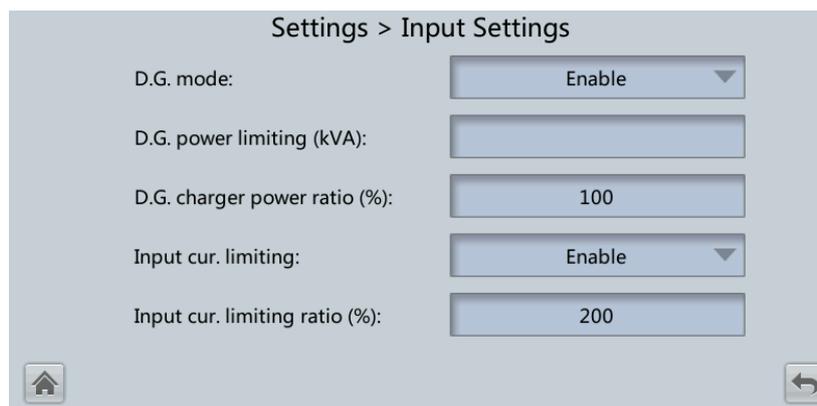
Item	Description	Default Value	Value Range
Single/Parallel	Specifies whether the UPS works in single mode or parallel mode.	Single	Single, Parallel
Requisite modules	Set this parameter based on the system capacity.	N/A	N/A
Redundant modules	Set this parameter based on load capacity and redundancy requirements.	0	0–19
Working mode	Specifies the UPS working mode.	Normal mode	Normal mode, ECO, Self-load mode, Converter mode
ECO voltage range	In ECO mode, when the difference between the bypass voltage and the rated voltage is greater than the specified value, the system determines that the ECO voltage is abnormal and transfers to inverter mode.	±5%	±5%, ±6%, ±7%, ±8%, ±9%, ±10%
BSC mode	<ul style="list-style-type: none"> When Huawei UPSs form a dual-bus system, set this parameter to Standard BSC mode. After setting this parameter to Standard BSC mode, 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 	Non-BSC	Non-BSC, Standard BSC mode, and Opt. BSC card mode

Item	Description	Default Value	Value Range
	<p>systems at the same time. If you need to change the settings in the future, perform operations under the guidance of maintenance engineers.)</p> <ul style="list-style-type: none"> When Huawei UPSs and UPSs of other brands form a dual-bus system, set the parameter to Opt. BSC card mode. <p>NOTE Ensure that the BSC signal cable between the BSC master and slave systems is properly connected and that BSC-related hardware is properly installed.</p>		
Altitude(m)	Set this parameter based on the altitude of the place where the rack is used.	≤ 1000	≤ 1000, 1000–2000, 2000–3000, 3000–4000, 4000–5000
Top outlet fan	Enable this parameter if a top outlet fan is configured. Then the fan running status can be checked.	Disable	Disable, Enable
Air filter maintenance period(d)	Specifies the rack air filter maintenance interval. If you set this parameter to 0 , there is no reminder.	0	0–365
Intra-rack power module startup delay(s)	The 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 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.	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 power module startup delay(s)		5	2–120
Batt. temp. sensor	The optional negative temperature coefficient (NTC) resistor monitors the ambient	Disable	Disable, Enable

Item	Description	Default Value	Value Range
[B_TEMP]	temperature near batteries. It ensures that batteries work reliably and safely.		
BCB trips if UPS stops power supply	Specifies whether the BCB trips when the UPS stops supplying power and the output power is off.	Enable	Disable, Enable
Intelligent detection module	If this parameter is set to Enable , Intelli Temp Detect is displayed on the Runn. Info. screen.	Enable	Disable, Enable
Switch cabinet	Enable this parameter when a switch cabinet is installed. After this parameter is set to Enable , the running status of the switch cabinet can be detected.	Disable	Disable, Enable
Top outlet cabinet	Enable this parameter when a top air-flow cabinet is installed.	Disable	Disable, Enable
Bottom cable entry cabinet	Enable this parameter when a bottom cabling cabinet is installed.	Disable	Disable, Enable

Input Settings

Figure 4-23 Input Settings screen

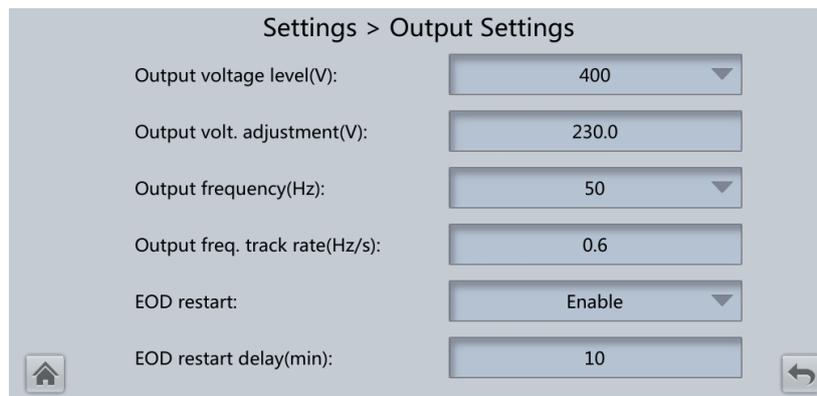


Item	Description	Default Value	Value Range
D.G. mode	Set this parameter to Enable when a DG connects to the input power distribution cabinet (PDC). The UPS enters the DG mode when a DG is detected	Disable	Disable, Enable

Item	Description	Default Value	Value Range
	over dry contacts.		
D.G. power limiting (kVA)	The two parameters enable the UPS to control the valid input current and input current limit values, preventing load impact and facilitating cooperation between the UPS and the DG.	Depends on the actual model.	0–5000
D.G. charger power ratio (%)		0	0–100
Input cur. limiting	Specifies whether to enable or disable input current limiting for the UPS to protect the generator.	Disable	Disable, Enable
Input cur. limiting ratio (%)	Allows the UPS to limit the input current to be lower than the ratio to protect the generator.	200	50–200

Output Settings

Figure 4-24 Output Settings screen

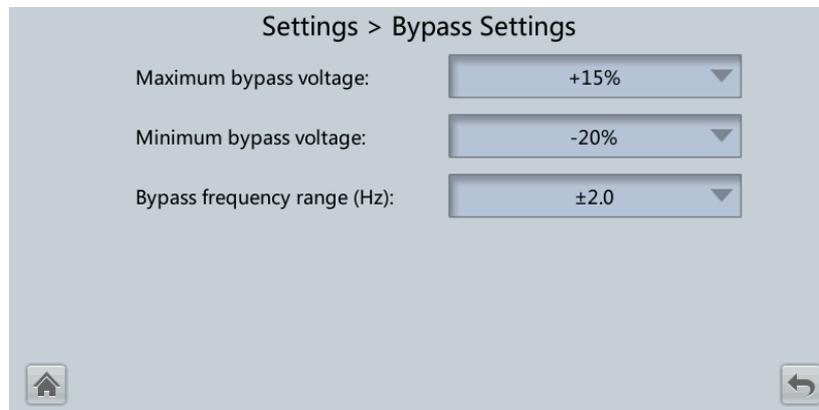


Item	Description	Default Value	Value Range
Output voltage level(V)	Specifies the system output voltage level. This parameter can be set only after the inverter shuts down. After you change the voltage level, the upper limit of the bypass voltage is restored to the default value. (If the voltage level 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
Output volt. adjustment(V)	The output voltage can be slightly adjusted based on the	The default value is 220.0,	380 V: 209.0–231.0

Item	Description	Default Value	Value Range
	onsite power distribution condition to ensure a minimum difference between the output voltage and the bypass voltage and to facilitate uninterruptible power supply when the UPS transfers from normal mode to bypass mode.	230.0, and 240.0 when the voltage level is 380 V, 400 V, and 415 V respectively.	400 V: 218.5–241.5 415 V: 228.0–252.0
Output frequency(Hz)	Specifies the system output frequency level.	50	50, 60
Output freq. track rate(Hz/s)	This parameter can be adjusted based on site requirements. If the rate is slow, the inverter frequency is generally different from the bypass frequency when the bypass frequency changes. If the output is overloaded or the inverter is faulty, an interruption (less than 20 ms) occurs when the UPS transfers from inverter mode to bypass mode. If the rate is fast, the inverter frequency may be unstable.	0.6	0.1–2.0
EOD restart	The UPS transfers to battery mode when the mains is abnormal. When batteries reach the end of discharge (EOD) threshold and the bypass is unavailable, the UPS powers off. After the mains recovers, the UPS will automatically restart if EOD restart is set to Enable . If EOD restart is set to Disable , manually rectify the fault and restart the UPS or enable the EOD restart function.	Enable	Disable, Enable
EOD restart delay(min)	If EOD restart is set to Enable , the UPS starts working after the time set for EOD restart delay when the input recovers from a power failure upon battery EOD.	10	1–1440

Bypass Settings

Figure 4-25 Bypass Settings screen



Item	Description	Default Value	Value Range
Maximum bypass voltage	When the difference between the bypass voltage and the rated voltage is greater than the specified value, the system determines that the bypass voltage is abnormal, and the bypass is unavailable.		<ul style="list-style-type: none"> When the voltage level is 380 V, the value is +10%, +15%, +20%, or +25%. The default value is +15%. When the voltage level is 400 V, the value is +10%, +15%, or +20%. The default value is +15%. When the voltage level is 415 V, the value is +10% or +15%. The default value is +10%.
Minimum bypass voltage	When the difference between the bypass voltage and the rated voltage is greater than the specified value, the system determines that the bypass voltage is abnormal, and the bypass is unavailable.	-20%	-10%, -15%, -20%, -30%, -40%, -50%, -60%
Bypass frequency 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, and the bypass is unavailable.	±2.0	±0.5, ±1.0, ±2.0, ±3.0, ±4.0, ±5.0, ±6.0

Battery Settings

NOTICE

Battery parameter settings are critical to 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 to **Single**.
- **Battery string sharing** affects the estimation of the actual charge current and discharge time. An incorrect setting causes a high or low charge current, which easily damages the batteries. An incorrect estimated discharge time may cause a data backup failure.
- When you set parameters, ensure the following: **Dis. curr. 0.1C EOD** \geq **Dis. curr. 0.3C EOD** \geq **Dis. curr. 0.5C EOD** \geq **Dis. curr. 1.0C EOD**.
- A cell consists of electrodes and electrolyte and is the basic unit of a battery. Each cell has a nominal voltage of 2 V. A battery is a module consisting of a single cell or multiple cells assembled in a shell. Each battery has a nominal voltage of 2 V, 6 V, or 12 V.

Figure 4-26 Battery Settings (lead-acid battery)

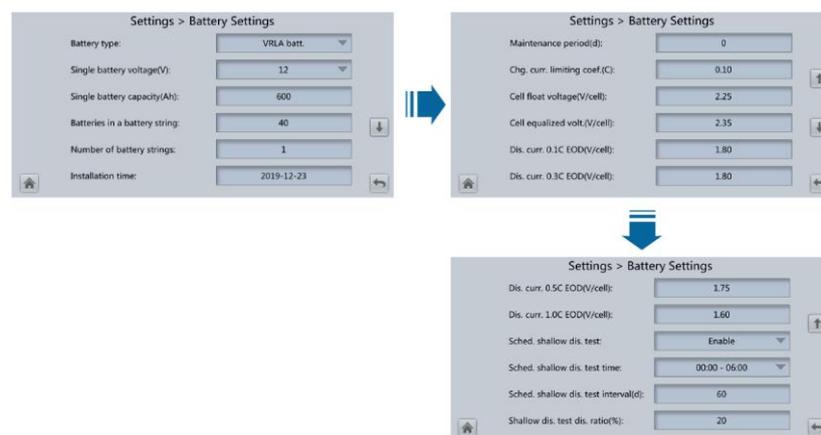


Figure 4-27 Battery Settings (lithium battery)



Item	Description	Default Value	Value Range
Battery type	Specifies the type of batteries connected to the UPS.	VRLA batt.	VRLA batt., lithium batt.
Battery capacity(Ah)	Specifies the capacity of lithium batteries connected to the UPS	N/A	N/A

Item	Description	Default Value	Value Range
	(the value is automatically obtained).		
Single battery voltage(V)	Specifies the voltage of each battery that is connected in series in a battery string.	12	2, 6, 12
Single battery capacity(Ah)	Specifies the capacity of each battery that is connected in series in a battery string.	Depends on the actual model.	5-9999
Batteries in a battery string	Specifies the number of batteries in a battery string.	Depends on the model.	Depends on the model.
Number of battery strings	Specifies the number of battery strings connected in parallel.	1	1-6
Installation time	A battery maintenance reminder is displayed when the maintenance time (counted from the installation time) comes.	N/A	N/A
Maintenance period(d)	Specifies the interval for reminding users of battery maintenance.	0	0-365
Cell float voltage(V/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. curr. 0.1C EOD(V/cell)	Specifies the EOD threshold when the discharge current is 0.1C, 0.3C, 0.5C, or 1.0C respectively.	1.80	1.8-1.9
Dis. curr. 0.3C EOD(V/cell)		1.80	1.8-1.9
Dis. curr. 0.5C EOD(V/cell)		1.75	1.75-1.85
Dis. curr. 1.0C EOD(V/cell)		1.60	1.6-1.75
Sched. shallow dis. test	When certain conditions are met, the charger shuts down, and batteries supply power to loads. The system records the battery discharge data as a reference for battery capacity and lifespan.	Disable	Disable, Enable
Sched. shallow dis. test time	Specifies the time for a scheduled shallow discharge test.	00:00 - 06:00	00:00 - 06:00, 06:00 - 12:00, 12:00 - 18:00, 18:00 - 24:00
Sched. shallow	Specifies the interval for a	60	30-90

Item	Description	Default Value	Value Range
dis. test interval(d)	scheduled shallow discharge test.		
Shallow dis. test dis. ratio(%)	Specifies the proportion of the discharge capacity to the total discharge capacity. The value is configurable in any mode.	20	10–50
Cell charge voltage(V/cell)	Specifies the charge voltage of lithium batteries (the value is automatically obtained).	N/A	N/A
Chg. cur. limiting coef.(C)	Lithium battery: You can set the charge current limit value. The current limit coefficient is a multiple of the battery capacity.	0.50	0.10–1.00
	Lead-acid battery: You can set the charge current limit value. The current limit coefficient is a multiple of the battery capacity.	0.10	0.05–0.15

iBOX Settings

Figure 4-28 iBOX Settings



NOTE

If lead-acid batteries are used and **Number of iBOXs** in **System Info > Settings > iBOX Settings > Basic Param.** is not **0**, **Batt. String Config** is displayed on the **iBOX Settings** screen.

