



UPS5000-S-1200 kVA

User Manual

Issue 08

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HUAWEI TECHNOLOGIES CO., LTD.



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About This Document

Purpose

This document describes the UPS5000-S-1200 kVA in terms of its features, performance, working principles, appearance as well as instructions for 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.

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

Change History

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

Issue 08 (2020-12-15)

Adapted the UPS to lithium batteries and updated the monitoring user interfaces.

Issue 07 (2020-09-10)

- Added the fan replacement procedure for a fan unit.
- Updated the monitoring UIs.

Issue 06 (2020-01-15)

Updated the installation procedure.

Issue 05 (2019-12-20)

Updated the safety information.

Issue 04 (2019-06-25)

Added the optional fan unit.

Issue 03 (2019-04-02)

Updated descriptions of installing communications cables.

Issue 02 (2019-01-26)

Updated the busbar installation sequence.

Issue 01 (2018-05-30)

This issue is the first official release.

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1 Safety Information

1.1 General Safety

Statement

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

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

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

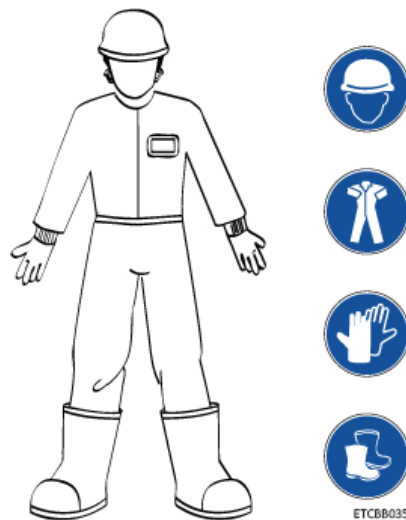
Follow local laws and regulations when installing, operating, or maintaining the equipment. The safety instructions in this document are only supplements to local laws and regulations.

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

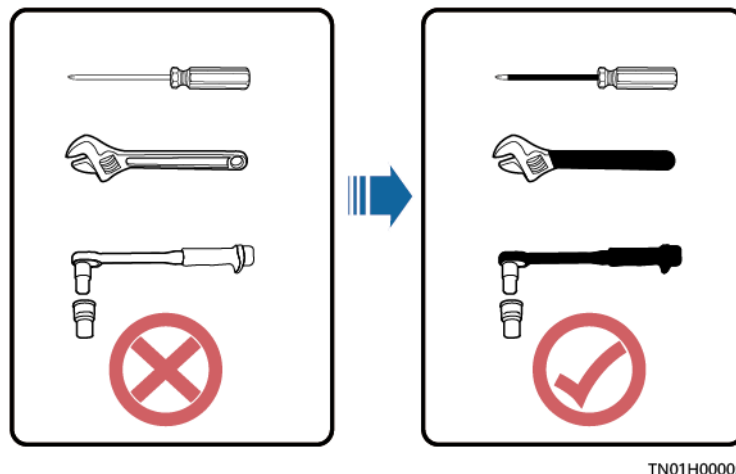
- Operation beyond the conditions specified in this document
- Installation or use in environments which are not specified in relevant international or national standards
- Unauthorized modifications to the product or software code or removal of the product
- Failure to follow the operation instructions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

General Requirements

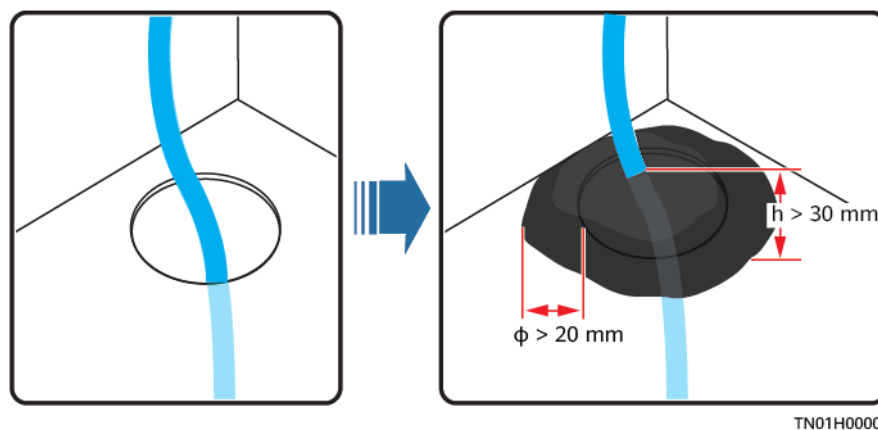
- Do not install, use, or operate outdoor equipment and cables (including but not limited to moving equipment, operating equipment and cables, inserting connectors to or removing connectors from signal ports connected to outdoor facilities, working at heights, and performing outdoor installation) in 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.



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



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

Personal Safety

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

1.2 Personnel Requirements

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

1.3 Electrical Safety

Grounding

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

General Requirements

Use dedicated insulated tools when performing high-voltage operations.

AC and DC Power

 DANGER

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

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

Cabling

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

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

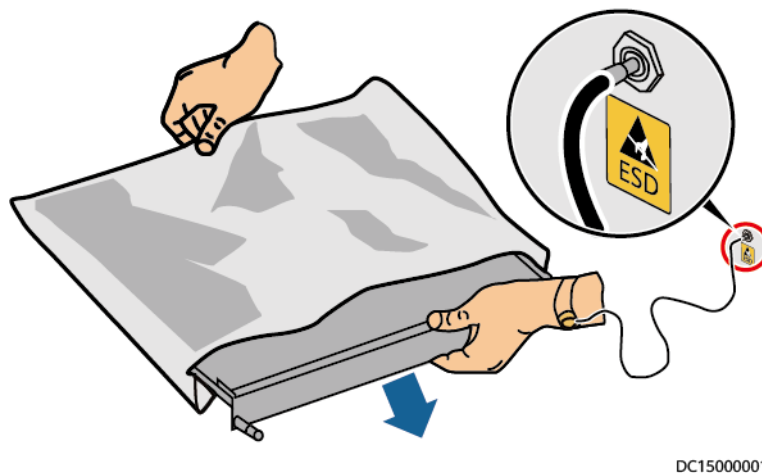
ESD

NOTICE

The static electricity generated by human bodies may damage the 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



DC15000001

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.

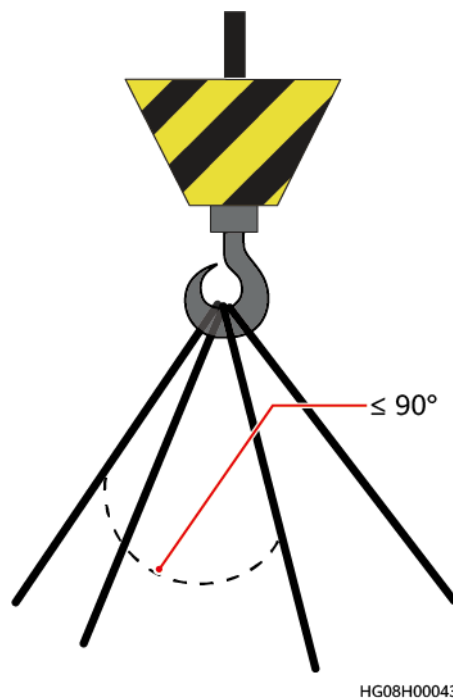
Installation at Heights

- 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

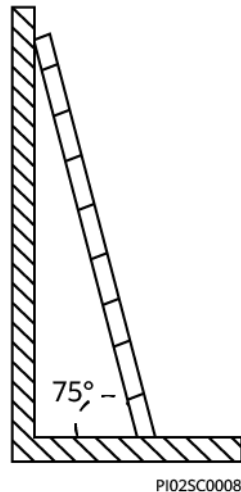
- Do not walk under hoisted objects.
- Only trained and qualified personnel should perform hoisting operations.
- Check that hoisting tools are available and in good condition.
- Before hoisting objects, ensure that hoisting tools are firmly secured onto a load-bearing object or wall.
- Ensure that the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

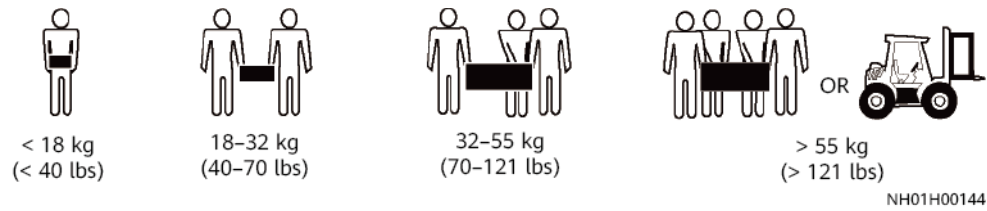
-
- Obtain the consent from the customer and subcontractor before drilling.
 - Wear goggles and protective gloves when drilling holes.
 - When drilling holes, protect the equipment from shavings. After drilling, clean up any shavings that have accumulated inside or outside the equipment.

Moving Heavy Objects

DANGER

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

-
- Be cautious to avoid injury when moving heavy objects.



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

1.6 Device Running Safety

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

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

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

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

NOTICE

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

DANGER

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

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

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

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

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

Do not use the UPS in the following places:

- Environments that are close to flammable or explosive materials, dust, corrosive gases or dust, conductive or magnetic dust, abnormal vibration, or collision
- Rooms or outdoor environments where temperature and humidity are not controlled (with high temperature, low temperature, moisture, direct sunlight, or heat sources)
- Non-confined environments near the ocean (0–3.7 km) and indoor or 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 Number Description

Figure 2-1 UPS model number

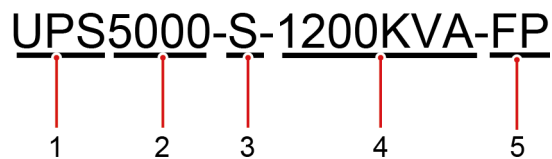


Table 2-1 Model number description

No.	Meaning	Value
1	Product category	UPS power supply and distribution product. UPS is short for uninterruptible power system.
2	UPS family	5000
3	UPS subcategory	S series
4	Output capacity	1200 kVA
5	Solution	FusionPower

The maximum capacity of UPS5000-S-1200 kVA-FP is 1200 kVA and it is compatible with a capacity of 1100 kVA, 990 kVA, 880 kVA, 770 kVA and 660 kVA.

2.2 Working Principle

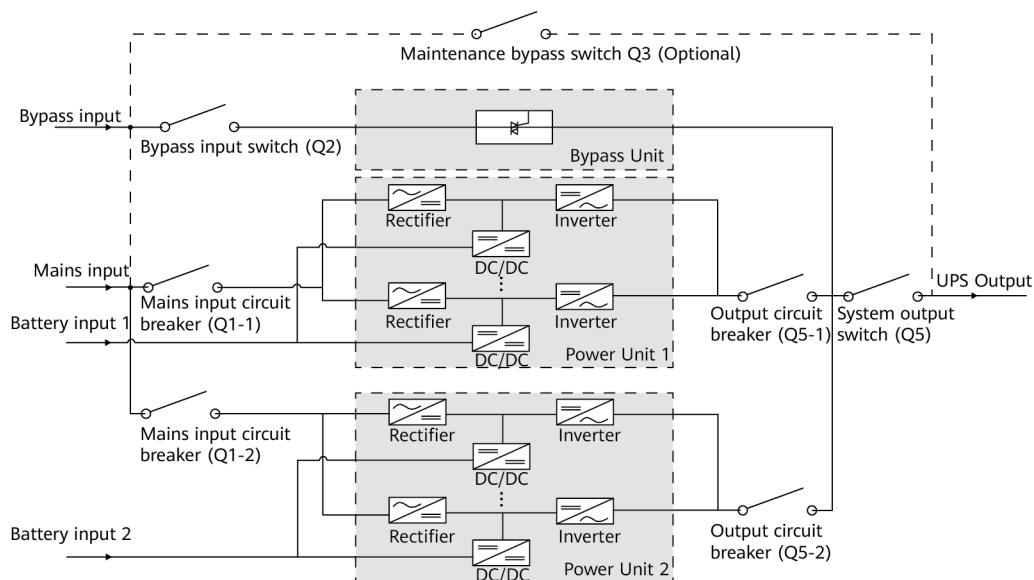
NOTE

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

2.2.1 Conceptual Diagram

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

Figure 2-2 UPS conceptual diagram



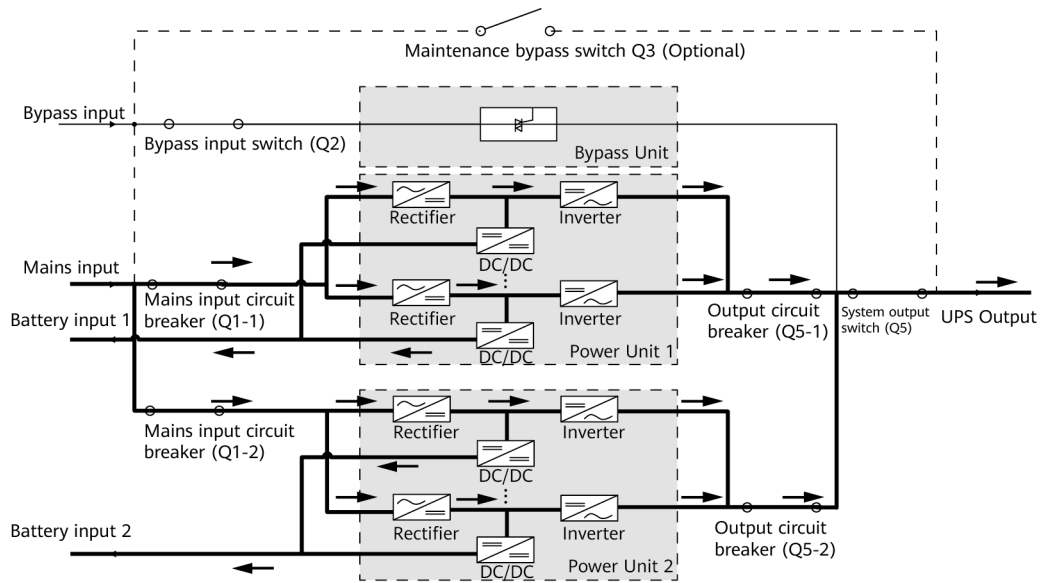
UA31P00001

2.2.2 Working Modes

2.2.2.1 Normal Mode

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

Figure 2-3 UPS conceptual diagram in normal mode

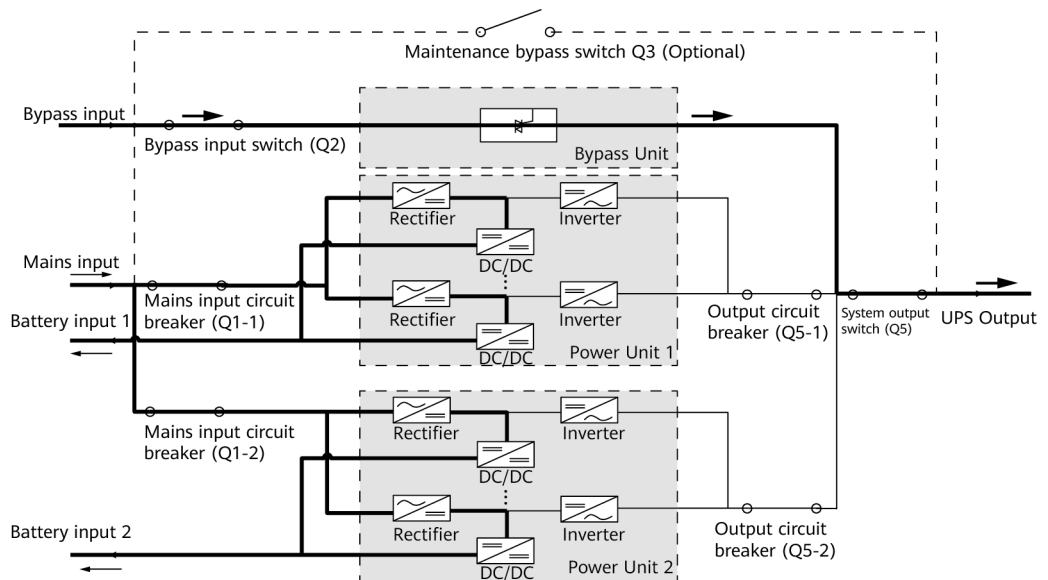


UA31P00002

2.2.2.2 Bypass Mode

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

Figure 2-4 UPS conceptual diagram in bypass mode

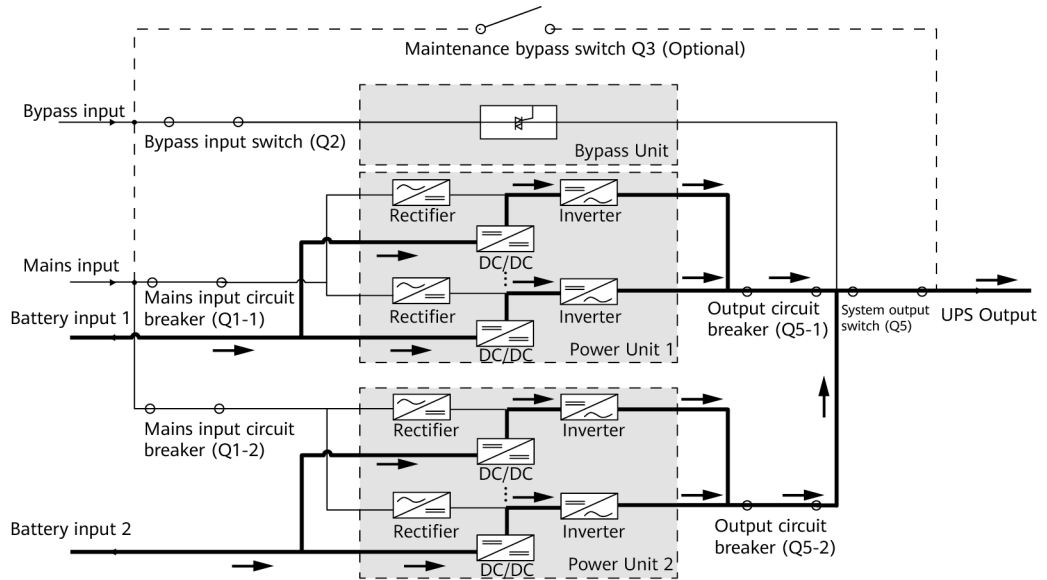


UA31P00003

2.2.2.3 Battery Mode

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

Figure 2-5 UPS conceptual diagram in battery mode

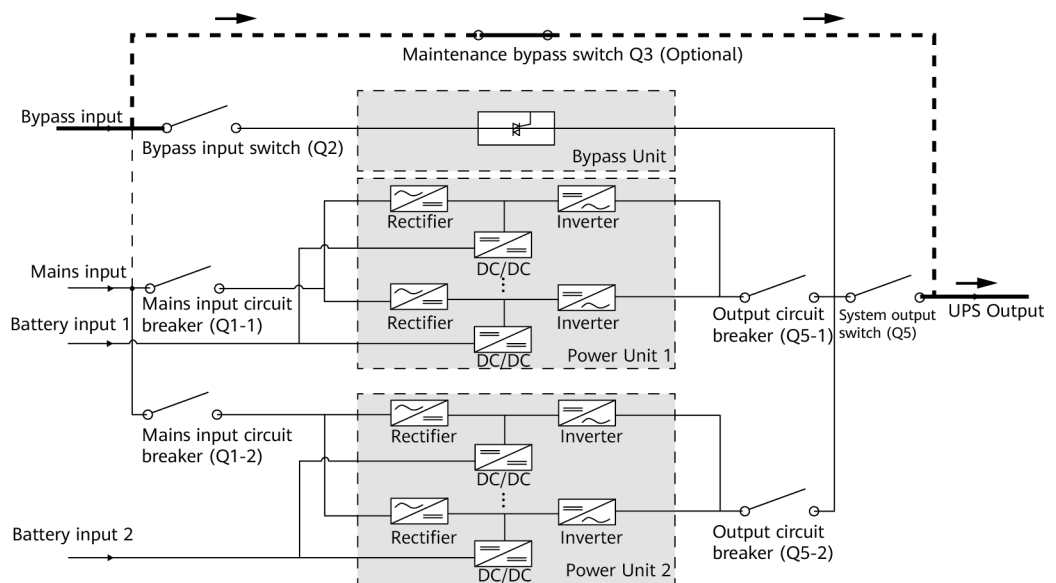


UA31P00004

2.2.2.4 Maintenance Bypass Mode

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

Figure 2-6 UPS conceptual diagram in maintenance bypass mode



UA31P00005

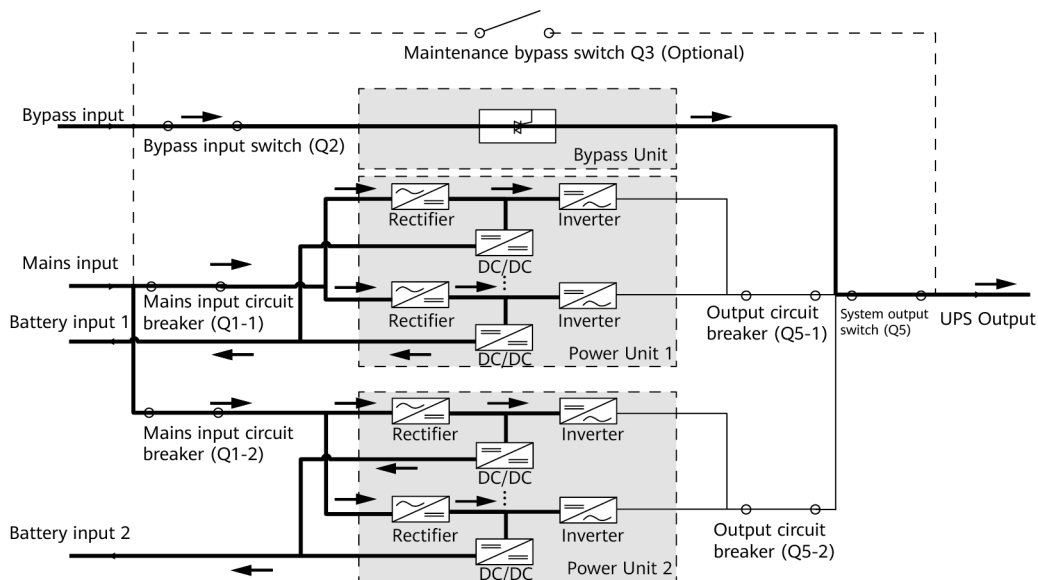
NOTE

If the UPS transfers to maintenance bypass mode due to software upgrade, you do not have to turn off Q1-1, Q1-2, Q2, Q5-1, Q5-2, or Q5 in the figure.

2.2.2.5 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 voltage is outside the ECO voltage range, the UPS transfers from bypass mode to normal mode. In bypass mode or normal mode, the rectifier keeps working and charges batteries using a charger. The ECO mode delivers a high efficiency.

Figure 2-7 UPS conceptual diagram in ECO mode



UA31P00006

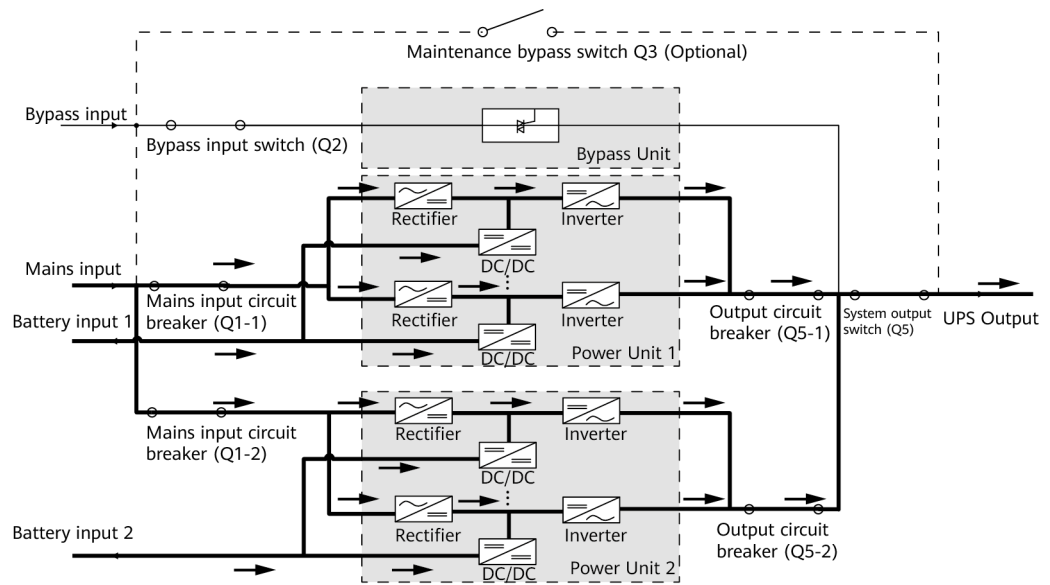
NOTE

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

2.2.2.6 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 2-8 Conceptual diagram in joint power mode

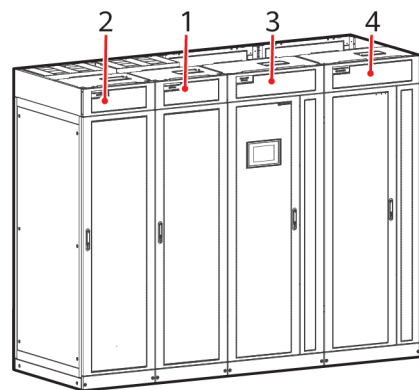


UA31P00007

2.3 Product Introduction

2.3.1 Appearance

Figure 2-9 UPS



UA31W00001

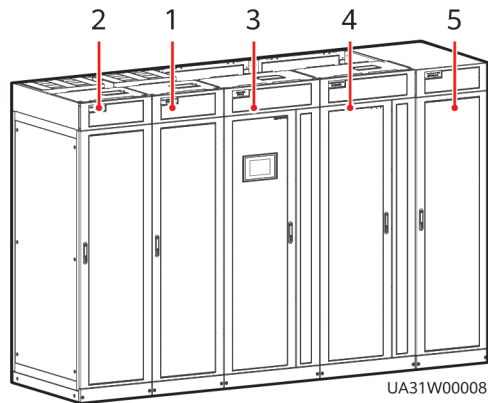
(1) Power Unit 1

(2) Power Unit 2

(3) Bypass Unit

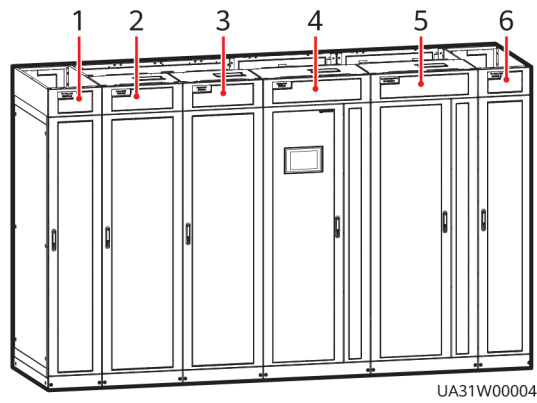
(4) Input and output Unit

Figure 2-10 UPS+Maintenance bypass unit



- (1) Power Unit 1
- (2) Power Unit 2
- (3) Bypass Unit
- (4) Input and output Unit
- (5) Maintenance bypass unit (optional)

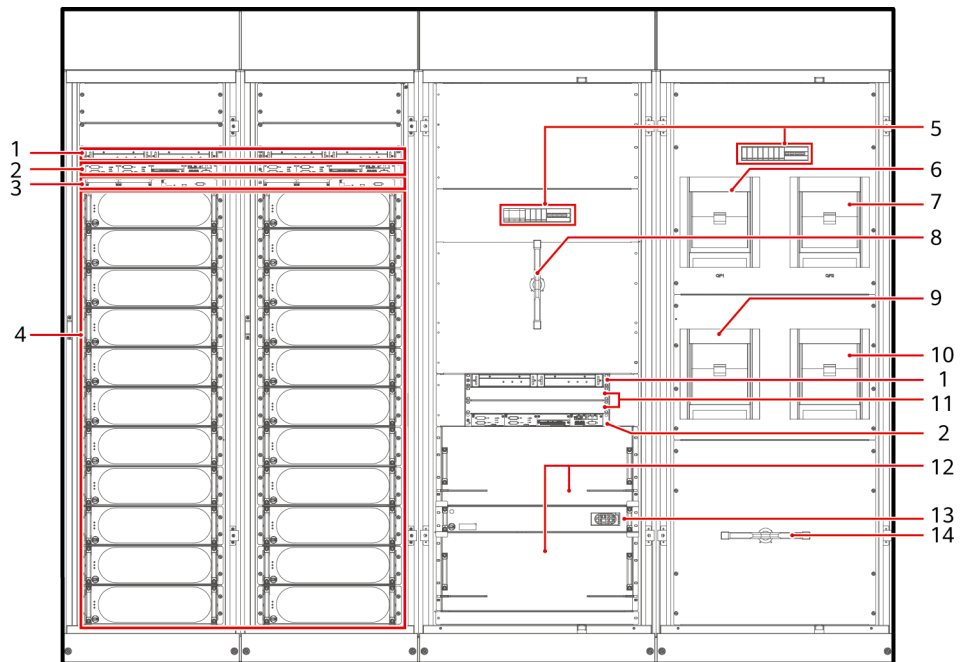
Figure 2-11 UPS+Fan unit



- (1) Fan unit - left (optional)
- (2) Power unit 2
- (3) Power unit 1
- (4) Bypass unit
- (5) Input/output unit
- (6) Fan unit - right (optional)

2.3.2 Product Structure

Figure 2-12 Structure with the door open



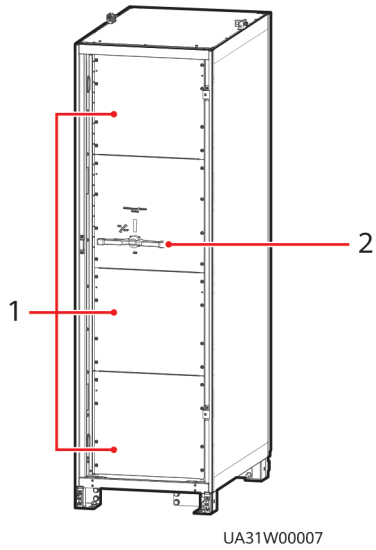
UA31W00002

- | | | | |
|---|--|--|------------------------------|
| (1) Surge protective box | (2) Control module | (3) Monitor control module | (4) Power modules |
| (5) SPD and SPD switch | (6) Mains input circuit breaker of power unit 1 (Q1-1) | (7) Mains input circuit breaker of power unit 2 (Q1-2) | (8) Bypass input switch (Q2) |
| (9) Output circuit breaker of power unit 1 (Q5-1) | (10) Output circuit breaker of power unit 2 (Q5-2) | (11) Filler panels | (12) Bypass module |
| (13) Bypass control module | (14) System output switch (Q5) | | |

NOTE

Modules in each power unit are numbered in ascending order, that is, module 1..., and module n.

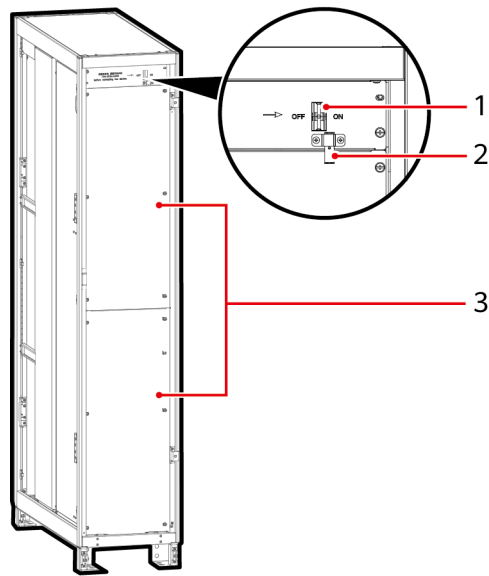
Figure 2-13 Maintenance bypass unit (optional)



(1) Cover

(2) Maintenance bypass switch

Figure 2-14 Fan unit (optional)



(1) Fan power switch

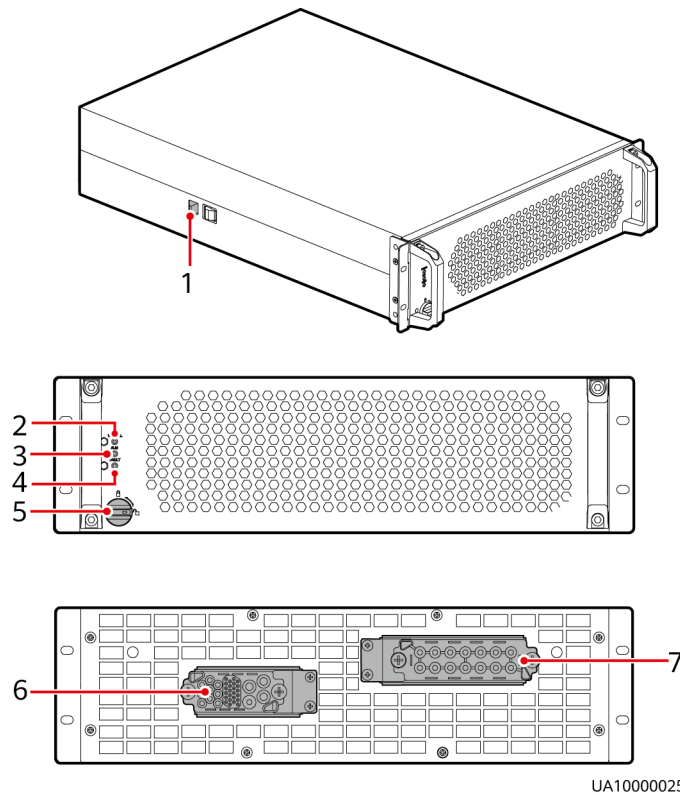
(2) Cover stopper

(3) Cover

2.3.3 Power Module

Appearance

Figure 2-15 Power module



- (1) Positioning lock (2) Run indicator (3) Alarm indicator (4) Fault indicator
(5) Ready switch (6) Output port (7) Input port

Table 2-2 Indicator description

Indicator	Color	Status	Description
Run 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 or rectifier DSP software is being upgraded, or the inverter FPGA software is being upgraded (blinking at 4 Hz, on for 0.125s and off for 0.125s).

Indicator	Color	Status	Description
		Off	The rectifier FPGA 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 rectifier FPGA software is being upgraded.
Fault indicator	Red	Steady on	A critical alarm is generated for the inverter or rectifier.
		Off	There is no critical alarm for the inverter or rectifier, or the rectifier FPGA software is being upgraded.

Functions

The power module consists of a power factor correction (PFC) rectifier, inverter, and DC/DC converter. The power module 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.

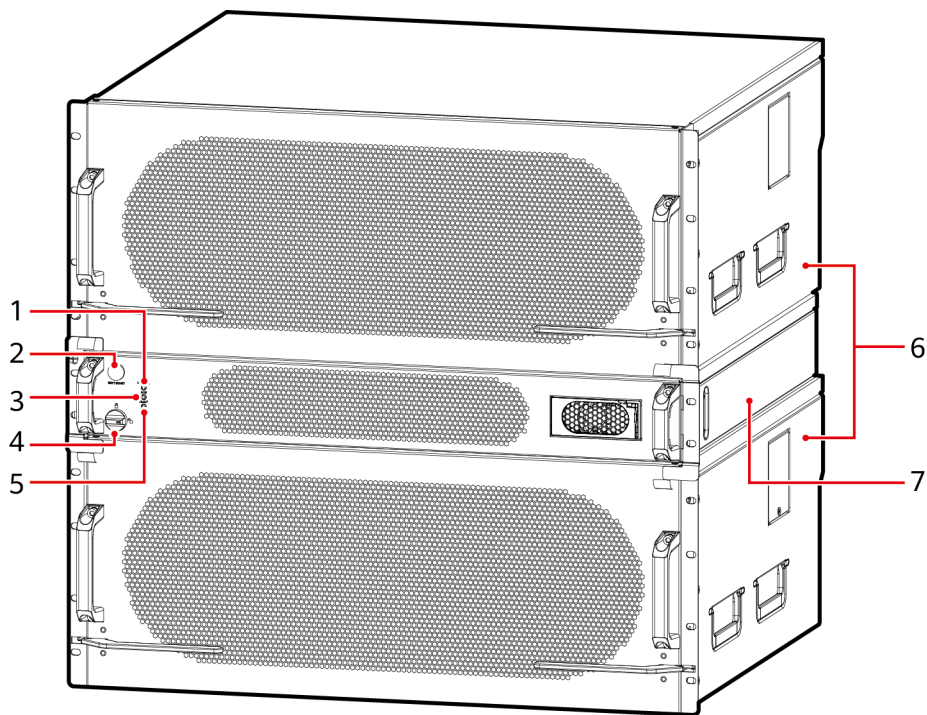
Specifications

- Dimensions (H x W x D): 130 mm x 442 mm x 620 mm
- Weight: < 34 kg
- Rated output capacity: 55 kVA/55 kW

2.3.4 Bypass Module

Appearance

Figure 2-16 Bypass module



UF01W00001

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

Table 2-3 Indicator description

Indicator	Color	Status	Description
Run indicator	Green	Steady on	The system is working in bypass mode.
		Blinking at long intervals	The bypass has no output (blinking at 0.2 Hz, on for 2.5s and off for 2.5s).
		Blinking at short intervals	The bypass is not configured or the DSP software is being upgraded (blinking at 4 Hz, on for 0.125s and off for 0.125s).
		Off	The bypass CPLD software is being upgraded.
Alarm indicator	Yellow	Steady on	A minor alarm is generated for the bypass.

Indicator	Color	Status	Description
		Off	There is no minor alarm for the bypass, or the CPLD 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 CPLD software is being upgraded.

Functions

The bypass module supplies power in the following cases:

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

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

In normal mode, if both the active and standby ECMs of the bypass unit are faulty, the bypass takes over power supply.

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

A manual operation is performed to transfer to bypass mode.

Specifications

- Dimensions (H x W x D):
 - 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

2.3.5 Control Module

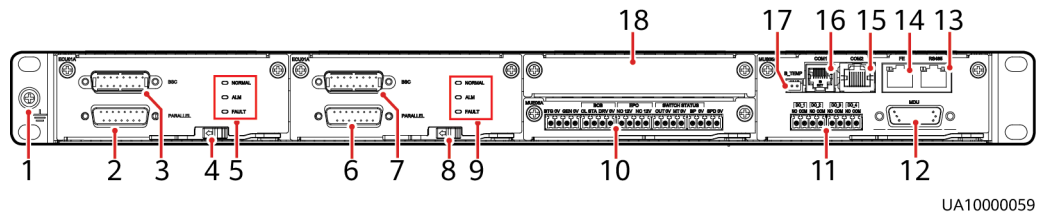
2.3.5.1 Overview

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.

NOTE

The optional backfeed protection card or dry contact extended card can be installed only in the control module of the bypass unit.

Figure 2-17 Signal panel on the control module



- (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.

2.3.5.2 ECM

Appearance

The control module consists of two energy control modules (ECMs) in active/standby mode.

Figure 2-18 ECM

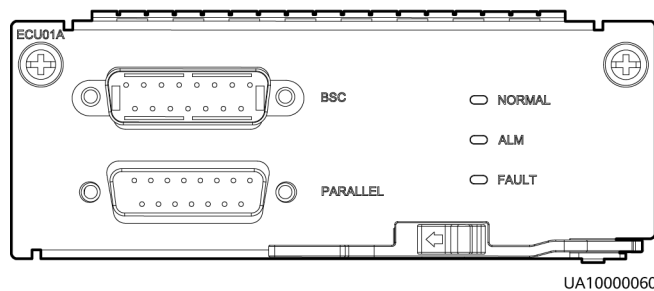


Table 2-4 Ports on the ECM

Silk Screen	Description
PARALLEL	The PARALLEL port transmits parallel signals between racks.

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

Table 2-5 Indicator description

Indicator	Color	Status	Description
NORMAL	Green	Steady on	This ECM is the active ECM.
		Blinking at 0.5 Hz	This ECM is the standby ECM and it is ready.
		Off	This ECM is not ready or the CPLD of this ECM is being upgraded.
		Blinking at 4 Hz	The DSP of the ECM is being upgraded or not configured.
ALM	Yellow	Steady on	The ECM has a minor alarm, but it does not need to be replaced.
		Off	The ECM has no minor alarm or the DSP 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 DSP 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 to communicate with the dry contact card. The ECM ensures equalized output currents between modules so that load power is equally shared.
- Provides module running information for the MDU.
- Controls the running of a single UPS5000, and reports the UPS5000 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.

Specifications

- Hot-swappable

- 1 U high

2.3.5.3 Dry Contact Card

Appearance

Figure 2-19 Dry contact card

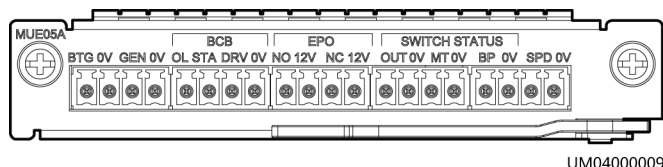


Table 2-6 Functions of control signal ports on the dry contact card

Silk Screen	Bypass Unit	Power Unit	Description	Status	Initial Status		
BTG	Reserved	In use: Controls the power unit.	Port for detecting battery grounding faults	<ul style="list-style-type: none"> • Connected: battery grounding fault • Disconnected: no battery grounding fault 	Disconnected		
0V			Port for signal ground				
GEN	In use: Controls the entire UPS system.	Reserved	Port for detecting diesel generator (D.G.) mode	<ul style="list-style-type: none"> • Connected: D.G. mode • Disconnected: non-D.G. mode 	Disconnected		
0V			Port for signal ground				
BCB_OL	Reserved	In use: Controls the power unit.	Port for detecting the BCB box	<ul style="list-style-type: none"> • Grounded: BCB box connected • Disconnected: BCB box not connected 	Grounded		
BCB_STA			Port for monitoring the battery switch			<ul style="list-style-type: none"> • Connected: battery switch ON • Disconnected: battery switch OFF 	Disconnected
BCB_DRV			Controls battery circuit breaker trip. When the voltage is +12 V, the circuit breaker trips.				
BCB_0V			Port for signal ground				

Silk Screen	Bypass Unit	Power Unit	Description	Status	Initial Status
EPO_NO	In use: Controls the entire UPS system.	Reserved	Emergency power-off (EPO) port	If the normally open (NO) port is connected to the EPO_12V port, EPO is triggered.	Disconnected
EPO_12V			+12 V		
EPO_NC			EPO port	If the normally closed (NC) port is disconnected from the EPO_12V port, EPO is triggered.	Connected
EPO_12V			+12 V		
SWITCH STATUS_OUTPUT			Port for monitoring the UPS output circuit breaker	<ul style="list-style-type: none"> Connected: circuit breaker ON Disconnected: circuit breaker OFF 	Connected
SWITCH STATUS_0V			Port for signal ground		
SWITCH STATUS_M T			Port for monitoring the maintenance circuit breaker	<ul style="list-style-type: none"> Disconnected: circuit breaker ON Connected: circuit breaker OFF 	Disconnected
SWITCH STATUS_0V			Port for signal ground		
SWITCH STATUS_BP			Port for monitoring the bypass input circuit breaker	<ul style="list-style-type: none"> Connected: circuit breaker ON Disconnected: circuit breaker OFF 	Connected
SWITCH STATUS_0V			Port for signal ground		
SPD			Port for monitoring the system output switch	<ul style="list-style-type: none"> Connected: system output switch ON Disconnected: system output switch OFF 	Connected
0V			Port for signal ground		

 **NOTE**

- The dry contact interface card takes effect only after it is set on the monitoring system. Set the unused dry contact signal to the unused status.
- Set the EPO port to NO or NC as required.
- Single cables require dual-insulated twisted cables. If the length of a power cable is within 25–50 m, its cross-sectional area must be 0.5 mm² to 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 emergency power-off (EPO).

Specifications

- Hot-swappable
- 0.5 U high

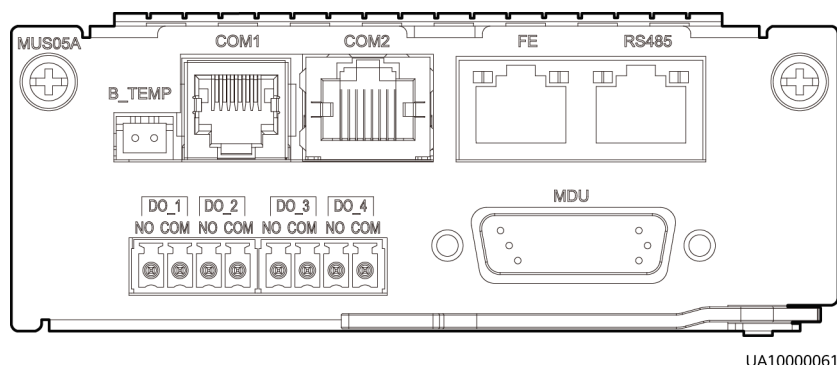
2.3.5.4 Monitoring Interface Card

NOTICE

- The FE port resembles the RS485 port. Follow the silk screen when connecting communications cables as, if the RS485 port is mistaken for the FE port during cable connection, the WebUI cannot be connected. Conversely, if the FE port is mistaken for 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.
- In a parallel system, ensure that used dry contacts properly connect to each UPS.

The monitoring interface card provides external ports as well as monitoring and control functions for the MDU. The ports include the ambient temperature and humidity sensor port, 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 information, and displays the UPS key information and parameters on the LCD.

Figure 2-20 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	Bypass Unit	Power Unit	Description
DO_1	NO	In use: Controls the entire UPS system.	Reserved	<ul style="list-style-type: none"> DO_1, DO_2, DO_3, and DO_4 indicate alarm outputs. Their default values are Critical alarm, Minor alarm, Bypass mode, and Battery mode, respectively. It 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, Batt. Volt. Below Thres. and Firefighting action. Configure power segment settings based on backup time.
	COM			
DO_2	NO			
	COM			
DO_3	NO			
	COM			
DO_4	NO			
	COM			
Southbound communications port 1	COM1	In use: Controls the entire UPS system.	In use: Control the power unit.	<ul style="list-style-type: none"> Supported protocol: Modbus-RTU. Connects to an ambient temperature and humidity sensor or battery temperature sensor; two-wire system.
Southbound communications port 2	COM2	Reserved		<ul style="list-style-type: none"> Supported protocol: Modbus-RTU. Connects to a southbound device, such as an iBattery.

Port	Silk Screen	Bypass Unit	Power Unit	Description
Network port	FE	In use: Controls the entire UPS system.	Reserved	<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 a third-party network management device over two wires.
DB26	MDU			Provides FE, RS485, I2C, and CAN signals.
Battery temperature sensor port	B_TEM P	Reserved		N/A

NOTE

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

Figure 2-21 and Figure 2-22 are recommended wiring methods for DO ports.

Figure 2-21 Wiring method 1

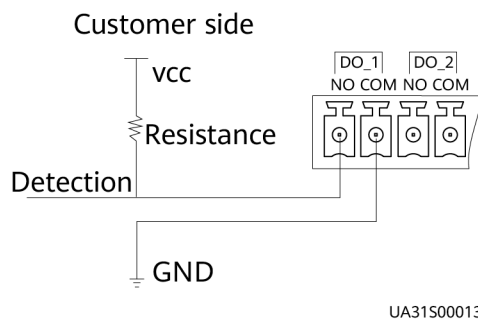


Figure 2-22 Wiring method 2

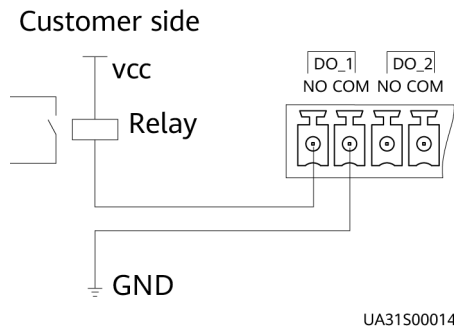


Figure 2-23 COM1 pins

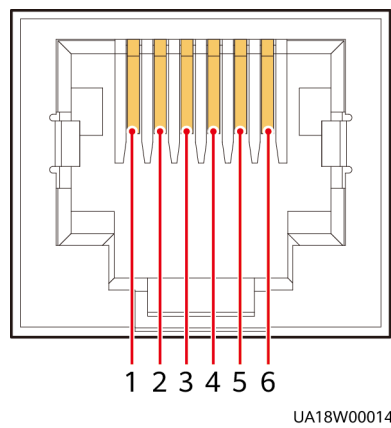
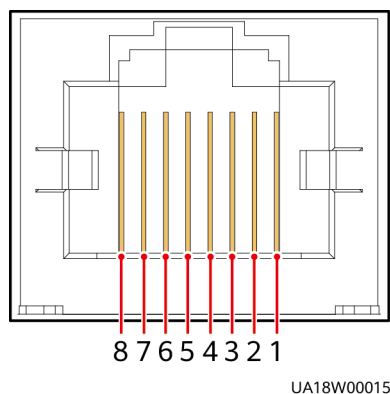


Table 2-8 COM1 pin definition

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

Figure 2-24 COM2 pins

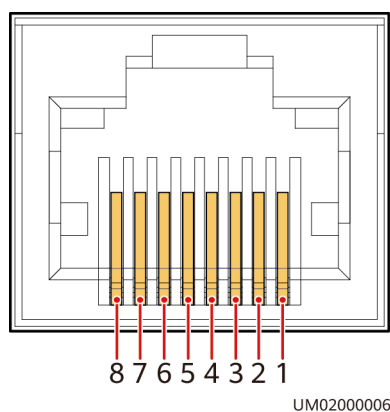


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Table 2-9 COM2 pin definition

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

Figure 2-25 RS485 pins



UM02000006

Table 2-10 RS485 pin definition

Pin	Description
1	RS485_T+

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

NOTE

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

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

2.3.6 MDU

Appearance

Figure 2-26 MDU

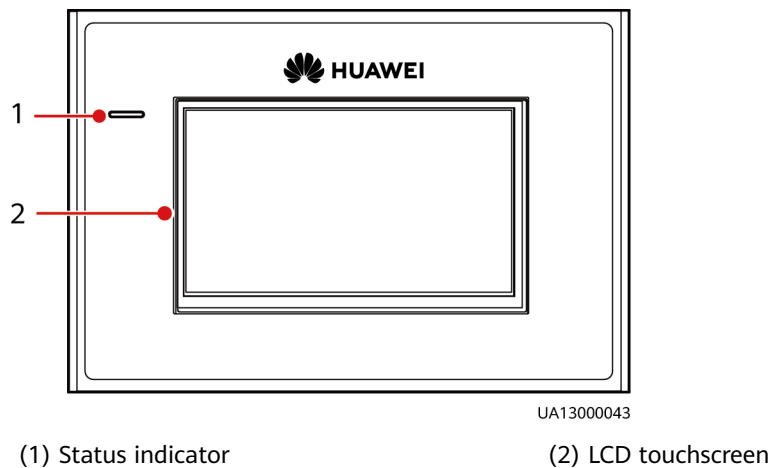


Table 2-11 Status indicator

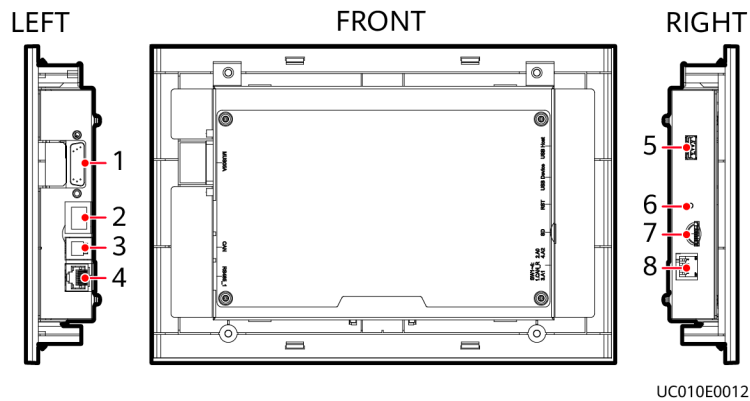
Status	Color	Meaning
On	Red	A critical alarm has been generated, and the buzzer sounds continuously.

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

NOTE

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

Figure 2-27 MDU ports



UC010E0012

Table 2-12 Description of MDU ports

No.	Port Name	Description
1	MUS05A (DB26)	Connects to the MDU and monitoring interface card
2	FE	Network port
3	CAN	Reserved
4	RS485_1	Reserved

No.	Port Name	Description
5	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 preventive maintenance. <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 the USB flash drive, import and export the configuration file, export run logs, and upgrade software.
6	RST	Restart switch for the MDU
7	SD	Reserved
8	DIP switch	Implements specific functions by using the DIP switch and specific buttons; controls the CAN communication build-out resistor in a parallel system

Functions

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

Specifications

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

2.4 Typical configurations

Table 2-13 Typical UPS configurations

Configuration	Application Scenario
Single UPS	Supplies power to common loads.
1+1 Parallel System	Supplies power to important loads in large-sized data centers. It features high availability and strong transient overload capability.

Configuration	Application Scenario
Dual-bus system	<p>The dual-bus system is suitable for scenarios where high availability requirements are posed for power supply. The dual-bus system supplies power to important loads in large- and medium-sized equipment rooms and data centers.</p> <p>In addition to common parallel system advantages, the dual-bus system also provides outstanding availability and eliminates bottleneck failures. However, configuration of the dual-bus system is complex.</p>
N (N>2) Bus System	<p>The N bus system is used to supply power to important loads, such as large cloud computing centers and enterprise data centers, to ensure high reliability.</p> <p>The N bus system provides N power routes. A single point of failure does not lead to a power failure, and therefore the N bus system provides higher reliability than that of the single-route power supply system. The reliability of the N bus system is slightly lower than that of the dual-bus system.</p>

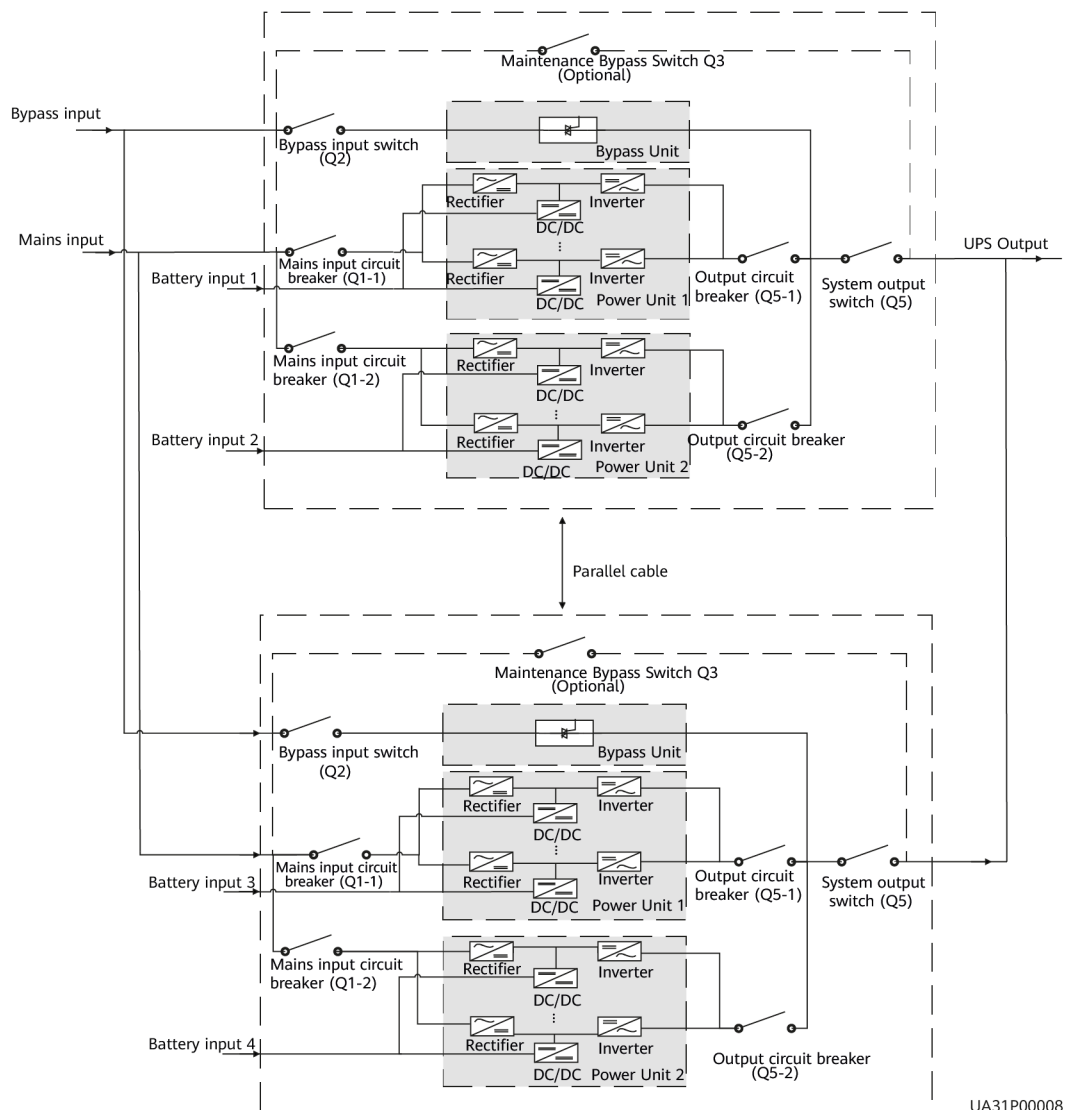
2.4.1 Single UPS

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.

2.4.2 1+1 Parallel System

In a 1+1 parallel system, the mains input, bypass input, and AC output terminals between cabinets are connected in parallel. Energy control modules (ECMs) on each UPS are connected over parallel cables. The parallel connections synchronize the UPS outputs to supply power to loads. If one UPS fails, the other UPSs continue supplying power to loads.

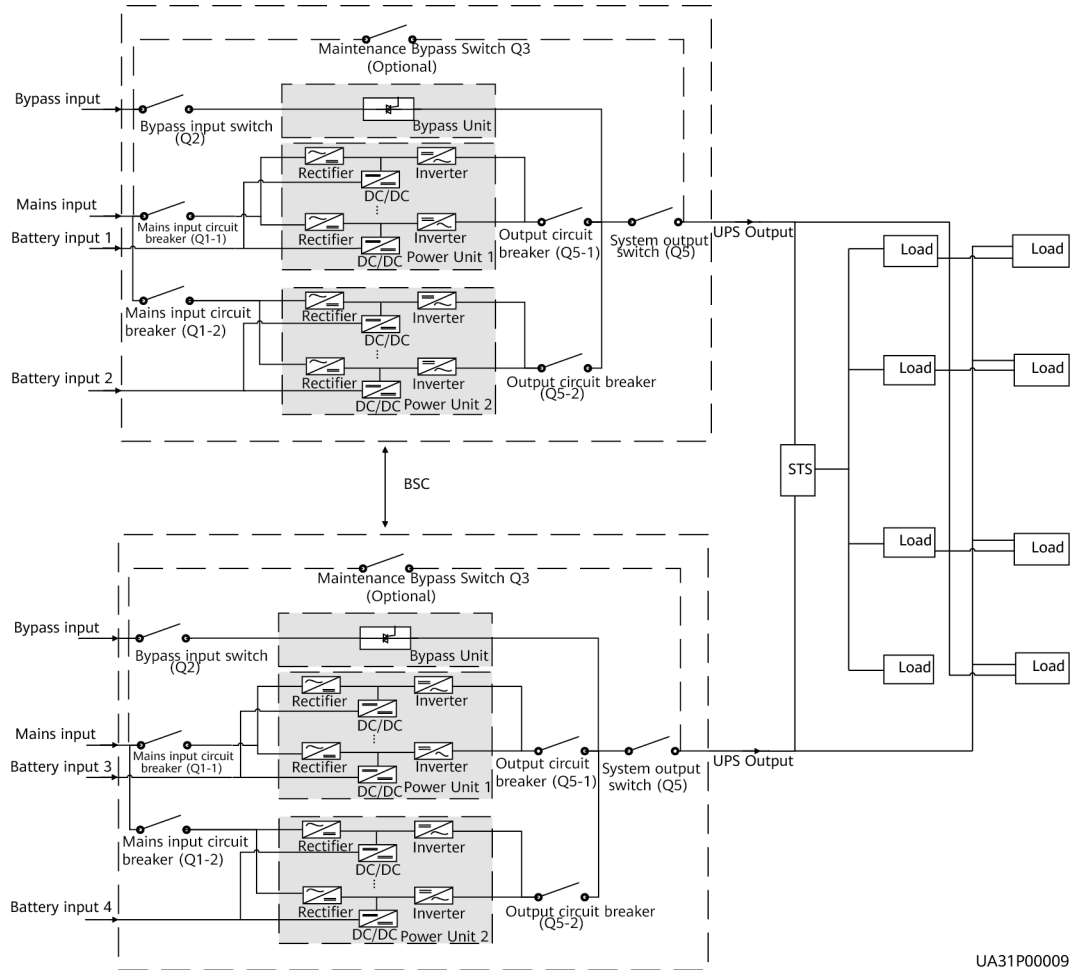
Figure 2-28 1+1 parallel system schematic diagram



2.4.3 Single UPS Dual-Bus System

The dual-bus system consists of two independent 1.2 MW systems. Each 1.2 MW system consists of one or two 1.2 MW UPS systems. One of the two UPS systems is a master system, and the other is a slave system. This design makes the dual-bus system highly reliable and suitable for loads with multiple input terminals. An optional static transfer switch (STS) can be installed to start the bus synchronization controller (BSC). The UPS systems work in normal mode or bypass mode. The conceptual diagram uses a dual-bus system with a single UPS as an example.

Figure 2-29 Single UPS dual-bus system schematic diagram



UA31P00009

2.5 Optional Components

Component	Model	Function	Reference Document
BCB box	<ul style="list-style-type: none"> PDU8000-0400DCV 8-BXA001 PDU8000-0630DCV 8-BXA001 PDU8000-0800DCV 8-BXA001 	Controls the connection between battery strings and the UPS, and supports overload protection, short-circuit protection, and remote trip control.	<i>PDU8000-(0125, 0250, 0400, 0630, 0800) DCV8-BXA001 BCB Box User Manual</i>
BBB box	<ul style="list-style-type: none"> PDU8000-1250DCV 8-BGA001 PDU8000-2000DCV 8-BGA001 	Converges the energy from multiple battery strings.	<i>PDU8000-(0630, 1250, 2000) DCV8-BGA001 BBB Box User Manual</i>

Component	Model	Function	Reference Document
iBattery	N/A	Collects battery information. It collects battery status data from the downstream iBAT groups through wireless communication, and sends the data to the ECC and the third-party NMS through COM or PoE ports. For details, see the document delivered with the device.	N/A
Dry contact extended card	N/A	Provides extended monitoring ports: five relay output ports and five input ports.	<i>UPS5000 Dry Contact Extended Card User Manual (03021RKN)</i>
Backfeed protection card	N/A	Detects mains and bypass backfeed and provides protection.	<i>UPS5000 Backfeed Protection Card User Manual (03021KQQ)</i>
Ambient temperature and humidity sensor	N/A	Monitors the ambient temperature and humidity, and can be applied to batteries.	<i>UPS Ambient Temperature and Humidity Sensor User Manual</i>
Battery grounding failure detector	N/A	Detects current leakage and generates alarms. When equipped with a remote trip switch, the detector protects devices and prevents the outbreak of a fire. Detects battery grounding failures and generates alarms when the ground leakage current exceeds a specified value.	<i>UPS Battery Grounding Failure Detector User Manual</i>
BSC cable	5 m/10 m/15 m/60 m	Connects UPSs in parallel.	N/A
Maintenance bypass unit	N/A	Provides mains power supply when the system is being maintained.	N/A
Fan unit	N/A	The fan unit is used for top air exhaust.	N/A
ECM expansion subrack	N/A	Install this subrack when the UPS is equipped with a backfeed protection card and dry contact expansion card.	N/A

 **NOTE**

The ECM expansion 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.

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 UPS reserved clearances (unit: mm)

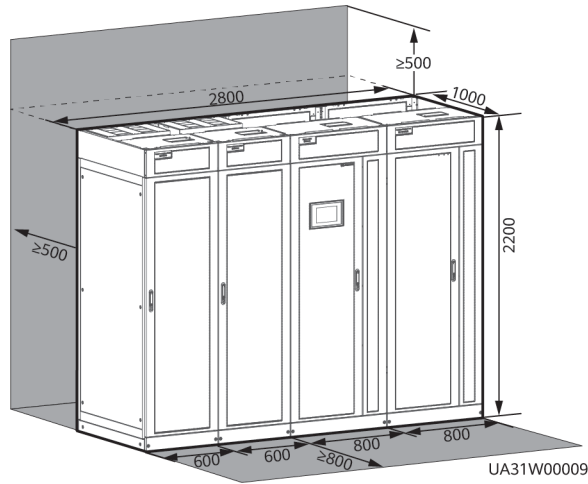


Figure 3-2 UPS+Maintenance bypass unit reserved clearances (unit: mm)

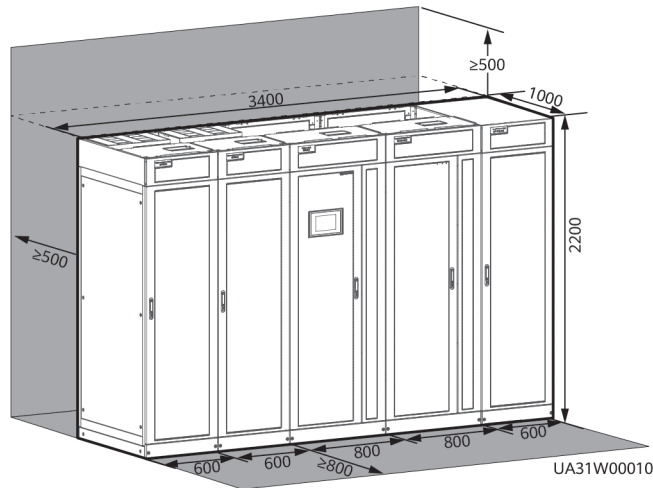
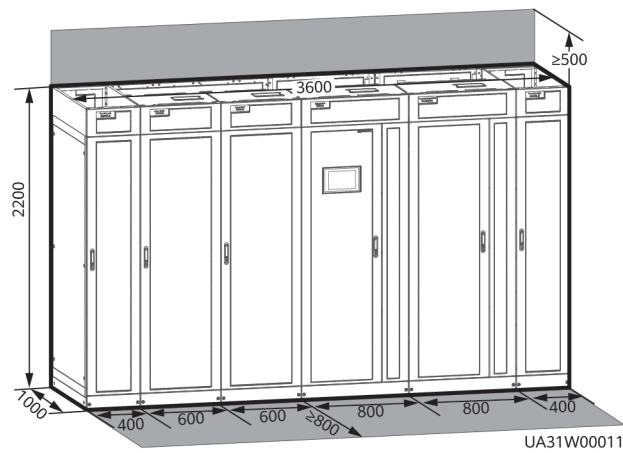


Figure 3-3 UPS+Fan unit reserved clearances (unit: mm)



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

- Reserve at least 800 mm from the front of the cabinet.
- Reserve at least 500 mm from the top of the cabinet.
- Reserve at least 500 mm from the rear of the cabinet for ventilation.
 - Reserve at least 200 mm from the rear of the cabinet if there are ventilation clearances reserved at the top, left, and right of the cabinet.
 - Reserve at least 800 mm if you need to perform operations at the rear of the cabinet.
 - If the fan unit is configured, no space is reserved at the rear.


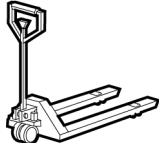

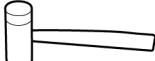
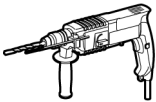
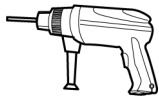
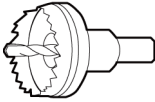

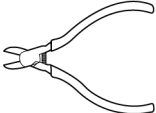
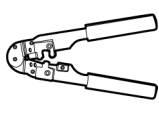
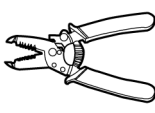

3.1.2 Tools and Instruments

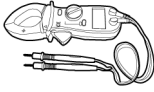




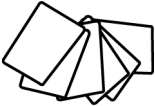
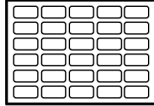

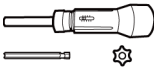
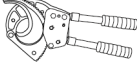



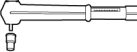
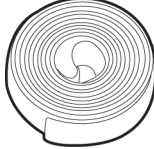

⚠ CAUTION

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
			
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

Tools and Meters			
			
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)
			
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.

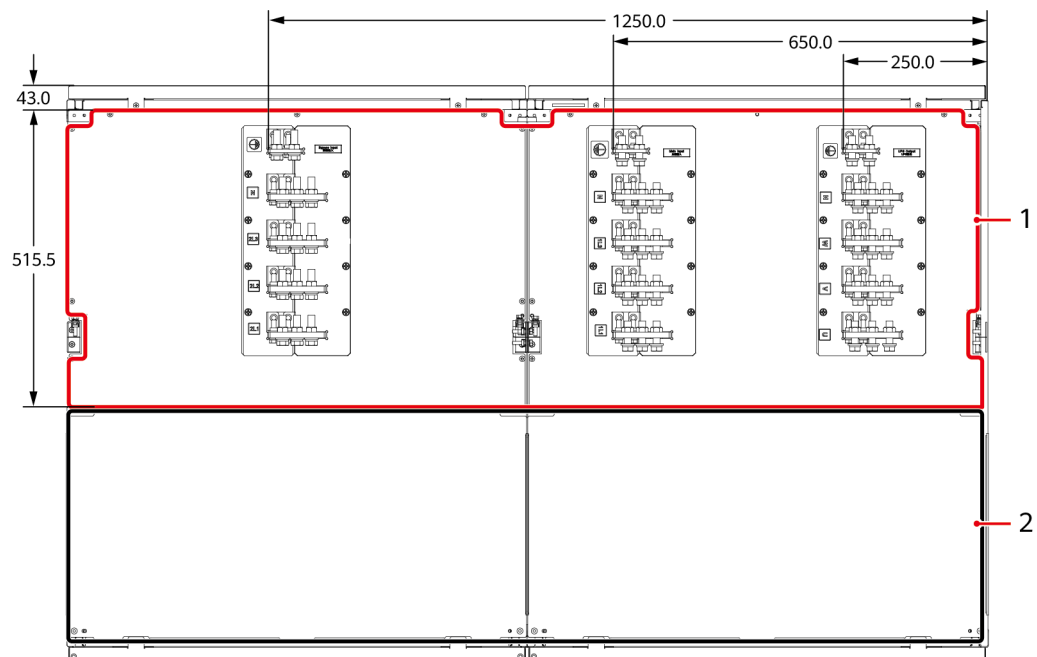
3.1.3 Preparing Power Cables and Copper Bars

NOTICE

The UPS can generate large leakage currents. A circuit breaker that provides leakage current protection is not recommended.

Prepare wiring copper bars based on the following figures and current requirements.

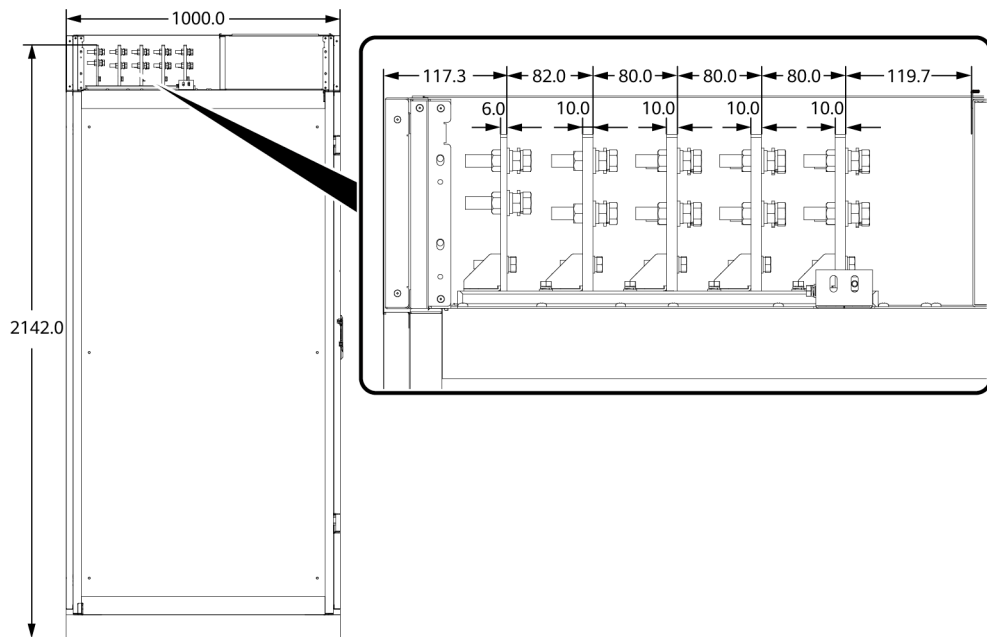
Figure 3-4 Distances between the top copper bars of the bypass unit and input and output unit (unit: mm)



UA30W00002

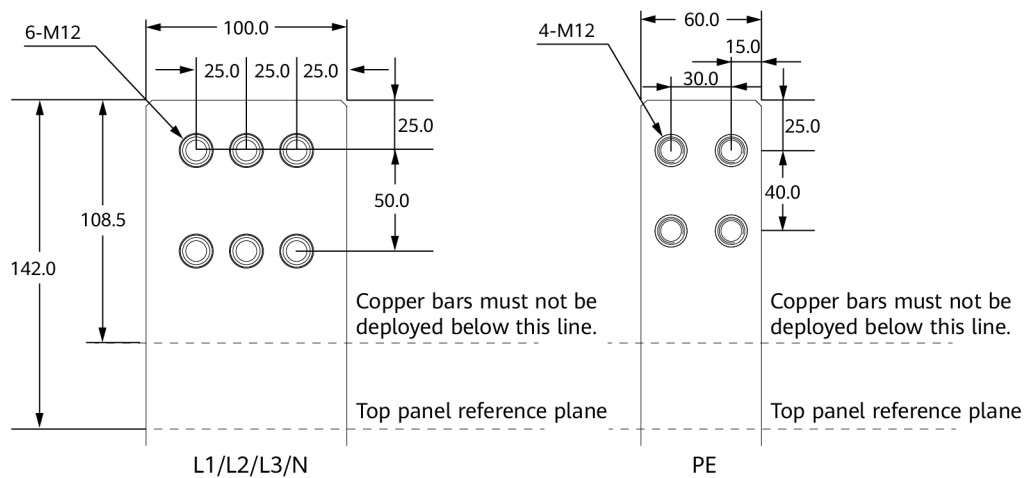
- (1) The area marked by the line box is reserved for dense busway.
- (2) No power distribution box (PDB) or cabling is allowed inside the area marked by the line box.