Figure 4-29 Basic Param.

Item	Description	Default Value	Value Range
Number of iBOXs	Specifies the number of iBOXs connected to the UPS.	0	0–6
Start address for iBOX-NMS communication	Specifies the communication address when the northbound device queries iBOX data.	0	0–124
iBAT number of iBOX N	Specifies the number of iBATs managed by the iBOX.	0	0–300

Figure 4-30 Advanced Param.

Item	Description	Default Value	Value Range
Current source	Specifies the specifications of the Hall effect sensor used to detect iBOX current.	Hall sensor 200A	Hall sensor 200A, Hall sensor 600A
Batt. abnormal BCB trip	Specifies whether BCB trips when batteries are abnormal.	Disable	Disable, Enable

Item	Description	Default Value	Value Range
Single batt. group number of hall	Single batt. group number of hall is equal to the number of Hall effect sensors at the positive or negative terminal of a battery string (Single batt. group number of hall ≥ 1).	1	1–8

Figure 4-31 Batt. String Config



Set the iBOX and iBAT numbers for each battery string.

Dry Contact Settings

NOTICE

- When you configure dry contacts, you need to set associated dry contacts. Otherwise, the UPS may not run properly.
- When you disable a dry contact card, the related dry contact signals are disabled.
- Dry contact signals are displayed on the screen only when you enable the corresponding dry contact card.
- When a dry contact card is not connected or some dry contacts of a dry contact card are not used, disable the card or the unused dry contacts on the screen to prevent false alarms.
- () encloses a unit, and [] encloses a silk screen.

Specify dry contact settings on the following four cards:

- Dry contact card (MUE05A): provides dry contact signals for the battery grounding failure detector, DG, BCB, and PDC.
- Backfeed protection card (MUE06A): provides backfeed protection signals. This card can be enabled or disabled.
- Monitoring interface card (MUS05A): provides four configurable system output dry contact signals.

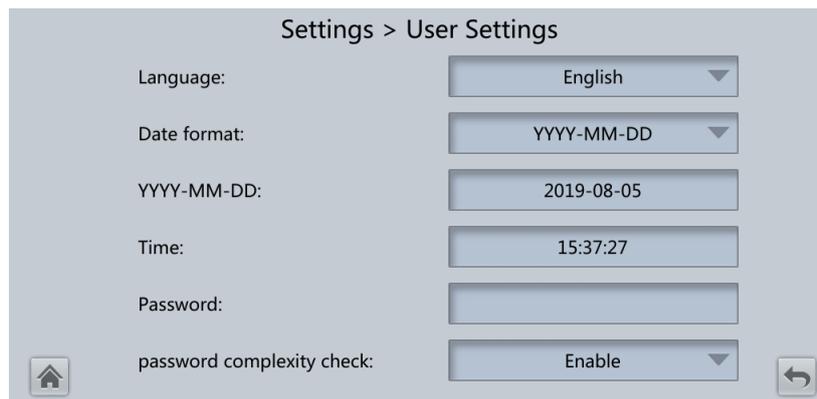
- Dry contact extended card (MUE07A): currently provides five input and five output signals.

Item	Description
MUE05A connection	Specifies the MUE05A connection status. Independent input signals can be enabled only when this parameter is set to Enable .
Battery ground fault [BTG]	Specifies whether to enable or disable battery grounding fault detection.
D.G. connection [GEN]	Specifies whether to enable or disable DG connection status detection.
BCB connection [OL]	Specifies whether to enable or disable BCB connection status detection.
Battery breaker [STA]	Specifies whether to enable or disable battery circuit breaker status detection.
PDC output breaker [OUT]	Specifies whether to enable or disable PDC output circuit breaker status detection.
PDC maintenance breaker [MT]	Specifies whether to enable or disable PDC maintenance circuit breaker status detection.
BP/SYSMT switch	If the BP/SYSMT switch is set to Enable , the port has dry contact signal access. How to use the port depends on the status of the BP/SYSMT switch.
BP/SYSMT switch function	If the BP/SYSMT switch is set to Enable , this parameter is displayed on the screen. Set this parameter to determine whether the port is used to detect the status of the PDC bypass input circuit breaker or system maintenance circuit breaker.
SPD/SYSOUT switch	If the SPD/SYSOUT switch is set to Enable , the port has dry contact signal access. How to use the port depends on the status of the SPD/SYSOUT switch.
SPD/SYSOUT switch function	If the SPD/SYSOUT switch is set to Enable , this parameter is displayed on the screen. Set this parameter to determine whether the port is used to detect the status of the PDC input SPD or system output circuit breaker.
MUE06A connection	Specifies the MUE06A connection status. The mains and bypass backfeed protection is enabled only when this parameter is set to Enable .
MUS05A DO_1 Action, MUS05A DO_2 Action, MUS05A DO_3 Action, MUS05A DO_4 Action	Controls the status of DO ports on the MUS05A dry contact card.
MUE07A DO_1 Action, MUE07A DO_2 Action, MUE07A DO_3 Action,	Controls the status of DO ports on the MUE07A dry contact extended card.

Item	Description
MUE07A DO_4 Action, MUE07A DO_5 Action	
MUS05A DO_1, MUS05A DO_2, MUS05A DO_3, MUS05A DO_4	Corresponds to the signal of the output dry contact DO on the MUS05A.
MUE07A DO_1, MUE07A DO_2, MUE07A DO_3, MUE07A DO_4, MUE07A DO_5	Corresponds to the signal of the output dry contact DO on the MUE07A.
MUE07A DI_1, MUE07A DI_2, MUE07A DI_3, MUE07A DI_4, MUE07A DI_5	Corresponds to the signal of the input dry contact DI on the MUE07A.

User Settings

Figure 4-32 User Settings screen



Item	Description	Default Value	Value Range
Language	Twelve languages are supported.	English	English, Chinese, Spanish, Dutch, French, German, Italian, Polish, Portuguese, Russian, Swedish, Turkish
Password	N/A	000001	N/A
password complexity check	If the password complexity check is set to Disable , the user password is required to be a	Enable	Disable, Enable

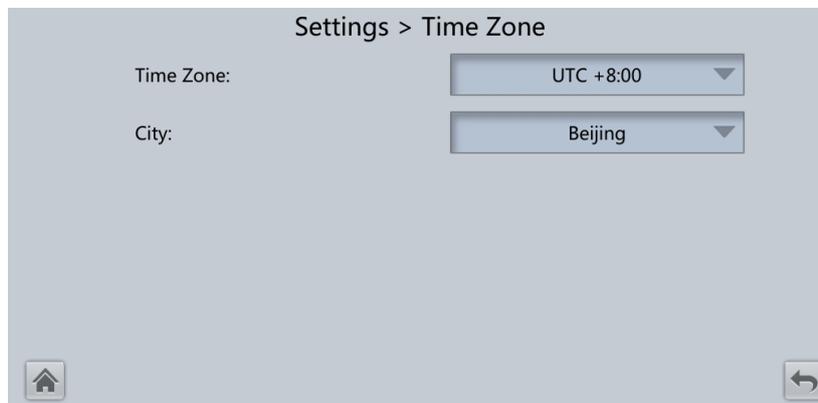
Item	Description	Default Value	Value Range
	string of six to eight digits. If the password complexity check is set to Enable , the password is required to be a string of 6–20 characters and contain at least two types of characters.		

 **NOTE**

Set the date and time to the actual date and time.

Time Zone

Figure 4-33 Time Zone settings



Set the local time zone.

4.1.2.5 Maintenance

On **System Info**, tap . The **Maintenance** screen is displayed.

Figure 4-34 Maintenance screen 1

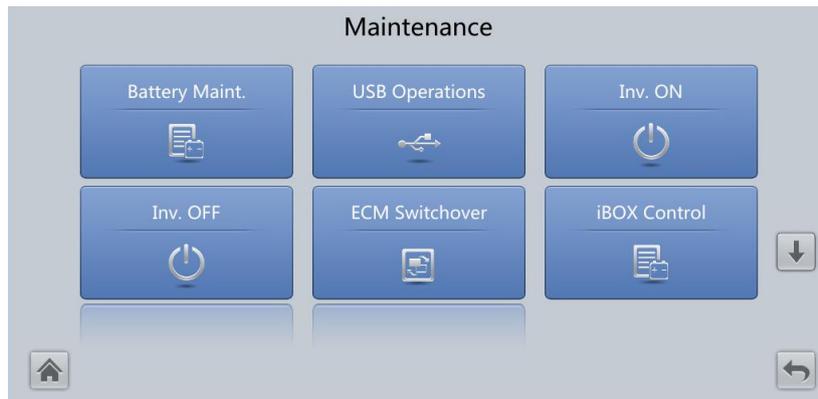


Figure 4-35 Maintenance screen 2



NOTE

If lead-acid batteries are used and **Number of iBOXs** in **System Info > Settings > iBOX Settings > Basic Param.** is not **0**, **iBOX Control** is displayed on the **Maintenance** screen.

Battery Maint.

NOTICE

- Perform battery maintenance when no alarm is generated on the UPS. Otherwise, power output may fail.
- A proportion of battery capacity discharges during battery maintenance. This reduces the discharge time before the next charge.
- Do not perform battery maintenance when a generator is connected.

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

Figure 4-36 Battery Maint. (lead-acid battery)

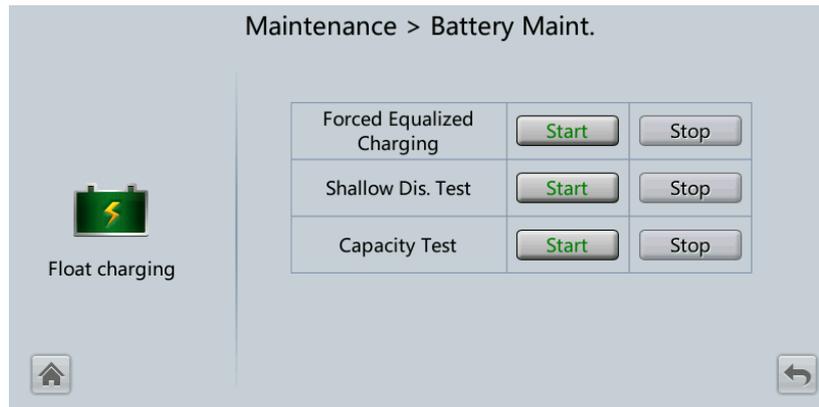


Figure 4-37 Battery Maint. (lithium battery)



Item	Description
Forced Equalized Charging	Allows you to perform equalized charging on batteries forcibly.
Shallow Dis. Test	Allows you to partially discharge batteries. A shallow discharge test is conducted to test the battery loop reliability and short-time discharge capacity when the batteries have not been discharged for a long time.
Capacity Test	Allows you to 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 **Export Config.**, **Upgrade Software**, **BSP Upgrade**, and **Import Config.** on **USB Operations**.

Figure 4-38 USB Operations



Starting or Shutting Down the Inverter

Item	Description
Inv. ON	Allows you to start the inverter manually.
Inv. OFF	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 switchover.
- After an ECM is inserted, switchover is supported only after the ECM is configured and starts working properly (about 30 seconds).

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

iBOX Control

Reset the specified iBOX and iBAT, and set the iBAT blinking function or measure the iBAT internal resistance.

Item	Description
Reset	Allows you to restart an iBOX or iBAT.
Blink	Allows you to start or stop the super fast blinking of the red indicator on the iBAT.

Item	Description
Internal resistance	<p>Allows you to measure the battery internal resistance. If the condition for measuring internal resistance is met (batteries are fully charged), you can tap Measure to start measuring the internal resistance of the selected iBAT in an iBOX.</p> <p>NOTE The interval between two measurement operations must be greater than 10 minutes.</p>

Bus Capacitor Life Estimate

If the service life of a capacitor is about to end, that is, **Module X bus capacitor life (y)** is less than 1.0, contact Huawei technical support to replace the power module.

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 other functions.

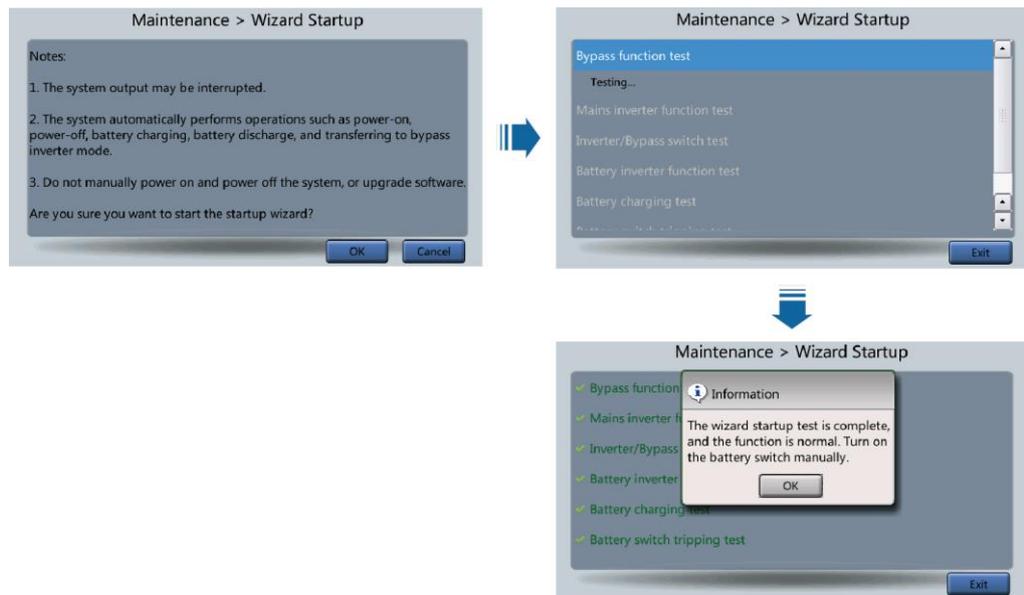
Perform operations as prompted.