Figure 3-5 Distances between top copper bars (unit: mm)



UA30W00004

Figure 3-6 Copper bar specifications (unit: mm)



UA30W00003

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

Item		Specifications
Mains input	Mains input current (A)	2420
Bypass input	Bypass input current (A)	2000
Output	Output current (A)	2000
Battery input (VRLA battery)	Battery nominal discharge current (A)	2632

Item		Specifications	
	Battery maximum discharge current (A)	3152	
	Recommended cross-sectional area (mm ²)	+	3 x (2 x 240)
		-	
	PE	240	
Battery input (SmartLi)	Nominal battery discharge current (A)	2467	
	Maximum battery discharge current (A)	3096	
	Recommended cross-sectional area	For details, see IEC-60364-5-52 and SmartLi User Manual.	
Equipotential ground point	Recommended cross-sectional area (mm ²)	16	

 **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 tables 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 change, for example, the cable layout or ambient temperatures, perform verification in accordance with the IEC-60364-5-52 or the 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 1.5–1.7 times.
- The nominal battery discharge current refers to the current at a voltage of 480 V when forty 12 V batteries are configured.
- The maximum battery discharge current refers to the current when forty 12 V batteries, 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 and compatible with application scenarios with 30–50 batteries.
- When the mains input and bypass input share a power source, configure input power cables as mains input power cables. In addition, cables listed in the table apply only to the following conditions:
 - Routing mode: The cables are routed over a ladder or bracket in a single layer (E in IEC60364-5-52). The distance between cables should be

greater than twice the cable diameter. Routing mode: The cables are routed over a ladder or bracket in a single layer (E multi-core and G single-core in IEC60364-5-52).

- The ambient temperature is 30°C.
- The AC voltage loss is less than 3%, and the DC voltage loss is less than 1%.
- 90°C flexible copper power cable.
- It is recommended that the AC power cable be no longer than 30 meters and the DC power cable 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	35 mm	47 N·m
Bypass input	Crimped DT terminals	M12	35 mm	47 N·m
Battery input	Crimped DT terminals	M16	55 mm	120 N·m
Output	Crimped DT terminals	M12	35 mm	47 N·m
PE	Crimped DT terminals	M12	35 mm	47 N·m
Equipotential ground point	Crimped DT terminals	M6	N/A	4.5 N·m

Table 3-4 Recommended upstream input and downstream output circuit breakers

Circuit Breaker Name	Specifications ^a
Mains input circuit breaker	2500 A/3P
Bypass input circuit breaker	2500 A/3P
Downstream output circuit breaker	The system has a general output switch. There is no need to add an external circuit breaker.

Circuit Breaker Name	Specifications ^a
a: recommended model when the short-circuit current where the circuit breaker is located is less than 65 kA	

 **NOTE**

- The upstream input circuit breakers recommended in the table are for reference only.
- If multiple loads are connected, specifications for branch circuit breakers must not exceed the recommended specifications.
- The circuit breaker selection principle is to protect loads and cables, and the cascading principle is to realize specific protection.

3.1.4 Unpacking

Context

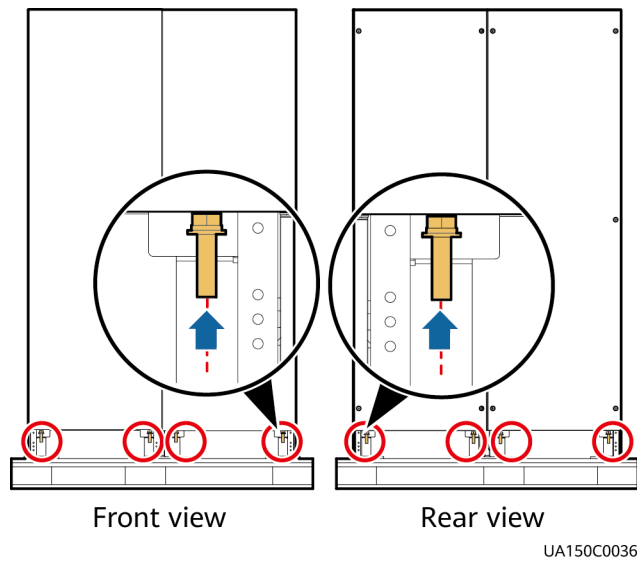
NOTICE

- Only trained personnel are allowed to move the UPS. Use a pallet truck to transport the UPS box secured to a wooden support to the installation position.
 - To prevent the UPS from falling over, secure it to an electric pallet truck using ropes before moving it.
 - To prevent shocks or falls, move the UPS gently. After placing the UPS in the installation position, unpack it with care to prevent scratches. Keep the UPS steady during unpacking.
 - If the UPS installation environment is in poor condition and the UPS will be stored for a long time after it is unpacked, wrap the UPS with the original plastic coat to prevent dust.
-

Procedure

- Step 1** Use a pallet truck to transport the UPS to the installation position.
- Step 2** Remove the UPS outer packing.
- Step 3** Remove the bolts that secure the UPS to the pallet and remove the UPS from the pallet.

Figure 3-7 Removing the pallet from the UPS



----End

3.1.5 (Optional) Splitting the Bypass Unit and Input and Output Unit

Context

If the door of the power distribution equipment room is not wide enough to move the UPS, you can split the bypass unit and input and output unit before the movement.

NOTICE

Put away the removed screws, copper bars and connecting plates to facilitate future cabinet combination.

Table 3-5 Specifications and number of screws

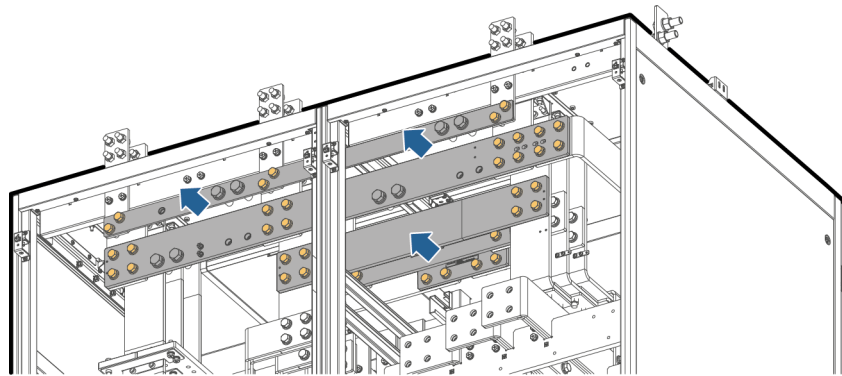
Position	Screw Specification	Quantity (PCS)
PE copper bar	M12x35	6
N, L1, L2 and L3 copper bars	M12x45	40
U, V and W copper bars	M12x45	6
Top epoxy plate	M8x20	3
Bottom epoxy plate	M6x30	4

Position	Screw Specification	Quantity (PCS)
Top connecting plate	M6x30	4
Middle connecting plate	M6x30	8
Bottom connecting plate	M12x45	8

Procedure

- Step 1** Open the front door of the bypass unit and input and output unit.
- Step 2** Remove the rear covers from the bypass unit and input and output unit.
- Step 3** Remove the PE, N, L1, L2 and L3 copper bars.

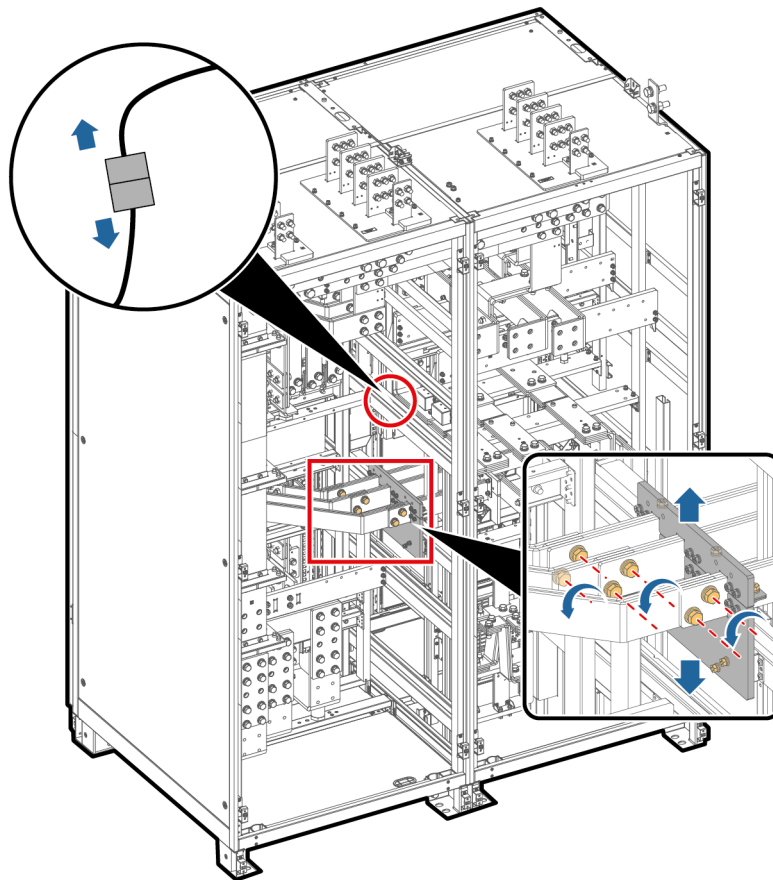
Figure 3-8 Remove copper bars



UA31H00047

- Step 4** Remove cable terminal, U, V and W copper bars and epoxy plate.

Figure 3-9 Remove the cable terminal, copper bars and epoxy plate



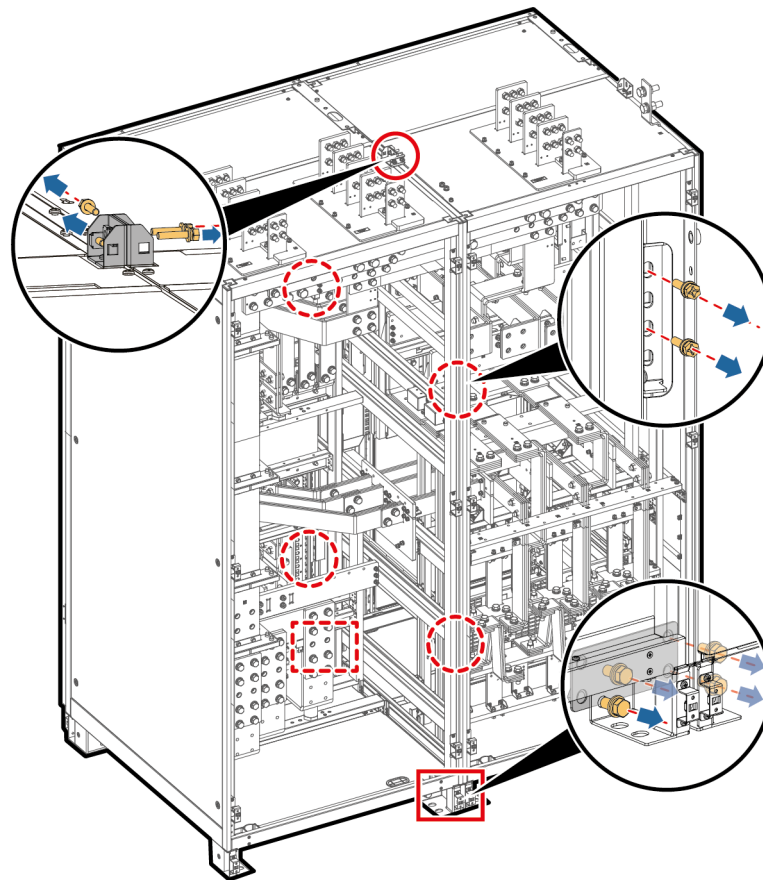
UA31H00048

Step 5 Remove the top, middle, and bottom connecting plates in sequence from the bypass unit and input and output unit.

NOTICE

Use a step ladder to remove the top connecting plates as the cabinet is high.

Figure 3-10 Removing connecting plates



UA31H00049

Step 6 Use a manual pallet truck to transport the bypass unit and input and output unit to the installation position. Ensure that the two cabinets align with each other.

----End

3.1.6 (Optional) Combining the Bypass Unit and Input and Output Unit

Procedure

Step 1 Install the bottom, middle, and top connecting plates for the bypass unit and input and output unit based on screw specifications in the table.

Step 2 Install the removed copper bars and epoxy plate components based on their numbers by referring to screw specifications in the table.

Step 3 Reconnect the removed cables.

Step 4 Check that the bypass unit and input and output unit are combined completely and securely.

Step 5 After checking that cabinets are combined properly, reinstall the rear covers.

----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 Floor Installation

Prerequisites

NOTICE

Ensure that the installation floor is flat.

Context

During delivery, two power units are transported separately, and the bypass unit and input/output unit are transported together.

Procedure

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

 **NOTE**

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

Figure 3-11 Power unit hole dimensions (unit: mm)

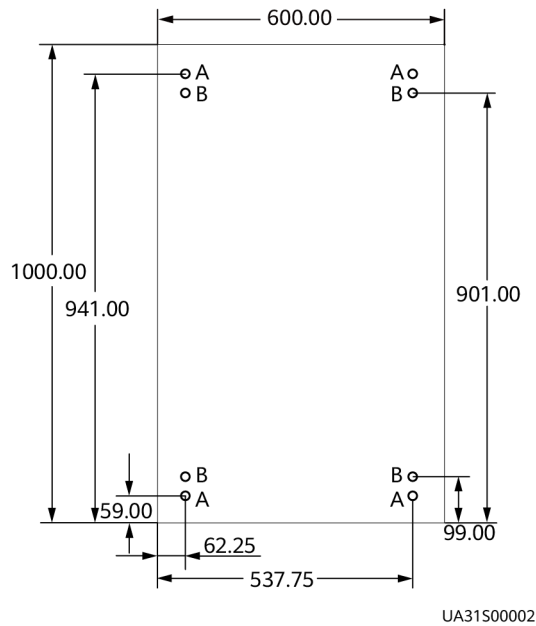
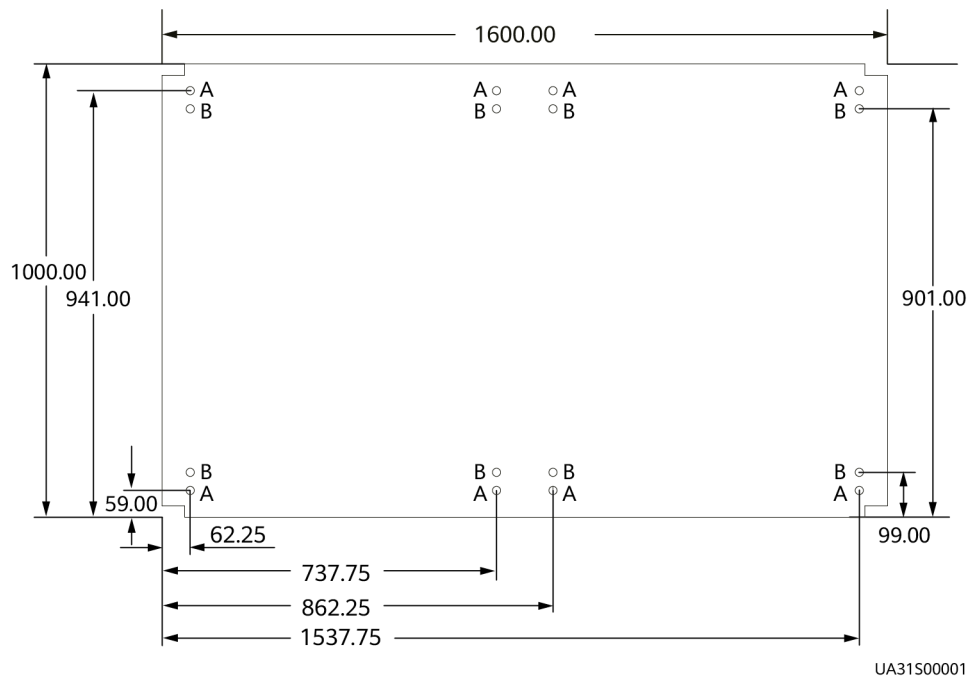
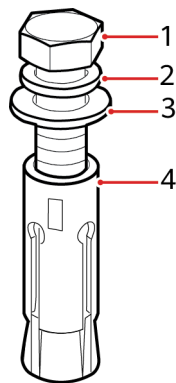


Figure 3-12 Dimensions for the holes for the bypass unit and input/output unit (unit: mm)



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

Figure 3-13 Expansion bolt composition



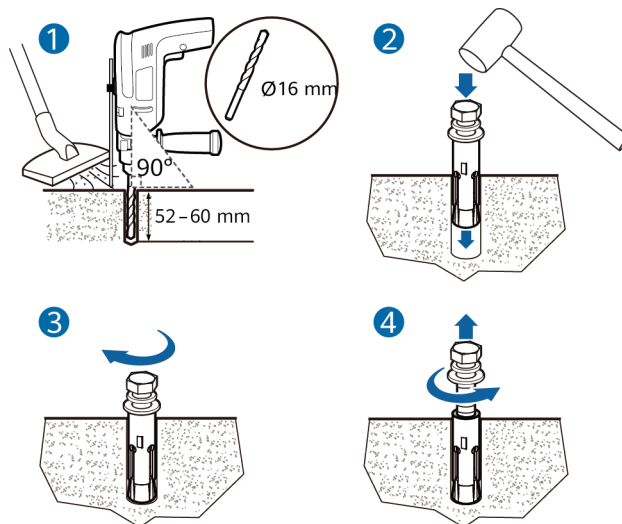
UA10000072

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

NOTICE

Ensure the expansion tube of the expansion bolts fits completely into the hole. The expansion sleeves must be completely buried under the ground to properly facilitate subsequent installation.

Figure 3-14 Installing expansion bolts (unit: mm)

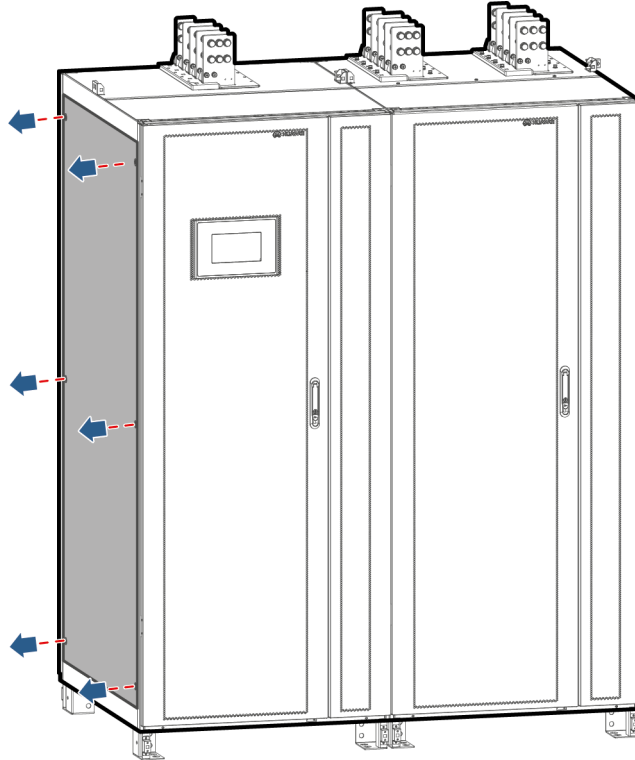


UA10000073

1. Drill holes in the ground by using a hammer drill. The hole depth is 52 mm to 60 mm.
2. Partially tighten the expansion bolt and vertically insert it into the hole. Hit 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 Remove the side panel from the bypass unit.

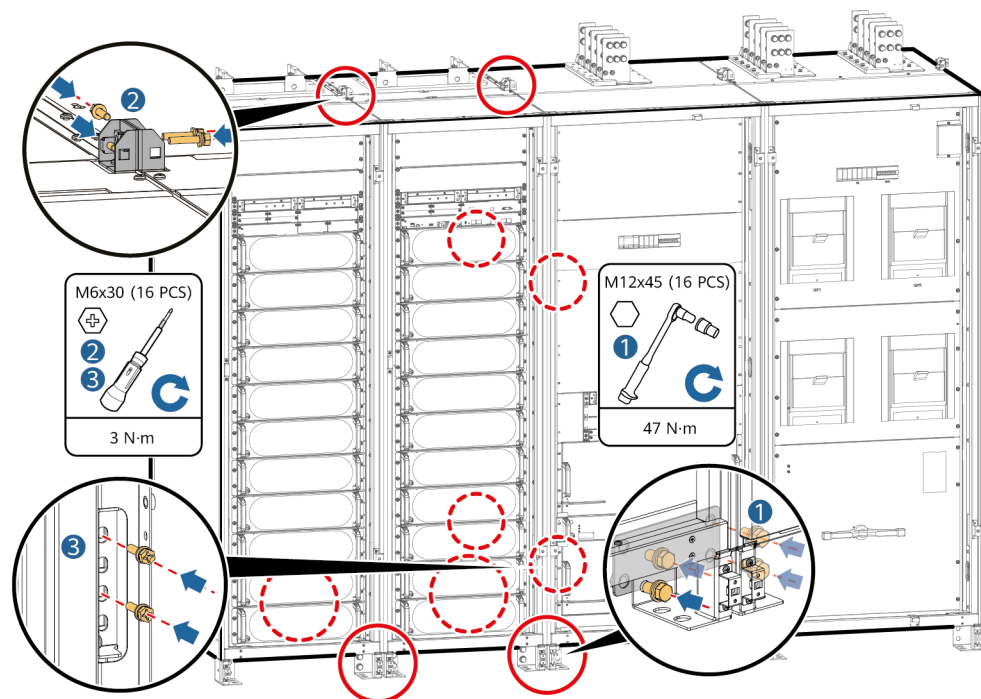
Figure 3-15 Removing the side panel from the bypass unit



UA31H00016

Step 4 Combine the power units and bypass unit, and install the connecting plates in the following sequence: bottom, top, and middle.

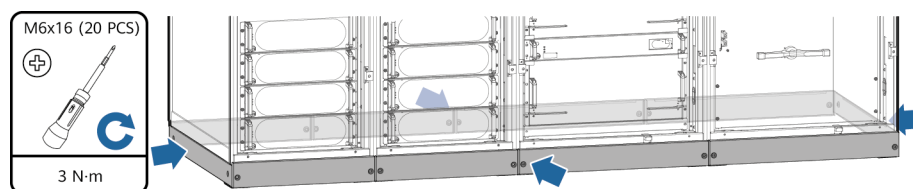
Figure 3-16 Installing connecting plates



UA31H00006

- Step 5** Install the side panels removed from the bypass unit to power unit 2.
- Step 6** Use M12x60 expansion bolts to secure the power units, bypass unit, and input/output unit to the expansion bolt mounting holes on the floor in sequence.
- Step 7** Install anchor baffle plates.

Figure 3-17 Installing anchor baffle plates



UA31H00017

----End

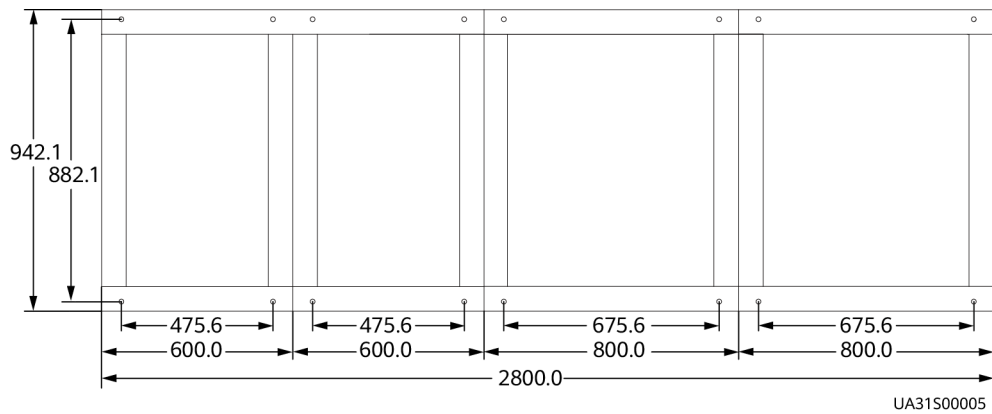
3.2.1.2 Channel Steel Installation

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.

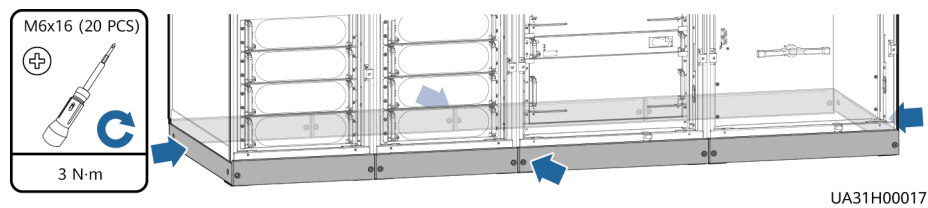
Figure 3-18 Recommended channel steel dimensions (unit: mm)



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** Remove the side panel from the bypass unit.
- Step 4** Combine the power units and bypass unit, and install the connecting plates in the following sequence: bottom, top, and middle.
- Step 5** Install the side panels removed from the bypass unit to power unit 2.
- Step 6** Use M12x60 common bolts to secure the power units, bypass unit, and input/output unit to the channel steel in sequence.
- Step 7** Install anchor baffle plates.

Figure 3-19 Installing anchor baffle plates



----End

3.2.2 Installing Busbars

Prerequisites

NOTICE

- Before handling a busbar, wear protective gloves to avoid getting injured by sharp edges.
- Move a busbar with caution to avoid scratching cabinets.
- Each busbar weighs about 50 kg. Be cautious to avoid injury when moving heavy objects.

Preparation: two scaling ladders that are more than one meter high

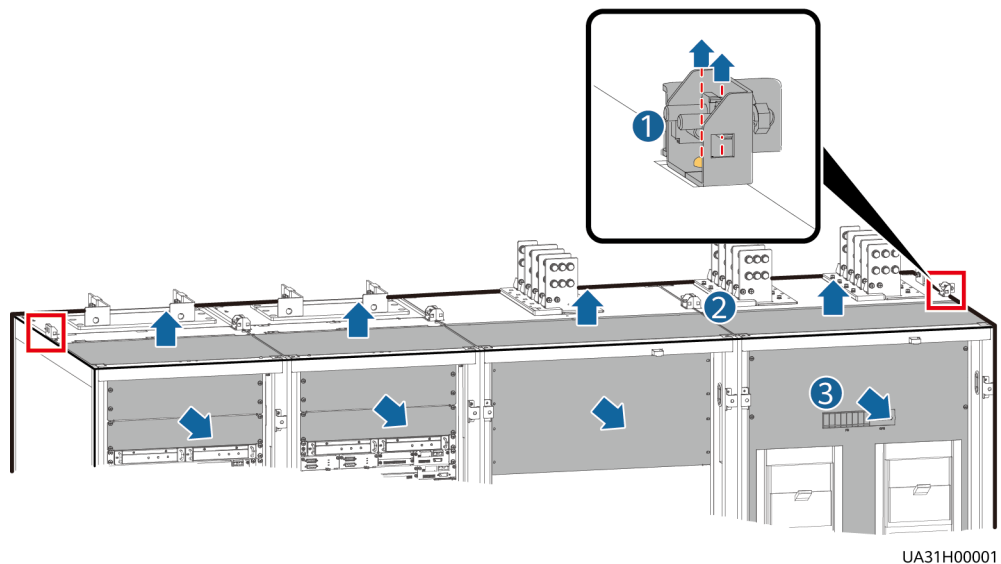
At least two persons are required to carry a busbar. At least two persons are required to hold the busbar on the top of the cabinet.

- When moving a busbar, hold both ends of the busbar component. It is recommended that the soft copper bar face downward.
- Do not move the busbar upward by holding the soft copper bar.

Procedure

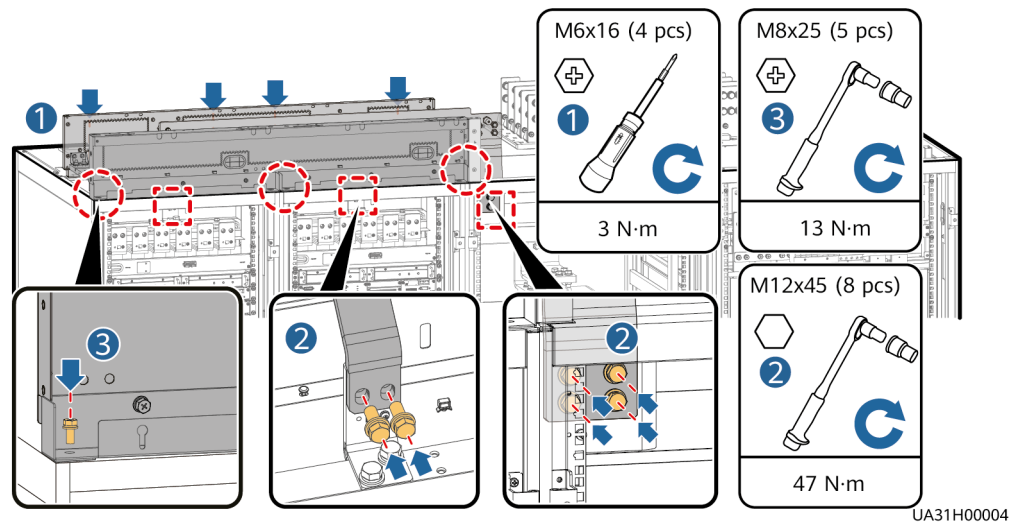
- Step 1** Remove the front panels and dustproof covers from the top of the cabinets, and remove the connecting kits at both ends of the top of the input and output unit and power unit 2.

Figure 3-20 Removing front panels and dustproof covers



- Step 2** Install the U-shaped sealing plate component (numbered 01).

Figure 3-21 Installing the U-shaped sealing plate component

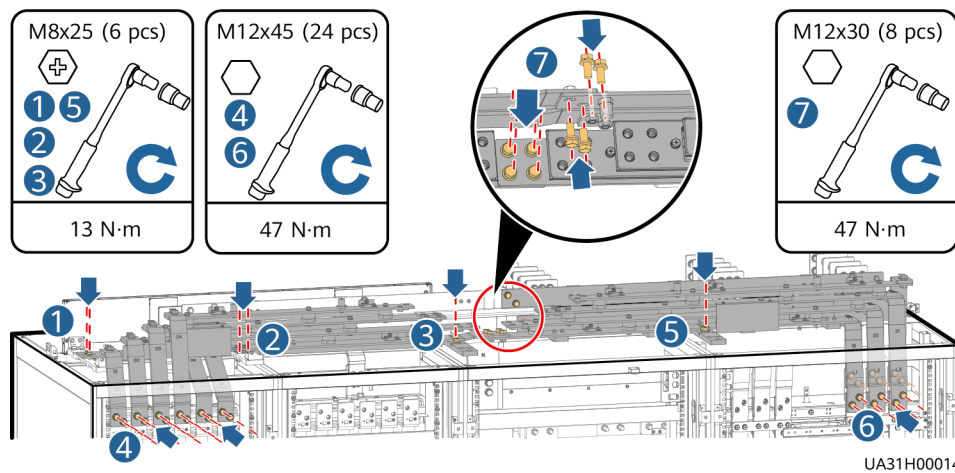


Step 3 Install busbar components (numbered 02 and 03), secure them to the cabinet.

NOTE

Before installation, remove the screws that are partially tightened from the busbar component.

Figure 3-22 Installing busbar component

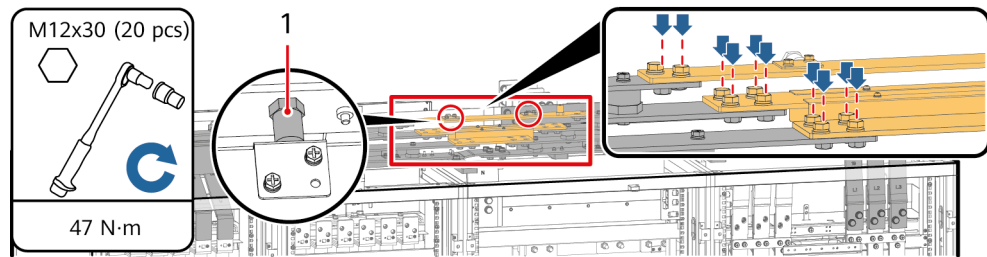


Step 4 Use copper bars (numbered 04–06) to connect the busbar components (numbered 02 and 03).

NOTE

Before installation, remove the screws that are partially tightened from the busbar component.

Figure 3-23 Installing busbar component

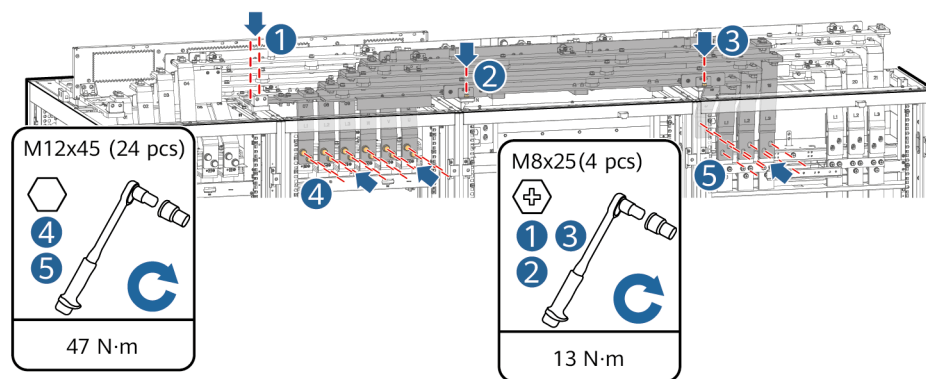


UA31H00064

(1) Insulator (The two insulators do not need to be secured with screws.)

Step 5 Install the busbar component (numbered 07) and secure it to the cabinet.

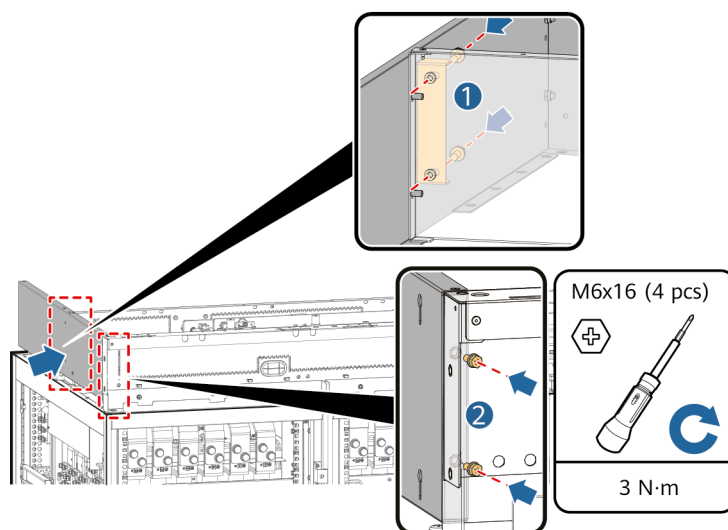
Figure 3-24 Installing busbar component



UA31H00015

Step 6 Install the left sealing plate (numbered 08).

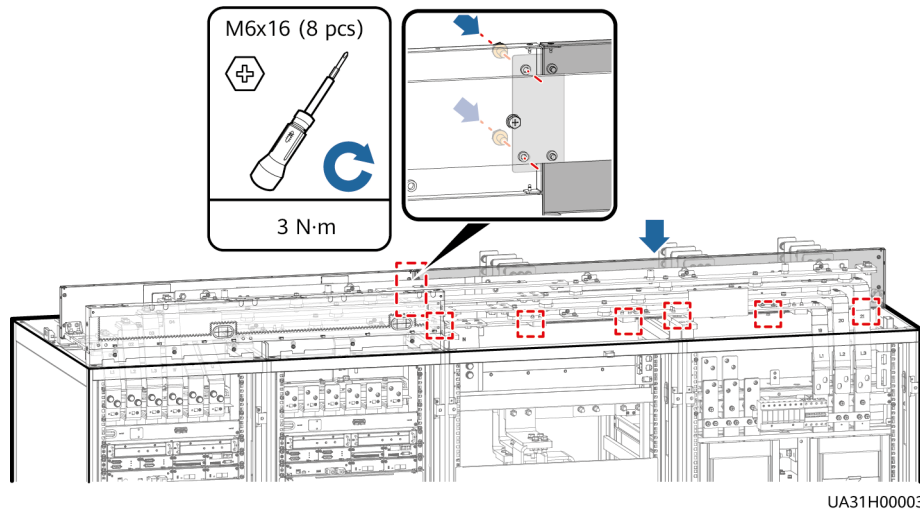
Figure 3-25 Installing sealing plates



UA13H00044

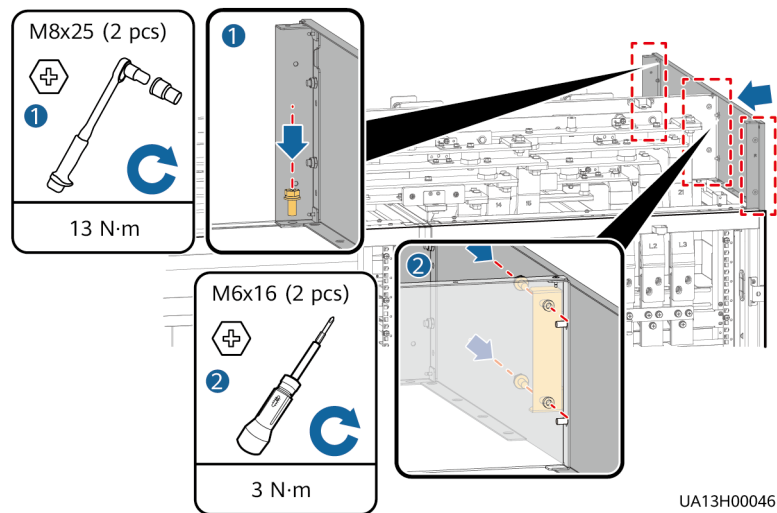
Step 7 Install the side sealing plate (numbered 09) for the input and output unit.

Figure 3-26 Installing sealing plates



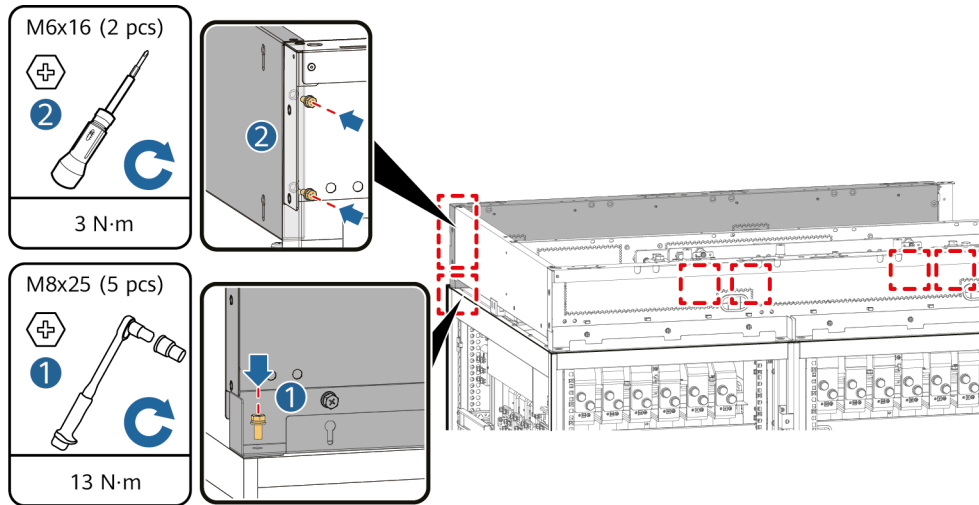
Step 8 Install the right sealing plate (numbered 10).

Figure 3-27 Installing sealing plates



Step 9 Install the rear sealing plate (numbered 11) for the power unit.

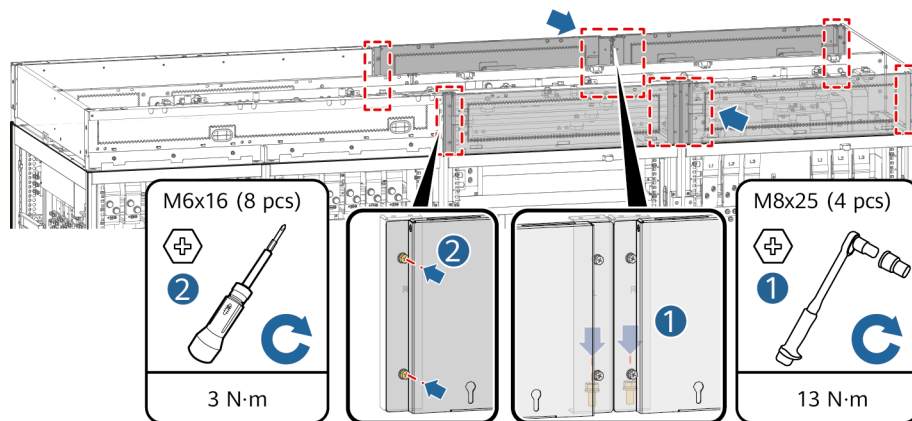
Figure 3-28 Installing sealing plates



UA31H00046

Step 10 Install the sealing plates (numbered 12) for the bypass unit and input and output unit.

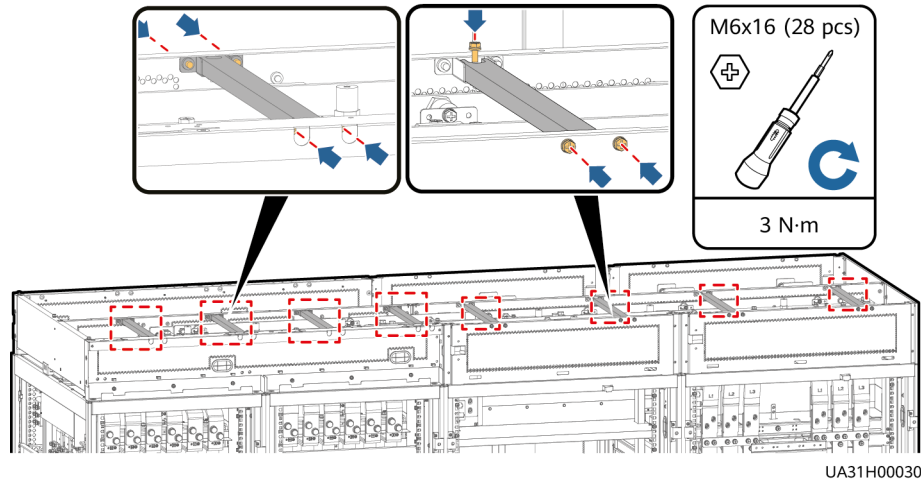
Figure 3-29 Installing sealing plates



UA31H00009

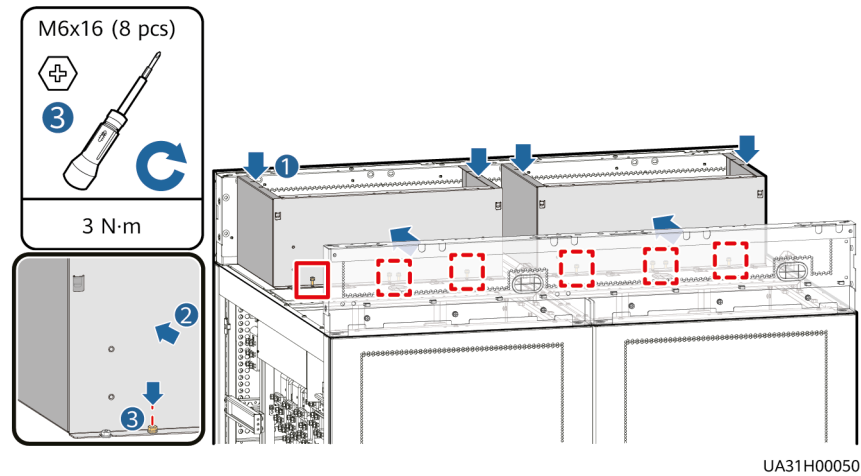
Step 11 Install supports for the busbar covers.

Figure 3-30 Installing supports for the busbar covers



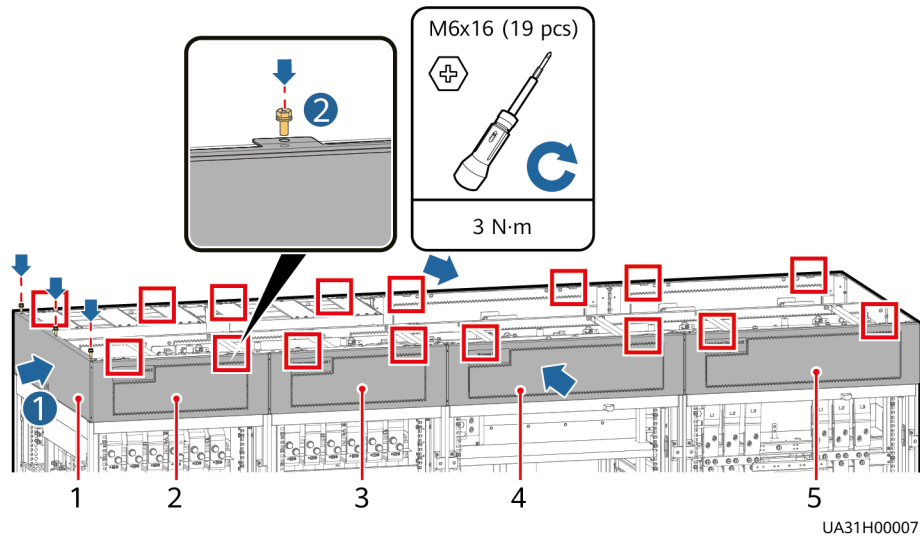
Step 12 Install sealing plates for the battery wiring protective covers.

Figure 3-31 Installing sealing plates for the battery wiring protective covers



Step 13 Install mounting plates.

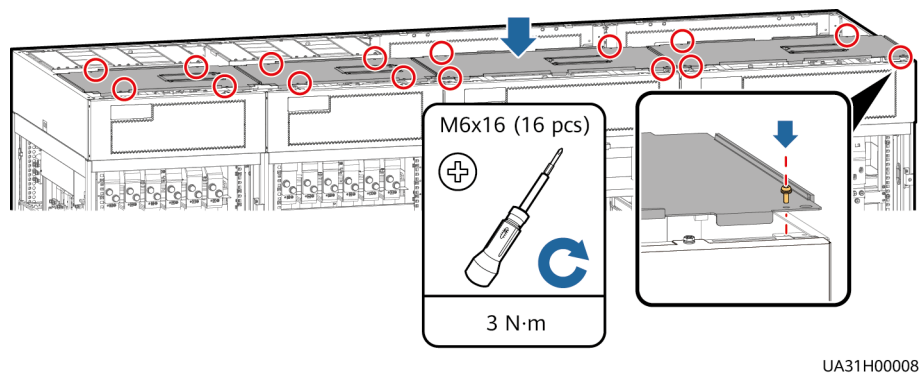
Figure 3-32 Installing mounting plates



- (1) Mounting plate (numbered 13)
- (2) Power unit 2 plate
- (2) Power unit 1 plate
- (4) Bypass unit plate
- (5) Input and output unit plate

Step 14 Install the busbar covers.

Figure 3-33 Installing the busbar covers



----End

3.2.3 UPS Cable Connection Reference

Context

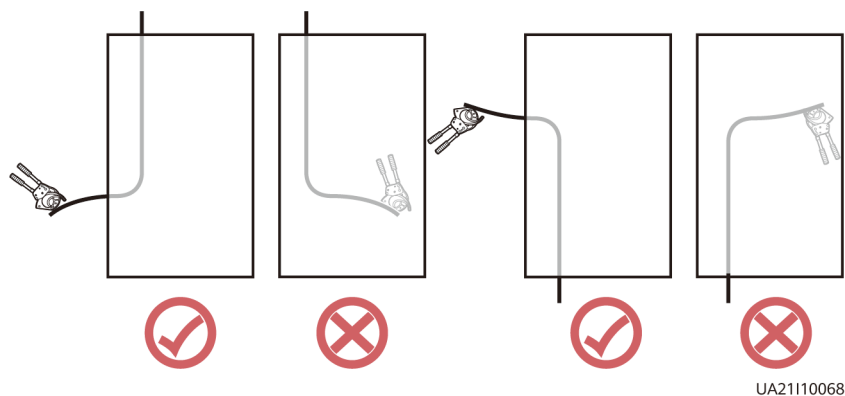
WARNING

- 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 3-34 Preparing a cable terminal outside the cabinet



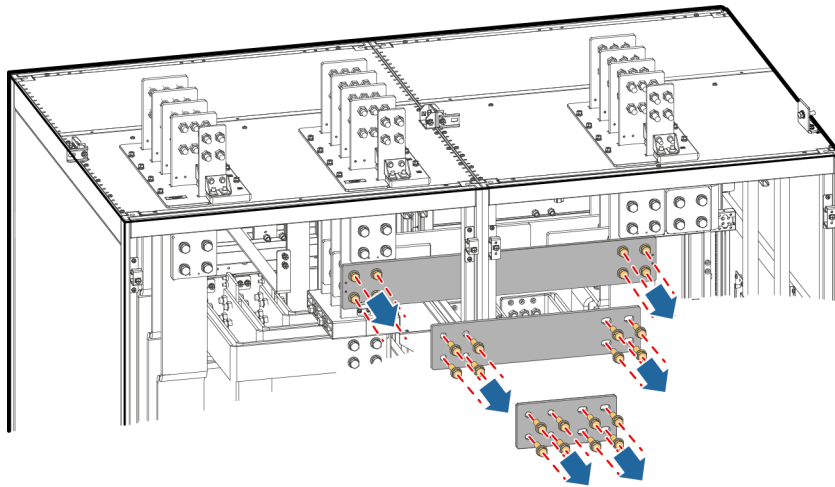
NOTE

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

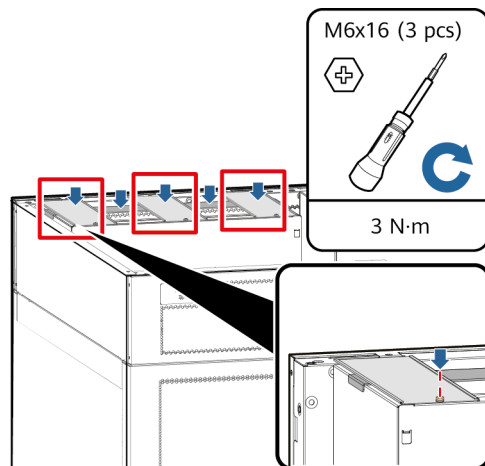
Figure 3-36 Removing copper bars



UA31H00010

- Step 3** Connect input and output busbars and battery cables based on the top copper bar position diagram.
- Step 4** Install supports and covers on the top of the protective covers for each power unit.

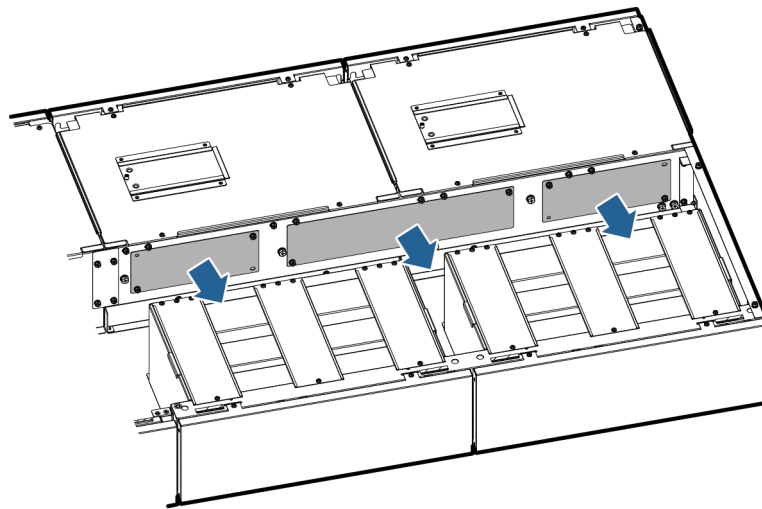
Figure 3-37 Installing top supports and covers



UA31H00002

- Step 5** Before power-on, remove the protective covers from the top of the power units.

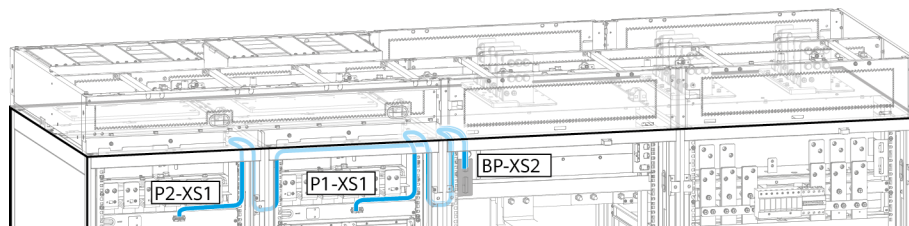
Figure 3-38 Removing the protective covers



UA13H00047

Step 6 Connect the signal cables between the power units and bypass unit.

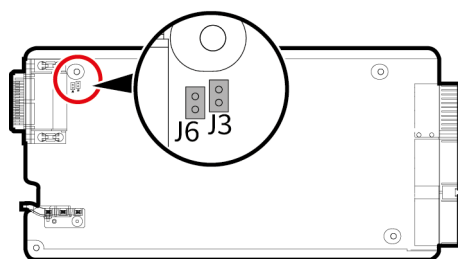
Figure 3-39 Connecting the signal cables



UA31140001

Step 7 Only if the system is in 1+1 parallel configuration (skip this step if the system is a single UPS or dual-bus system), remove ECM 1 and ECM 2 from each control module of power unit 1, power unit 2, and bypass unit of each UPS, remove the J3 and J6 jumper caps from each ECM, and reinstall the ECMs in the control modules.

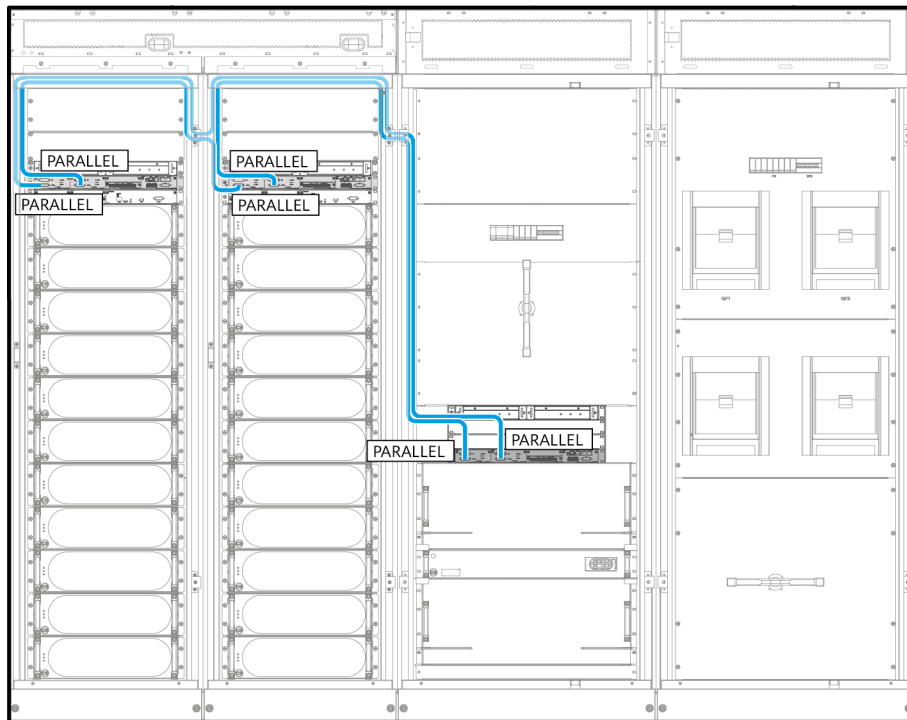
Figure 3-40 Removing jumper caps



UA31H00070

Step 8 Connect the PARALLEL ports on the power units and bypass unit to form a loop by using parallel signal cables.

Figure 3-41 Connecting the signal cables



UA31140002

----End

3.2.5 Installing Optional Components

3.2.5.1 Installing a Battery Grounding Failure Detector

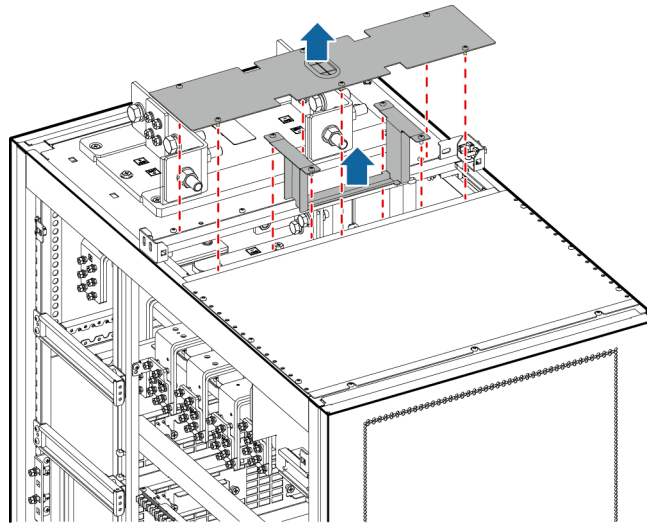
Prerequisites

- If the power units share battery strings, you need to install a battery grounding failure detector only in power unit 1.
- If the power units do not share battery strings, you need to install battery grounding failure detectors in both power units.

Procedure

- Step 1** Remove the top cover from the power unit, and remove the bracket of the battery grounding failure detector.

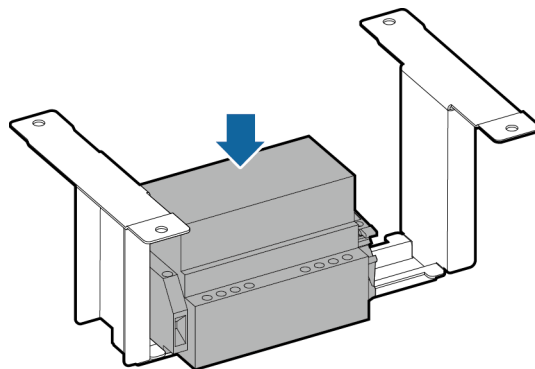
Figure 3-42 Removing the cover and bracket



UA31H00027

Step 2 Mount the battery grounding failure detector onto the bracket and reinstall the bracket in the cabinet.

Figure 3-43 Installing a battery grounding failure detector

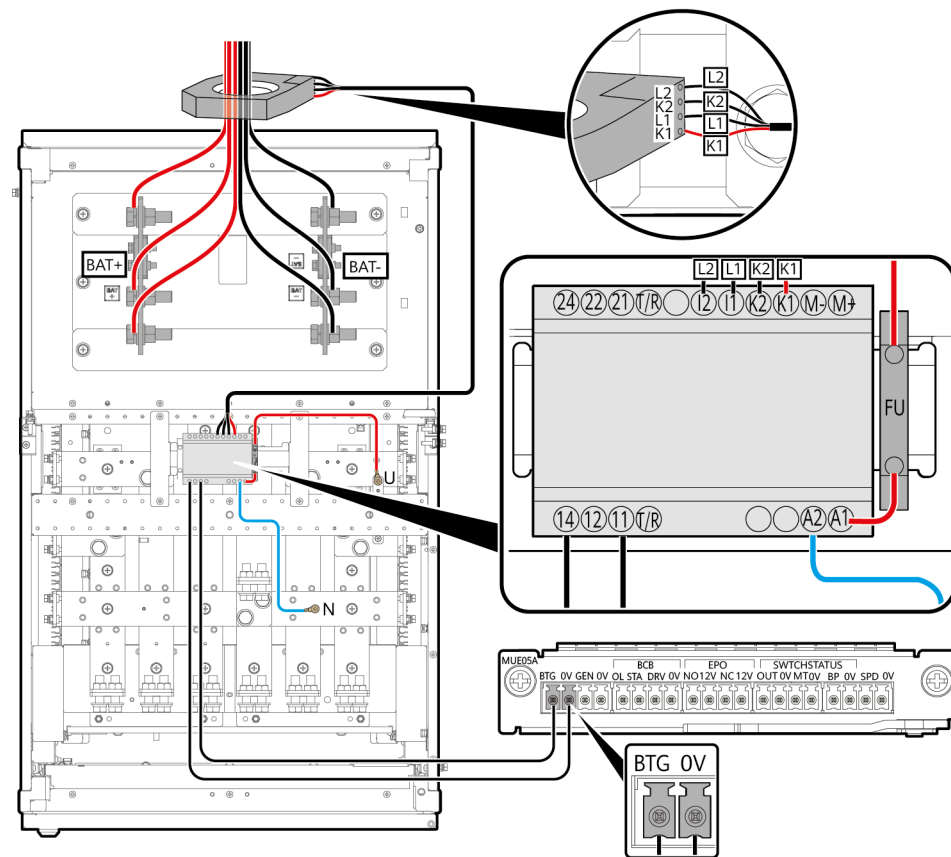


UA31H00029

Step 3 Connect cables.

1. Connect the power cables of the battery grounding failure detector to copper bars U and N on the top of the cabinet.
2. Connect the signal cable of the battery grounding failure detector to the dry contact card (MUE05A) of the control module of the power unit.
3. Connect the transformer and battery grounding failure detector.

Figure 3-44 Connecting cables



UA31110001

Step 4 Reinstall the cover on the top of the power unit.

----End

3.2.5.2 Installing the Maintenance Bypass Unit

Prerequisites

No busbars have been installed for the UPS.

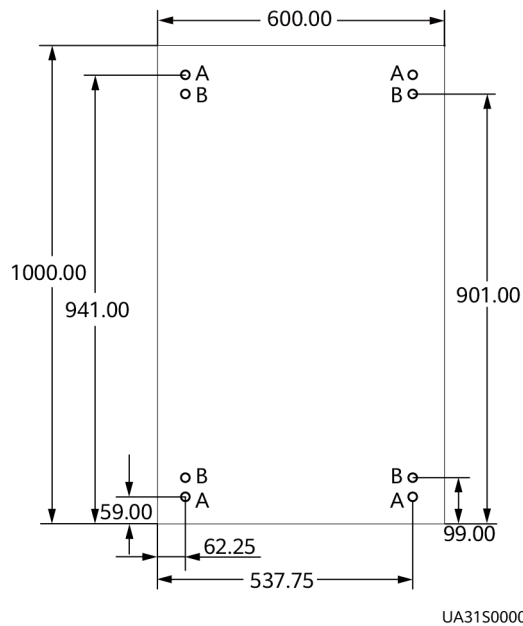
Procedure

Step 1 Determine the installation position for the maintenance bypass unit based on the cabinet securing holes in the marking-off template.

NOTE

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

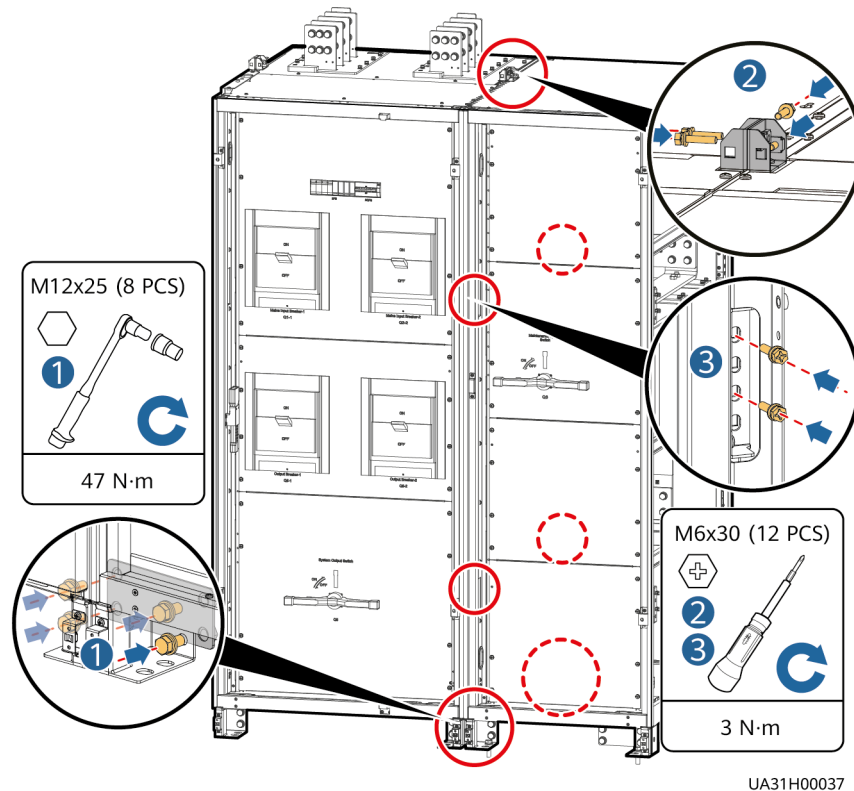
Figure 3-45 Hole dimensions (unit: mm)



Step 2 Remove the side panel and PC panel from the input and output unit, and remove the rear and front covers from the input and output unit and maintenance bypass unit.

Step 3 Combine the maintenance bypass unit with the input and output unit.

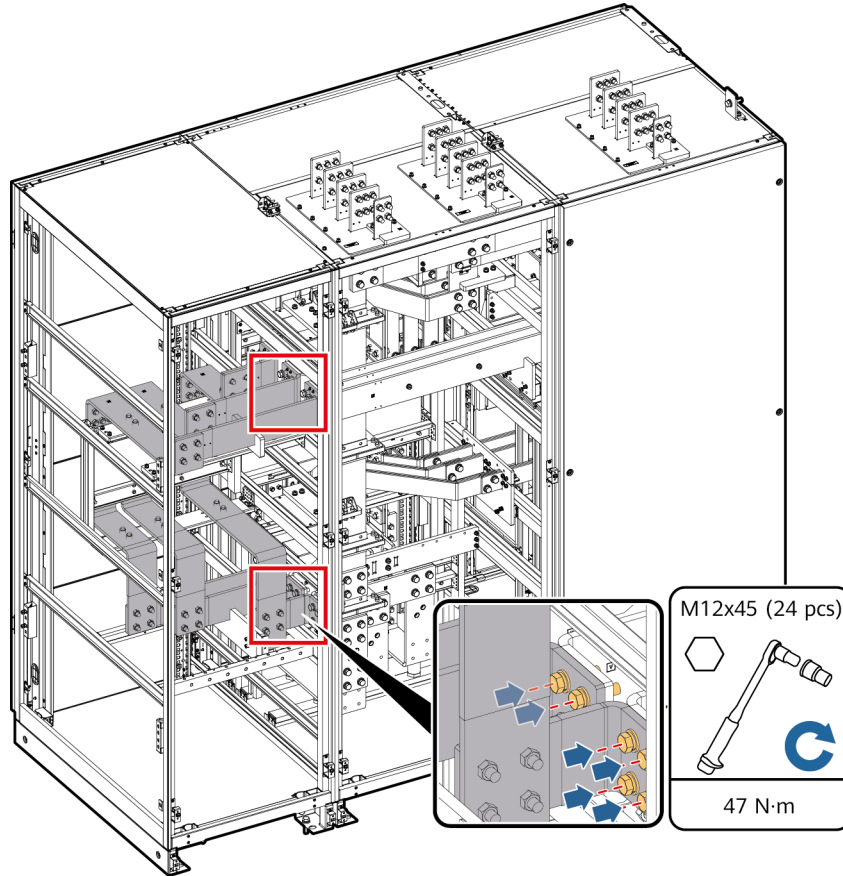
Figure 3-46 Installing connecting plates



Step 4 Secure the maintenance bypass unit to the mounting surface.

Step 5 Connect copper bars inside the maintenance bypass unit and input and output unit.

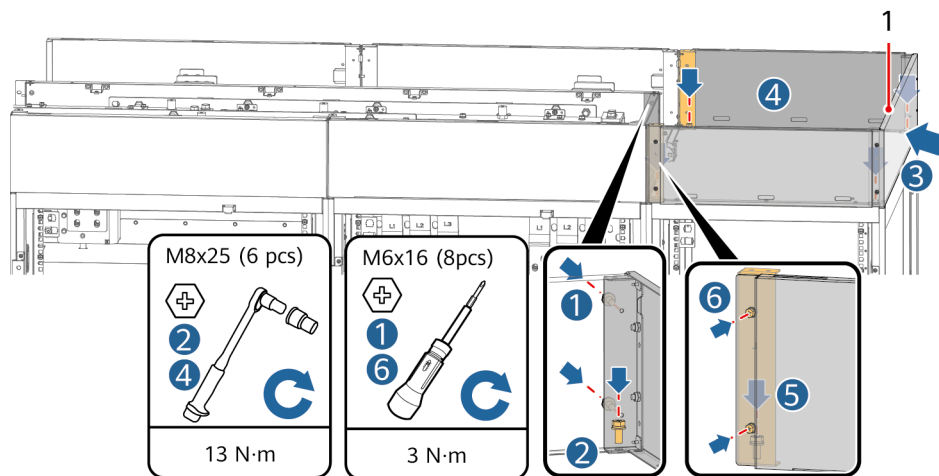
Figure 3-47 Connecting internal copper bars



UA31H00038

Step 6 Install sealing plate supports and sealing plates for the maintenance bypass unit.

Figure 3-48 Installing sealing plate supports and sealing plates

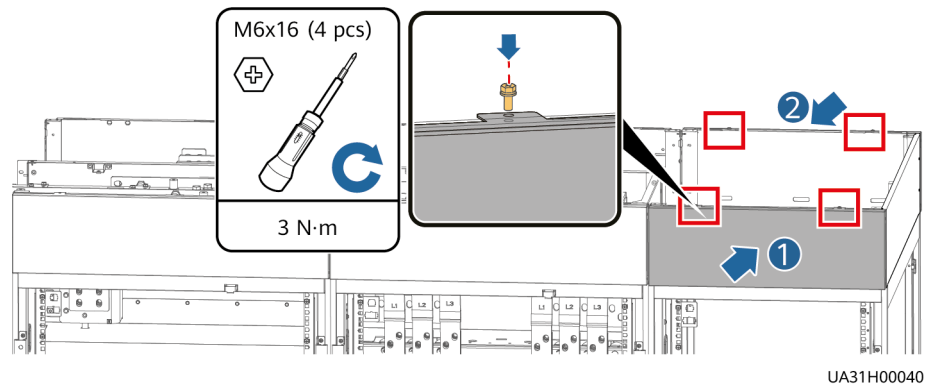


UA31H00039

(1) Right sealing plate (numbered 10)

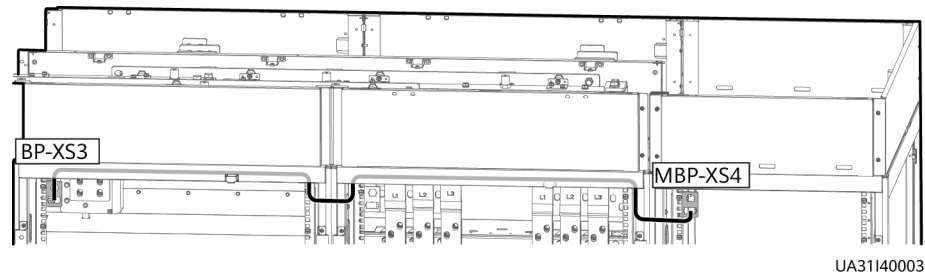
Step 7 Install mounting plates for the maintenance bypass unit.

Figure 3-49 Installing mounting plates



Step 8 Connect signal cables to the maintenance bypass unit.

Figure 3-50 Connecting signal cables



Step 9 Install anchor baffle plates for the maintenance bypass unit.

Step 10 Reinstall the front and rear covers, and install the side panel removed from the input and output unit on the maintenance bypass unit.

----End

3.2.5.3 Installing a Fan Unit

Configure the fan unit if you install the cabinet against the wall.

Installing a Cabinet

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

NOTE

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

Figure 3-51 Fan unit hole dimensions (unit: mm)

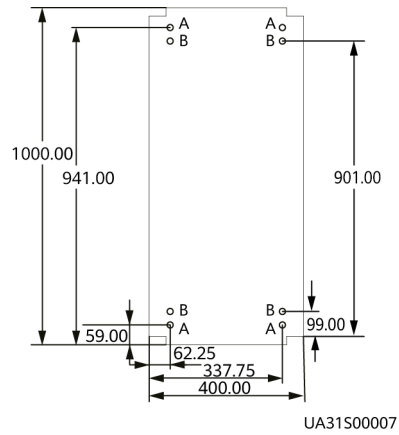
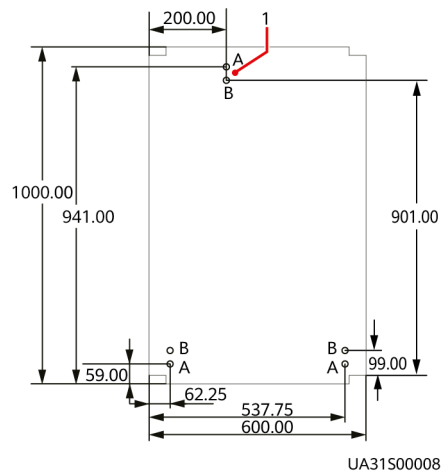
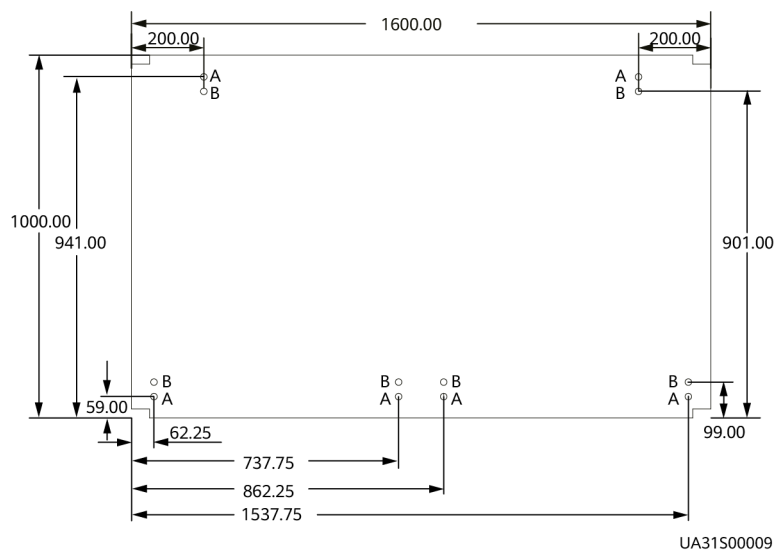


Figure 3-52 Power unit hole dimensions (unit: mm)



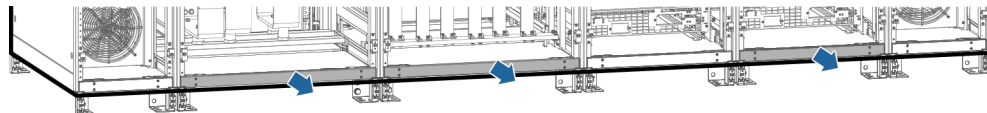
(1) This hole is not required when power unit 1 is installed.

Figure 3-53 Dimensions for the holes for the bypass unit and input/output unit (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** Install side plates for the bypass unit and input/output unit.
- Step 4** Remove the rear door from the cabinet.
- Step 5** Remove the door header from the rear of the cabinet.