NOTICE

Before performing **Wizard Startup**, ensure that:

- The system is a single UPS system.
- No minor or critical alarm occurs.
- The UPS works in normal mode with a load rate 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.
- The SOC is greater than 30%.

Figure 4-39 Wizard Startup



NOTE

Choose **Settings > Dry Contact Set**, set **MUE05A connection** to **Enable**, and set **BCB connection [OL]** to **Enable**. **Wizard Startup** can be used to test the battery switch tripping function.

4.1.2.6 About

On **System Info**, tap **About** to view the model, manufacturer, monitoring version, and power version. To view the detailed version information, tap **Version Info**.

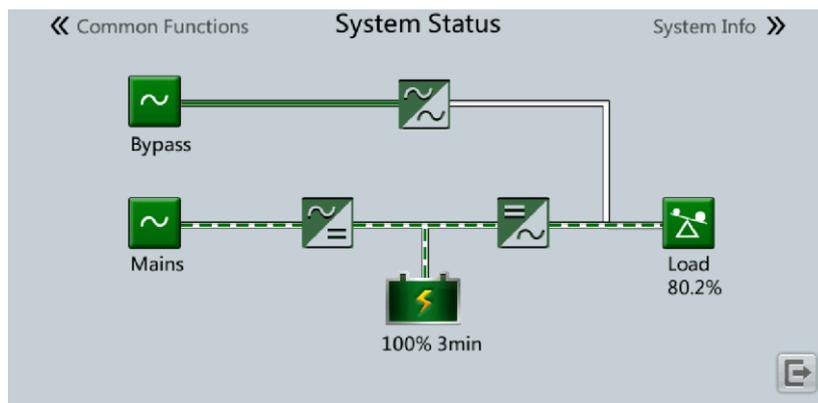
Figure 4-40 About screen



4.1.3 System Status

On the **System Status** to view the mains input, bypass input, load, and battery information.

Figure 4-41 System status



4.1.4 Common Functions

Figure 4-42 Common functions 1

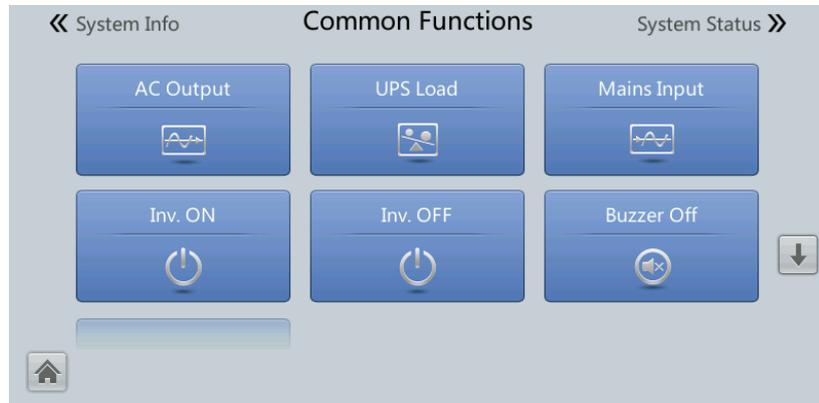
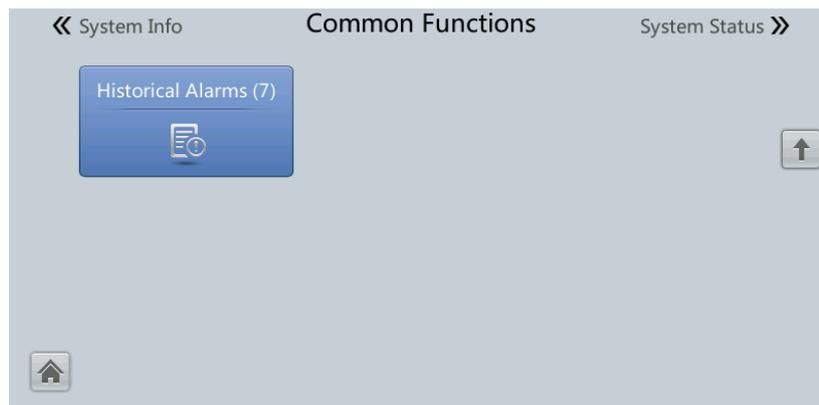


Figure 4-43 Common functions 2



4.2 WebUI

4.2.1 Login

Context

Internet Explorer 11 is used as the example browser.

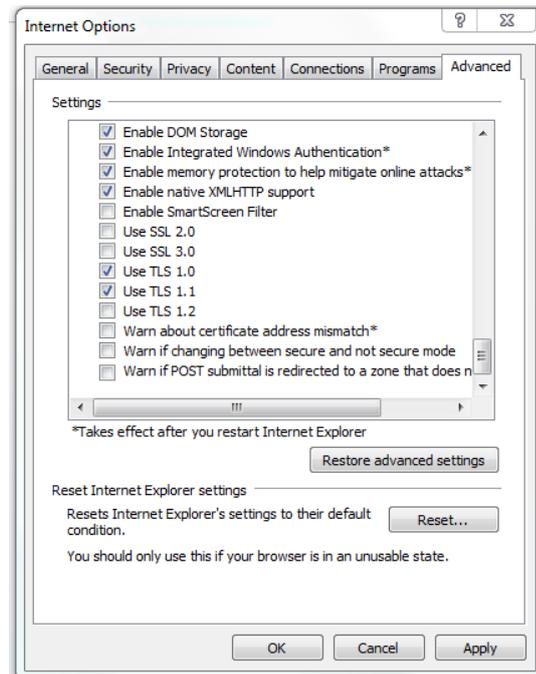
The system supports Internet Explorer 11 and Firefox 31.0.

Procedure

Step 1 Open the browser and choose **Tools > Internet Options**.

Step 2 On the **Advanced** tab page, ensure that **Use TLS 1.0**, and **Use TLS 1.1** are selected and click **OK**.

Figure 4-44 Settings in the Internet Options dialog box



Step 3 Enter **https://UPS IP address** in the address box of the browser, select a language, set **User name** and **Password**, and click **Login**.

NOTE

The preset UPS IP address is 192.168.0.10. You can set the UPS Ethernet IP address on the LCD or WebUI. The value range is 1.0.0.0–223.255.255.255.

Table 4-11 User description

Default User	Preset Password	User Rights
admin (system administrator)	Changeme	Performs all operations on the LCD and WebUI, including system running information browsing, system information exporting, parameter setting, system control, system configuration, and system maintenance.
operator (common user)	Changeme	Only browses the system running information, exports system information, starts/shuts down the inverter, rectifies faults, and controls the buzzer. Other control and maintenance functions that may affect system operation are invisible and parameters cannot be set.
browser (browsing user)	-	Only browses the system running information.

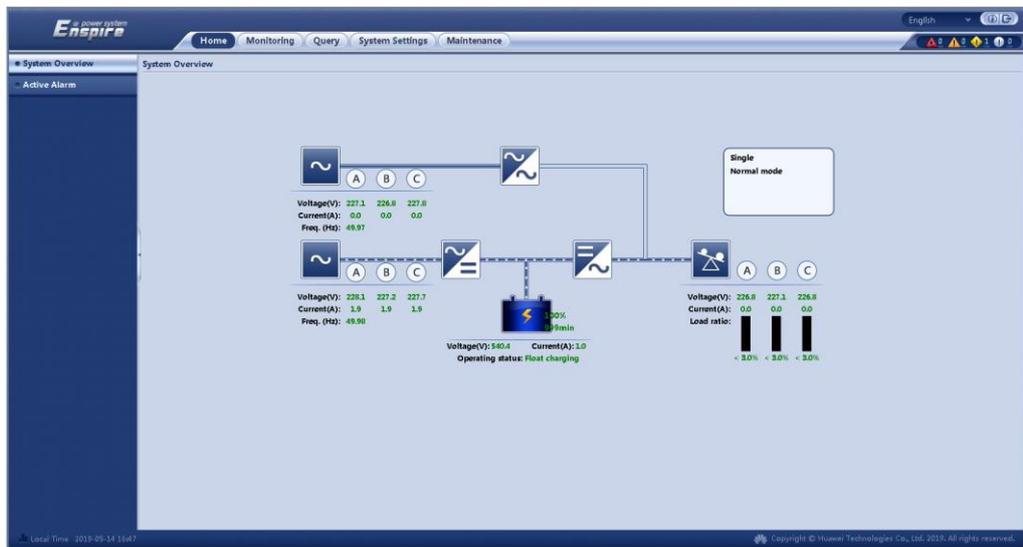
NOTE

- If an incorrect password is entered five consecutive times, the account will be logged out for 5 minutes.
- After a user logs in to the WebUI, if another user logs in with the same user name, the current account will be logged out.
- It is advised to change the password after the first login using **User Mgmt.** on the **Config.** page to prevent unauthorized access.

----End

4.2.2 Home

Figure 4-45 Home



Item	Description
System Overview	View the operation status of the mains input, bypass input, battery, and AC output of the system.
Active Alarm	View the active alarms of the system.

4.2.3 Monitoring

Figure 4-46 Monitoring



Item	Description
UPS System	View Running Information of the UPS, set Running Parameter for the UPS, and perform Running Control on the UPS.
Bypass	View the bypass input Running Information and set Running Parameter .
Module Summary	Query the module Running Information and set Running Parameter .
ECM Summary	Set Running Parameter for the ECM.
Battery System	View the battery Running Information and set Running Parameter .
Battery String Summary	<p>NOTE</p> <p>If Number of iBOXs is not 0 and lead-acid batteries are used, Battery String Summary is displayed on the Monitoring page.</p> <p>Set parameters for the iBOX and iBAT connected to each battery string.</p>

UPS System

Table 4-12 System settings

Item	Description	Default Value	Value Range
High ambient temperature alarm threshold(°C)	An alarm is generated when the ambient temperature reaches or exceeds the threshold specified by this parameter.	55	40–60
Low ambient temperature alarm threshold(°C)	An alarm is generated when the ambient temperature is lower than the threshold specified by this parameter.	–10	–20 to 0
EPO 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	Disable	Disable, Enable

Item	Description	Default Value	Value Range
	to Enable , check that the EPO cable is connected correctly.		
Bus capa. life	If this parameter is set to Enable , the UPS detects the bus capacitor life.	Enable	Disable, Enable
Paral. sys. hibernate	When customer loads are light, enable parallel hibernation to alternate modules in hibernation mode, which can prolong their service life and improve system efficiency.	Disable	Disable, Enable
Module cycle hiber. period(d)	Specifies the rotation interval of modules in hibernation mode. The default value is 30, which means that the hibernating module is rotated automatically every 30 days.	30	1–100
D.G. ECO bypass supply	Specifies whether ECO bypass is allowed to supply power in DG mode. When the DG is connected to the dry contact signal GEN: <ul style="list-style-type: none"> • If this parameter is set to Enable, the system can enter ECO mode when the DG supplies power to the bypass and the ECO function is enabled. • If this parameter is set to Disable, the system is not allowed to enter ECO mode when the DG supplies power to the bypass. 	Enable	Disable, Enable
RAM verification	Specifies whether to enable the memory check function. If this parameter is set to Enable , the control chip RAM working status is checked regularly. If this parameter is set to Disable , regular check is disabled.	Disable	Disable, Enable
Record time after fault	Specifies the time for storing fault data after the UPS experiences a fault. The default value is 0ms , which means that the data during 20 ms before the fault occurs is recorded. If the value is set to 40ms , it means that the data during 20 ms before the fault occurs and the data during 40 ms after the fault occurs are recorded, and the like.	0ms	0ms, 20ms, 40ms, 60ms, 80ms
Collect real-time site waveform	If this parameter is set to Enable , one waveform can be stored manually.	Disable	Disable, Enable
Fan life	Specifies whether to enable the life detection for fans in the power modules and bypass modules.	Enable	Disable, Enable
Key update interval(d)	-	180	30–1095
BCB trips in case of EOD	If this parameter is set to Enable , the BCB trips in case of EOD.	Enable	Disable, Enable

Table 4-13 Input settings

Item	Description	Default Value	Value Range
Input adaptability	Input adaptability mode 1: It is applicable to normal power grids, normal DGs, and DGs that are sensitive to the output reactive component. Input adaptability mode 2: It is applicable to normal power grids, normal DGs, and input power sources with high internal resistance.	Mode 2	Mode 1, Mode 2

Table 4-14 Output settings

Item	Description	Default Value	Value Range
Zero display with no load output	If this parameter is set to Enable , the output current is displayed as 0 with no load output, and the output load rate is displayed as 3% . When this parameter is set to Disable , the output current and output load rate are not adjusted to 0 .	Enable	Disable, Enable
Calib. output current if no load	If this parameter is set to Enable , the current at no load will be calibrated once automatically. This function can be used only when the UPS carries no load.	Disable	Disable, Enable
Output interruption transfer time(ms)	Set this parameter based on the output interruption time acceptable to loads.	0	0, 40, 60, 80, 100, 120
Max. BPM transfer times	Cross currents occur during the transfer between bypass mode and inverter mode, which impacts the system. This parameter limits the number of transfers between bypass mode and inverter mode within 1 hour, which ensures system security.	5	1–10
Current equalization detection	Monitors the current differences between racks or modules. If this parameter is set to Enable , the Mod. Cur. Eq. Data can be viewed on the running information page.	Disable	Disable, Enable
Inverter async. alarm	Specifies whether an Inverter asynchronous alarm can be displayed on the monitoring page when the inverter does not track the bypass input. Power supply is not affected no matter whether this parameter is set to Enable or Disable .	Disable	Disable, Enable
Bus overvoltage recovery	Specifies whether to automatically clear the alarm and restart the power module when the rectifier or inverter shuts down due to a bus overvoltage alarm. If Bus overvoltage	Enable	Disable, Enable

Item	Description	Default Value	Value Range
	recovery is set to Enable , the bus overvoltage alarm is automatically cleared, and the rectifier and inverter automatically start when the bus voltage recovers (less than 420 V) within Bus overvolt. recovery time . When Bus overvoltage recovery is set to Disable , the bus overvoltage alarm cannot be automatically cleared, and the rectifier and inverter cannot automatically start.		
Bus overvolt. recovery time	If Bus overvoltage recovery is set to Enable , the bus overvoltage alarm is automatically cleared, and the rectifier and inverter automatically start when the bus voltage recovers (less than 420 V) within Bus overvolt. recovery time .	5s	5s, 1min, 5min, 10min
Capacitor failure detection	If this parameter is set to Enable , the inverter capacitor fault detection is performed based on the settings of Capacitor failure detection upper limit and Capacitor failure detection lower limit . If the inverter capacitor is faulty, the power module shuts down the inverter to prevent the fault from escalating.	Disable	Disable, Enable

Table 4-15 Bypass settings

Item	Description	Default Value	Value Range
BPM mode upon BPM overtemp.	Specifies whether to start bypass mode when overtemperature occurs.	Enable	Disable, Enable

Battery System

NOTICE

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

- Retain default settings for **Chg. curr. limiting coef.** and **Cell float voltage**. Only professional maintenance personnel are allowed to change the settings.
- When you set parameters, ensure the following: **Chg. curr. limiting coef.** > **Transfer-to-equalized charging curr. coef.**
- **Single batt. float chg. voltage deviation alarm thres.** and **Single batt. dis. voltage deviation alarm thres.** are used to check whether the batteries in each battery string have the same charge voltage and discharge voltage. When a value exceeds the specified range, an alarm is generated. The calculation formula is (Charge/Discharge voltage – Average voltage)/Average voltage x 100%. The charge/discharge voltage and average voltage are obtained from the BMU. If no BMU is configured, these two parameters do not need to be set.