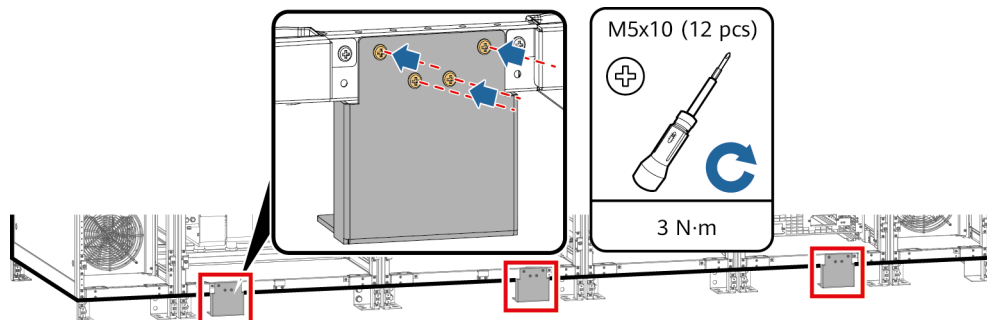
Figure 3-54 Removing the door header (rear view of the cabinet)



UA31H00051

- Step 6** Install the fan unit accessories at the rear of the cabinet.

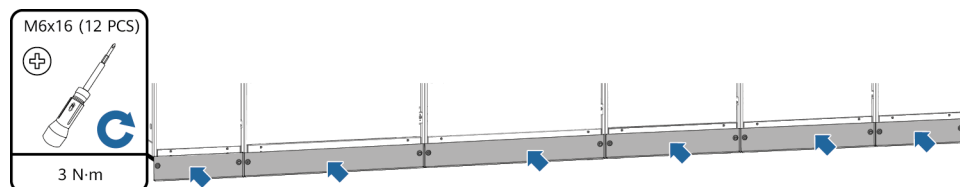
Figure 3-55 Installing the fan unit accessories (rear view of the cabinet)



UA31H00052

- Step 7** Reinstall the rear door plate without meshes in the door header and fan unit accessories.
- Step 8** Install the anchor baffle plate at the rear of each cabinet.

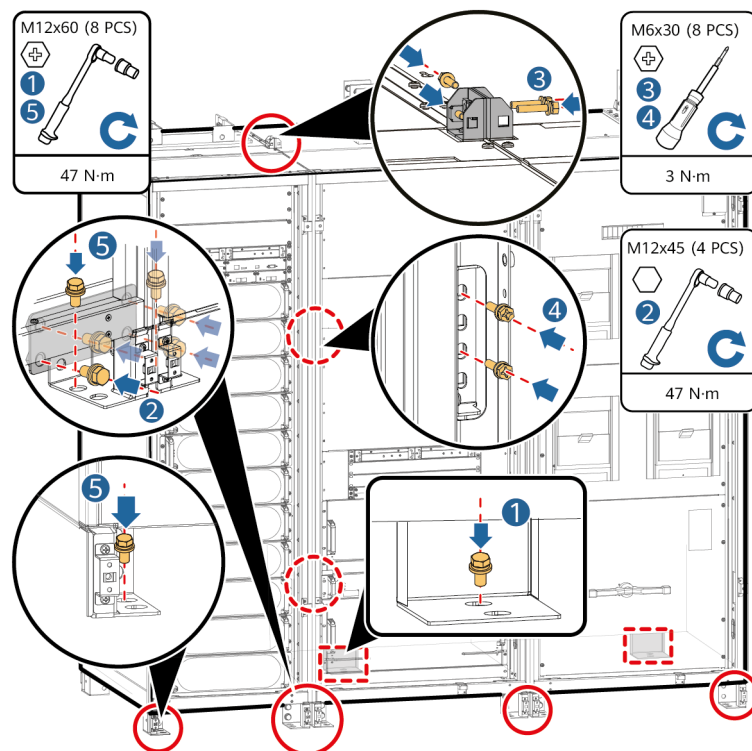
Figure 3-56 Installing the anchor baffle plate at the rear of the cabinet



UA31H00053

- Step 9** Secure the cabinet.
 1. Combine power unit 1 and the bypass unit. (Install anchor screws close to the wall for the bypass unit, install connecting kits at the bottom, top, and then middle of the cabinet, and secure the anchor screws under the front door of the cabinet.)

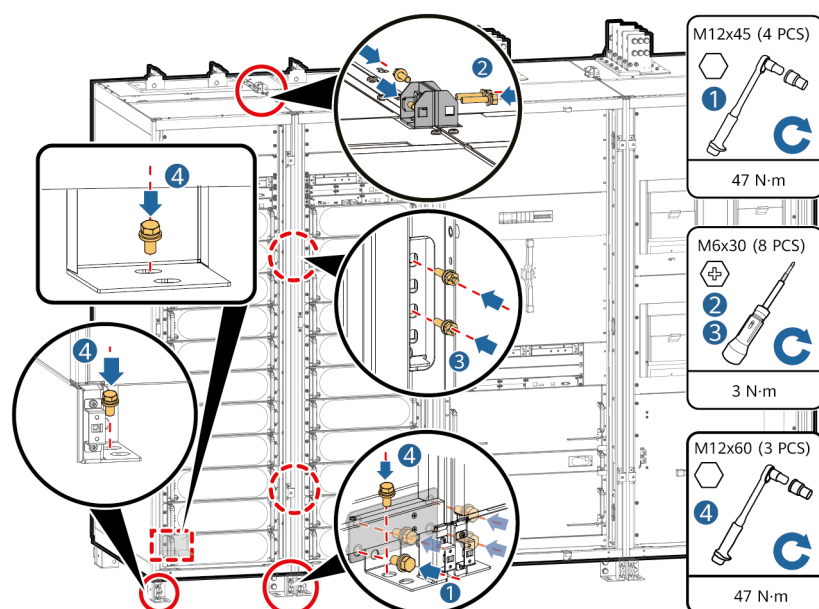
Figure 3-57 Combining power unit 1 and the bypass unit



UA31H00066

2. Combine power unit 2. (Install anchor screws close to the wall for the power unit 2, install connecting kits at the bottom, top, and then middle of the cabinet, and secure the anchor screws under the front door of the cabinet.)

Figure 3-58 Combining power unit 2

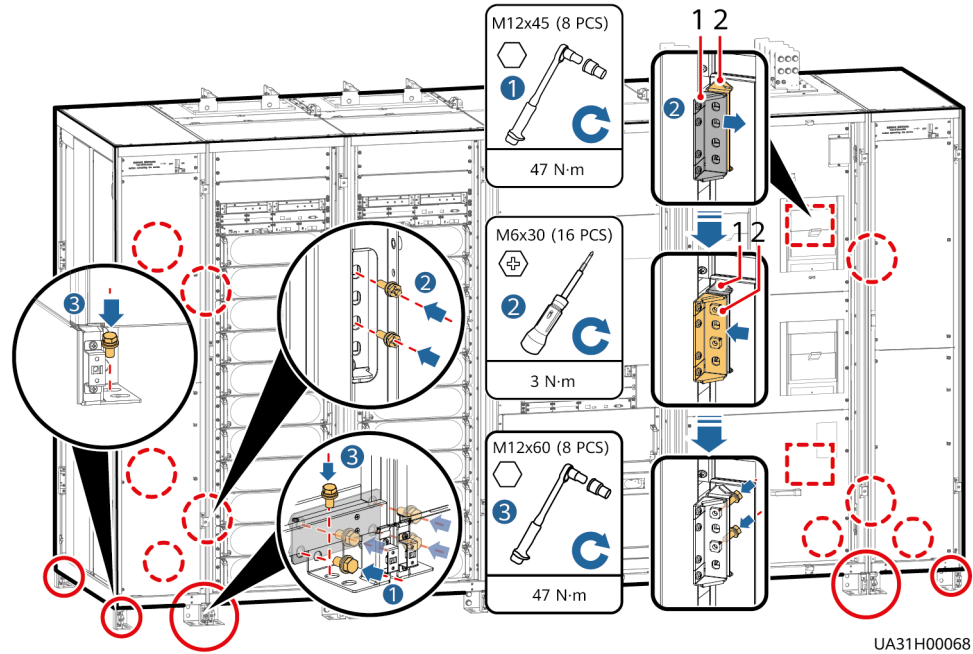


UA31H00067

3. Combine fan units.
 - a. Install connecting kits from the bottom to the middle.

- b. Remove the bottom cover from the fan unit.
- c. Tighten the anchor screws.
- d. Reinstall the bottom cover.

Figure 3-59 Combining fan units



(1) Connecting kits without floating nuts (2) Connecting kits with floating nuts

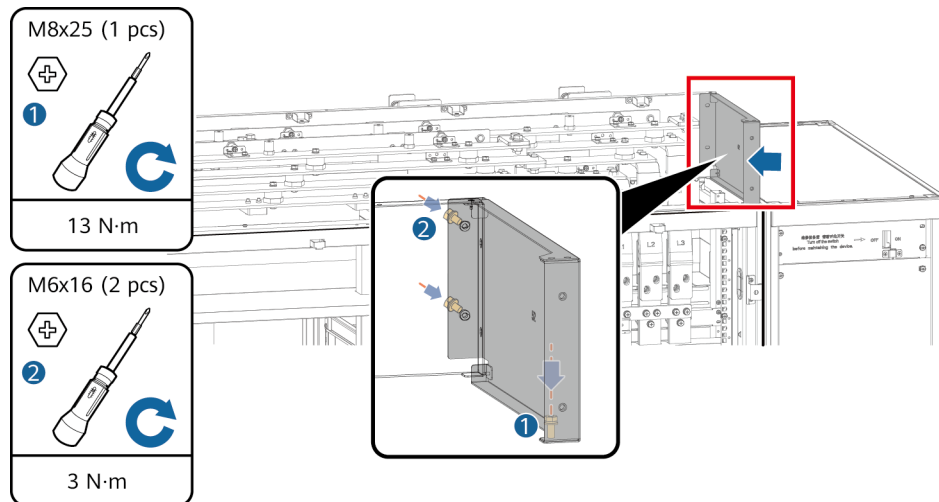
----End

Installing a Busbar

The procedure for installing the sealing plate is different. For details about other steps, see the procedure for installing the busbar.

Step 1 Install the right sealing plate of the input/output unit.

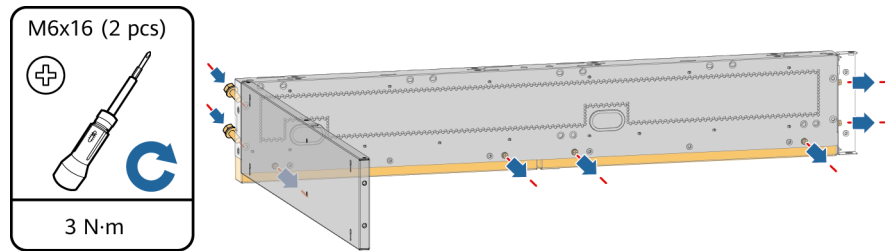
Figure 3-60 Install the right sealing plate



UA13H00057

Step 2 Remove the rear sealing plate from the power unit.

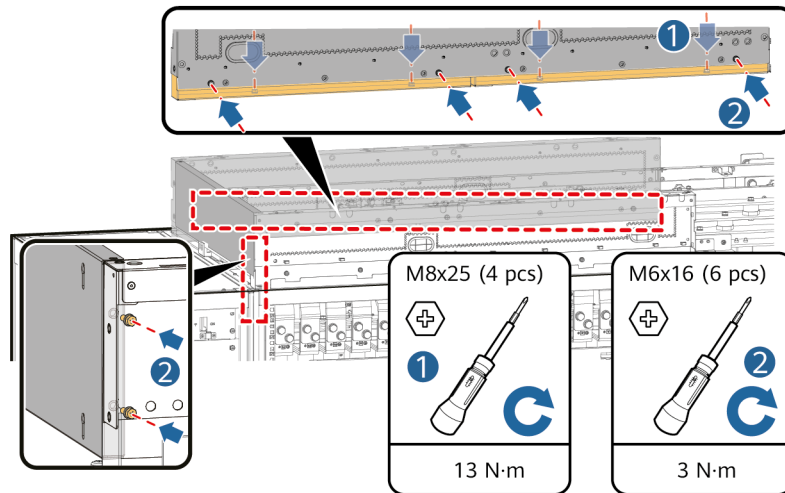
Figure 3-61 Removing the rear sealing plate from the power unit



UA31H00059

Step 3 Install the rear sealing plate of the power unit.

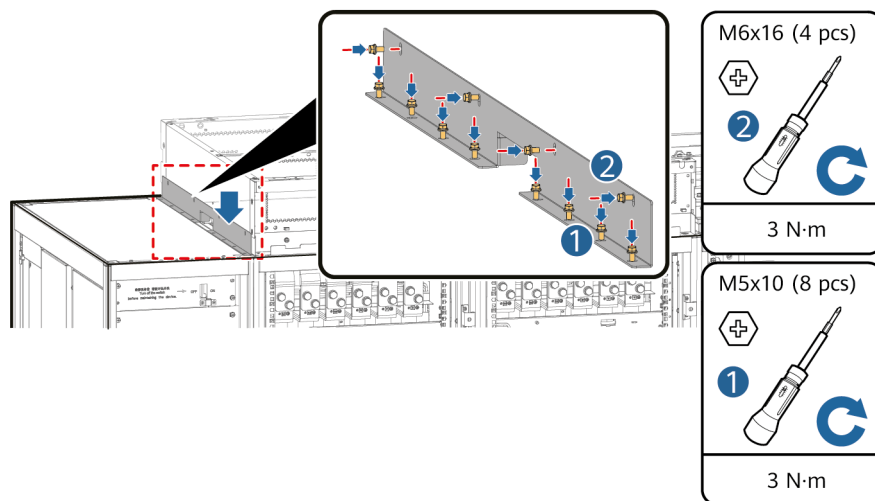
Figure 3-62 Installing the rear sealing plate of the power unit



UA31H00061

Step 4 Install the fan baffle plate (numbered 50).

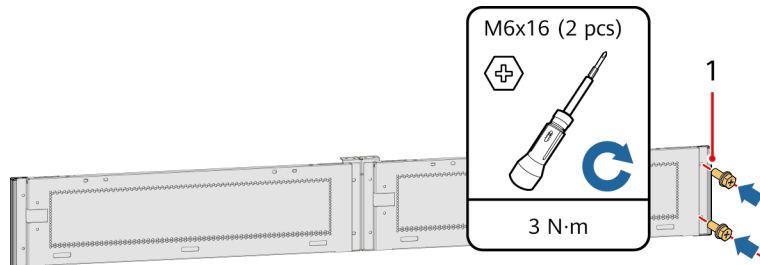
Figure 3-63 Installing the baffle plate of the left fan unit



UA31H00056

Step 5 Install the rear sealing plate assembly for the bypass unit.

Figure 3-64 Installing the rear sealing plate assembly for the bypass unit

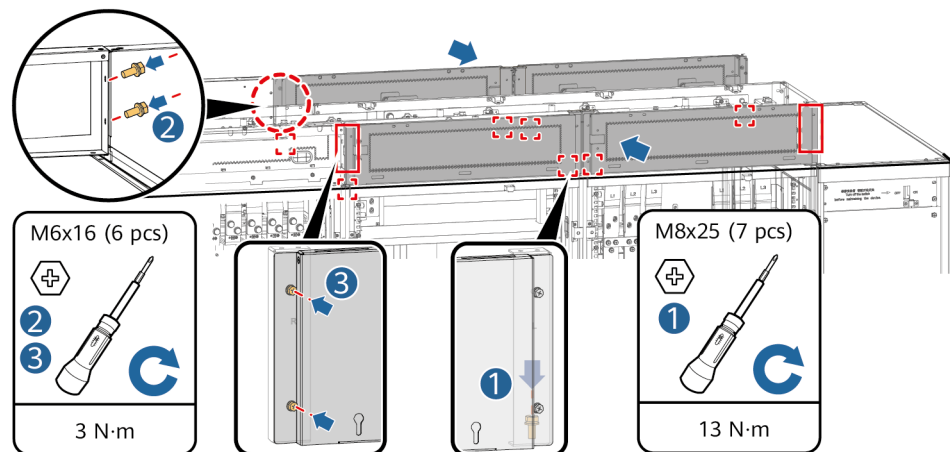


UA31H00060

(1) Part R (the part removed from the rear sealing plate of the power unit)

Step 6 Install the front and rear sealing plates (numbered 12) of the bypass unit and input/output unit.

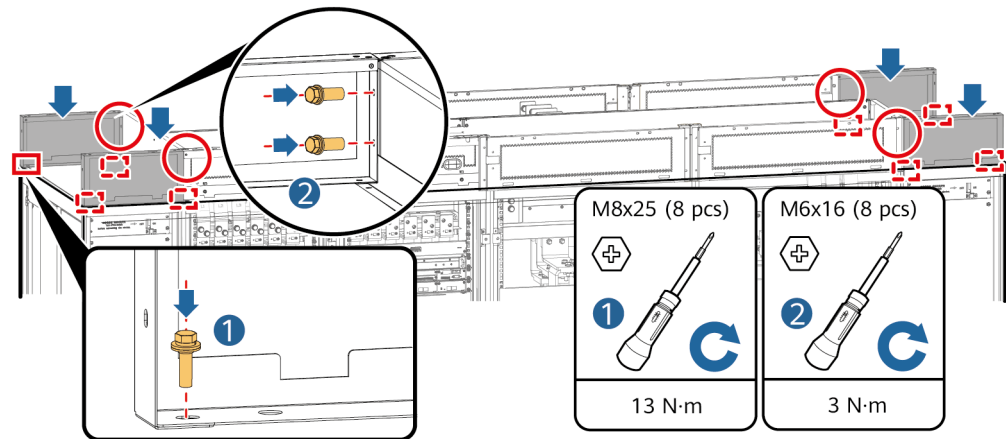
Figure 3-65 Installing the front and rear sealing plates of the bypass unit and input/output unit



UA31H00062

Step 7 Install the front and rear sealing plates (numbered 52) of the fan unit.

Figure 3-66 Installing the front and rear sealing plates of the fan unit



UA31H00058

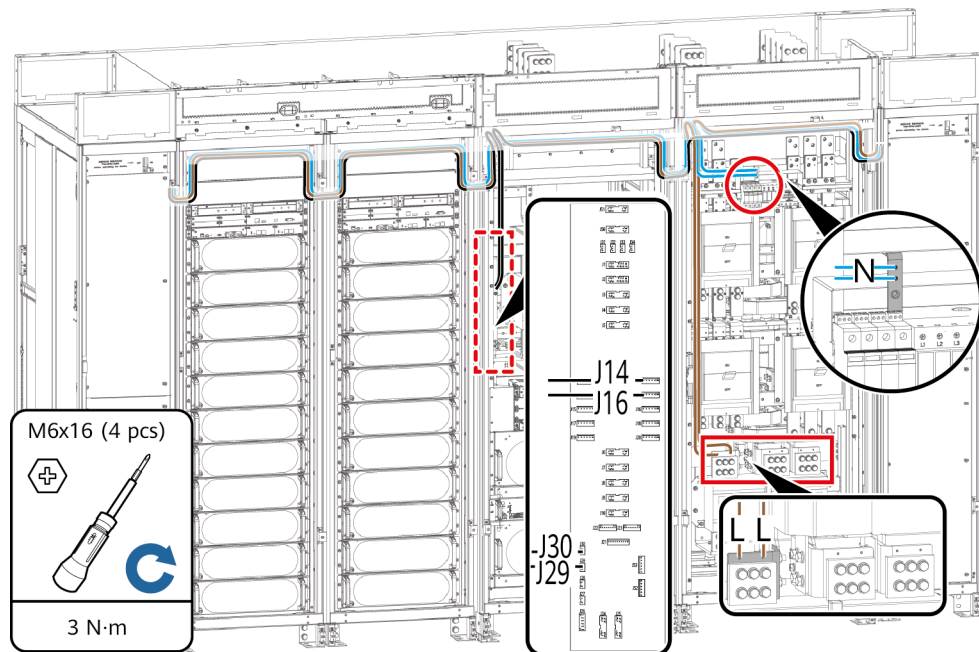
----End

Installing a Cable

The procedure for installing a cable for the fan unit and installing a mounting plate is different. For details about how to install cables for the power cabinet, bypass cabinet, and input/output bypass cabinet, see the preceding steps.

Step 1 Install the cable of the fan unit.

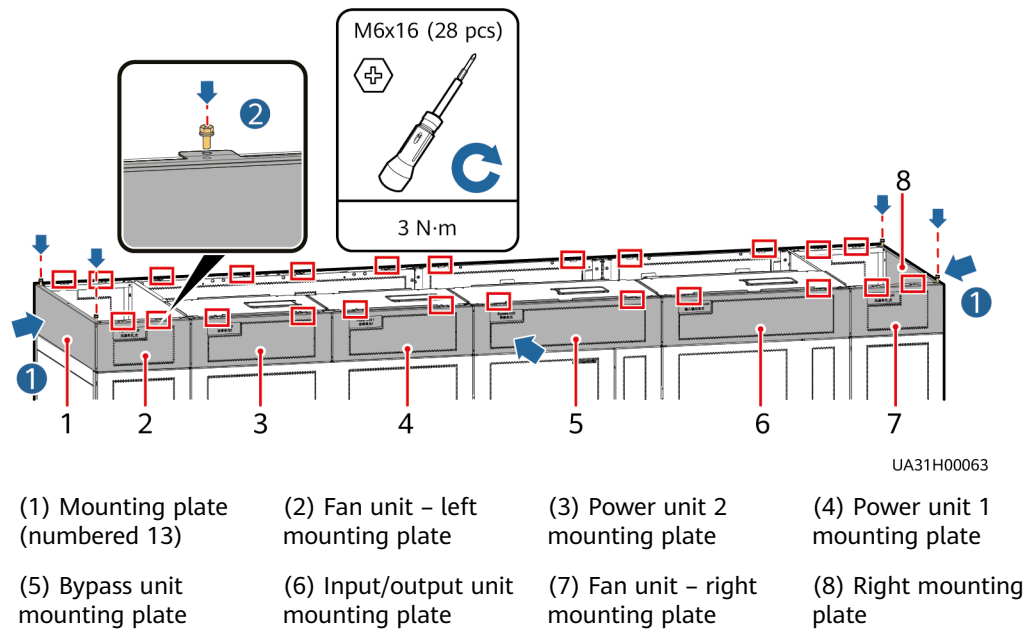
Figure 3-67 Installing the cable of the fan unit



UA31I10002

Step 2 Install the mounting plate.

Figure 3-68 Installing the mounting plate



----End

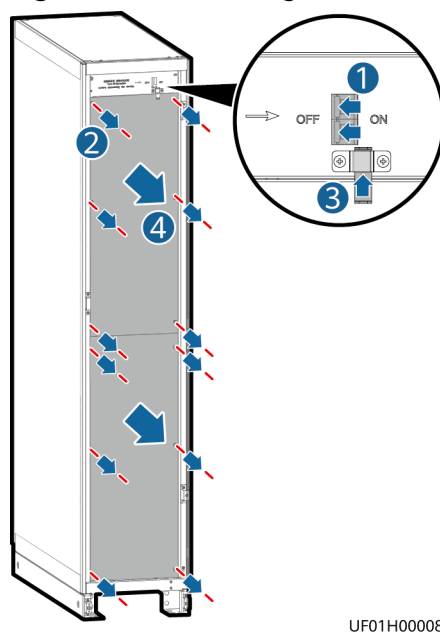
Replacing Fans

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

Step 1 Switch off the circuit breaker and remove the covers.

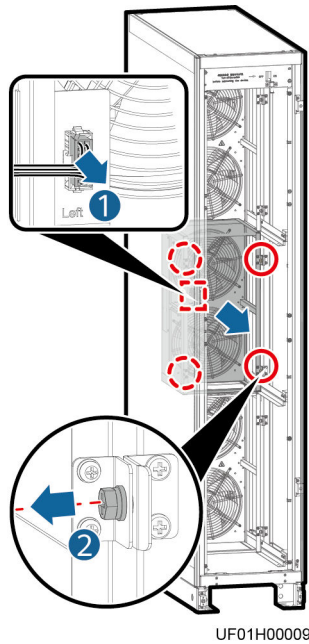
1. Switch off the circuit breaker.
2. Remove the screws from the cover.
3. Move the cover stopper upwards.
4. Remove the covers.

Figure 3-69 Removing covers



Step 2 Remove the cables and fan assembly.

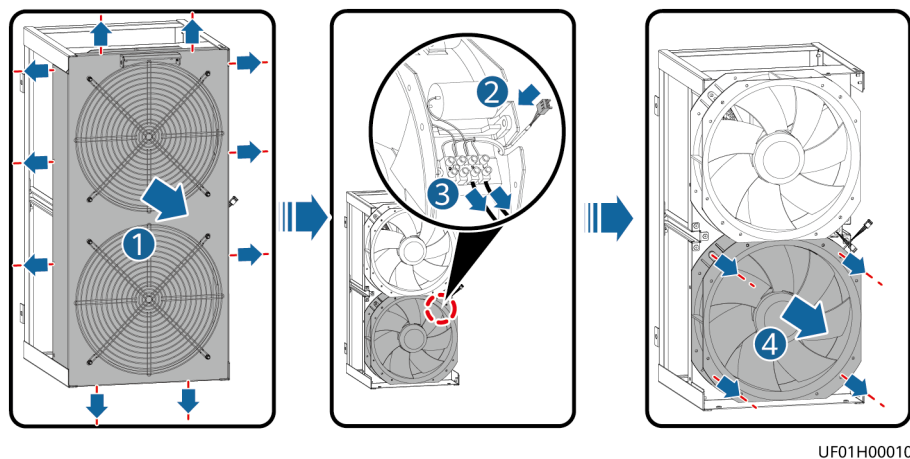
Figure 3-70 Removing the fan assembly



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 3-71 Removing the faulty fan



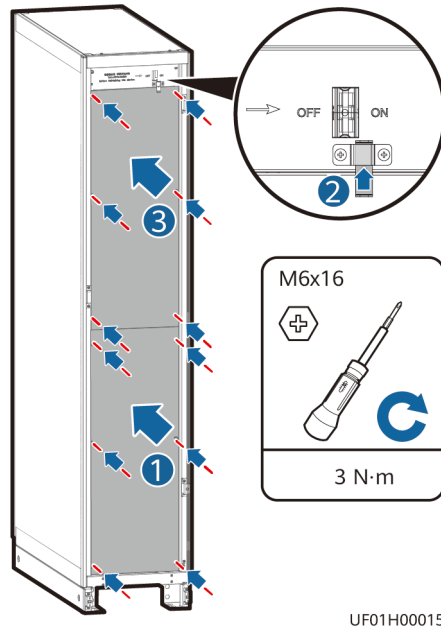
Step 4 Install the new fan, and install the fan power cable and signal cable.

Step 5 Reinstall the fan cover.

Step 6 Reinstall the fan assembly and install cables.

Step 7 Reinstall the cover.

Figure 3-72 Reinstalling the cover



Step 8 Switch on the circuit breaker.

Step 9 Clear the fault alarm.

----End

3.2.5.4 Connecting Cables Between the UPS and the SmartLi

Prerequisites

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

Procedure

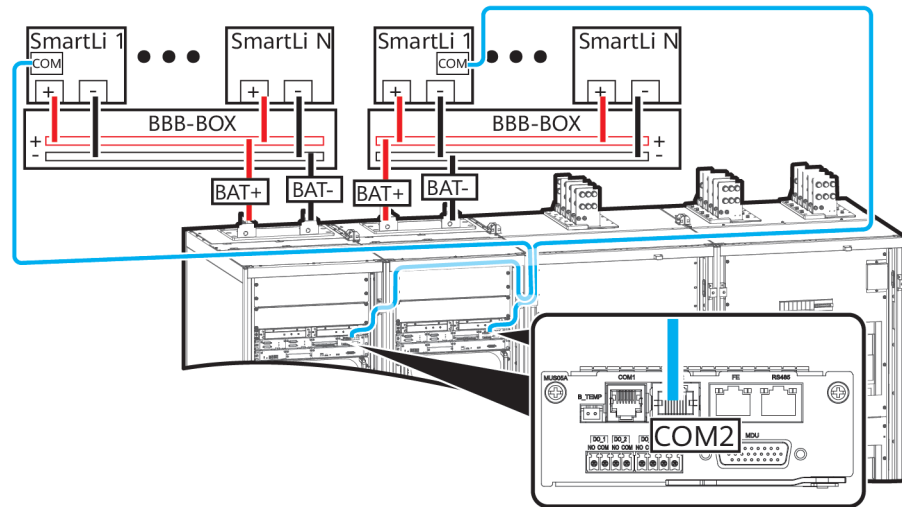
Step 1 Connect cables between the UPS and the SmartLi.

1. Connect battery cables of each power unit to the SmartLi or BBB box.
2. Connect the COM2 port on the monitoring interface card (MUS05A) in the control module of each power unit to the COM port on the master SmartLi cabinet of the corresponding power unit.

NOTICE

- Connect the ground cable of the SmartLi or its BBB box to the battery PE of the UPS or the ground bar in the equipment room based on the site survey.
- Route a signal cable out of the cabinet only from the top of the bypass unit, as shown in the figure.
- The number and colors of cables are for reference only.

Figure 3-73 Cable connection diagram (with a BBB box)



UA15110023

----End

3.2.5.5 Connecting Other Optional Components

Table 3-7 Optional component signal cable connection description

Optional Component	Optional Component Signal Cable Connected to the Power Unit		Optional Component Signal Cable Connected to the Bypass Unit
	Power Unit Battery Strings Shared	Power Unit Battery Strings Not Shared	
Battery circuit breaker box (BCB box)	BCB dry contact on the dry contact card (MUE05A) in the control module of power unit 1	Connect the BCB box of each power unit battery string to the BCB dry contact on the dry contact card (MUE05A) in the control module of the corresponding power unit.	-
Ambient temperature and humidity sensor	N/A	N/A	COM1 port on the monitoring interface card (MUS05A) in the control module of the bypass unit

Optional Component	Optional Component Signal Cable Connected to the Power Unit		Optional Component Signal Cable Connected to the Bypass Unit
	Power Unit Battery Strings Shared	Power Unit Battery Strings Not Shared	
Battery temperature sensor	COM1 port on the monitoring interface card (MUS05A) in the control module of power unit 1	Connect the temperature sensor of the battery string of each power unit to the COM1 port on the monitoring interface card (MUS05A) in the control module of the power unit.	N/A
iBattery	Connect the iBattery of the battery string to COM2 port on the monitoring interface card (MUS05A) in the control module of power unit 1.	Connect the iBattery of the battery string of each power unit to the COM2 port on the monitoring interface card (MUS05A) in the control module of the corresponding power unit.	N/A
Dry contact extended card	N/A	N/A	Install in the control module of the bypass unit.
Backfeed protection card	N/A	N/A	Install in the control module of the bypass unit.

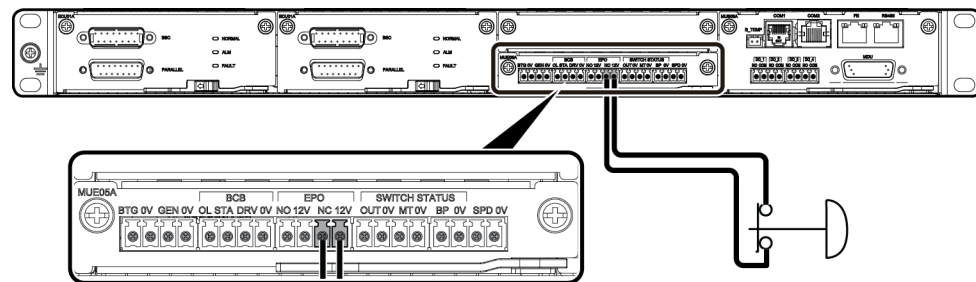
3.2.6 Remote EPO

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.

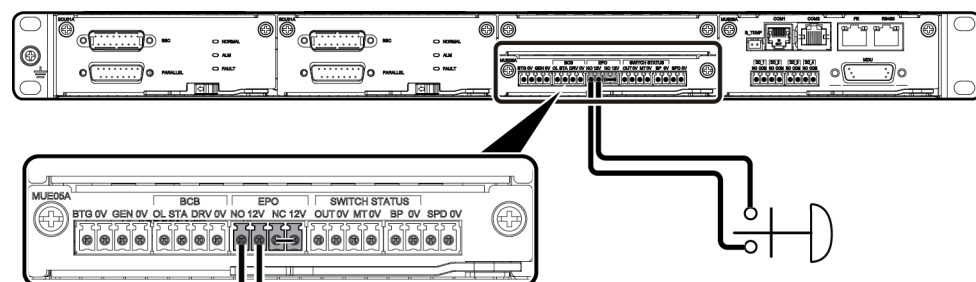
Connect the requisite EPO switch to the bypass unit dry contacts

Figure 3-74 Cable connection for an NC EPO switch



UA10000063

Figure 3-75 Cable connection for an NO EPO switch



UA10000062

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.

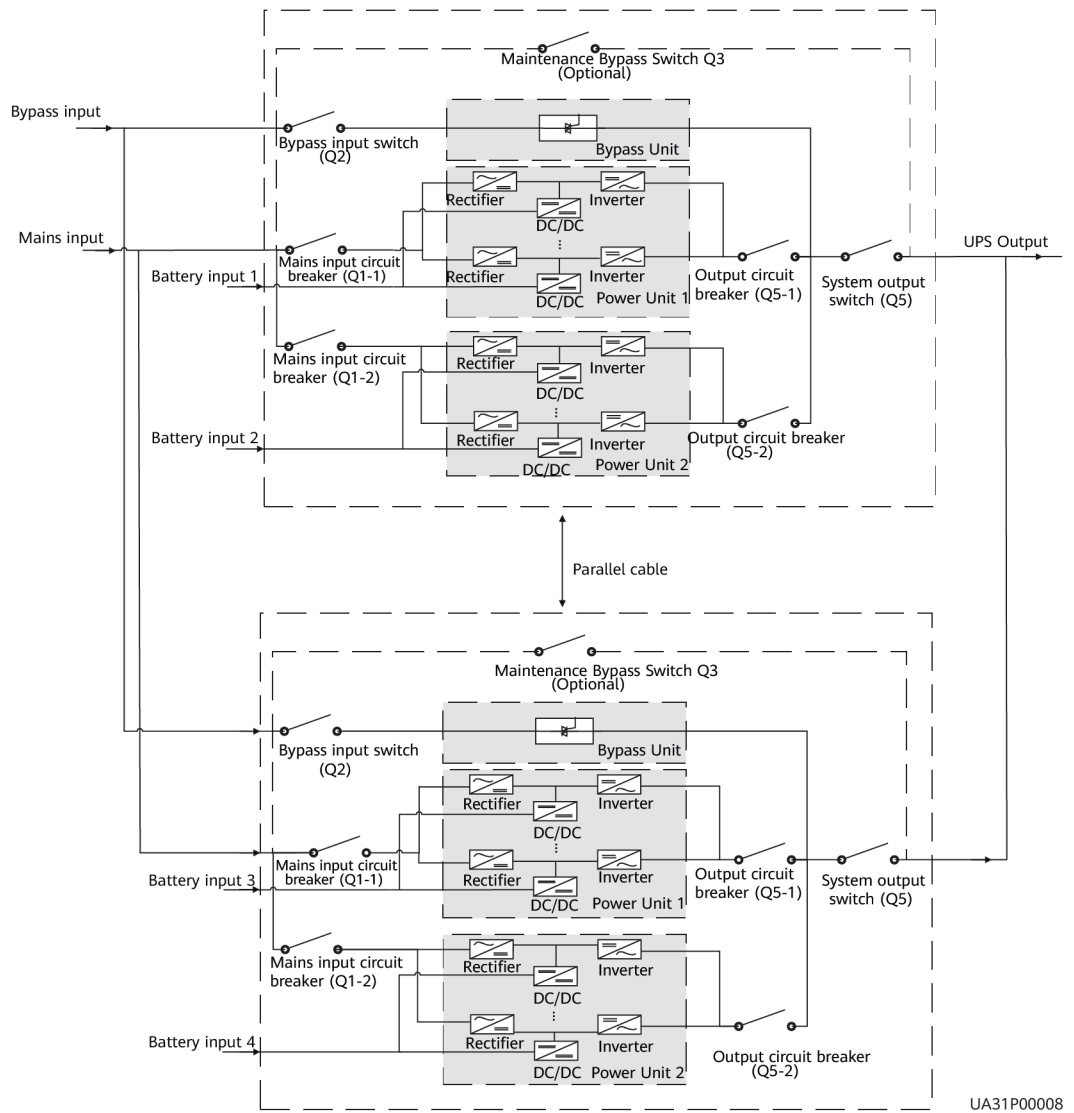
3.3 Parallel System Installation

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 3-76 1+1 parallel system schematic diagram

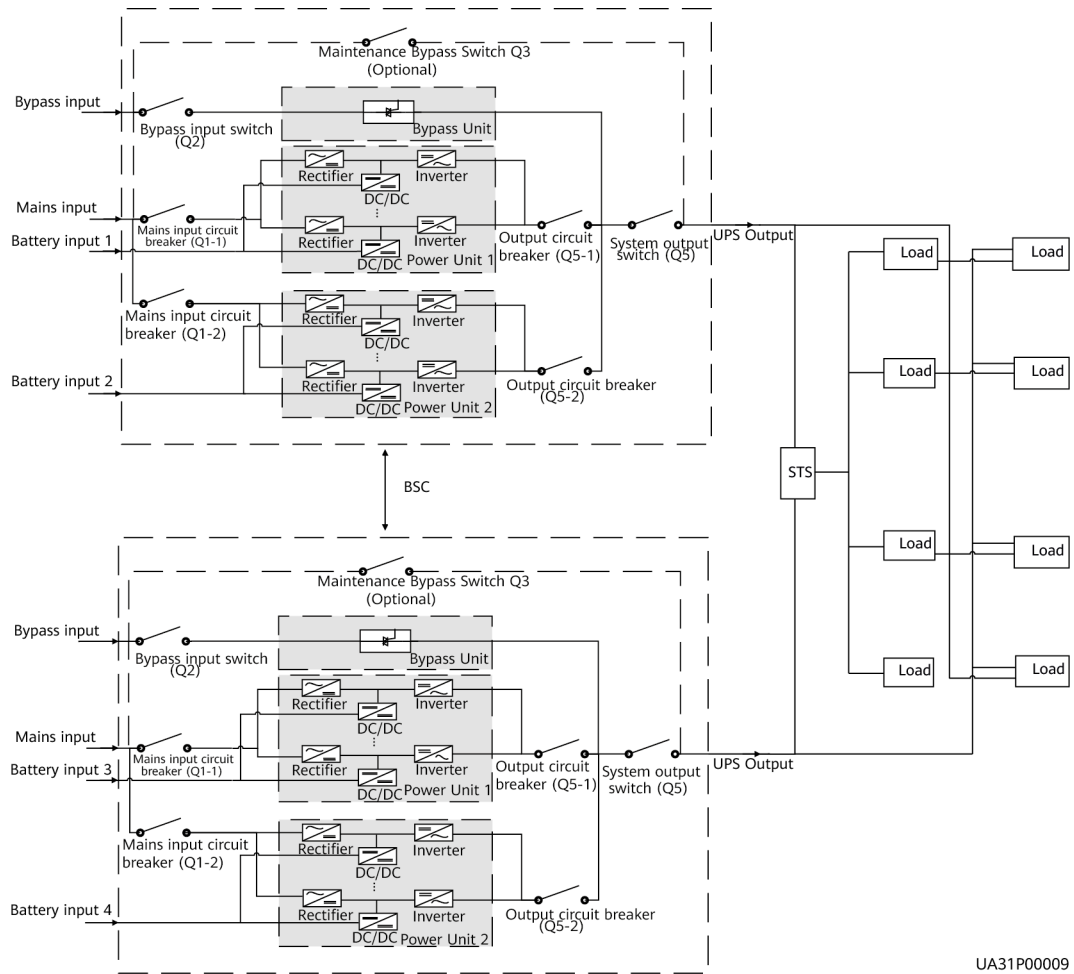


UA31P00008

NOTICE

Connect power cables according to port silk screen.