Item	Description	Default Value	Value Range
Float volt. temp. comp.	If this parameter is set to Enable , the float charging voltage is calibrated based on the battery temperature when a battery temperature sensor is connected. The parameter is configurable in any mode.	Enable	Disable, Enable
Float volt. temp. comp. coef.(mV/(°C·cell))	Specifies the calibration coefficient during float charging voltage temperature compensation.	3.3	0.0–6.0
Float chg. temp. comp. center(°C)	Specifies the reference temperature during float charging voltage temperature compensation.	25	20–30
Automatic equalized charging	If this parameter is set to Enable , the UPS automatically changes the battery management status to equalized charging based on the charge current and float charging time.	Enable	Disable, Enable
Transfer-to-equalized charging curr. coef.(C10)	Batteries enter equalized charging state when the battery currents exceed this parameter value.	0.05	0.02–0.08
SOC to start equalized charging (%)	If the SOC is lower than the specified value, batteries start equalized charging.	70	0–100
Scheduled equalized charging interval(d)	After batteries transfer from equalized charging to float charging, if the batteries do not discharge, equalized charging starts only after the float charging time exceeds Equalized charging protection interval . After equalized charging is complete, batteries automatically transfer to equalized charging when the non-equalized charging time exceeds Scheduled equalized charging interval .	60	30–180
Equalized charging protection interval(d)		7	0–15
Forced equalized charging protection time(h)	When batteries are under float charging or hibernation for a long time, enable forced equalized charging for the batteries. When the forced equalized charging time reaches Forced equalized charging protection time , batteries automatically transfer to float charging mode.	18	12–24
Max. batt. dis. time(h)	Set the maximum battery discharge time. When the discharge time reaches this value, the UPS	24	0–48

Item	Description	Default Value	Value Range
	powers off. If the parameter is set to 0 , battery discharge protection is not implemented.		
Undertemp. alarm thresh.(°C)	Battery temperatures can be monitored in a timely manner. If a battery overtemperature alarm is generated, the charge current limit value decreases to 0.03 CA. Battery charging stops if a battery overtemperature protection alarm is generated (when the temperature reaches the overtemperature threshold plus 3°C).	-5	-20 to +5
Overtemp. alarm thresh.(°C)		50	35-55
Single batt. float chg. voltage deviation alarm thres.(%)	Single batt. float chg. voltage deviation alarm thres.(%) and Single batt. dis. voltage deviation alarm thres.(%) are used to check whether the batteries in each battery string have the same charge voltage and discharge voltage. When a value exceeds the specified range, an alarm is generated. The calculation formula is (Charge/Discharge voltage – Average voltage)/Average voltage x 100%.	10	5-30
Single batt. dis. voltage deviation alarm thres.(%)		20	10-30
Batt. charging capacity mismatch	After this function is set to Enable (default value), an alarm is generated if the configured battery capacity exceeds the charging capacity of the rack.	Disable	Disable, Enable
Batt. mode shut	When the mains fails and the UPS transfers to battery mode, the UPS can automatically power off according to the preset shutdown delay time. If the parameter is disabled, this function is not available.	Disable	Disable, Enable
Bat mode shut delay (s)	Specifies the shutdown delay time in battery mode.	7200	0-7200
Backup time warning	An alarm is generated if this parameter is set to Enable and the backup time is less than the warning threshold.	Disable	Disable, Enable
Backup time warning thresh. (min)	Specifies the backup time warning threshold.	5	3-30
Remain. cap. warning	An alarm is generated if this parameter is set to Enable and the remaining capacity is less than the warning threshold.	Disable	Disable, Enable
Remain. cap. warn. thresh. (%)	Specifies the remaining capacity warning threshold.	20	5-50
Intelligent hibernation	If this parameter is set to Enable , the intelligent battery hibernation function is enabled.	Disable	Disable, Enable
Class 1 grid hiber. time (d)	Specifies the hibernation time for class 1 power grids.	13	0-30

Item	Description	Default Value	Value Range
Class 2 grid hiber. time (d)	Specifies the hibernation time for class 2 power grids.	6	0–15
Thres. of low batt. SOC over dry contact(%)	If an output dry contact is set to Low battery SOC and the battery SOC is lower than this threshold, the output dry contact generates a signal.	75	5–80
Thres. of low batt. volt. over dry contact(V/cell)	Lead-acid battery: If Batt. Volt. Below Threshold is set for an output dry contact and the battery voltage is lower than this threshold, the output dry contact generates a signal.	1.70	1.70–2.10
	Lithium battery: If Batt. Volt. Below Threshold is set for an output dry contact and the minimum electrochemical cell voltage is lower than the threshold, the output dry contact generates a signal.	2.80	2.60–3.20

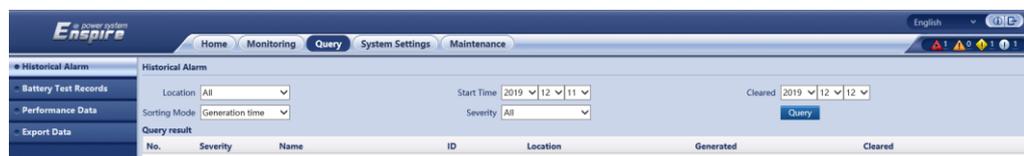
Battery String Summary

Item	Description
No. of iBOX	Number of an iBOX connected to the UPS
iBAT start No.	Start number of an iBAT connected to the iBOX
iBAT end No.	End number of an iBAT connected to the iBOX

4.2.4 Query

On the **Query** page, you can query **Historical Alarm**, **Battery Test Records**, and **Performance Data**, and perform **Export Data**.

Figure 4-47 Query



Item	Description
Historical Alarm	Queries historical alarms of the system or components.
Battery Test	Query and export Cap. test logs and Common test logs .

Item	Description
Records	
Performance Data	Queries the performance data of the components related to the system.
Export Data	Export Historical Alarm, Active Alarm, Operation Log, and Performance Data.

4.2.5 System Settings

Figure 4-48 System settings (lead-acid battery)

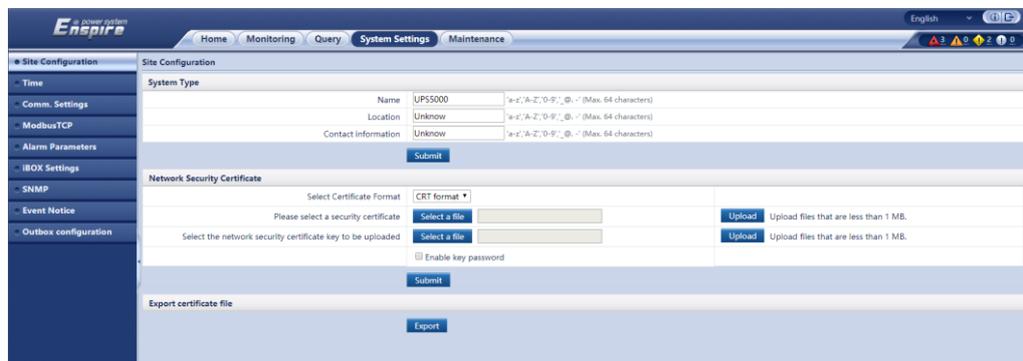
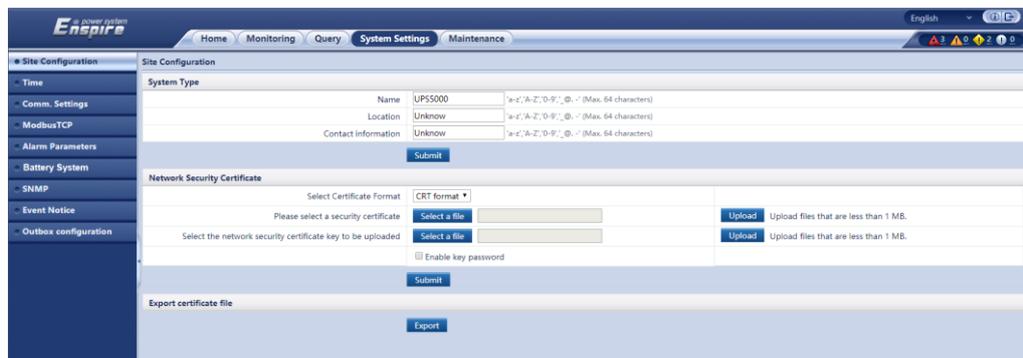


Figure 4-49 System settings (lithium battery)



Site Configuration

Table 4-16 System type

Item	Description
Name	Site name.
Location	Site location.

Item	Description
Contact information	Site contact information.

Table 4-17 Network security certificate

Item	Description
Select Certificate Format	CRT format and PEM format are supported.
Please select a security certificate	Upload a network security certificate.
Select the network security certificate key to be uploaded	Upload the key of the network security certificate.

Export certificate file: Export the root certificate.

Time

Set the time zone and time for the site.

Comm. Settings

Set parameters such as **IP Settings**, **RS485 Settings**, **ModbusTCP Settings**, **Amb. T/H Sensor**.

ModbusTCP

Table 4-18 Access ModbusTCP security certificate

Item	Description
Upload CA certificate file	Import a CA certificate for the UPS to verify the certificate of the Modbus-TCP communication access party.
Upload local certificate file	Users can replace the UPS certificate with a trusted certificate.
Upload key file	Key file of the certificate.
Key password	Decryption password of the key.
Confirm key password	Confirm the decryption password of the key.

Alarm Parameters

Enable or disable alarm information for components in the system.

iBOX Settings

Set iBOX parameters.

Battery System

Check the SmartLi start address.

SNMP

- The default SNMP version is SNMPv3, and the preset MD5/SHA password is **Changeme1**, and the preset DES/AES password is **Changeme2**. Change the password after your first login, preventing unauthorized access.

NOTE

- The standard protocols SNMP V1 and SNMP V2 have security risks. You are advised to use the secure protocol SNMP V3.
- The standard encryption algorithms MD5 and DES have security risks. You are advised to use the secure encryption algorithms SHA and AES.
- To obtain the Mib file, choose **System Settings > SNMP > Mib File > Export**.
- The **SNMP Trap** is used to set the IP address of a server on which the NMS software is installed. The trap port needs to be the same as that on the NMS. If **SNMP Trap** is incorrectly set or not set, system information will be lost or not reported in time.

Event Notice

- Mailbox Settings: Set the email address of the recipient in **Mailbox Settings**.
- Alarm Notification: Set **Alarm notification delay** in **Alarm Notification Parameter Settings**, set **Time of the first reminder** and **Interval** in **Alarm Reminder Configuration**, and perform the **Add**, **Modify**, or **Delete** operation on alarm notifications in **Alarm Notification User Settings**.
- After the **Event Notice** information is configured, alarms will be sent to the configured mailbox.

Outbox configuration

Table 4-19 Outbox settings

Item	Description
Address type	IP address is supported.
Mailbox server IP address	After the IP address of the outbox server is configured, alarm notification emails will be sent to the configured server.
Encryption mode	TLS , SSL , and No encryption are supported.
SMTP port	The default value is 587 .
Outbox	Outbox address.
User authentication for mailbox server login	After Enable is selected, user authentication is required for server login.

Item	Description
User Name	User name for authentication.
Password	Password for authentication.

Mailbox Certificate: Upload the CA certificate file.

4.2.6 Maintenance

On the **Maintenance** page, you can perform **Software Upgrade** and **User Management**, query **Version Information**, query and export **E-label**, export **Fault Information**, and import and back up **Configuration File**.

Figure 4-50 Maintenance page



Item	Description
Software Upgrade	Upgrades the software version of the system.
Version Information	Queries the software and hardware versions of devices in the system.
Configuration File	Imports and exports system configuration files.
E-label	Queries and exports e-labels of devices in the system.
User Management	Allows users to perform Add , Modify , Delete , Lock , and Unlock operations, and set passwords.
Fault Information	Exports fault information.
BSP Upgrade	Upgrades the BSP version.

5 Operations

5.1 Powering On and Starting the UPS

Prerequisites

Measure the voltage and frequency values of the UPS upstream input switches. The line voltage range is 139–485 V AC, and the frequency range is 40–70 Hz.

5.1.1 Powering On the UPS

Context

- The following operations are applicable to a single UPS. For parallel systems, contact Huawei technical support.
- Before power-on, ensure that the devices have passed all check items in the section "Verifying the Installation."
- Before power-on, ensure that all the UPS switches and upstream switches are OFF.

Procedure

Step 1 Turn on the SPD switches 1QFS and 2QFS.

Step 2 Turn on the upstream bypass and mains input switches.

After the UPS is powered on, initialization begins. The MDU displays the Huawei logo and an initialization progress bar.

----End

5.1.2 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.
-

5.1.2.1 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**.
 - b. 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

5.1.2.2 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 whether the UPS can operate normally.

- Set **Single/Parallel** after double check. Incorrect settings 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.
- Set all battery parameters correctly based on site requirements. Battery parameter settings are critical to battery maintenance, battery lifespan, and UPS discharge time.