Figure 3-77 Single UPS dual-bus system schematic diagram



UA31P00009

NOTICE

The length and specifications of power cables on each UPS must 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 3-78 Connecting signal cables in a 1+1 parallel system

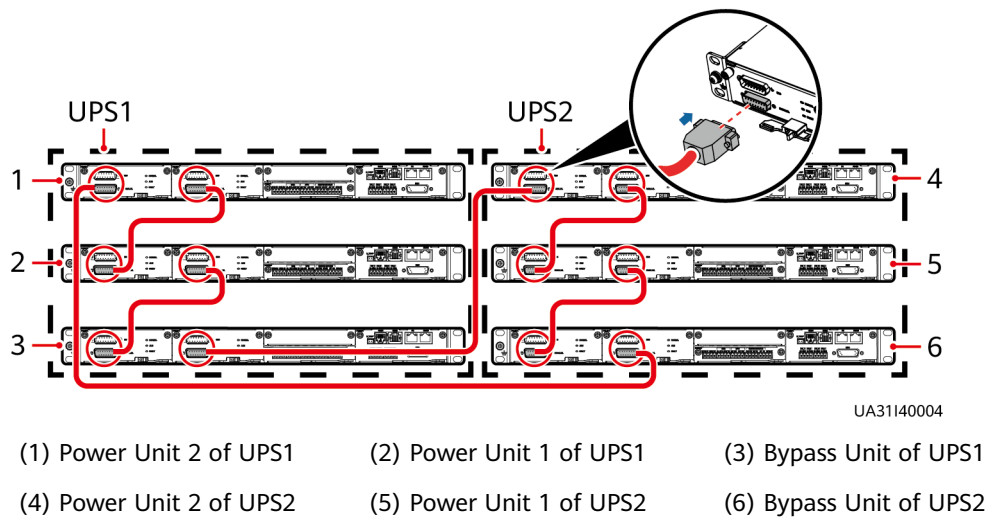
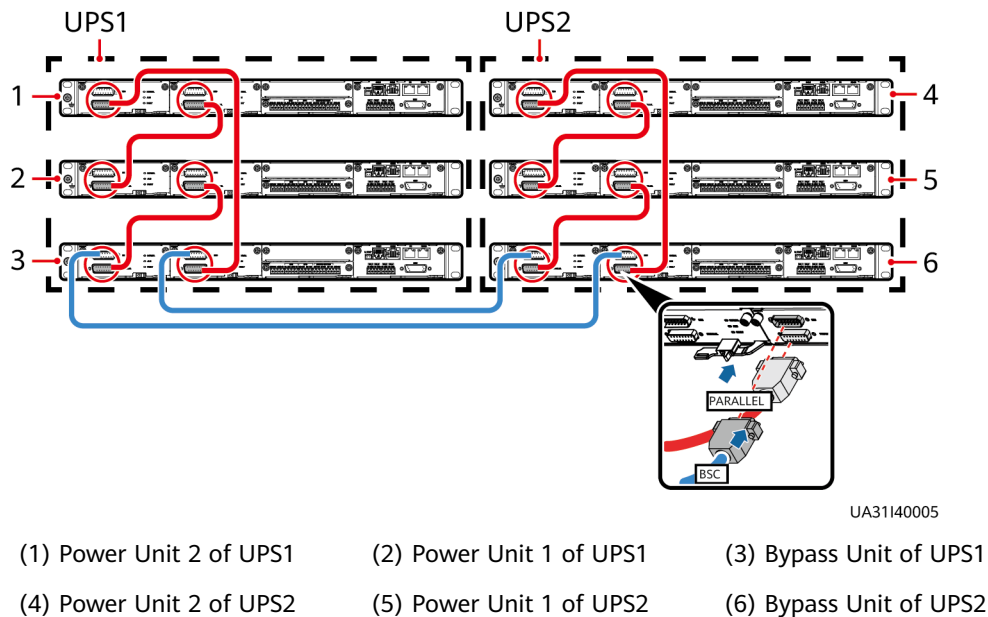


Figure 3-79 Connecting signal cables in a single UPS dual-bus system



Connecting Other Signal Cables

Connect signal cables for each UPS.

3.4 Installation Verification

Table 3-8 lists check items.

NOTICE

If the check results of listed items 8 and 9 in [Table 3-8](#) do not meet the acceptance criteria, the UPS may be damaged.

Table 3-8 Installation checklist

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 plates.
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 those 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 cabinet	<p>The inside and outside of the cabinet, and other operating components, are free from conductive dust.</p> <ol style="list-style-type: none"> 1. There is no foreign matter (such as copper wires and screws) on the top of the cabinet. 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 plate of the cabinet. 5. There is no foreign matter on the rear module subrack.

 **NOTE**

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

4 User Interface

4.1 LCD Interface

4.1.1 Main Menu

NOTICE

User interfaces displayed in this document correspond to the MDU version V300R002C10SPC436 and are for reference only.

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

Figure 4-1 Main menu

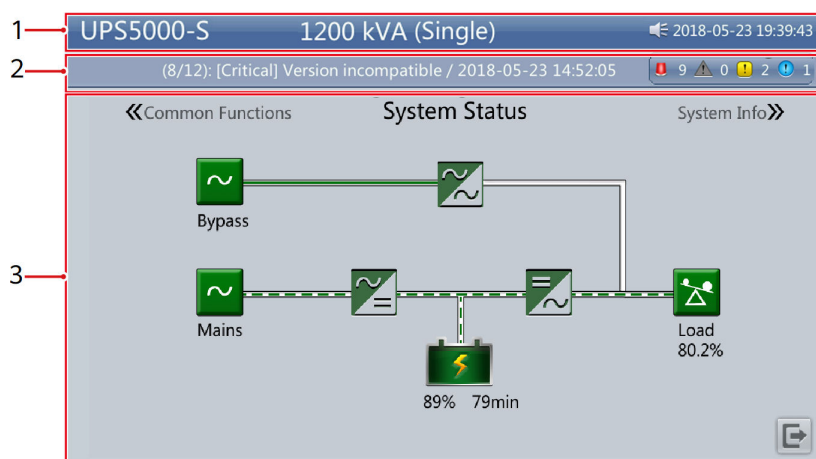


Table 4-1 Main screen description

Number	Area	Function
1	Status bar	Displays the UPS 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 area to open the active alarm page.
3	Information area	Displays the power flow as well as key information such as load and battery information. Tap the Bypass , Mains , Battery , and Load icons to view details.

Table 4-2 Functions of common buttons






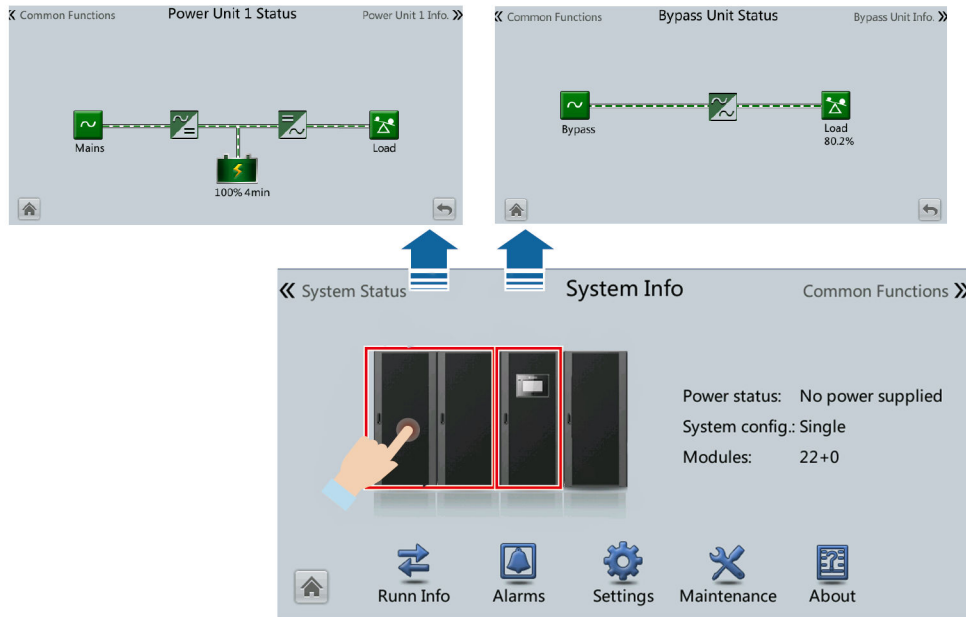
Button	Function
	Returns to the main screen.
	Scrolls the page down.
	Scrolls the page up.
	Returns to the upper-level menu.
	Logs a user out.

Table 4-3 LCD user passwords

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

On the **System Info** screen of the system, you can tap the power unit or bypass unit as indicated in the following figure to access the monitoring screen for the power unit or bypass unit.

Figure 4-2 Status of the power unit and bypass unit



4.1.2 Menu Hierarchy

Table 4-4 LCD menu hierarchy

Menu Position	Main Menu	Second-Level Menu	Third-Level Menu	
System	System Status	Bypass	-	
		Mains	-	
		Load	-	
		Battery	-	
	System Info	Runn Info	AC Output	
			UPS Load	
			Mains Input	
			Bypass Input	
			Power Unit 1 Batt.	
			Power Unit 2 Batt.	
			Total Runtime	
Alarms	Alarms	Active Alarms		
		Historical Alarms		

Menu Position	Main Menu	Second-Level Menu	Third-Level Menu	
			Buzzer Off	
			Clear Faults	
		Settings	Comm Settings	
			System Settings	
			Input Settings	
			Output Settings	
			Bypass Settings	
			Dry Contact Set	
			Settings Wizard	
			User Settings	
			Parameter Sync	
			DST Settings	
		Maintenance	USB Operations	
			Inv. ON	
		Inv. OFF		
		Screen Calib.		
	About	-		
	Common Functions	AC Output	-	
		UPS Load	-	
		Mains Input	-	
		Inv. ON	-	
Inv. OFF		-		
Buzzer Off		-		
Historical Alarms		-		
Power Unit	Power Unit Status	Mains	-	
		Load	-	
		Battery	-	
	Power Unit Info	Runn Info	AC Output	-
			UPS Load	-

Menu Position	Main Menu	Second-Level Menu	Third-Level Menu	
			Mains Input	
			Battery Information	
			Module Data	
			Total Runtime	
			Battery Detailed Data (only for lead-acid batteries)	
		Alarms	Active Alarms	
			Historical Alarms	
		Settings	Comm Settings	
			Battery Settings	
			iBOX Settings (only for lead-acid batteries)	
			Dry Contact Set	
		Maintenance	Battery Maint.	
			ECM Switchover	
			iBOX Control (only for lead-acid batteries)	
			Fan Life	
			Bus Capa. Life	
		About	-	
		Common Functions	AC Output	-
			UPS Load	-
	Mains Input		-	
Historical Alarms	-			
Bypass Unit	Bypass Unit Status	Bypass	-	
		Load	-	
	Bypass Unit Info	Runn Info	AC Output	
		UPS Load		

Menu Position	Main Menu	Second-Level Menu	Third-Level Menu
			Bypass Input
			Total Runtime
		Alarms	Active Alarms
			Historical Alarms
		Maintenance	ECM Switchover
			Fan Life
	About	-	
	Common Functions	AC Output	-
		UPS Load	-
		Historical Alarms	-

4.1.3 System Info

4.1.3.1 Running

Table 4-5 Running data description

Running Item	System	Power Unit	Bypass Unit
AC Output	System AC output data	AC output data of this power unit	AC output data of the bypass unit
UPS Load	System load data	Load data of this power unit	Load data of the bypass unit
Mains Input	System mains input data	Mains input data of this power unit	N/A
Bypass Input	System bypass input data	N/A	System bypass input data
Power Unit 1 Batt.	Power unit 1 battery data	N/A	N/A
Power Unit 2 Batt.	Power unit 2 battery data	N/A	N/A
Total Runtime	System inverter and bypass runtime	Inverter runtime of this power unit	System bypass runtime

Running Item	System	Power Unit	Bypass Unit
Environment Data	System environment data	N/A	N/A
Battery Information	N/A	Battery information of this power unit	N/A
Module Data	N/A	Module data of this power unit	N/A
Battery Detailed Data (only for lead-acid batteries)	N/A	Detailed battery data of this power unit	N/A


On the **System Info** screen, tap  to access the **Runn Info** screen of the system.

Figure 4-3 System running 1

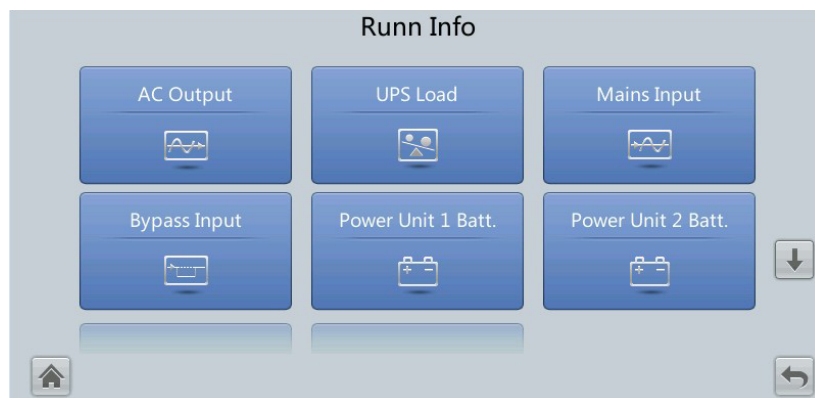


Figure 4-4 System running 2




On the **System Info** screen, tap the power unit icon to access the **Power Unit N battery** screen, and tap  to access the **Runn Info** screen of the current power unit.

Figure 4-5 Power unit running 1



Figure 4-6 Power unit running 2



NOTE

If the battery type is lead-acid battery and **Number of iBOXs** in **System Info > Settings > iBOX Settings > Basic Param.** is not 0, **Battery Detailed Data** is displayed on the **Runn Info** screen.

Table 4-6 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 4-7 UPS load

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

 **NOTE**

The **UPS load** of the power unit does not display the **Load ratio**.

Table 4-8 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 4-9 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 4-10 Power Unit N Batt.

Item	Description
Battery Status	Lead-acid battery: The value can be Not connected, Equalized charging, Float charging, Hibernating, discharging, or Not chg. or dis. Lithium battery: The value can be Not connected, Float charging, discharging, or Not chg. or dis.
Voltage (V)	Voltage of the battery string.
Current (A)	Current of the battery string (the current is + when batteries are being charged and - when discharged).
Temperature (°C) (only for lead-acid batteries)	Battery operating temperature (A battery sensor is required. If the sensor is not installed, 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)	-

 **NOTE**

The **Power Cabinet N** data in the system running is the same as the **Battery Info** data in the power unit running.

Table 4-11 Total runtime

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

 **NOTE**

The value must be an integer. For example:

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

Table 4-12 Environment data

Item	Description
Ambient temperature (°C)	Temperature measured by the ambient temperature and humidity sensor. (An ambient temperature and humidity sensor is required. If no sensor is connected, the ambient temperature sampled by the bypass unit is displayed.)
Ambient humid. (%RH)	Humidity measured by the ambient temperature and humidity sensor. If the sensor is not installed, NA is displayed.

- Module Data: reflects each data of a module.
- Battery Detailed Data - Batt. String Data: reflects the voltage, current, SOC, and SOH data of each battery string.
- Battery Detailed Data - String N Battery Data: reflects the temperature, voltage, internal resistance, current, SOC, and SOH data of a single battery in the battery string.

4.1.3.2 Alarms

Table 4-13 Alarm display description

Running Item	System	Power Unit	Bypass Unit
Active Alarms	All active alarms	Active alarms of this power unit	Active alarms of the bypass unit
Historical Alarms	All historical alarms	Historical alarms of this power unit	Historical alarms of the bypass unit
Buzzer Off	Buzzer off	-	-
Clear Faults	Clearing all alarms	-	-


Tap  on the **System Info** screen to access the **Alarms** screen.

Figure 4-7 System alarms



Active Alarms

This screen displays alarm information including the severity, name, ID, location, and generation time.

Historical Alarms

This screen displays alarm information including the severity, name, ID, location, generation time, and clear time.

Buzzer Off

Two buzzer menus are available:

- Buzzer On
If this selection is enabled, when a critical alarm, a minor alarm, or a certain warning is generated the buzzer is activated.
- Buzzer off
If this selection is enabled, the buzzer is muted.

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

4.1.3.3 Settings

Table 4-14 Setting data description

Setting Item	System	Power Unit
Comm - IP Settings	System IP settings	IP settings of this power unit
Comm - RS485 Settings	System RS485 settings	RS485 settings of this power unit
Comm - ModbusTCP Settings	System ModbusTCP settings	ModbusTCP settings of this power unit

Setting Item	System	Power Unit
Comm - Amb T/H Sensor	Ambient temperature and humidity sensor settings of the system	-
Comm - Batt Temp Sensor (only for lead-acid batteries)	-	Battery temperature sensor settings of this power unit
Comm - BMU (only for lead-acid batteries)	-	BMU settings of this power unit
Comm - Battery System (only for lithium batteries)	-	Battery System of this power unit
Comm - WiFi Settings	System WiFi settings	-
Comm - SSH Settings	System SSH Settings	-
System Settings	System settings	-
Input Settings	Input settings	-
Output Settings	Output settings	-
Bypass Settings	Bypass settings	-
Dry Contact	System dry contact settings	Dry contact settings of this power unit
Settings Wizard	Settings wizard	-
User Settings	User settings	-
Parameter Sync	Synchronizing parameters of the power units and bypass unit.	-
DST Settings	DST settings	-
Battery Settings	-	Battery settings of this power unit
iBOX Settings (only for lead-acid batteries)	-	iBOX settings of this power unit


On the **System Info** screen, tap  to access the **Settings** screen of the system.

Figure 4-8 System settings 1

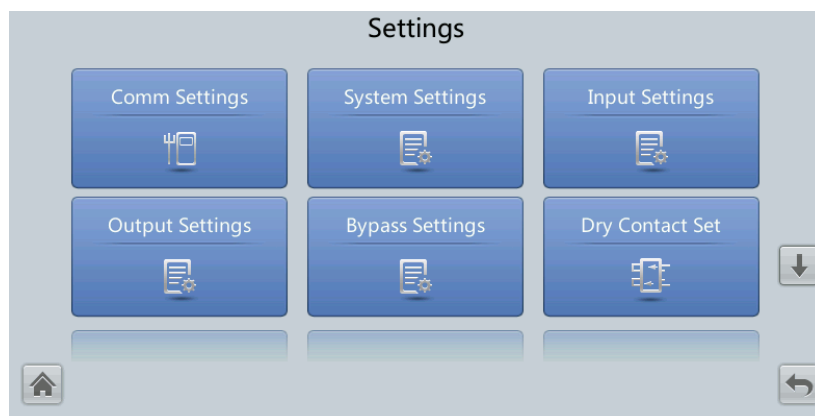


Figure 4-9 System settings 2




On the **System Info** screen, tap the power unit icon to access the **Power Cabinet N Info** screen, and tap  to display the **Settings** screen of the current power unit.

Figure 4-10 Power unit settings (lead-acid battery)

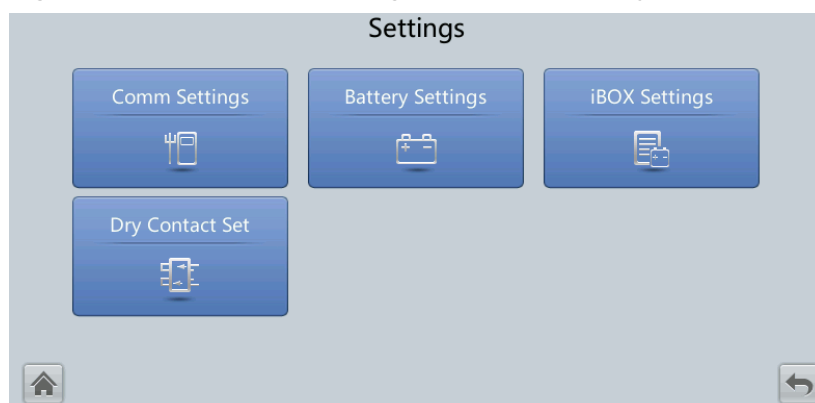
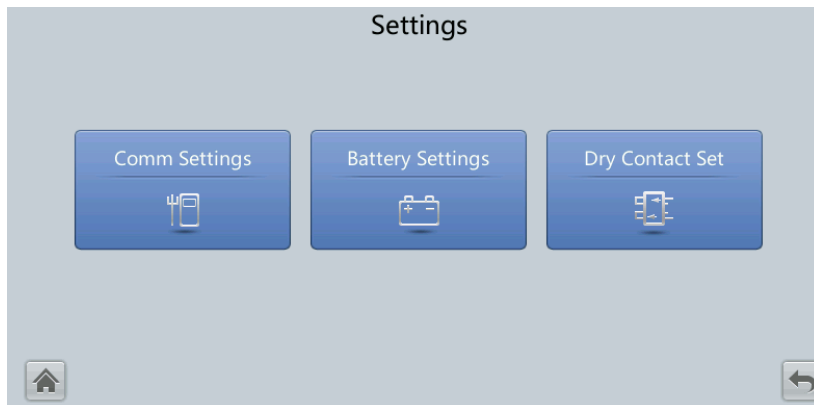


Figure 4-11 Power unit settings (lithium battery)



Communication Settings

Figure 4-12 System communication settings

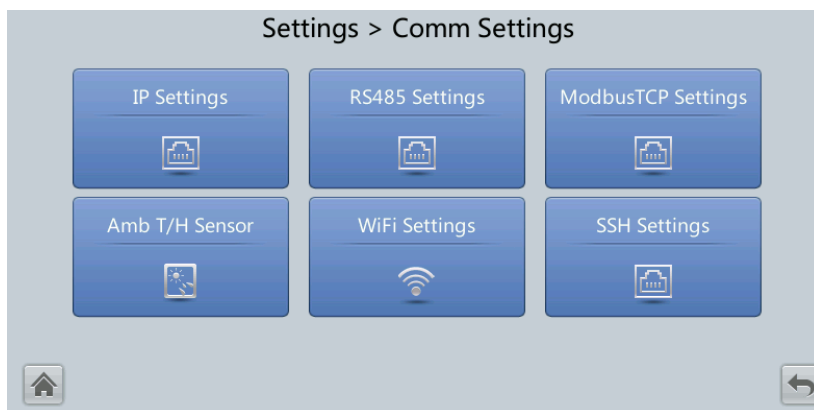


Figure 4-13 Power unit communication settings (lead-acid battery)



Figure 4-14 Power unit communication settings (lithium battery)

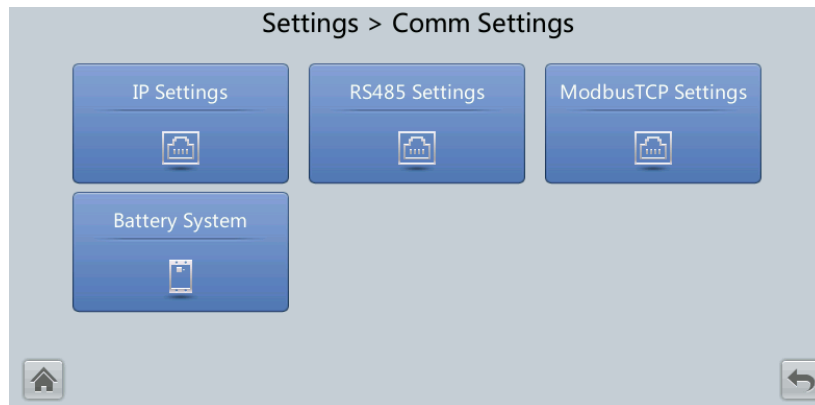
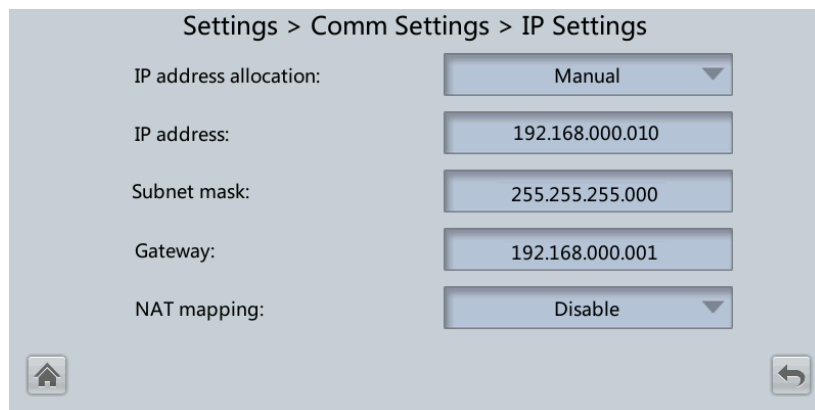


Figure 4-15 IP settings



IP address allocation

- If the MDU is directly connected to a computer, the IP address can only be allocated manually. The IP addresses of the MDU and computer must be in the same network segment, and must be different.
- If the MDU is connected to a computer through a LAN switch or router with the DHCP function, the IP address can be allocated manually or automatically. Manual allocation is used by default.

- **Manual:** Check that their IP addresses are two different values on the same network segment. Set the UPS IP address to be in the same subnet as the PC IP address. Perform the bitwise AND operation for the UPS IP address and the PC IP address with the subnet mask respectively. If the operation results are the same, the two IP addresses are in the same subnet.

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

Table 4-15 Bitwise AND operation example

-	PC IP Address (182.98.225.125)	UPS IP Address (182.98.225.112)
PC IP address/UPS IP address	10110110.01100010.11100001.01111101	10110110.01100010.11100001.01110000
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

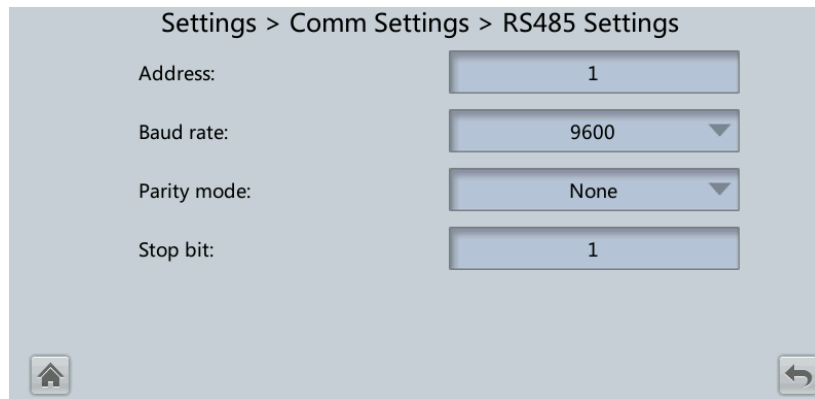
- **Automatic:** The MDU automatically searches for available IP addresses in the connected network. Ensure that the MDU and PC are on the same network segment.

 **NOTE**

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

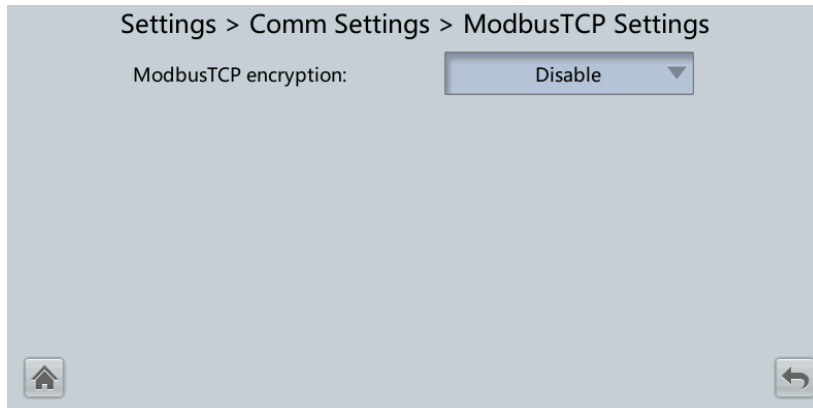
Item	Description	Default Value	Value Range
IP address	Specifies the IP address for the Ethernet. NOTICE Ensure that the UPS IP address is unique on the network segment. Otherwise, the WebUI display function may not function properly.	192.168.0.10	1.0.0.0–223.255.255.255
Subnet mask	Specifies the subnet 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
NAT mapping	NAT means network address translation. If it is set to Disable , Internet cannot access IP addresses in the local area network (LAN).	Disable	Disable, Enable

Figure 4-16 RS485 communication settings



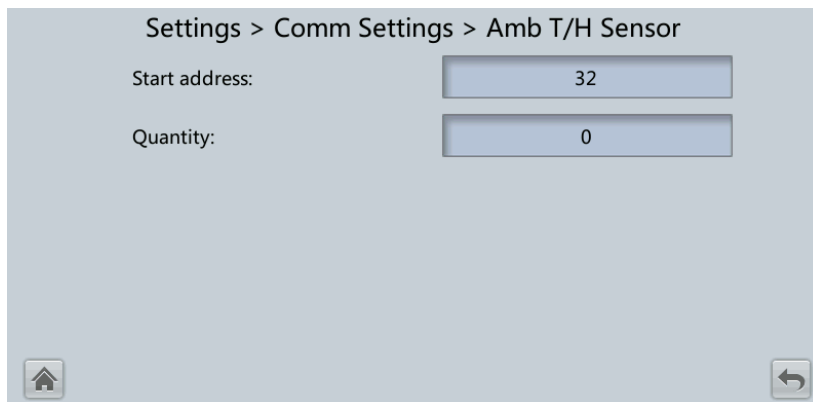
Item	Description	Default Value	Value Range
Address	This serial port address is allocated by the user.	1	1-254
Baud Rate	Select a baud rate to match the user's network management conditions onsite.	9600	9600, 19200, 115200
Parity mode	Verify the validity of RS485 communication characters. When a device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

Figure 4-17 Modbus TCP 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 4-18 Ambient temperature and humidity sensor



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

Figure 4-19 Battery temperature sensor

Settings > Comm Settings > Batt Temp Sensor

Start address:

Quantity:

Item	Description	Default Value	Value Range
Start address	-	16	16-28
Quantity	Number of cascaded battery temperature sensors	0	0-4

Figure 4-20 BMU

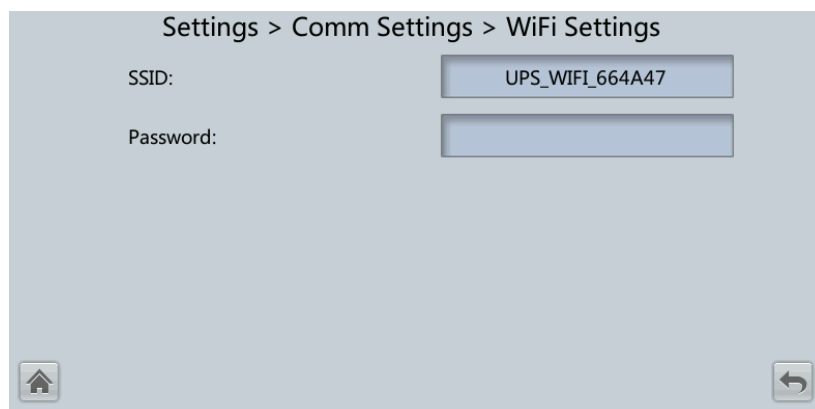
Settings > Comm Settings > BMU

Start address:

Quantity:

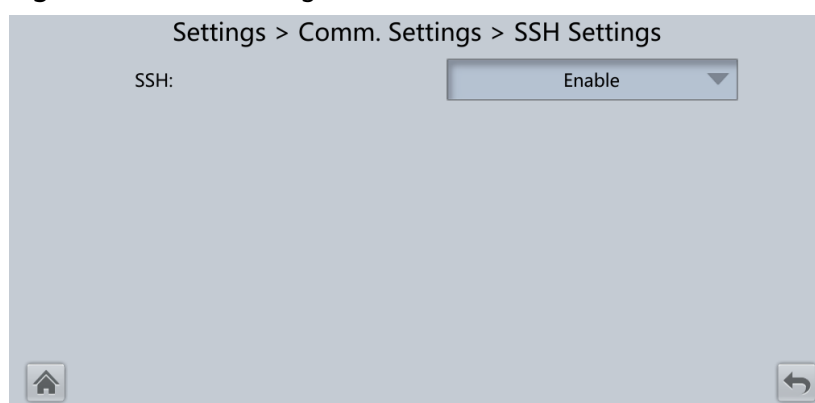
Item	Description	Default Value	Value Range
Start address	-	112	-
Quantity	Number of cascaded BMUs	0	0-12

Figure 4-21 WiFi communication settings



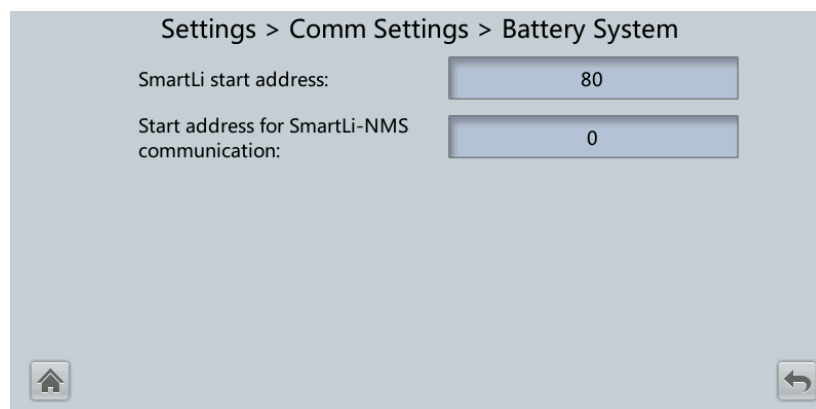
Item	Description	Default Value	Value Range
SSID	When using the mobile app for site setup or inspection, set WiFi SSID after connecting a WiFi module over a USB port to identify the WiFi device to which the mobile phone is connected.	UPS_WIFI + Last six characters of the MAC address	-
Password	The password for accessing WiFi.	Changeme	-

Figure 4-22 SSH settings



Item	Description	Default Value	Value Range
SSH	Enables or disables Secure Shell (SSH) login.	Enable	Disable, Enable

Figure 4-23 Battery system



Item	Description	Default Value	Value Range
SmartLi start address	SmartLi communication address when the UPS queries SmartLi data.	80	-
Start address for SmartLi-NMS communication	Address for the NMS to obtain lithium battery data.	0	0-124

System Settings

Figure 4-24 System settings 1

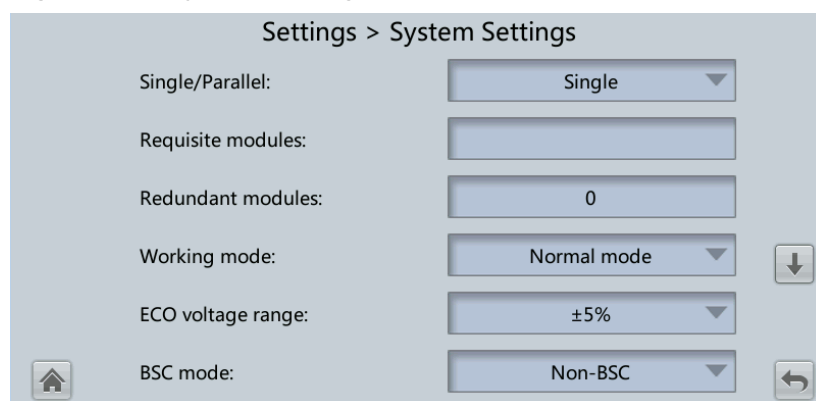


Figure 4-25 System settings 2

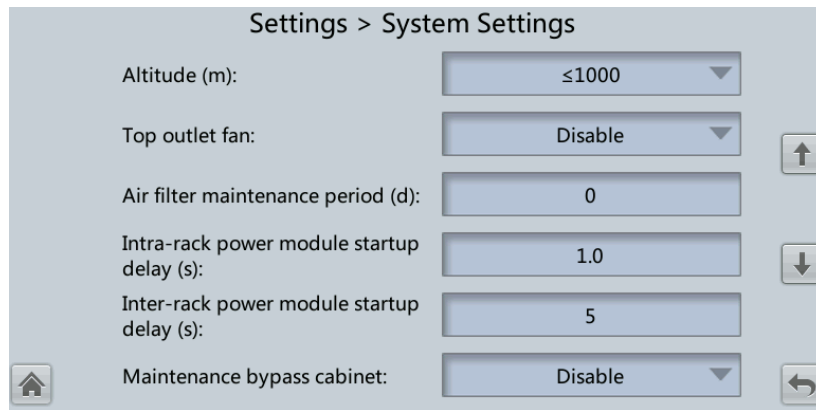
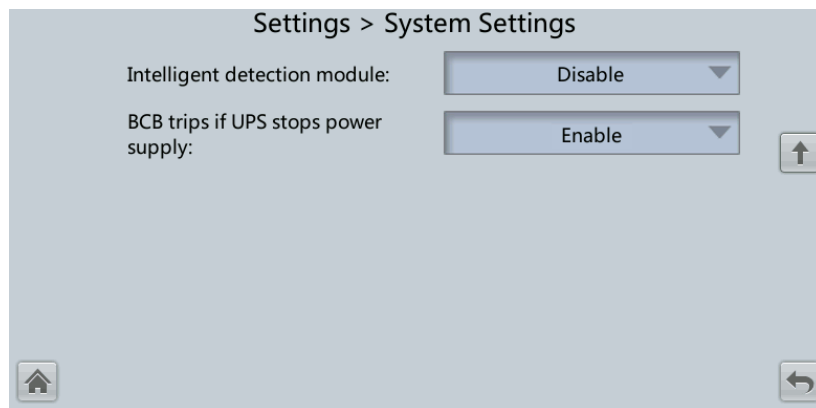


Figure 4-26 System settings 3



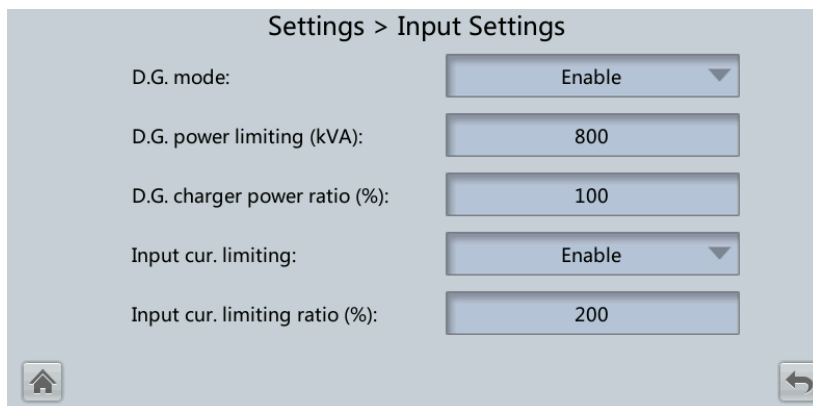
Item	Description	Default Value	Value Range
Single/ Parallel	Specifies whether the UPS works in single mode or parallel mode.	Single	Single, Parallel
Requisite modules	Matches the system capacity.	-	12-22
Redundant modules	Set this parameter based on load capacity and redundancy requirements.	0	0-10
Working mode	UPS working mode	Normal mode	Normal mode, ECO, Self-load mode, Converter mode

Item	Description	Default Value	Value Range
ECO voltage range	In ECO mode, when the difference between the bypass voltage and the rated voltage is greater than this value, the system determines that the ECO voltage is abnormal and transfers to normal mode.	±5%	±5%, ±6%, ±7%, ±8%, ±9%, ±10%
BSC mode	<ul style="list-style-type: none"> If the system is a dual-bus system that consists of Huawei UPSs, 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 systems at the same time. If you need to change the settings in the future, perform operations under the guidance of maintenance engineers.) <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>	Non-BSC mode	Non-BSC mode, Standard BSC mode, Optional BSC card
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	If the fan unit is configured, set this parameter to Enable .	Disable	Disable, Enable
Air filter maintenance period (d)	Specifies the rack air filter maintenance interval. If it is set to 0 , there is no reminder.	0	0–365

Item	Description	Default Value	Value Range
Intra-rack power module start delay (s)	<p>These two parameters enable the UPS to control the interval that each rack (or module) transfers from battery mode to normal mode, which reduces the impact on the generator or power grid. In the case of battery undervoltage, the system automatically shortens the delay for transferring to normal mode to 1/8 of the normal delay to accelerate the transfer and prevent battery overdischarge. Intra-rack power module start delay (s) can be set to a value ranging from 0.5 to 120. Inter-rack power module start delay (s) can be set to a value ranging from 2 to 120. The preset value of Inter-rack power module start delay (s) is 5.0. 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.</p>	1.0	0.5–120.0
Inter-rack power module start delay (s)		5	2–120
Maintenance bypass cabinet	If the maintenance bypass unit is configured, set this parameter to Enable .	Disable	Disable, Enable
Intelligent detection module	N/A	Disable	Disable, Enable
BCB trips if UPS stops power supply	Indicates whether the BCB trips when the system stops supplying power and the output power is off.	Enable	Disable, Enable

Input Settings

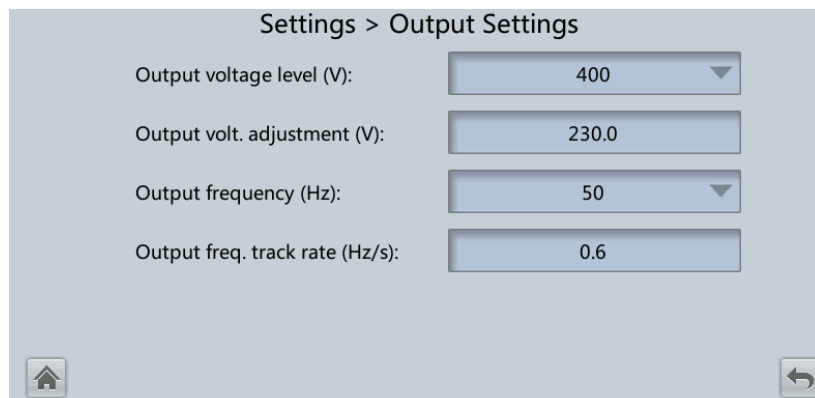
Figure 4-27 Input settings



Item	Description	Default Value	Value Range
D.G. mode	Set this parameter to Enable when a D.G. connects to the input PDC. The UPS enters the D.G. mode when a D.G. is detected over dry contacts.	Disable	Disable, Enable
D.G. power limiting (kVA)	Set these two parameters to control the valid input current and limiting input current, which prevents load impact and facilitates better cooperation between the UPS and the D.G.	800	0 to 5000
D.G. charger power ratio (%)		100	0-100
Input cur. limiting	Specifies whether to enable or disable input current limiting to protect generators.	Disable	Disable, Enable
Input cur. limiting ratio (%)	Limits the input current to protect the D.G.	200	50-200

Output Settings

Figure 4-28 Output settings

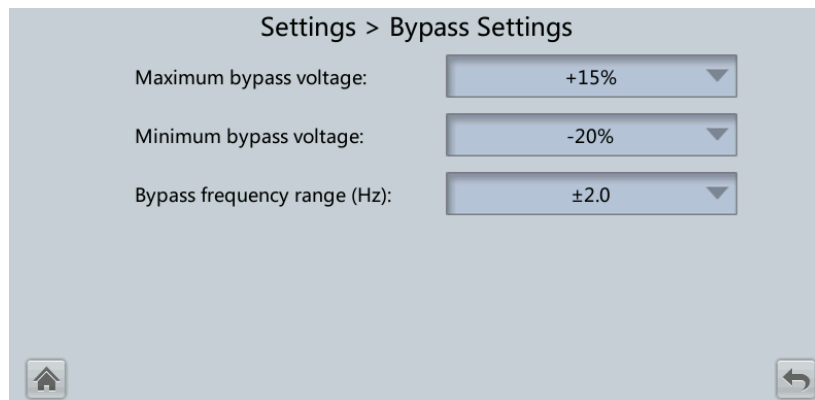


Item	Description	Default Value	Value Range
Output voltage level	Specifies the system output voltage level. This parameter is configurable only after the inverter shuts down. After you change the voltage level, the upper limit of the bypass voltage restores to the default value. (If the voltage level is 380 V or 400 V, the default upper limit is +15%. If the voltage level is 415 V, the default upper limit is +10%.)	400	380, 400, 415
Output volt. adjustment (V)	The output voltage can be slightly adjusted based on the onsite power distribution condition to ensure a minimum difference between the output voltage and the bypass voltage and facilitate uninterruptible power supply when the UPS transfers from normal mode to bypass mode.	The default value is 220.0, 230.0, and 240.0 when the voltage level is 380 V, 400 V, and 415 V respectively.	380 V: 209.0–231.0 400 V: 218.5–241.5 415 V: 228.0–252.0
Output frequency (Hz)	Specifies the system output frequency level.	50	50, 60

Item	Description	Default Value	Value Range
Output freq. track rate (Hz/s)	This parameter can be adjusted based on site requirements. If Output freq. track rate (Hz/s) is slow, the inverter frequency is different from the bypass frequency when the bypass frequency changes. If output is overloaded or the inverter is faulty, an interruption (less than 20 ms) occurs when the UPS transfers from normal mode to bypass mode. If Output freq. track rate (Hz/s) is fast, the inverter frequency is unstable.	0.6	0.1 to 2.0

Bypass Settings

Figure 4-29 Bypass settings



Item	Description	Default Value	Value Range
Maximum bypass voltage	When the difference between the bypass voltage and the rated voltage exceeds the upper threshold for the bypass voltage, the system determines that the bypass voltage is not normal and that the bypass is unavailable.	<ul style="list-style-type: none"> • When the voltage level is 380 V, the value range is +10%, +15%, +20%, and +25%. The default value is +15%. • When the voltage level is 400 V, the value range is +10%, +15%, and +20%. The default value is +15%. • When the voltage level is 415 V, the value range is +10% and +15%. The default value is +10%. 	
Minimum bypass voltage	When the difference between the bypass voltage and the rated voltage exceeds the upper threshold for the bypass voltage, the system determines that the bypass voltage is not normal and that the bypass is unavailable.	-20%	-10%, -15%, -20%, -30%, -40%, -50%
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, so the bypass is unavailable. The frequency range must be greater than the ECO frequency range.	±2.0	±0.5, ±1.0, ±2.0, ±3.0, ±4.0, ±5.0, ±6.0

Battery Settings

NOTICE

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

- **Battery string sharing** affects the actual charge current and the estimated discharge time. An incorrect setting will cause a high or low charge current, which may damage the batteries. An incorrect estimated discharge time may cause a data backup fault.
- When you set parameters, ensure the following: **Dis. cur. 0.1C EOD \geq Dis. cur. 0.3C EOD \geq Dis. cur. 0.5C EOD \geq Dis. cur. 1.0C EOD.**
- A cell consists of electrodes and electrolyte, which is the basic unit for the battery. Each cell has a nominal voltage of 2 V. A battery is a module consisting of single or multiple cells in a shell. Each battery has a nominal voltage of 2 V, 6 V, or 12 V.
- In a 1+1 parallel system, two 1.2MW UPS systems cannot share the same battery string.

Figure 4-30 Battery settings (lead-acid battery)

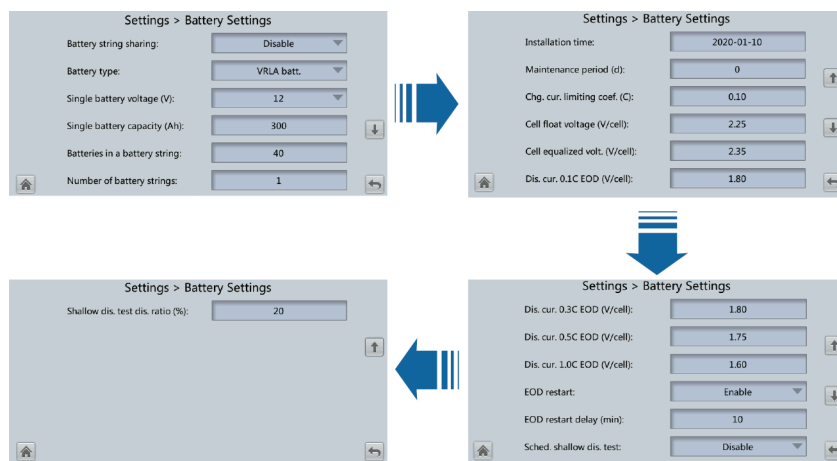
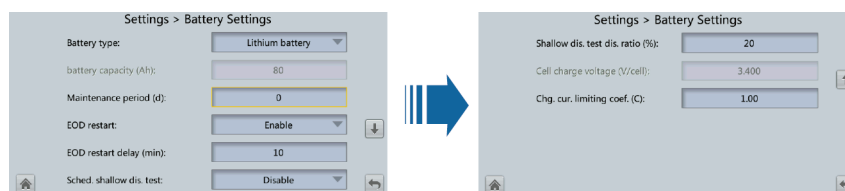


Figure 4-31 Battery settings (lithium battery)



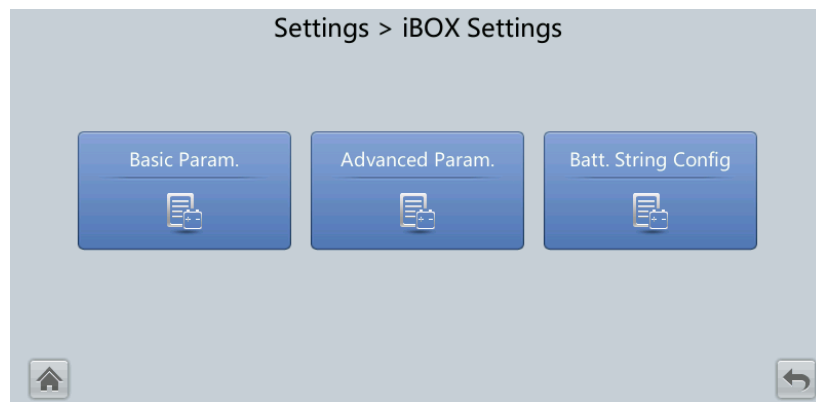
Item	Description	Default Value	Value Range
Battery string sharing (only for lead-acid batteries)	Two power units share battery strings.	Disable	Disable, Enable
Battery type	Type of batteries connected to the UPS.	VRLA batt.	VRLA batt., lithium batt.
Battery capacity (Ah)	Capacity of lithium batteries connected to the UPS (the value is automatically obtained).	-	-
Single battery voltage (V)	Specifies the voltage of each battery that is connected in the battery string in series.	12V	2, 6, 12
Single battery capacity (Ah)	Specifies the capacity of each battery that is connected in the battery string in series.	Depends on the actual model.	5-9999
Batteries in a battery string	Specifies the number of batteries in a battery string.	<ul style="list-style-type: none"> • 2 V battery: 240 • 6 V battery: 80 • 12 V battery: 40 	<ul style="list-style-type: none"> • 2 V battery: 180-300 • 6 V battery: 60-100 • 12 V battery: 30-50
Number of battery strings	Specifies the number of battery strings connected in parallel.	1	1-4
Installation time	A battery maintenance reminder is displayed when the maintenance time (counted from the installation time) comes.	-	-
Maintenance period (d)	Specifies the interval for reminding users of battery maintenance. If this parameter is set to 0 , there is no reminder.	0	0-365
Cell float voltage (V/cell)	Specifies the battery float charging voltage.	2.25	2.23 to 2.30
Cell equalized volt. (V/cell)	Specifies the battery equalized charging voltage.	2.35	2.30 to 2.40

Item	Description	Default Value	Value Range
Dis. cur. 0.1C EOD (V/cell)	Specifies the EOD threshold when the discharging current is 0.1C, 0.3C, 0.5C, and 1.0C respectively.	1.80	1.80–1.90
Dis. cur. 0.3C EOD (V/cell)		1.80	1.80–1.90
Dis. cur. 0.5C EOD (V/cell)		1.75	1.75–1.85
Dis. cur. 1.0C EOD (V/cell)		1.60	1.60–1.75
EOD restart	<p>If the mains is not functioning normally, the UPS will transfer to battery mode. When batteries reach the EOD threshold, the bypass is disabled, and EOD restart is Enable, the UPS will restart as soon as the mains resumes.</p> <p>If EOD restart is disabled, clear the alarm manually or enable the restart function for the UPS.</p>	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 the power failure upon EOD.	10	1–1440
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 the reference for battery capacity and lifespan.	Disable	Disable, Enable
Sched. shallow dis. test time	Time for 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 dis. test interval (d)	Interval for scheduled shallow discharge test.	60	30–90

Item	Description	Default Value	Value Range
Shallow dis. test dis. ratio (%)	Set 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)	Charge voltage of lithium batteries (the value is automatically obtained)	-	-
Chg. cur. limiting coef. (C)	Lithium battery: The charging current limit is a multiple of the battery capacity.	0.50	0.10 to 1.00
	Lead-acid battery: The charging current limit is a multiple of the battery capacity.	0.10	0.05 to 0.15

iBOX Settings

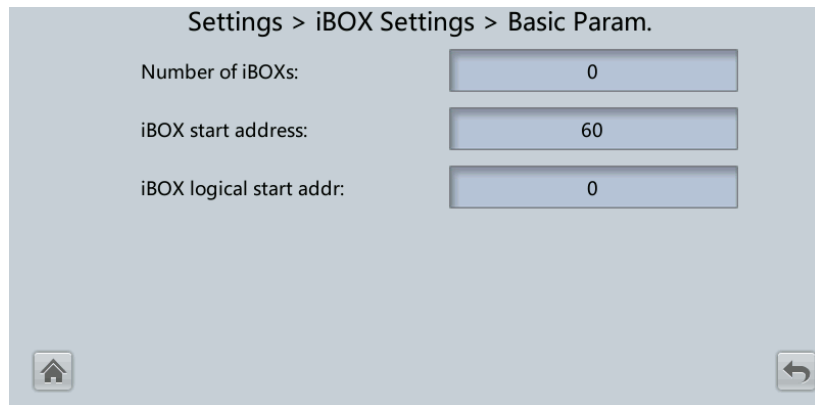
Figure 4-32 iBOX settings



NOTE

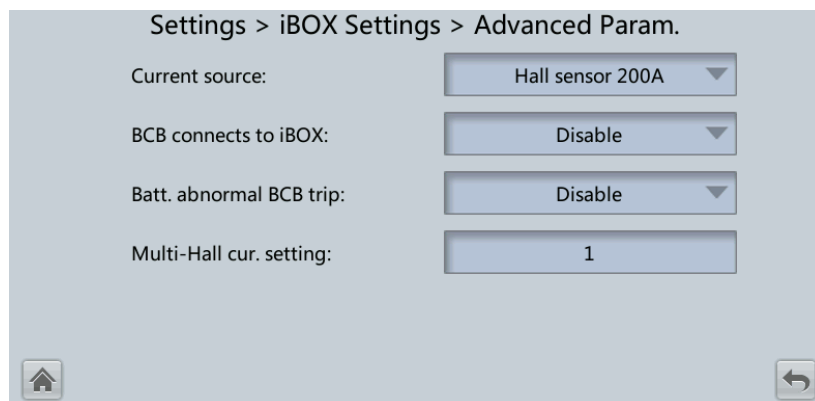
If the battery type is lead-acid battery and **Number of iBOXs** in **System Info > Settings > iBOX Settings > Basic Param.** is not 0, **Batt. String Config** is displayed on the **iBOX Settings** screen.

Figure 4-33 Basic parameters



Item	Description	Default Value	Value Range
Number of iBOXs	The number of iBOXs connected to this power unit.	0	0-4
iBOX start address	Communication address when the southbound device queries iBOX data.	60	-
iBAT number of iBOXN	The number of iBATs managed by the iBOX.	0	0-300
iBOX logical start addr	Communication address when the northbound device queries iBOX data.	0	0-124

Figure 4-34 Advanced parameters



Item	Description	Default Value	Value Range
Current source	Specifications of the Hall effect sensor used to detect iBOX current.	200 A	Hall sensor 200A, Hall sensor 600A, Hall sensor 1500A
BCB connects to iBOX	Whether the BCB is connected to the iBOX.	Disable	Disable, Enable
Batt. abnormal BCB trip	Whether the BCB trips when batteries are abnormal.	Disable	Disable, Enable
Multi-Hall cur. setting	Multi-Hall cur. setting is equal to the number of Hall effect sensors at the positive or negative terminal of a battery string (Multi-Hall cur. setting ≥ 1).	1	1-8

Figure 4-35 Battery string configuration



Set the iBOX and iBAT number for each battery string.

Dry Contact Settings

NOTICE

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

Specify dry contact settings on the following cards:

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

Item	Description	System	Power Unit
MUE05A connection	Specifies the MUE05A connection status. Independent input signals can be enabled only when this parameter is set to Enable .	In use	In use
Batter ground fault [BTG]	Enable or disable battery grounding fault detection.	-	In use
D.G. connection [GEN]	Enable or disable D.G. connection detection.	In use	-
BCB connection [OL]	Enable or disable BCB connection detection.	-	In use
Battery breaker [STA]	Enable or disable battery circuit breaker status detection.	-	In use
PDC output breaker [OUT]	Enable or disable PDC output circuit breaker status detection.	In use	-

Item	Description	System	Power Unit
PDC maintenance breaker [MT]	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. Using the port depends on the status of the BP/SYSMT switch.		
SPD/SYSOUT switch	If the SPD/SYSOUT switch is set to Enable , the port has dry contact signal access. How a user uses the port depends on the status of the SYSOUT switch.		
MUE06A connection	Specifies the MUE06A connection status. If this parameter is set to Enable , the mains and bypass backfeed protection is enabled.		
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, MUE07A DO_4 Action, MUE07A DO_5 Action	Controls the status of DO ports on the MUE07A extended dry contact card.		

Item	Description	System	Power Unit
MUE07A DI_1 valid, MUE07A DI_2 valid, MUE07A DI_3 valid, MUE07A DI_4 valid, MUE07A DI_5 valid	<p>If the DI port valid setting is closed, the corresponding DI port executes the specified action, for example, raises an alarm, when the DI port detects a short circuit.</p> <p>If the DI port valid setting is open, the corresponding DI port executes the specified action, for example, raises an alarm, when the DI port detects an open circuit.</p>		
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 4-36 User settings 1

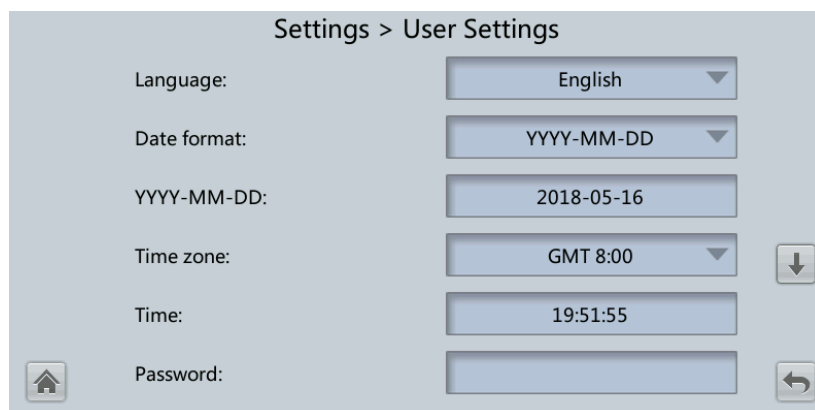
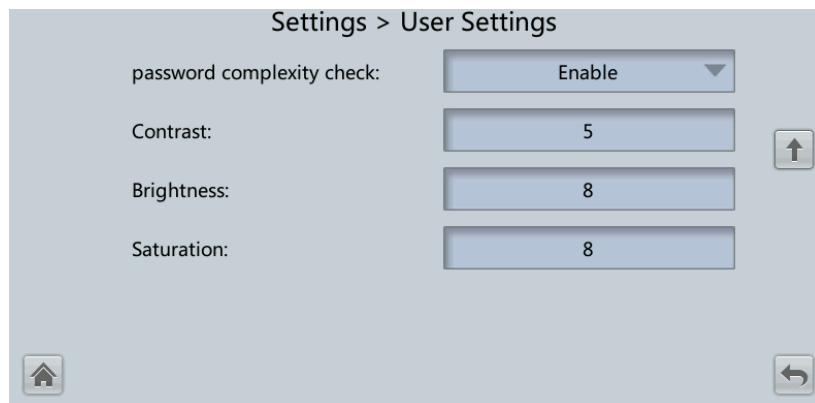


Figure 4-37 User settings 2



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	-	000001	-
password complexity check	If the password complexity check is disabled, the user password is required to be a string of six to eight digits. If the password complexity check is enabled, the password is required to be a string of 6–20 characters and contain at least two types of characters.	Enable	Disable, Enable

NOTE

Set the date and time as required.

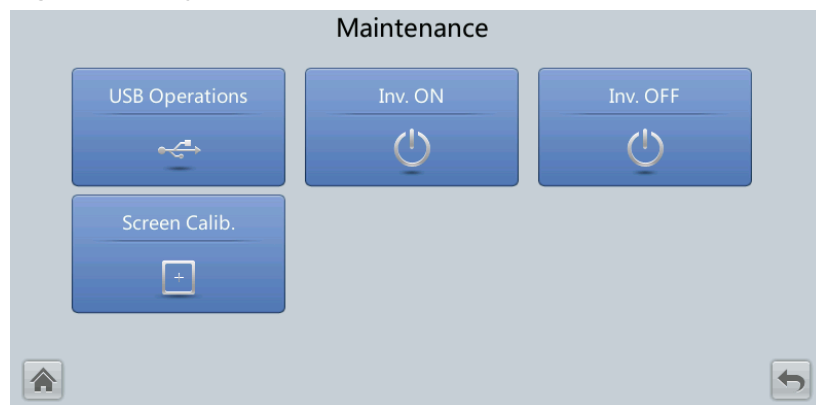
4.1.3.4 Maintenance

Table 4-16 Maintenance description

Maintenance Item	System	Power Unit	Bypass Unit
USB Operations	USB operations	-	-
Inv. ON	Starting the inverter of the single UPS	-	-
Inv. OFF	Shutting down the inverter of the single UPS	-	-
Screen Calib.	Calibrating the touchscreen	-	-
Battery Maint.	-	Battery maintenance of this power unit	-
ECM Switchover	-	Switchover of active and standby ECMs of this power unit	Switchover of active and standby ECMs of the bypass unit
iBOX Control (only for lead-acid batteries)	-	Controlling the iBOX of this power unit	-
Fan Life	-	Estimating the fan life of the power modules in this power unit	Estimating the fan life of the bypass
Bus Capa. Life	-	Estimating the bus capacitor life of this power unit	-

On the **System Info** screen, tap  to display the **Maintenance** screen.

Figure 4-38 System maintenance




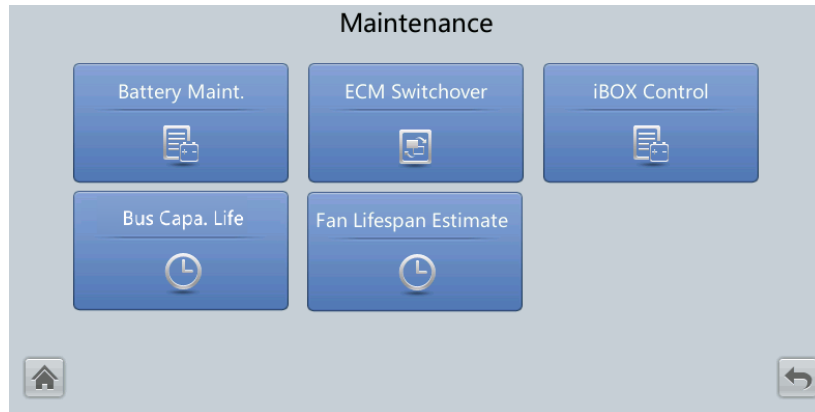
On the **System Info** screen, tap the power unit icon to access the **Power Cabinet N Info** screen, and tap  to display the **Maintenance** screen of the current power unit.

Figure 4-39 Power unit maintenance



 **NOTE**

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

USB Operations

Figure 4-40 USB operations



Starting or Shutting Down the Inverter

Item	Description
Inv. ON	The Inv. ON screen allows you to start the inverter manually.
Inv. OFF	The Inv. OFF screen allows you to shut down the inverter manually.

Battery Maintenance

NOTICE

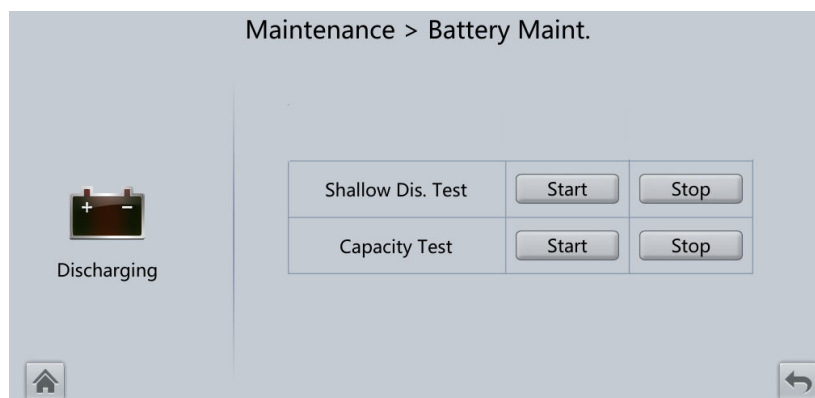
- Perform battery maintenance when no alarm is active on the UPS. Otherwise, the UPS may supply no power.
- A proportion of battery capacity will discharge during battery maintenance. This reduces the discharge time before the next charge.
- Do not perform battery maintenance when a D.G. is connected.

Perform battery maintenance periodically to increase the battery lifespan and improve the UPS reliability. Battery maintenance includes **Forced Equalized Charging**, **Shallow Dis. Test**, and **Capacity Test**. The next maintenance time displayed on the screen indicates the upcoming time in which to check batteries.

Figure 4-41 Battery maintenance (lead-acid battery)



Figure 4-42 Battery Maint. (lithium battery)



Item	Description
Forced Equalized Charging	Forcibly perform equalized charging on batteries.

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

ECM Switchover

NOTICE

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

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

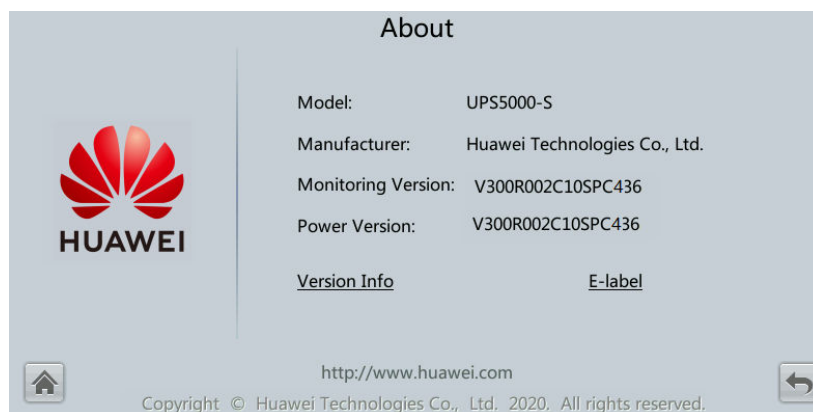
Bus capacitor life forecast

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

4.1.3.5 About

On the **About** screen, you can view the model, manufacturer, monitoring version, and power version.

Figure 4-43 About



4.1.4 System Status

On the **System Status** screen, you can view the data and information related to the mains input, bypass input, load, and battery by tapping corresponding icons.

Figure 4-44 System status

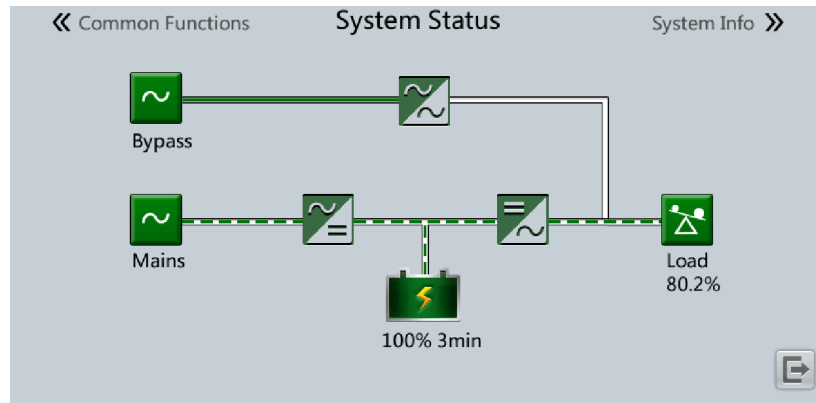


Figure 4-45 Power unit status

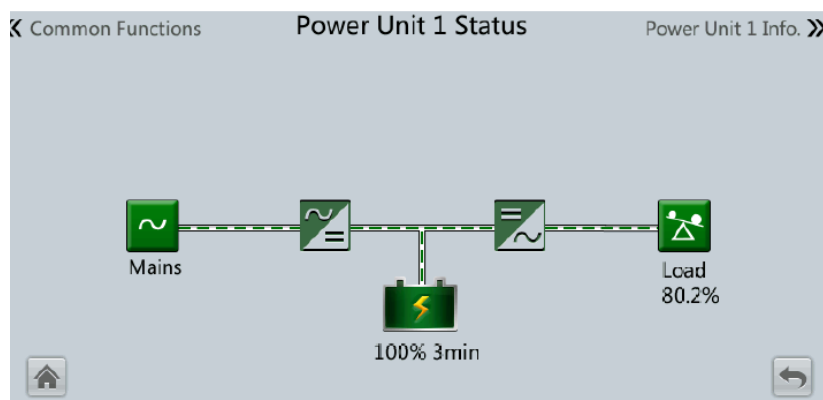
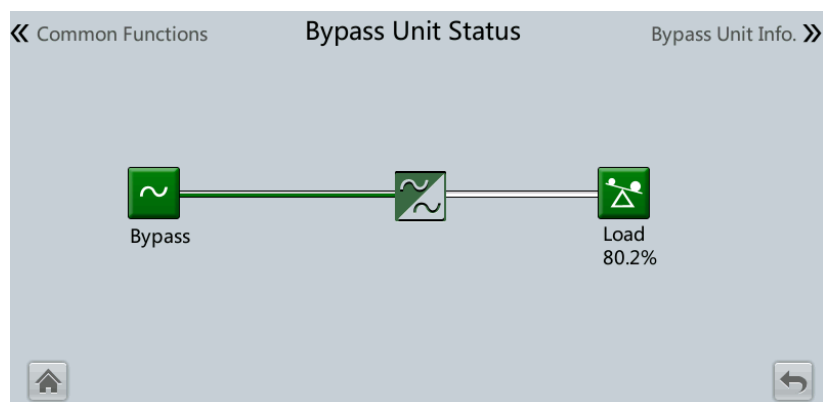


Figure 4-46 Bypass unit status



4.1.5 Common Functions

Table 4-17 Description of common functions

Common Function Item	System	Power Unit	Bypass Unit
AC Output	System AC output data	AC output data of this power unit	AC output data of the bypass unit
UPS Load	System load data	Load data of this power unit	System load data
Mains Input	System mains input data	Mains input data of this power unit	N/A
Inv. ON	Starting the inverter of the single UPS	N/A	N/A
Inv. OFF	Shutting down the inverter of the single UPS	N/A	N/A
Buzzer Off	Buzzer off	N/A	N/A
Historical Alarms	All historical alarms	Historical alarms of this power unit	Historical alarms of the bypass unit

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**.
- 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 4-18 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)	N/A	Only browses the system running information.

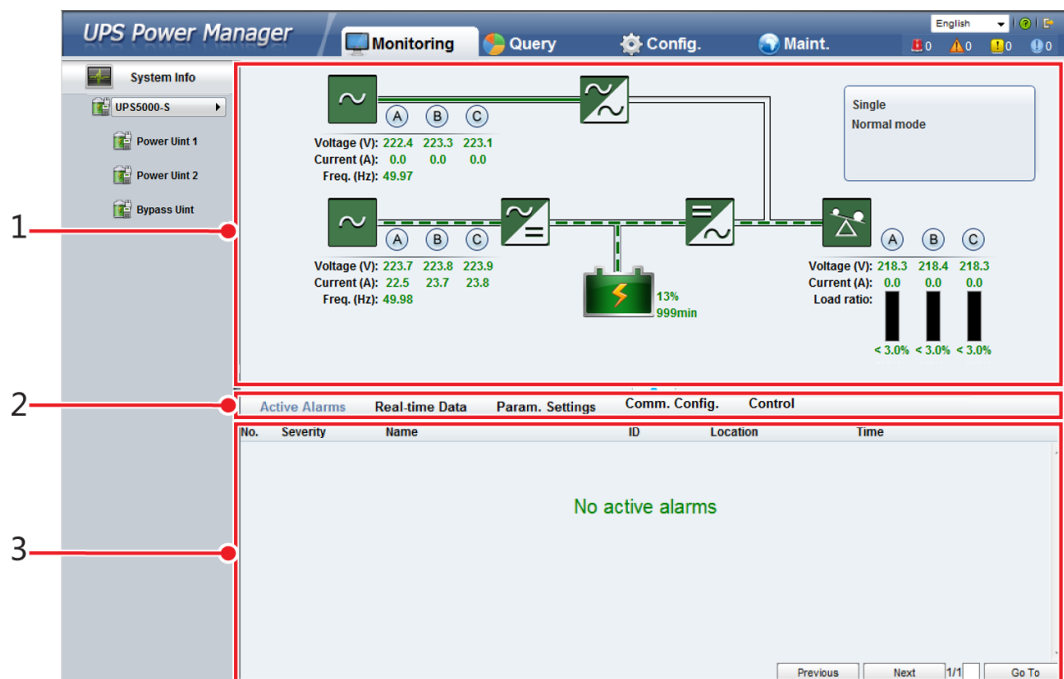
 **NOTE**

- 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 Monitoring Page

Figure 4-47 Monitoring page



NOTE

- If **NA** is displayed for load ratio, the value is invalid or outside the range.
- When the message "**Don't let this page create more messages**" is displayed on the browser, if you select this option, you cannot set parameters or click **Start Inverter**. In this case, you need to restart the browser.