Figure 5-1 Settings Wizard



NOTE

- Set the time and date correctly. Incorrect time and date will cause false fault analysis during maintenance or repair, affecting the normal operation.
- After network parameters are set, connect the UPS to the network, ensuring that maintenance personnel can manage or control the UPS remotely. 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. Other alarms need to be handled.

 **NOTE**

- After you set parameters on the **Settings Wizard** screen, choose **System Info > Settings > System Settings**. Check that **Requisite modules** and **Redundant modules** match the actual values.
- If dry contact signals are connected to the system, choose **System Info > Settings > Dry Contact Set**. Check that the connected dry contacts have been enabled and that the disconnected dry contacts have been disabled.
- If the system has connected to the remote EPO switch, you need to choose **Monitoring > Param. Settings > System Settings** on the WebUI and check that **EPO detection** is set to **Enable**.

Step 3 View the system running status diagram on the LCD to check that the UPS is working in bypass mode.

----End

5.1.3 Starting the Inverter

UPS System User List

Table 5-1 UPS system user list

Default User	Preset Password	
admin (administrator)	LCD	000001
	Web	Changeme
operator (common user)	LCD	000001
	Web	Changeme
browser (browsing user)	Web	-

Starting the Inverter on the LCD

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

 **NOTE**

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

Step 2 On 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.

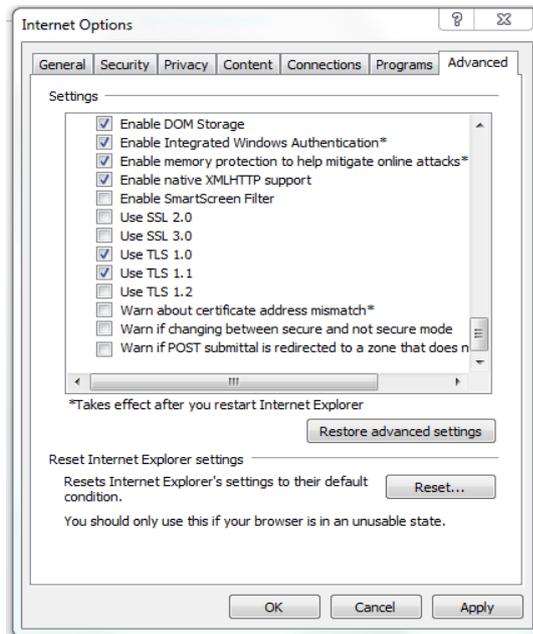
----End

Starting the Inverter on the WebUI

Step 1 Open a browser (Internet Explorer 11 as an example) and choose **Tools > Internet Options**.

Step 2 Click the **Advanced** tab, check that **Use TLS 1.0** and **Use TLS 1.1** are selected, and click **OK**.

Figure 5-2 Setting internet options



- Step 3** In the address box of the browser, enter `https://UPS IP address`.
- Step 4** Enter the correct user name and password and click **Login**.
- Step 5** On the WebUI, choose **Monitoring > UPS System > Running Control**, and click **Inv. ON**, and confirm the operation to start the inverter.

Figure 5-3 Starting the inverter



NOTE

If the power module receives a startup command when it cannot be started, the startup command will be retained for 1 minute. Within 1 minute, if there is no situation (for example, the power module encounters other faults, executes a shutdown command, or a fault is rectified) that requires the startup command to be cleared and the power module becomes able to start, then the power module responds to the startup command.

----End

5.1.4 Powering On Loads

Context

After the inverter starts, the UPS transfers to inverter mode, and the **Bypass mode** alarm on the MDU disappears.

Procedure

- Step 1** After confirming that the battery string is properly connected, switch on the battery string input circuit breaker. If there are multiple battery strings, switch on the circuit breaker for each battery string and then the general circuit breaker between the battery strings and the UPS. The **No battery** alarm on the MDU disappears.
- Step 2** Turn on the downstream output switch to supply power to loads.
- End

5.1.5 (Optional) Setting Parameters for the BCB Box

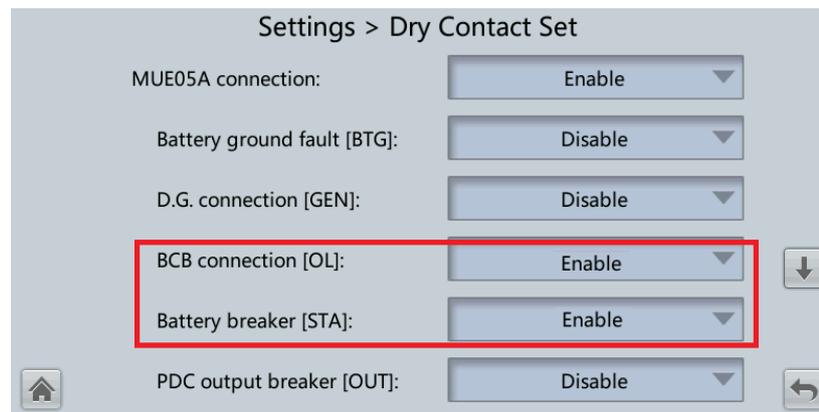
Prerequisites

A BCB box is installed.

Procedure

- Step 1** Choose **Settings > Dry Contact Set**, set **MUE05A connection** to **Enable**, and set **BCB connection [OL]** and **Battery breaker [STA]** to **Enable**.

Figure 5-4 BCB connection settings



----End

5.1.6 (Optional) Setting Parameters for the Top Air-Flow Cabinet

Prerequisites

A top air-flow cabinet is configured.

Procedure

- Step 1** Choose **System Info > Settings > System Settings**, and set **Top outlet cabinet** to **Enable**.
- End

5.2 Shutting Down and Powering Off the UPS

Context

NOTICE

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

Procedure

Step 1 Shut down the inverter.

- Shutting down the inverter on the LCD
Choose **Common Functions** > **Inv. OFF**. After confirmation, the inverter is shut down.

NOTE

You can also choose **System Info** > **Maintenance** > **Inv. OFF** to shut down the inverter.

- Shutting down the inverter on the WebUI
Choose **Monitoring** > **UPS System** > **Running Control**, and click **Inv. OFF**.

If the inverter shuts down and the bypass is normal, the UPS transfers to bypass mode. The **Bypass mode** alarm is displayed on the LCD.

Figure 5-5 Normal bypass

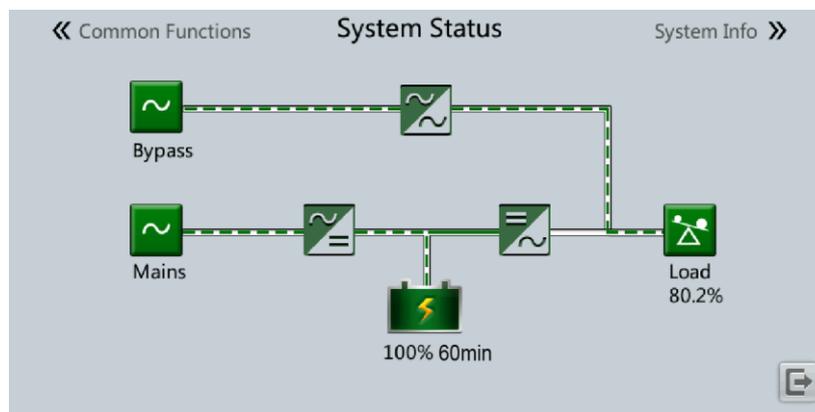
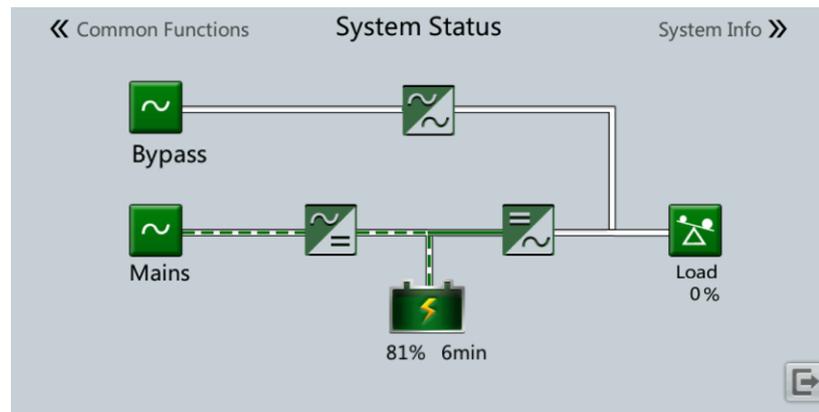


Figure 5-6 Abnormal bypass



- Step 2** After the inverter shuts down, turn off the downstream output switch.
- Step 3** Switch off the battery string circuit breaker. If there are multiple battery strings, switch off the general circuit breaker between battery strings and the UPS and then switch off the circuit breaker for each battery string.
- Step 4** Turn off the upstream mains and bypass input switches.
- End

5.3 Cold-Starting the UPS Using Batteries

Lead-Acid Battery Cold Start

- Step 1** Check that batteries are properly connected. Use a multimeter to measure the voltage of each battery string. The value should be greater than the specified value (Voltage of a single battery x Number of batteries in the battery string).
- Step 2** Turn off the mains and bypass input switches in the external input PDC, and switch on the battery circuit breaker. If there are multiple battery strings, switch on the circuit breaker for each battery string and then the general circuit breaker between the battery strings and the UPS.
- Step 3** Use a multimeter to measure the voltage of each battery string connected to the UPS. If the voltage is greater than the specified value (Voltage of a single battery x Number of batteries in the battery string), batteries are connected properly.
- Step 4** Press and hold down the **BATT START** button on the bypass control module for more than 2 seconds. The system automatically enters the battery cold start state. The MDU displays the Huawei logo and an initialization progress bar.
- Step 5** After the initialization is complete, start the inverter on the LCD.
- End

Lithium Battery Cold Start

- Step 1** Check that the cables between the UPS and the lithium battery cabinet are properly connected.

- Step 2** Turn off the mains and bypass input switches in the external input PDC.
- Step 3** Power on the lithium battery cabinet by referring to the lithium battery cabinet manual.
- 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** When the green indicator on the battery control unit in the lithium battery cabinet blinks at 1 Hz or is steady on, press and hold down the **BATT START** button on the UPS bypass control module for more than 2 seconds. The system automatically enters the battery cold start state. The MDU displays the Huawei logo and an initialization progress bar.
- Step 6** After the MDU initialization is complete, start the inverter.
- End

5.4 Transferring to Bypass Mode Manually

NOTICE

Before you shut down the inverter, ensure that the bypass is normal. If the bypass is abnormal, after you shut down the inverter, the UPS supplies no power, and the loads are powered off.

Shut down the inverter on the LCD or WebUI. The UPS automatically transfers to bypass mode.

NOTE

If you shut down the inverter when the bypass input voltage or frequency exceeds the specified threshold, the UPS supplies no power, and the loads are powered off.

5.5 Setting ECO Mode

Prerequisites

The UPS is working in inverter mode.

Context

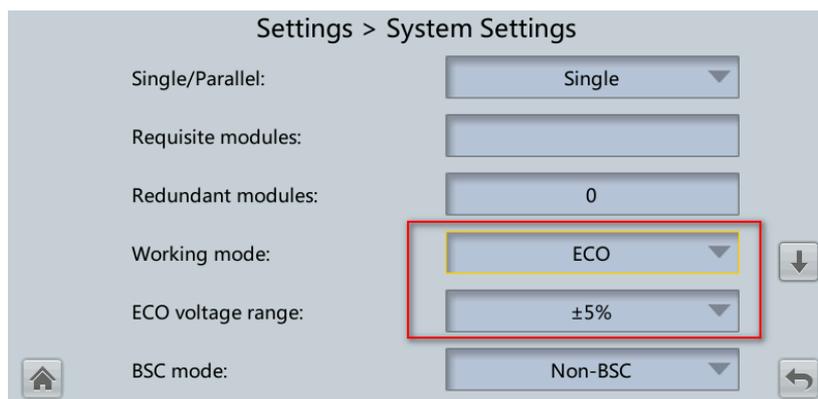
- The UPS is set to non-ECO mode by default. Set the UPS to ECO mode when it is required.
- In ECO mode, the bypass takes priority over the inverter in supplying power. If the bypass fails, the UPS transfers to inverter mode.
- Both a single UPS and a parallel system support ECO mode which ensures a higher efficiency.
- To avoid frequent transfers between ECO mode and normal mode, do not set 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 setting ECO mode, ensure that the bypass is working properly.

Procedure

- Step 1** On the LCD, choose **System Info > Settings > System Settings** and set **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 specifications

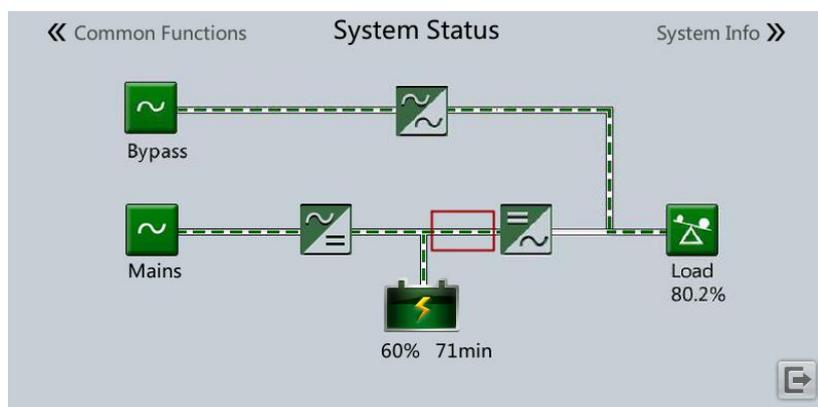


- Step 3** (Optional) If you set ECO mode in bypass mode, manually start the UPS inverter.

NOTICE

After the inverter is started, the UPS still works in bypass mode, and the inverter is on standby. When the bypass is abnormal, the UPS transfers to inverter mode immediately. If the inverter is not started, the UPS stops supplying power when the bypass is abnormal, and the system may power off.

Figure 5-8 System status in ECO mode



----End

5.6 Testing Batteries

5.6.1 Lead-Acid Battery Test

5.6.1.1 Performing a Forced Equalized Charging Test

Context

NOTICE

Before performing a forced equalized charging test, ensure that:

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

Procedure

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

Step 2 Tap **Start** on the right of **Forced Equalized Charging** to start a forced equalized charging test.

Figure 5-9 Starting a forced equalized charging test



NOTE

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

- The 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

5.6.1.2 Performing a Shallow Discharge Test

NOTICE

Before performing a shallow discharge test, ensure that:

- The UPS works in normal mode with a load rate 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 an automatic shallow discharge test 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** on the right of **Shallow Dis. Test** to start a shallow discharge test.

Figure 5-10 Starting a shallow discharge test



NOTE

When the battery test is completed normally, 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 rate fluctuation exceeds 10%.

- An alarm is generated.

----End

5.6.1.3 Performing a Capacity Test

Context

NOTICE

Before performing a capacity test, ensure that:

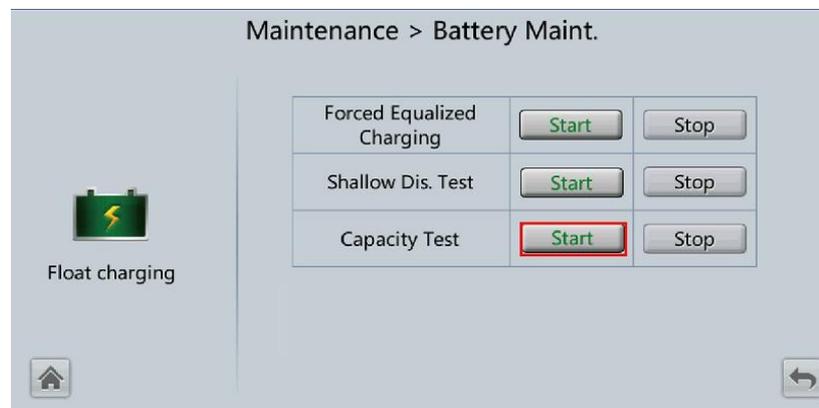
- The UPS is working in normal mode; float charging or hibernation has lasted for 2 hours after the SOC reaches 100%; the load rate fluctuation is less than 10%.
- The UPS generates no battery overtemperature, overvoltage, or overcurrent alarm. No generator is connected to the UPS.
- The mains, batteries,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

Procedure

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

Step 2 Tap **Start** on the right of **Capacity Test** to start a capacity test.

Figure 5-11 Starting a capacity test



NOTE

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

- The battery discharge voltage reaches the 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 obtained from the capacity test. Based on monthly capacity test data, select the test data obtained from a capacity test that has the maximum discharge capacity as the current-month test data. Save the test data obtained from the latest 36 tests.

----End

5.6.2 Lithium Battery Test

5.6.2.1 Performing a 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 SOC reaches 100%; the load rate 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 generates no alarms related to lithium batteries.

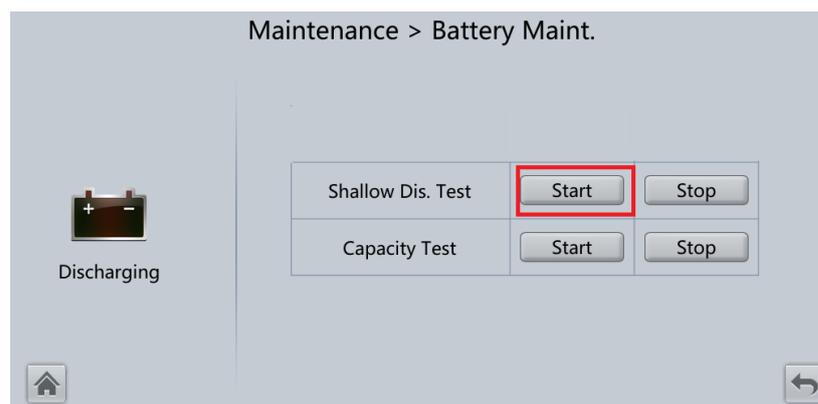
Automatic Shallow Discharge Test

1. On the home screen of the 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 an automatic shallow discharge test based on the settings.

Manual Shallow Discharge Test

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

Figure 5-12 Starting a shallow discharge test



NOTE

When the battery test is completed normally, 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 rate fluctuation exceeds 10%.

- An alarm is generated.

5.6.2.2 Performing a Capacity Test

Context

NOTICE

Before performing a capacity test, ensure that:

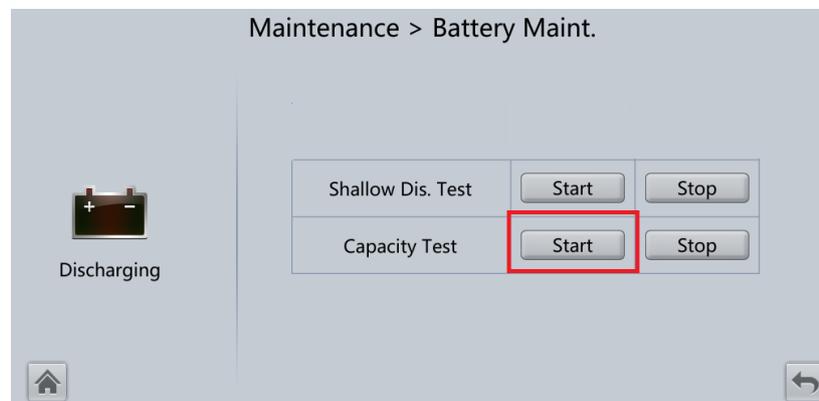
- The UPS is working in normal mode; float charging or hibernation has lasted for 2 hours after the SOC reaches 100%; the load rate fluctuation is less than 10%.
- The UPS generates no battery overtemperature, overvoltage, or overcurrent alarm. No generator is connected to the UPS.
- The mains, batteries,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

Procedure

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

Step 2 Tap **Start** on the right of **Capacity Test** to start a capacity test.

Figure 5-13 Starting a capacity test



NOTE

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

- The minimum electrochemical 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. The test data is obtained from the capacity test. Save the test data obtained from the latest 36 tests.

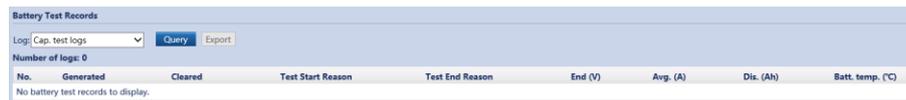
----End

5.6.3 Downloading the Test Data

Procedure

- Step 1** On the WebUI, choose **Query** > **Battery Test Records**, choose logs that need to be queried from the **Log** drop-down list box, and click **Query**.

Figure 5-14 Battery Test Records



- Step 2** Choose logs that have been queried from the **Log** drop-down list box, and click **Export**.

----End

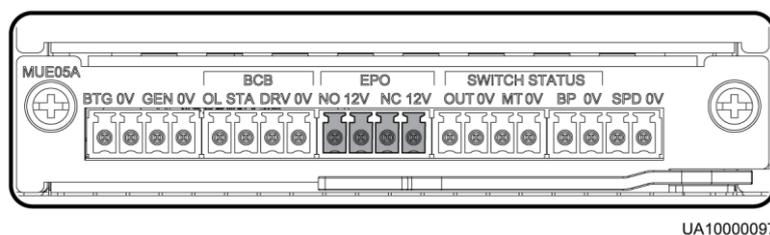
5.7 Performing EPO

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.

Figure 5-15 EPO ports



UA10000097

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

5.8 Clearing the EPO State

Procedure

- Step 1** Clear the EPO state of the system. Check that the external EPO switch connected to the dry contact is in non-EPO state or insert the 4-pin terminal on the EPO port of the dry contact card.
- Step 2** Clear the EPO alarm.
- On the LCD
Choose **System Info** > **Alarms** and tap **Clear Faults**. After confirmation, the EPO alarm is cleared.
 - On the WebUI
Choose **Monitoring** > **UPS System** > **Running Control** > **System Commands and Tests** and click **Clear Faults**. The EPO alarm is cleared.
- Step 3** View active alarms and check that the EPO alarm is cleared. If the system bypass input is normal, the UPS transfers to bypass mode.
- On the LCD
Choose **System Info** > **Alarms** > **Active Alarms** to check that the EPO alarm has been cleared.
 - On the WebUI
Choose **Home** > **Active Alarm** to check that the EPO alarm has been cleared.
- Step 4** Start the inverter.
- End

5.9 Exporting Data

Prerequisites

You have logged in to the WebUI.

Context

The following data can be exported:

- Historical alarms
- Active alarms
- Performance data
- Operation logs
- E-label
- Fault information

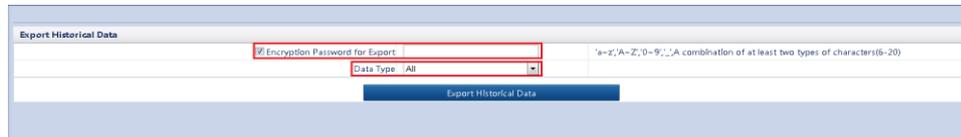
NOTE

This procedure describes how to export historical alarms.

Procedure

- Step 1** Choose **Query > Export Data > Export Historical Data**, set **Encryption Password for Export**, and select **Historical Alarm** from the **Data Type** drop-down list.

Figure 5-16 Exporting historical data



- Step 2** Click **Export Historical Data** and save the displayed webpage.

----End

5.10 Setting Hibernation Mode

Prerequisites

NOTICE

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 16.67 kVA for a 100 kVA module), the UPS may enter and exit from hibernation mode repeatedly.

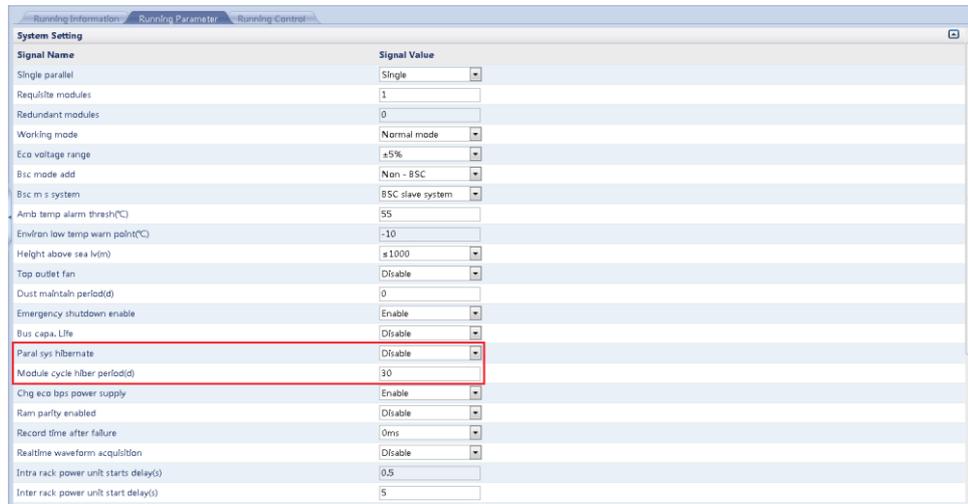
Context

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 more load power. This improves the system efficiency in the case of small load power and increases the power module service life. The hibernation function can be set on the WebUI.

Procedure

- Step 1** On the WebUI, choose **Monitoring > UPS System > Running Parameter**, and set **Paral sys hibernate** to **Enable**.
- Step 2** Set **Module cycle hiber period(d)** to an integer ranging from 1 to 100. The default value is **30**.

Figure 5-17 System settings



Signal Name	Signal Value
Single parallel	Single
Requisite modules	1
Redundant modules	0
Working mode	Normal mode
Eco voltage range	+5%
Bsc mode add	Non - BSC
Bsc m s system	BSC slave system
Amb temp alarm thresh(°C)	55
Environ low temp warn point(°C)	-10
Height above sea lv(m)	≤1000
Top outlet fan	Disable
Dust maintain period(d)	0
Emergency shutdown enable	Enable
Bus capa. Life	Disable
Paral sys hibernate	Disable
Module cycle hiber period(d)	30
Chg eco bps power supply	Enable
Ram parity enabled	Disable
Record time after failure	0ms
Realtime waveform acquisition	Disable
Intra rack power unit starts delay(s)	0.5
Inter rack power unit start delay(s)	5

 **NOTE**

Click **Submit** after setting parameters on the WebUI.

----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 style="list-style-type: none">• Ambient temperature: 0–40°C• Humidity: 0–95% RH (non-condensing)• Rodent-proof measures have been taken for the equipment room.• The equipment room is airtight.	<ul style="list-style-type: none">• If the humidity or temperature is abnormal, check the air conditioner status.• Put rodent-proof baffle plates at the door of the UPS equipment room.• Check that the equipment room is airtight and not in a direct ventilation environment.
Power grid environment	<ul style="list-style-type: none">• Input voltage: 380 V AC, 400 V AC, or 415 V AC (line voltage)	<ul style="list-style-type: none">• If the input voltage is abnormal, check the power grid status and input cable

Check Item	Expected Result	Troubleshooting
	<ul style="list-style-type: none"> Output voltage: 380 V AC, 400 V AC, or 415 V AC (tolerance $\pm 1\%$, line voltage) Frequency: 40–70 Hz 	<p>connection.</p> <ul style="list-style-type: none"> If the output voltage is abnormal, check the UPS running status and check whether an alarm is generated.
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.
Status record	Record the three-phase load rate and output power factor.	If an exception occurs, check the load status.
Shallow discharge test (recommended)	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 terminals (between the UPS and the power distribution cabinet)	The insulation layer of cables is intact and terminals are free from black marks	<ul style="list-style-type: none"> Replace the cables. Secure the output terminals.

Check Item	Expected Result	Troubleshooting
	and noticeable sparks.	
Cables and circuit breaker through-current capacity	The circuit breakers and cables meet load requirements. The actual cable through-current capacity is greater than the circuit breaker specifications.	<ul style="list-style-type: none"> • Replace the circuit breaker. • Replace the cable.

6.2 Lead-Acid Battery Maintenance

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 management alarm	No battery management alarm is generated.	Identify the cause of an alarm based on the alarm information.
Battery appearance	<ol style="list-style-type: none"> 1. The surface is clean and tidy without stains. 2. The battery terminals are intact. 3. Batteries are free from damage and cracks. 4. Batteries are free from acid leakage. 5. Batteries are not deformed or bulged. 	If the battery appearance is abnormal, contact Huawei technical support.
Battery operating temperature	<ol style="list-style-type: none"> 1. The ambient battery temperature is $25\pm 5^{\circ}\text{C}$. 2. The battery operating temperature is lower than 	<ol style="list-style-type: none"> 1. Identify the cause of an abnormal battery operating temperature. 2. If the fault persists, contact

Item	Expected Result	Troubleshooting
	battery temperature +20°C. 3. Battery charge and discharge conditions meet the requirements specified in the battery specifications.	Huawei technical support.
Charge voltage of battery string	<ul style="list-style-type: none"> Equalized charging voltage: $(2.35 \text{ V/cell} \pm 1\%) \times \text{Single battery voltage} / 2 \times \text{Number of batteries in a battery string}$ Float charging voltage: $(2.25 \text{ V/cell} \pm 1\%) \times \text{Single battery voltage} / 2 \times \text{Number of batteries in a battery string}$ 	<ol style="list-style-type: none"> 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. Check whether the equalized charging voltage and float charging voltage are correctly set for the UPS. If the fault persists, contact Huawei technical support.

6.2.3 Quarterly Maintenance

Table 6-5 Quarterly maintenance

Item	Expected Result	Troubleshooting
Battery temperature sensor measurement accuracy	The difference between the temperature measured by the temperature sensor and the temperature displayed on the MDU is less than 3°C.	<ol style="list-style-type: none"> Install the temperature sensor in the correct position. Replace the battery temperature sensor.
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 style="list-style-type: none"> Equalized charging voltage: $2.35 \text{ V/cell} \pm 0.02 \text{ V/cell}$ 	<ol style="list-style-type: none"> Check whether the equalized charging voltage and float charging voltage

Item	Expected Result	Troubleshooting
	<ul style="list-style-type: none"> Float charging voltage: 2.25 V/cell \pm0.02 V/cell 	<p>of a battery are normal.</p> <ol style="list-style-type: none"> 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. If the fault persists, contact Huawei technical support.
Shallow discharge test (recommended)	Conduct a shallow discharge test when the UPS is backed up to verify that the batteries can discharge normally.	<ol style="list-style-type: none"> If the batteries cannot discharge normally, locate the fault (for abnormal alarms, see the alarm list). If the fault persists, contact Huawei technical support.

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 style="list-style-type: none"> Locate the cause when an exception is identified. If the fault persists, contact Huawei technical support.
Battery connection reliability	<ol style="list-style-type: none"> 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.) 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.) 	<ol style="list-style-type: none"> Rectify any abnormal connection. If the fault persists, contact Huawei technical support.

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.
- When batteries reach EOD, the battery switch in the BCB box trips if the BCB box is configured. To restore battery discharge, close the battery switch in the BCB box (if any) first.
- 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.

For details about how to rectify common faults, see Table 7-1. 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	The rectifier is not working, and the bus voltage is not boosted.	The mains voltage exceeds the upper threshold 280 V or is less than the lower	Check whether the mains voltage exceeds the threshold. If yes, contact the electric

Case	Symptom	Possible Cause	Measure
normal.		threshold 80 V.	power company.
		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 indicator is on, the inverter is faulty, and the UPS transfers to bypass mode.	The UPS is overloaded or short-circuited.	Reduce load or rectify short circuits.
		The power module is faulty.	Replace the power module.
The charger generates an alarm.	The buzzer is activated, the Fault indicator is on, and the charging function fails.	The charger fails.	Replace the power module.
		The charger experiences overcurrent.	Replace the power module.
		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 mode and does not transfer to inverter mode.	When the mains is normal, the UPS works in bypass mode and does not transfer to inverter mode.	Set the UPS working mode to ECO mode.	Set the working mode correctly.
		The bypass transfer times reach the upper threshold.	On the LCD, choose Clear Faults .
The bypass is not normal.	The buzzer is activated, and the Fault indicator is on.	The bypass thyristor is damaged.	Replace the bypass module.
		The bypass module experiences overtemperature.	Reduce the load, or improve ventilation.

 **NOTE**

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

8 Technical Specifications

Table 8-1 Physical specifications

Item	Specifications
Cabling mode	Battery cables are routed in and out from the top, and input and output cables are connected using the busway.
IP rating	IP20
Communication	Supports dry contacts, RS485 ports, and FE ports. Supports SNMP and Modbus.
Dimensions (H x W x D)	2200 mm x 1600 mm x 1000 mm
Weight	1497 kg

Table 8-2 Environmental specifications

Item	Specifications
Operating temperature	0°C to 55°C Temperature derating coefficient: not derated at 0°C–40°C, derated to 0.9 at 41°C–45°C, derated to 0.8 at 46°C–50°C, and derated to 0.7 at 51°C–55°C
Storage temperature	–40°C to +70°C
Relative humidity	0%–95% RH (non-condensing)
Altitude	0–1000 m When the altitude is greater than 1000 m, the power is derated as described in IEC 62040-3. The upper limit of the altitude is 4000 m.

Table 8-3 Safety compliance

Safety Certification	Standard
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Safety Certification	Standard
CE	EN 62040-1:2013
CB	IEC 62040-1:2013
TUV	EN 62040-1:2013
CQC	CQC 3108-2011
CCC	GB 7260.1-2008
TLC	YD/T 2165-2017

Table 8-4 EMC

EMC Test Item	Standard
Conducted emission	EN/IEC 62040-2
Radiated emission	EN/IEC 62040-2
Low-frequency signal interference	IEC 61000-2-2
ESD immunity	IEC 61000-4-2
Conducted susceptibility	EN/IEC 62040-2 EN/IEC 61000-4-6
Radiated susceptibility	EN/IEC 62040-2 EN/IEC 61000-4-3
Electrical fast transient	EN/IEC 62040-2 IEC 61000-4-4
Surge	EN/IEC 62040-2 IEC 61000-4-5
Voltage dips and short interruptions (220 V AC)	IEC 61000-4-11
Power frequency magnetic field	IEC 61000-4-8

Table 8-5 Mains input electrical specifications

Item	Specifications
Power system	Three-phase four-wire + PE
Rated voltage	380 V AC/400 V AC/415 V AC (line voltage)
Voltage range	0–30°C: not derated at 324–485 V AC, derated from 100% load to 45% load at 324–191 V AC, and derated from 45% load to 35% load at 191–139 V AC

Item	Specifications
	30–40°C: not derated at 342–485 V AC, derated from 100% load to 45% load at 342–191 V AC, and derated from 45% load to 35% load at 191–139 V AC
Rated frequency	50 Hz/60 Hz
Frequency range	40–70 Hz
Power factor	<ul style="list-style-type: none"> • > 0.99 (100% load) • > 0.98 (50% load) • > 0.94 (30% load)
Harmonic current	<ul style="list-style-type: none"> • THDi < 9% (30% linear load), THDi < 6% (50% linear load), THDi < 3% (100% linear load) • THDi < 11% (30% non-linear load), THDi < 8% (50% non-linear load), THDi < 5% (100% non-linear load)

Table 8-6 Bypass input electrical specifications

Item	Specifications
Power system	Three-phase four-wire + PE
Rated voltage	380 V AC/400 V AC/415 V AC (line voltage)
Rated frequency	50 Hz/60 Hz
Frequency range	50 Hz/60 Hz±6 Hz (adjustable with a tolerance of 0.5–6 Hz, ±2 Hz by default)
Input mode	The mains input and bypass input share a power source (by default) or use different power sources.

Table 8-7 Battery electrical specifications

Item	Specifications
Battery voltage (VRLA battery)	360–600 V DC 12 V batteries (30–50 batteries optional, 0 by default; set based on site requirements) 2 V batteries (180–300 batteries optional, 0 by default; set based on site requirements)
Battery cold start	If a mains outage occurs, batteries can start the UPS to supply power to loads.
Charger output power	Under rated conditions, the maximum charge power of a module is 15 kW, and the charge current is limited to 30 A.
Battery string sharing (VRLA battery)	Supported in a parallel system

Item	Specifications
Charging voltage (VRLA battery)	<ul style="list-style-type: none"> Equalized charging voltage: 2.35 V/cell Float charging voltage: 2.25 V/cell
Battery type	<ul style="list-style-type: none"> VRLA SmartLi

NOTICE

The UPS supports the SmartLi. For details about the parameters, see the *SmartLi User Manual*.

Table 8-8 Output electrical specifications

Item	Specifications
Power system	Three-phase four-wire + PE
Voltage	380 V AC/400 V AC/415 V AC (line voltage)
Frequency	<ul style="list-style-type: none"> In normal mode, the frequency is synchronous with the bypass input frequency. In battery mode, the frequency is 50 Hz/60 Hz with a tolerance of $\pm 0.05\%$.
Voltage distortion	<ul style="list-style-type: none"> THD < 1% (linear load) THD < 3% (non-linear load)
Power factor	1
Transfer time (normal)	<ul style="list-style-type: none"> Uninterruptible transfer: 0 ms Interruptible transfer: < 5 ms
Output voltage imbalance	Voltage imbalance: $\pm 3\%$ Phase imbalance: $120 \pm 1^\circ$ (balanced load), $120 \pm 2^\circ$ (unbalanced load)
Overload capability	Inverter overload capability: <ul style="list-style-type: none"> 100% < load \leq 110%: The UPS transfers to bypass mode after 60 minutes or longer. 110% < load \leq 125%: The UPS transfers to bypass mode after 10 minutes or longer. 125% < load \leq 150%: The UPS transfers to bypass mode after 1 minute or longer. When the load is greater than 150% or a short circuit occurs, the UPS transfers to bypass mode after 200 ms or longer. Bypass overload capability: <ul style="list-style-type: none"> The UPS runs continuously at 135% load at 30°C; the UPS generates only alarms and uses overtemperature protection

Item	Specifications
	at 135–150% load at 30°C. <ul style="list-style-type: none"> • The UPS runs continuously at 125% load at 40°C; the UPS generates only alarms and uses overtemperature protection at 125–150% load at 40°C. • The UPS runs for 5 minutes at bypass single-phase or three-phase load of 150%–200% at 40°C; the UPS runs for 1 minute at bypass single-phase or three-phase load greater than 200% at 40°C. • The UPS runs for 100 ms when the load exceeds 1000%.

Table 8-9 System electrical specifications

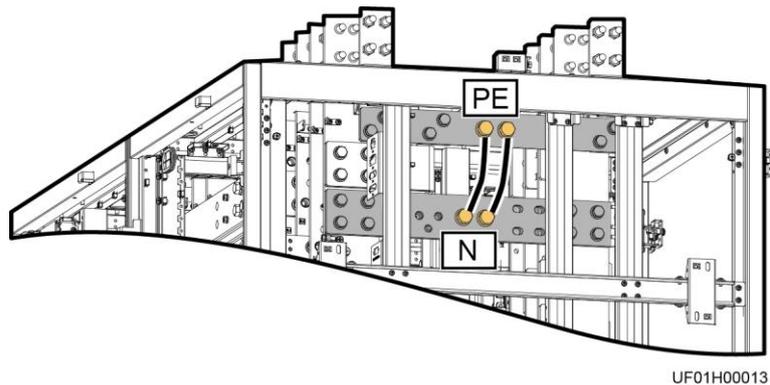
Item	Specifications
Parallel system reliability	Redundant parallel signals
ECO in a parallel system	Supported
Number of parallel UPSs	2
Power distribution system	TN, TN-C, TN-CS, TT

A (Optional) TN-C System Application

If the TN-C system is adopted, short-circuit the input N and PE, and connect the input PE and N to terminals on the N bar.

- Recommended cable cross-sectional area: 240 mm²
- Recommended screw: M16

Figure A-1 Short-circuiting the input N and PE (side view)



B Alarm List

 **NOTE**

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

Alarm ID (Alarm ID-Cause ID)	Alarm Name	Severity	Possible Cause	Suggestion
0001-1	Mains voltage abnormal	Minor	<ul style="list-style-type: none"> • Cable connections are incorrect. • The mains is abnormal. • The power module is faulty. • The output or battery is incorrectly grounded. 	<ol style="list-style-type: none"> 1. Check whether cables to mains are disconnected, loose, or incorrectly connected. 2. If cable connections are correct, measure the mains voltage with a multimeter. If the mains voltage is greater than 280 V, the mains input is abnormal; if the mains voltage is less than 272 V, the sampling circuit of the power module is abnormal. Replace the faulty power module. 3. Check whether the output or battery is incorrectly grounded.
0001-2			<ul style="list-style-type: none"> • Cable connections are incorrect. • The mains is abnormal. • The mains input fuse for the power module is blown. 	<ol style="list-style-type: none"> 1. Check whether cables to mains are disconnected, loose, or incorrectly connected. 2. If cable connections are correct, measure the mains voltage with a multimeter. If the mains voltage is lower than 80 V, the mains input is abnormal; if the mains voltage is greater than 88 V, the sampling circuit or the fuse of the power module is abnormal. Replace the faulty power module.
0001-3			The mains is abnormal.	Check the mains input frequency.
0004-1	Mains ph. Reversed	Minor	Cable connections are incorrect.	Check cable connections.

Alarm ID (Alarm ID-Cause ID)	Alarm Name	Severity	Possible Cause	Suggestion
0005-1	Mains neutral absent	Minor	Cable connections are incorrect.	<ol style="list-style-type: none"> 1. Secure or connect the neutral wire to the cabinet if it is loose or disconnected. 2. Check that the neutral wire to the power distribution system is normal.
0006-1	Mains undervoltage	Minor	<ul style="list-style-type: none"> • The mains is abnormal. • The power module sampling circuit is abnormal. 	Check whether the mains voltage ranges from 80 V (excluding 80 V) to 185 V with a multimeter. If no, the mains monitoring circuit of the power module is faulty. Replace the faulty power module.
0010-1	Abnormal bypass voltage	Minor	<ul style="list-style-type: none"> • The bypass voltage range is incorrectly set. • The bypass input voltage is abnormal. 	<ol style="list-style-type: none"> 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.
0010-2			<ul style="list-style-type: none"> • The bypass frequency range is incorrectly set. • The bypass input frequency is abnormal. 	<ol style="list-style-type: none"> 1. Check the bypass input voltage or cable connections with a multimeter. 2. Check the bypass input frequency. Check the rated frequency and frequency range configured on the LCD.
0011-1	Bypass phase reversed	Minor	The phase sequence of the three-phase bypass input is reversed.	Check whether the cable phase sequence is correct with a multimeter. If no multimeter is available, exchange the positions of any two cables.
0012-1	Bypass neutral absent	Minor	The bypass input neutral wire is lost.	<ol style="list-style-type: none"> 1. Secure or connect the neutral wire to the cabinet if it is loose or disconnected. 2. Check that the neutral wire to the power distribution system is normal.
0020-1	Battery connected reversely	Critical	Batteries are not properly installed.	<ol style="list-style-type: none"> 1. Check whether battery terminals are correctly installed with a multimeter. If no, reinstall the batteries. 2. Check whether the battery voltage of the PDU is normal. If yes, the battery sampling circuit of the power module is faulty. Replace the faulty power module.
0021-1	Battery EOD	Critical	The battery	If a BCB box is installed, check whether the

Alarm ID (Alarm ID-Cause ID)	Alarm Name	Severity	Possible Cause	Suggestion
			voltage reaches the EOD threshold due to continuous discharge.	BCB box has tripped. If yes, turn on the BCB box switch.
0022-1	No battery	Minor	<ul style="list-style-type: none"> There is no battery string. The battery string is not properly installed. The battery fuse in the power module is blown. 	<ol style="list-style-type: none"> Check whether battery cables are correctly connected. Check that the battery terminal voltage is normal. Check that the battery fuse in the power module is intact.
0025-1	Battery overvoltage	Minor	<ul style="list-style-type: none"> The configured number of batteries is less than the actual number. The battery neutral wire is absent. 	<ol style="list-style-type: none"> Check whether battery parameters are correctly set. If they are correctly set, certain batteries may be faulty. Check that the battery neutral wire is correctly connected.
0026-1	Low battery voltage	Minor	<ul style="list-style-type: none"> Battery discharge results in low battery voltage. The battery neutral wire is absent. The charger is faulty. 	<ol style="list-style-type: none"> If the low battery voltage alarm is generated in battery mode, check whether the mains voltage recovers. If yes, charge batteries immediately. Check that the battery neutral wire is correctly connected. 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.
0530-1	Battery ground fault	Critical	<ul style="list-style-type: none"> The battery string is not properly grounded. The battery ground monitoring cable is faulty. 	<ol style="list-style-type: none"> Check that the positive and negative terminals of the battery string are grounded or have sufficient resistance to the ground. Check whether the battery grounding failure detector is faulty by replacing it with a new one. If no battery grounding failure detector is available, check on the dry contact

Alarm ID (Alarm ID-Cause ID)	Alarm Name	Severity	Possible Cause	Suggestion
			<ul style="list-style-type: none"> The dry contact card is faulty. 	<p>card 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 card may be faulty. Replace the card.</p>
0032-1	Battery overvoltage protection	Critical	<ul style="list-style-type: none"> The battery voltage is greater than the upper threshold. The configured number of batteries is less than the actual number. The actual number of batteries does not meet requirements. 	<ol style="list-style-type: none"> Check the battery voltage. Check that the configured number of batteries matches the actual number. Check that the actual number of batteries meets requirements.
0036-2	Battery maintenance reminder	Warning	The batteries are due for maintenance.	Maintain the batteries.
0037-1	Battery undervoltage	Critical	<ul style="list-style-type: none"> The UPS works in battery mode for a long time. The charger is faulty. 	<ol style="list-style-type: none"> Check that the battery voltage is normal. Check that the output is not overloaded. Check whether any battery is damaged. If yes, replace the faulty battery. Check whether any alarm is generated for a battery charger. If a charger is damaged, replace the related module.
0040-7	Rectifier abnormal	Critical	<ul style="list-style-type: none"> The fans of the power module are abnormal. The ventilation channel of the power module is obstructed. 	<ol style="list-style-type: none"> Check whether the ventilation channel of the power module is blocked. If yes, rectify the fault to restore the normal operation of the fans. Check whether the fans are abnormal. Replace the power module if the fans are faulty.
0043-1	Fan abnormal	Critical	<ul style="list-style-type: none"> The fans of the power 	Replace the faulty power module.

Alarm ID (Alarm ID-Cause ID)	Alarm Name	Severity	Possible Cause	Suggestion
			<p>module are abnormal.</p> <ul style="list-style-type: none"> The fan monitoring cable for the power module is abnormal. 	
0043-2			The fans are faulty.	Check the fans or replace the bypass module.
0043-3			<ul style="list-style-type: none"> The fans are faulty. The fan monitoring cable is faulty. 	<ol style="list-style-type: none"> Replace the fans. Check the fan monitoring cable.
0043-4				
0047-1	Not ready	Critical	The ready switch is OFF.	Turn on the ready switch.
0060-4	Inverter abnormal	Critical	<ul style="list-style-type: none"> A load short circuit occurs. A short circuit occurs inside the module (this fault seldom occurs). The output is incorrectly grounded. 	<ol style="list-style-type: none"> Check load cable connections. Check that the output is grounded. If the load cable connections are normal and the output is correctly grounded, replace the power unit or module.
0061-2	Inverter alarm	Minor	<ul style="list-style-type: none"> The I2C bus is abnormal. The E2PROM is faulty. 	<ol style="list-style-type: none"> Manually rectify the fault and check whether the alarm is cleared. If the alarm is generated again, replace the power module.
0061-7	Inverter alarm	Minor	The bypass waveform is abnormal.	<ul style="list-style-type: none"> If not all modules generate the alarm, start the UPS, transfer it to inverter mode, and replace the modules that generate the alarm. If all modules generate the alarm, switch off the bypass input circuit breaker. After the inverter relay is closed, switch on the bypass input circuit breaker 10s

Alarm ID (Alarm ID-Cause ID)	Alarm Name	Severity	Possible Cause	Suggestion
				later.
0564-1	Overload timeout	Critical	<ul style="list-style-type: none"> The loads are excessive. Derating reduces the rated system power. The module is damaged. The output is incorrectly grounded. The peak load current is excessively high. 	<ol style="list-style-type: none"> Check that there is no overload. Check that the module power is not derated due to a fan fault. Check that the power grid has no large asymmetric load. Check that the output is grounded. Check that the peak load rate does not exceed the specifications. If the alarm persists, replace the power module.
0565-1	Load impact transfer-to-bypass	Minor	<ul style="list-style-type: none"> A large-power RCD load is instantly connected, or the output load short-circuits. The inverter bridge short-circuits. 	<ol style="list-style-type: none"> Check the loads. If the loads are normal, replace the power module.
0566-1	Output overload	Minor	<ul style="list-style-type: none"> The loads are excessive. Derating reduces the rated system power. The module is damaged. 	<ol style="list-style-type: none"> Check that there is no overload. Check that the module power is not derated due to a fan fault. If the alarm persists, replace the power module.
0570-4	BPM module abnormal	Critical	<ul style="list-style-type: none"> The bypass fan is abnormal, or the ventilation channel is blocked. The ambient temperature exceeds the 	<ol style="list-style-type: none"> Check the bypass fans and ventilation channel. If the fans are faulty, replace them. Check that the ambient temperature does not exceed 40°C. Check that there is no overload.

Alarm ID (Alarm ID-Cause ID)	Alarm Name	Severity	Possible Cause	Suggestion
			upper threshold. <ul style="list-style-type: none"> The loads are excessive. 	
0583-1	Inter-rack par. cable abnormal	Critical	<ul style="list-style-type: none"> The inter-rack parallel CAN bus is disconnected or short-circuits. Only one UPS works in a parallel system. An ECM is faulty. 	<ol style="list-style-type: none"> Check the CAN bus. Rectify the disconnection or short circuit fault. Replace the ECM.
0583-4			The inter-rack industrial-frequency synchronization cable is disconnected.	Replace the inter-rack parallel cable.
0583-5		The inter-rack carrier synchronization cable is disconnected.		
0583-6		<ul style="list-style-type: none"> The intra-rack INVBYP cable is disconnected. The parallel CAN bus is disconnected. 		
0584-2	Inter-rack par. 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	

Alarm ID (Alarm ID-Cause ID)	Alarm Name	Severity	Possible Cause	Suggestion
			disconnected.	
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 BPM transfers	Minor	The system frequently transfers to bypass mode due to overload timeout or load impact.	Check the loads.
0087-1	System transfer-to-bypass	Warning	The neighboring UPS is abnormal and transfers to bypass mode.	Check the reason why the neighboring UPS transfers to bypass mode.
0088-1	Rack address conflict	Critical	The configured rack address conflicts with another one.	Check the rack address setting.
0089-1	Rack output overload	Minor	<ul style="list-style-type: none"> The loads are excessive. The rack capacity setting is not appropriate. 	<ul style="list-style-type: none"> If the loads are excessive, remove some loads or expand the UPS capacity. Check that the configured rack capacity meets requirements.
0090-1	Dry contact board fault	Critical	The I2C communication of the dry contact card MUE05A fails.	Replace the dry contact card MUE05A.
0090-2			The I2C communication of the dry contact card MUE06A fails.	Replace the dry contact card MUE06A.
0356	Battery Mode	Minor	The UPS is working in battery mode.	The running status is displayed. See details about how to handle other alarms.
0359	No power supplied	Warning	No power is supplied.	The running status is displayed. See details about how to handle other alarms.
0332	Output disabled	Minor	The output is disabled.	The running status is displayed. See details about how to handle other alarms.

Alarm ID (Alarm ID-Cause ID)	Alarm Name	Severity	Possible Cause	Suggestion
0337	PDC bypass input breaker open	Critical	The bypass input circuit breaker of the PDC is OFF.	The running status is displayed. No further measures are required.
0338	PDC output breaker open	Critical	The output circuit breaker of the PDC is OFF.	<ol style="list-style-type: none"> 1. Check that all UPS output circuit breakers are ON. 2. On the LCD, check whether PDC output breaker open alarm has disappeared. If no, tap the Clear Fault button to clear the alarm.
0341	PDC Maint. breaker closed	Minor	The PDC maintenance circuit breaker is ON.	The running status is displayed. No further measures are required.
0342	Mains input breaker open	Critical	The mains input circuit breaker is OFF.	The running status is displayed. No further measures are required.
0343	BPM input breaker open	Critical	The bypass input circuit breaker is OFF.	The running status is displayed. No further measures are required.
0340	Maint. breaker closed	Minor	The maintenance circuit breaker is ON.	The running status is displayed. No further measures are required.
0335	Generator connected	Warning	The generator is connected.	The running status is displayed. No further measures are required.
0594-1	Insufficient redundant racks	Minor	<ul style="list-style-type: none"> • The loads are excessive. • The configured number of redundant racks is incorrect. 	<ol style="list-style-type: none"> 1. Reduce the loads. 2. Decrease the configured number of redundant racks.
0095-1	Insuffi. redundancy	Minor	<ul style="list-style-type: none"> • The loads are excessive. • The configured number of redundant modules is incorrect. 	<ol style="list-style-type: none"> 1. Reduce the loads. 2. Decrease the configured number of redundant modules.
0096-1	ECO volt. Abnormal	Minor	<ul style="list-style-type: none"> • The ECO bypass voltage or 	<ol style="list-style-type: none"> 1. Check the bypass input voltage and frequency. 2. Check that the rated voltage, rated

Alarm ID (Alarm ID-Cause ID)	Alarm Name	Severity	Possible Cause	Suggestion
			<p>frequency is out of the preset range.</p> <ul style="list-style-type: none"> The ECO bypass voltage or frequency range is incorrectly set. The bypass input sequence is reverse or the neutral wire is disconnected. 	<p>frequency, ECO bypass voltage range, and frequency range are correctly set.</p> <ol style="list-style-type: none"> 3. Check that the bypass cables and circuit breakers are correctly connected.
0098-1	Bypass current not shared	Minor	<ul style="list-style-type: none"> The output and input circuit breakers are OFF. The length of the bypass input or output power cables is incorrect. The bypass SCR open-circuits. 	<ol style="list-style-type: none"> 1. Check that the output circuit breakers and bypass input circuit breakers on each rack are ON. 2. Check that the length of the bypass input or output power cables on each rack are correct. 3. If the alarm persists, rectify any bypass SCR open circuit.
0150-1	Inverter asynchronous	Minor	<ul style="list-style-type: none"> The bypass frequency changes fast. The output frequency track rate is incorrectly set. 	<ol style="list-style-type: none"> 1. Check that the bypass output frequency does not change fast. 2. Check that the Output freq. track rate is properly set.
0101-1	BSC signal abnormal	Minor	<ul style="list-style-type: none"> The dual bus connector is loose. Parameters are set incorrectly. 	<ol style="list-style-type: none"> 1. Check the dual bus connector. 2. Check the parameter settings. 3. The master BSC system is not supplying power.

Alarm ID (Alarm ID-Cause ID)	Alarm Name	Severity	Possible Cause	Suggestion
0102-1	Maint. breaker misoperation	Critical	The user operation is incorrect.	<ol style="list-style-type: none"> 1. Shut down the inverter and then turn on the maintenance circuit breaker. 2. After the maintenance is complete, turn off the maintenance circuit breaker and then manually start the inverter.
0380-1	In self-check	Warning	The inverter self-check is in progress.	Wait until the inverter self-check is complete.
0309-1	rectifier power limiting	Warning	<ul style="list-style-type: none"> • The current limit percentage configured on the LCD is too small. • The loads are excessive. • Derating reduces the rated system power. • The module is damaged. 	<ol style="list-style-type: none"> 1. Check the current limit percentage configured on the LCD. 2. Check that there is no overload. 3. Check that the module power is not derated due to a fan fault. 4. Check that the power grid has no large asymmetric load. 5. Check that the output is grounded. 6. If the alarm persists, replace the power unit or module.

C Acronyms and Abbreviations

A

AWG American Wire Gauge

B

BSC bus synchronization controller

BCB box battery circuit breaker box

BBB box battery bus bar box

C

CE Conformance Européenne

D

DSP digital signal processing

E

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

M

MDU monitor display unit

P

PC personal computer

PE protective earthing

PDU power distribution unit

R

RS485 Recommended Standard 485

S

STS static transfer switch

SNMP Simple Network Management Protocol

T

THDi total distortion of the input current waveform

THDv total harmonic distortion of output voltage

U

UPS uninterruptible power system

USB Universal Serial Bus

V

VRLA valve-regulated lead acid