Table 4-19 Monitoring details

Number	Area	Function
1	Running status area	Displays the power flow and UPS running information.
2	Menu bar	Displays alarms and real-time data, sets parameters, and provides control commands. The Active Alarms page is displayed by default.
3	Information area	Displays system monitoring information.

The parameters that have been introduced in the LCD section are not described in the WebUI section.

The information displayed in **Active Alarms** and **Real-time Data** is the same as that on the LCD, so the information is not described in the WebUI section.

4.2.2.1 Parameter Settings

Figure 4-48 System parameter settings

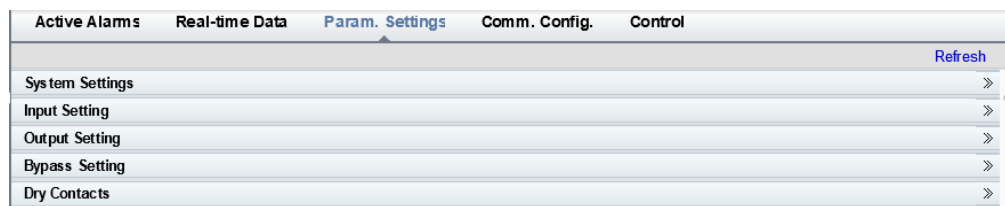


Figure 4-49 Power unit parameter settings



System Settings

Item	Description	Default Value	Value Range
Cabinet No.	Power unit number. After power-on, the system identifies the cabinet SW terminal and updates the number automatically. This parameter is configurable only for power units.	1	1-2
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	Indicates whether to enable emergency power-off (EPO). EPO is performed only when this parameter is enabled and the EPO switch is triggered. When EPO detection is changed from Disable to Enable , check that the EPO cable is connected correctly.	Disable	Disable, Enable
Bus Capa. Life	If this parameter is set to Enable , the UPS detects the bus capacitor lifespan.	Disable	Disable, Enable

Item	Description	Default Value	Value Range
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 the system efficiency.	Disable	Disable, Enable
Module cycle hiber. period (d)	Indicates the rotation interval of modules in hibernation mode. The default value is 30, which means that the hibernating module is rotated every 30 days.	30	1-100
D.G. ECO Bypass Supply	Indicates whether ECO bypass is allowed to supply power in D.G. mode. When the D.G. 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 bypass mode when the D.G. 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 D.G. supplies power to the bypass. 	Enable	Disable, Enable
RAM verification	Enable or disable 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

Item	Description	Default Value	Value Range
Record time after fault	Indicates the time for storing fault data after the UPS experiences a fault. The default value is 0 ms, which means that the data during 20 ms before the fault occurs is recorded. If the value is set to 40 ms, 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.	0 ms	0 ms, 20 ms, 40 ms, 60 ms, 80 ms
Collect real-time site waveform	If this parameter is set to Enable , one waveform can be stored manually.	Disable	Disable, Enable
Fan life	Indicates the life detection for fans in the power modules and bypass module.	Enable	Disable, Enable
Pre-warn. time for fan life (mon)	Indicates the time when a warning about fan life needs to be raised in advance before the fan life ends.	12	1-24
BCB trips in case of EOD	If this parameter is set to Enable , the BCB will trip in case of EOD.	Enable	Disable, Enable

Input Settings

Item	Description	Default Value	Value Range
Input adaptability	The value of Input adaptability can be Strong or Weak . Strong input adaptability applies to the D.G. or input sources whose input current has high frequency oscillation. In this mode, the total distortion of the input current waveform (THDi) is poor, but the system is stable. Weak input adaptability is suitable for mains and AC input sources.	Mode 2	Mode 1, Mode 2

Output Settings

Item	Description	Default Value	Value Range
Zero display with no load output	If this parameter is set to Enable , the output current and output load ratio are displayed as < 3% in the case of no load. If this parameter is set to Disable , the output current and output load ratio are not displayed as 0 in the case of no load.	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 ms, 40 ms, 60 ms, 80 ms, 100 ms, 120 ms
Max. BPM transfer times	Cross currents occur during the transfer between bypass mode and inverter mode, which impacts the system. This parameter specifies the number of transfers between bypass mode and inverter mode within 1 hour, which ensures system security.	5	1-10
Current equal. detection	Monitors the current differences between racks or modules. If this parameter is set to Enable , the Mod. Cur. Eql. Data can be viewed on the maintenance page.	Disable	Disable, Enable
Inverter async. alarm	Specifies whether an Inverter asynchronous alarm can be displayed on the LCD when the inverter cannot track the bypass frequency change. Normal power supply is not affected no matter whether this parameter is set to Enable or Disable .	Disable	Disable, Enable

Item	Description	Default Value	Value Range
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 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.	Enable	Disable, Enable
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 Capacitor failure detection is set to Enable , the power module (power unit) performs inverter capacitor fault detection based on the settings of Capacitor failure detection upper limit and Capacitor failure detection lower limit . If the power module determines that the inverter capacitor is faulty, it shuts down the inverter to prevent the fault from expanding.	Enable	Disable, Enable

Item	Description	Default Value	Value Range
Capacitor failure detection upper limit (A)	-	13.0	10.0-13.0
Capacitor failure detection lower limit (A)	-	2.5	0.0-2.5

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
BPM cur. eql. Function	When paralleling, whether the active current sharing is allowed for bypass.	Enable	Disable, Enable
Bypass current eql. threshold	When BPM cur. eql. function is set to Enable and the maximum bypass load rate in the parallel system exceeds this threshold, the bypass current equalization function is enabled.	40%	40%, 50%, 60%, 70%, 80%
Lightload BPM cur. eql. Detect	Enable or disable the light load bypass current imbalance alarm. If this parameter is set to Enable , the load is light (less than 30% load), and the load rate of a certain rack is less than 10%, the system will generate a bypass current imbalance alarm and cannot enter the ECO mode. If this parameter is set to Enable , the preceding detection is not performed. Whether the bypass current is imbalanced does not affect the ECO bypass mode.	Enable	Disable, Enable

Battery Settings

NOTICE

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

- Retain default settings for **Chg. cur. limiting coef.** and **Cell float voltage**. Only professional maintenance personnel are allowed to change the settings.
- When you set parameters, ensure the following: **Chg. cur. limiting coef.** > **Transfer-to-equalized charging cur. 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 $(\text{Charge/Discharge voltage} - \text{Average voltage}) / \text{Average voltage} \times 100\%$. The charge/discharge voltage and average voltage are obtained from the BMU. If the BMU is not 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 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)	Calibration coefficient during float voltage temperature compensation.	3.3	0.0–6.0
Float Chg Temp Comp Center (°C)	Indicates the reference temperature during temperature compensation of the float charging voltage.	25	20–30
Automatic equalized charging	If this parameter is set to Enable , the UPS automatically changes the battery management status to equalized charge based on the charge current and float charge time.	Enable	Disable, Enable
Transfer-to-equalized charging cur. coef. (C10)	The battery enters equalized charge state when the battery current exceeds this parameter value.	0.05	0.02–0.08

Item	Description	Default Value	Value Range
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 reaches Equalized charging protection interval . After equalized charging is complete, scheduled equalized charging starts 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 continuously under float charging or hibernation, enable forced equalized charging. When the forced equalized charging time reaches the value of this parameter, 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 powers off. If the time is set to 0 hours, battery discharge protection is not implemented.	24	0-48
Undertemp. alarm thresh. (°C)	Battery temperatures can be monitored in a timely manner. If a low or high battery temperature alarm is detected, the charging current limit decreases to 0.03 CA. Battery charging stops if a battery overtemperature protection alarm (when the temperature reaches the high temperature threshold plus 3°C) is generated.	-5	-20 to +5
Overtemp. alarm thresh. (°C)		50	35 to 55

Item	Description	Default Value	Value Range
Single batt. float chg. voltage deviation alarm thres. (%)	<p>Single batt. float chg. voltage deviation alarm thres. (%) and Single batt. dis. voltage deviation alarm thres. (%) are used to check whether the cells in each battery string have the same charge voltage and discharge voltage. When a value exceeds the specified range, an alarm is generated.</p> <p>The calculation formula is (Charge/Discharge voltage – Average voltage)/Average voltage x 100%.</p>	10	5–30
Single batt. dis. voltage deviation alarm thres. (%)		20	10–30
Batt. charging capacity mismatch	After this function is enabled, an alarm is generated if the configured battery capacity exceeds the charging capacity of the rack.	Enable	Disable, Enable
Bat mode shut	The UPS can automatically power off according to the preset shutdown delay time only in battery mode. If the parameter is disabled, this function is not available.	Disable	Disable, Enable
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
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
Intelligent hibernation	If this parameter is set to Enable , the intelligent battery hibernation function is enabled.	Disable	Disable, Enable
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 will output signals.	75	5–80

Item	Description	Default Value	Value Range
Thres. of low batt. volt. over dry contact (V/cell)	Lead-acid battery: If an output dry contact is set to Batt. Volt. Below Threshold , and the battery voltage is lower than this threshold, the output dry contact will output signals.	1.70	1.70–2.10
	Lithium battery: If Batt. Volt. Below Threshold is set for an output dry contact and the minimum electrochemical voltage is lower than the threshold, the output dry contact will output signals.	2.80	2.60–3.20

4.2.2.2 Communication Settings

Figure 4-50 System communication settings

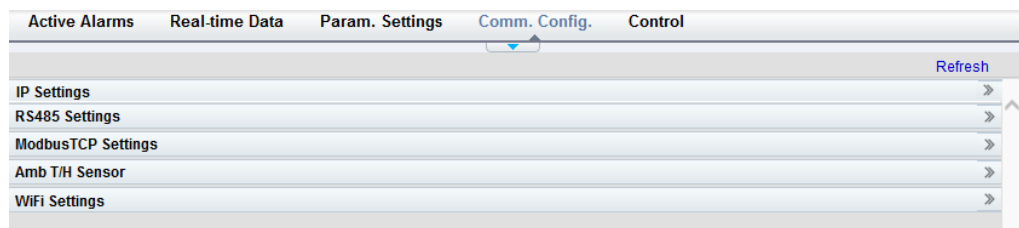


Figure 4-51 Power unit communication settings (lead-acid battery)

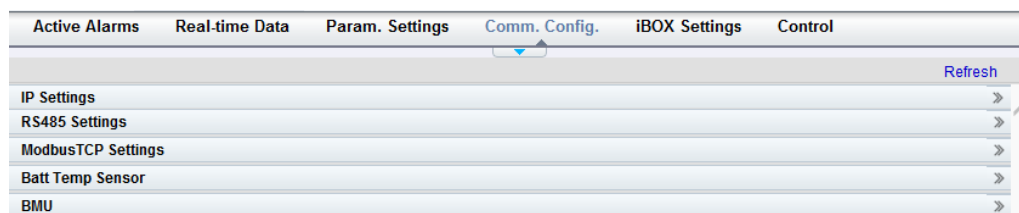
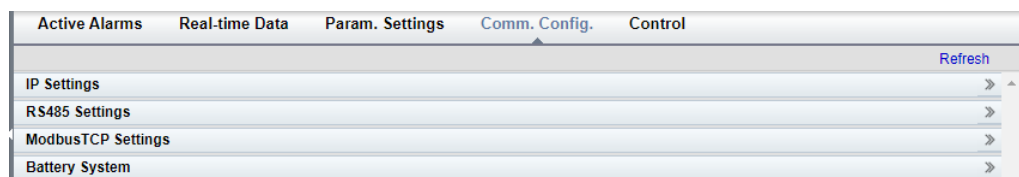
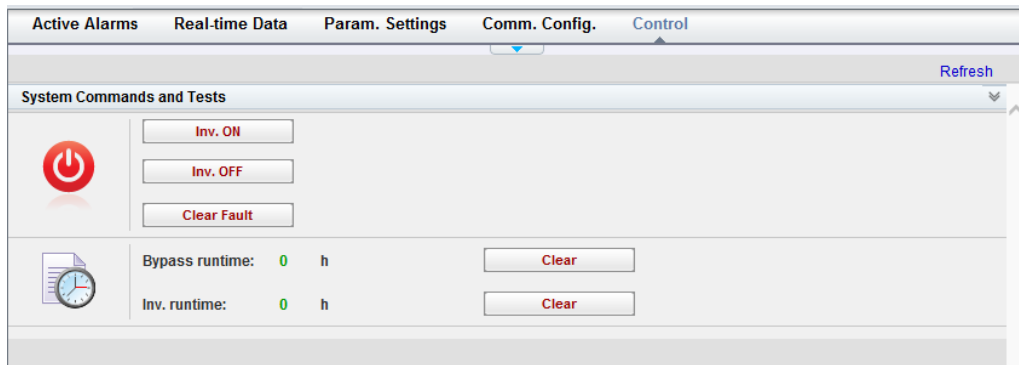


Figure 4-52 Power unit communication settings (lithium battery)



4.2.2.3 Control

Figure 4-53 System control



You can start or shut down the inverter of this power unit.

Figure 4-54 Power unit control (lead-acid battery)

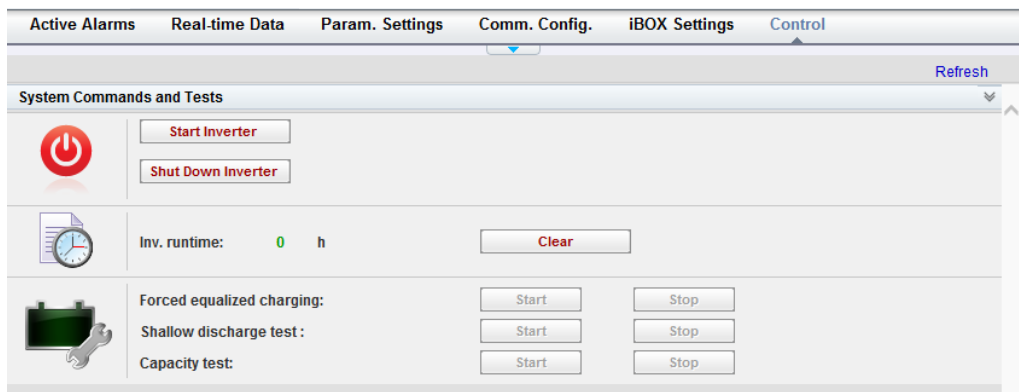
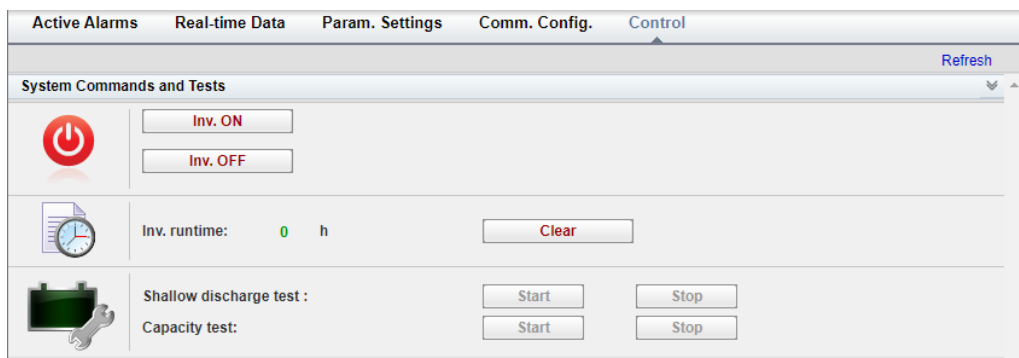


Figure 4-55 Power unit control (lithium battery)



4.2.3 Query

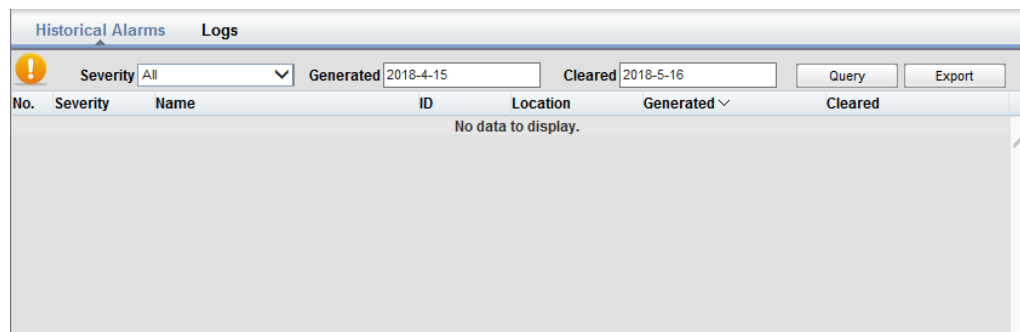
4.2.3.1 Historical Alarms

Table 4-20 Query description

Cabinet	Historical Records
System	Query all historical alarms.
Power unit	Query historical alarms of the current power unit.
Bypass unit	Query historical alarms of the bypass unit.

The following figure uses system query as an example.

Figure 4-56 Historical alarms

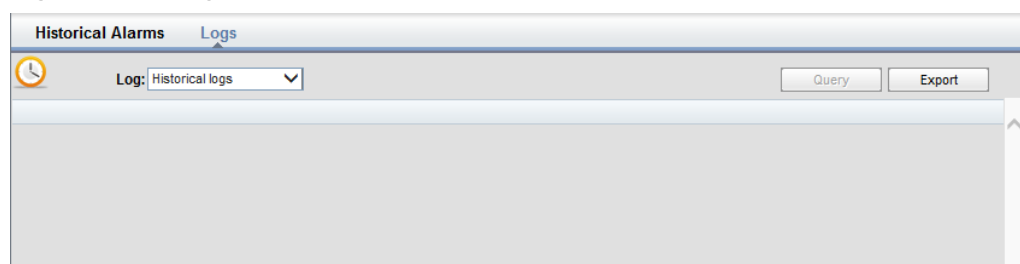


4.2.3.2 Logs

Table 4-21 Query description

Cabinet	Log Record
System	Export historical logs of all units (excluding battery test logs).
Power unit	Query and export the battery test logs of the current power unit.
Bypass unit	-

Figure 4-57 Logs

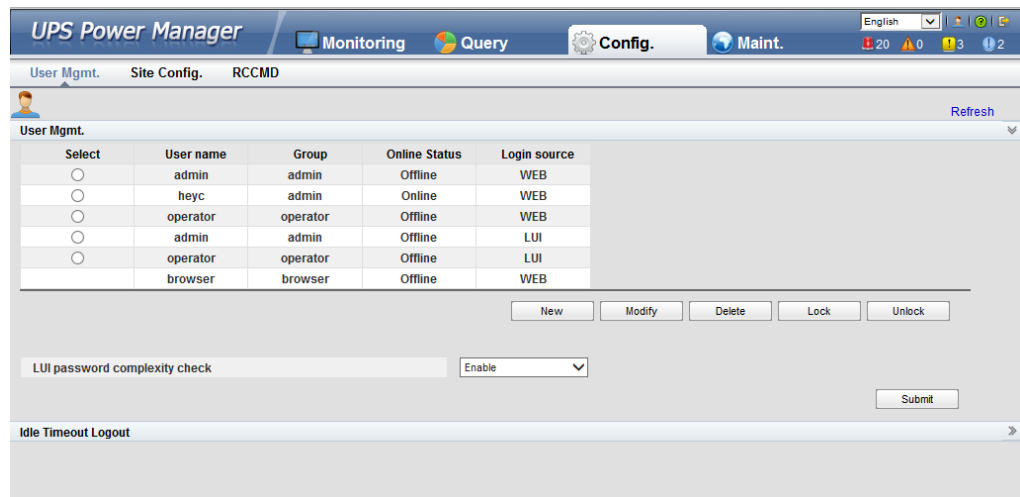


4.2.4 Config.

4.2.4.1 User Management

On the home page, choose **Config.** > **User Mgmt.**

Figure 4-58 User management

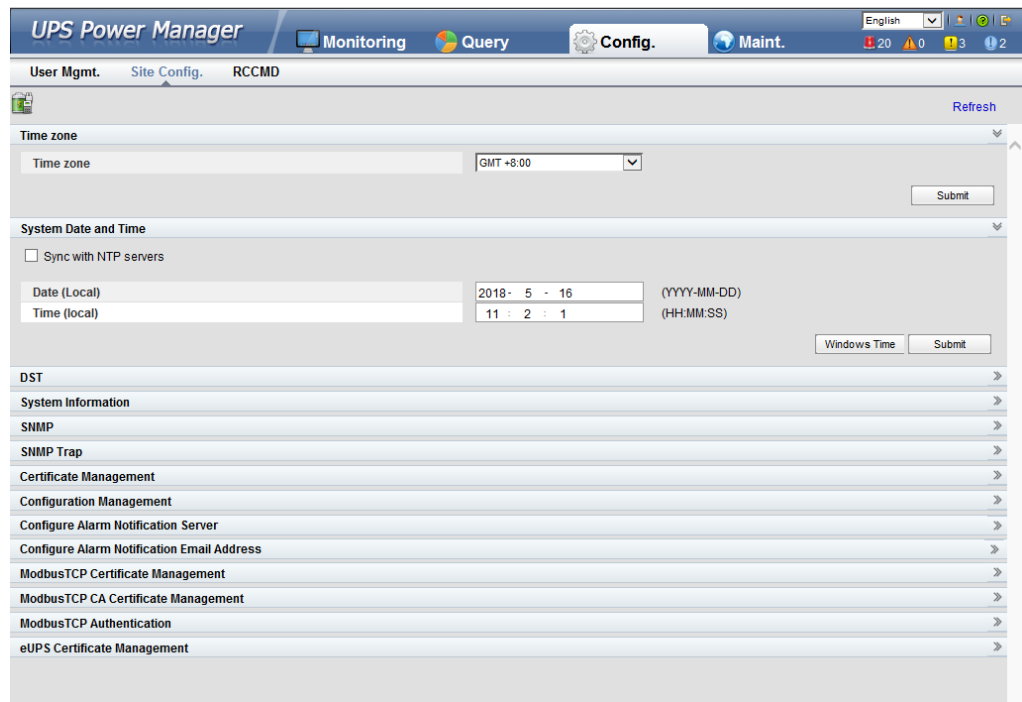


NOTE

- On the **User Mgmt.** page, you can add, modify, delete, lock, or unlock users and change user passwords.
- The WebUI user name cannot exceed 10 characters and can contain only uppercase and lowercase letters, digits, and underscores. The password contains 6 to 20 characters and at least two types of uppercase letters, lowercase letters, digits, and underscores.
- If the LUI password complexity check is disabled, the user password is required to be a string of six to eight digits. If the password complexity check is enabled, the user password is required to be a string of 6–20 characters and contain at least two types of characters.

4.2.4.2 Site Config.

Figure 4-59 Site configuration



 NOTE

- The NTP parameters are used to set the NTP server address, port number, and synchronization interval.
- 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.
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 **Config. > Site Config. > SNMP > Download HUAWEI_UPS_MIB**.
- **SNMP Trap** indicates the IP address of the server configured with network management system (NMS) software. If **SNMP Trap** is incorrectly set or not set, system information will be lost or not reported in time.
- The certificate is used for Secure Sockets Layer (SSL) encryption protection for WebUI login. You need to apply to a third-party institution for the certificate.
- **Configuration Management** is used to upload and export configuration parameters in the monitoring system.
- **Multi-brand Management** is used to import the brand information of a partner to the corresponding WebUI.
- Specify **Email server IP address**, **Sender's email**, and **User account authentication required** when sending a mail and click **Test** to check whether the test email can be received. **Configure Alarm Notification Server** is used to configure a server for receiving alarm emails from the monitoring system.
- Set **Email** and **Alarm Severity** and simulate an alarm. Check that the alarm email can be received. **Configure Alarm Notification Email Address** is used to configure the email address for receiving alarm emails from the monitoring system.
- **ModbusTCP Certificate Management**: ModbusTCP supports the Transport Layer Security (TLS) secure protocol for encrypted transmission and implements access authentication through the bidirectional certificate. Customers can replace the UPS certificate with the certificate trusted by them.
- **ModbusTCP CA Certificate Management**: Import a CA certificate to verify the validity of the ModbusTCP access certificate.
- **ModbusTCP Authentication**: Verify the identity legitimacy of both parties to ensure data security for both parties in ModbusTCP communication.
- After eUPS certificate management is configured, a certificate can be imported on the WebUI to replace the preset eUPS certificate.

4.2.4.3 RCCMD

RCCMD

RCCMD function is set to **Disable** by default, as shown in [Figure 4-60](#). If required, set it to **Enable** upon first login. After you submit the setting, the page refreshes. The controls such as **SSL Encrypted Transmission** and **Event Configuration** will be displayed on the page, as shown in [Figure 4-61](#).

Figure 4-60 RCCMD function disabled

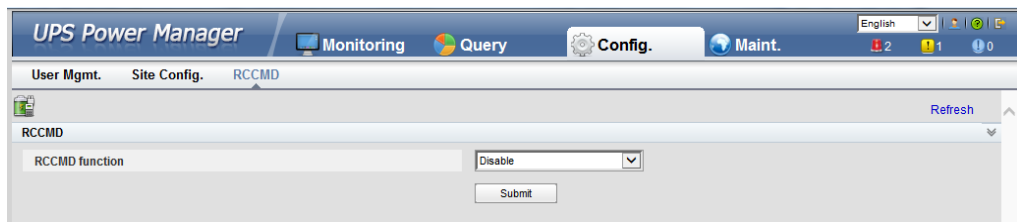
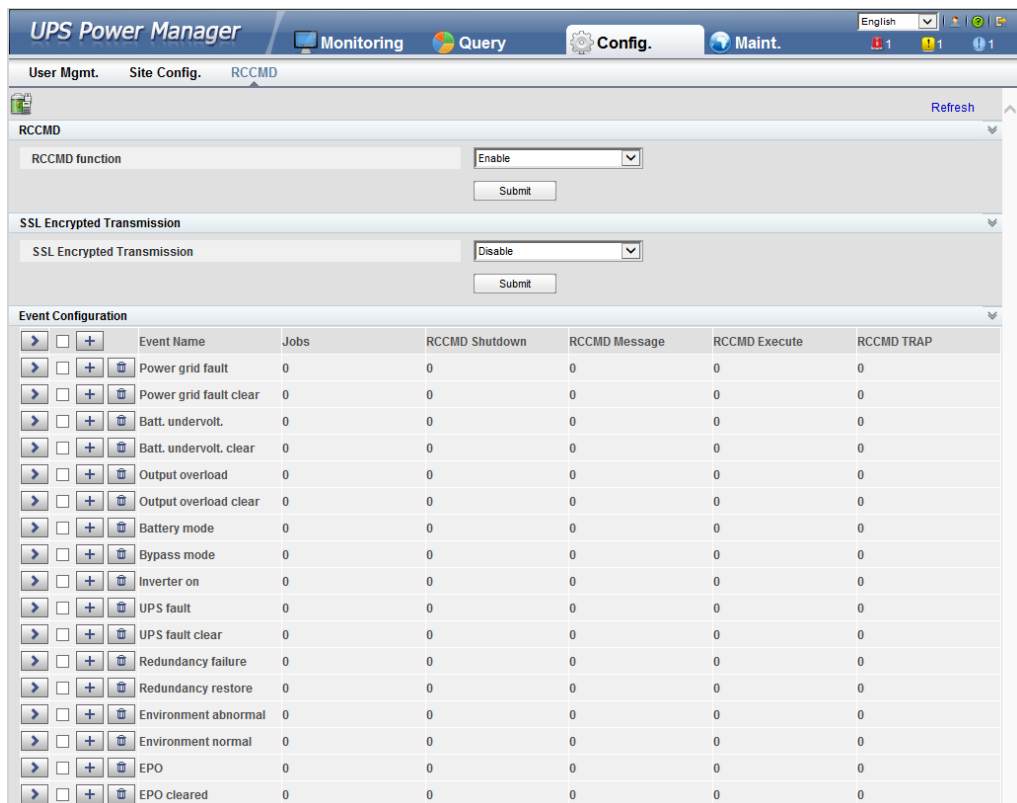


Figure 4-61 RCCMD function enabled



SSL Encrypted Transmission

NOTICE

The SSL encrypted transmission set on the page of the UPS5000 monitor display module (MDU) must be the same as the setting on the RCCMD client.

SSL Encrypted Transmission is set to **Enable** by default, as shown in [Figure 4-62](#). If it is set to **Disable**, the RCCMD certificate controls will not be displayed on the page, as shown in [Figure 4-63](#). If **SSL Encrypted Transmission** is set to **Disable**, a message indicating there is a risk will be displayed.

Figure 4-62 SSL encrypted transmission enabled by default

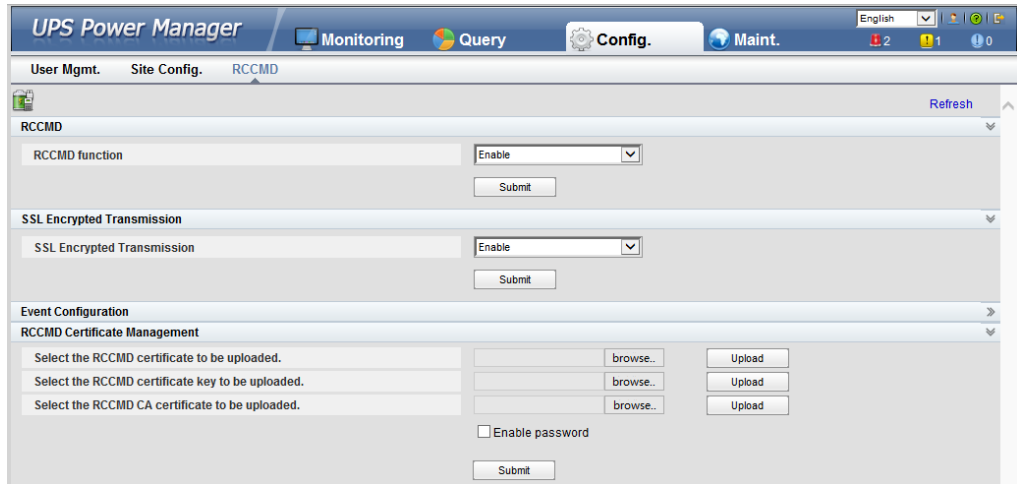
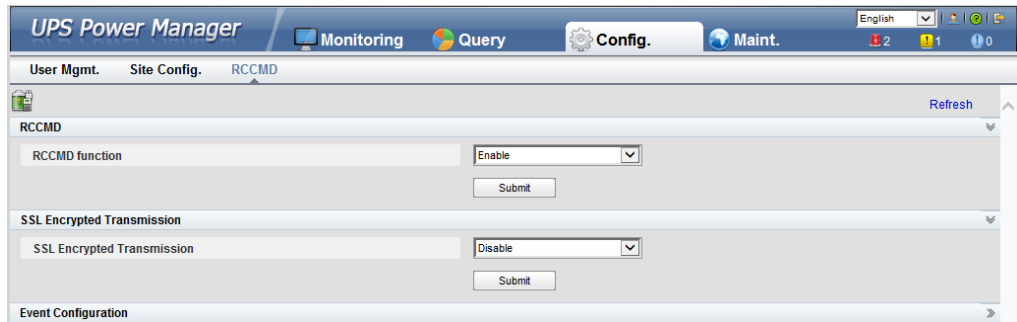


Figure 4-63 SSL encrypted transmission disabled



Event Configuration

The MDU supports 17 alarm events, and a maximum of 50 jobs can be added for each event, as shown in [Figure 4-64](#). [Figure 4-64](#) shows the buttons on the **Event Configuration** page, and [Table 4-22](#) describes these buttons.

Figure 4-64 Event configuration page

		Event Configuration					
		Event Name	Jobs	RCCMD Shutdown	RCCMD Message	RCCMD Execute	RCCMD TRAP
1	→	+	+	+	+	+	+
2	→	+	+	+	+	+	+
3	→	+	+	+	+	+	+
	→	+	+	+	+	+	+
	→	+	+	+	+	+	+
	→	+	+	+	+	+	+
	→	+	+	+	+	+	+
	→	+	+	+	+	+	+
	→	+	+	+	+	+	+
	→	+	+	+	+	+	+
	→	+	+	+	+	+	+
	→	+	+	+	+	+	+
	→	+	+	+	+	+	+
	→	+	+	+	+	+	+
	→	+	+	+	+	+	+
	→	+	+	+	+	+	+
	→	+	+	+	+	+	+
	→	+	+	+	+	+	+

 NOTE

Number of jobs = Number of **RCCMD Shutdown** jobs + Number of **RCCMD Message** jobs + Number of **RCCMD Execute** jobs + Number of **RCCMD TRAP** jobs.

Table 4-22 Buttons on the event configuration page

No.	Name	Description
1	Button for expanding all	You can view all jobs of all events by clicking this button.
2	Button for expanding one event	You can view all jobs of the event by clicking this button.
3	Button for adding one job	You can add one job for the event by clicking this button.
4	Button for adding one job for events	Select multiple events, and you can add one job for the selected events at the same time by clicking this button.
5	Button for deleting all jobs	You can delete all jobs of the event by clicking this button.

Figure 4-65 shows the buttons after one event is expanded and **Table 4-23** describes these buttons.

Figure 4-65 Buttons after one event is expanded

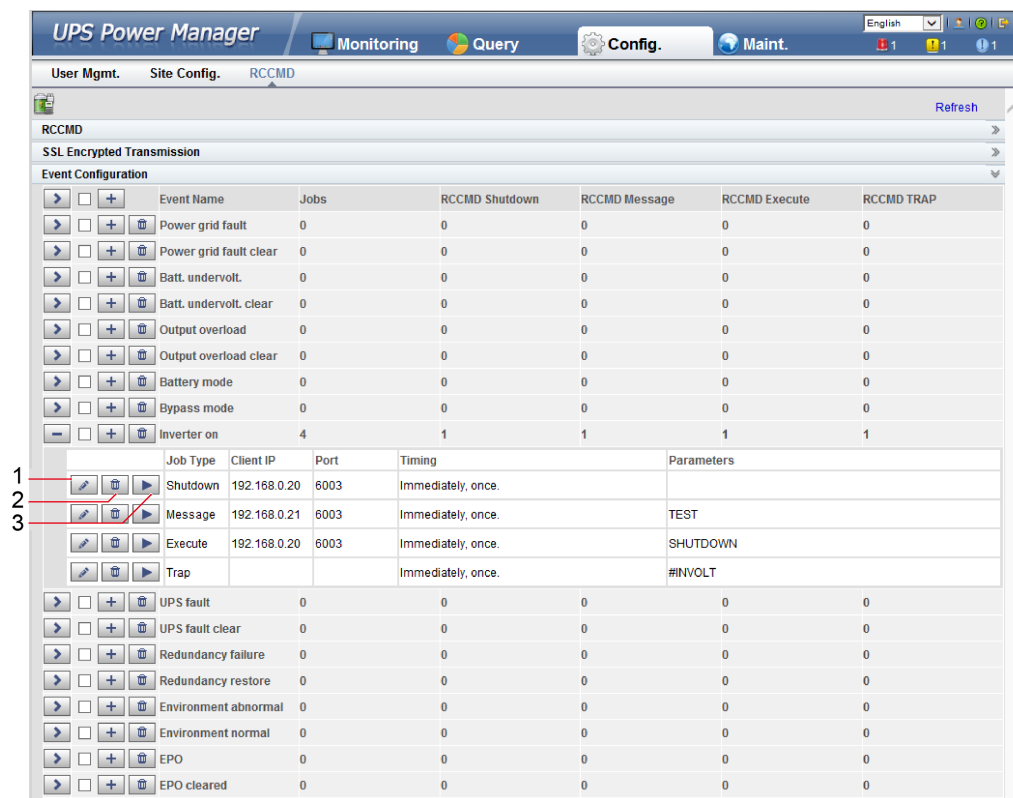


Table 4-23 Buttons after one event is expanded

No.	Name	Description
1	Button for modifying	A dialog box for modifying a job is displayed after you click this button. You can modify the job.
2	Button for deleting one job	You can delete the job by clicking this button.
3	Button for test	If you click this button, the job will be performed and a message showing test succeeds or fails will be displayed on the page.

Adding one job for one event: Select one event (for example, **Inverter on**), click the button for adding one job, and the page for adding a job for the event is displayed.

When adding a job, the job types to be selected are: **RCCMD Shutdown**, **RCCMD Message**, **RCCMD Execute**, and **RCCMD TRAP**. **RCCMD Shutdown** is selected by default. For different job types, you need to enter different contents.

- **RCCMD Shutdown:** You need to specify the RCCMD client IP address and port. When the RCCMD client receives the job, it will shut down the computer.

Figure 4-66 RCCMD shutdown

- **RCCMD Message:** Specify the RCCMD client IP address, port, and message to be conveyed. The RCCMD client will receive the message. For example, enter "This is a test message".

Figure 4-67 RCCMD message

- **RCCMD Execute:** Specify the RCCMD client IP address, port, and command to be executed. For example, enter **SHUTDOWN**, and the RCCMD client will shut down the computer after receiving the command.

Figure 4-68 RCCMD execute

- **RCCMD TRAP:** When the event happens, the MDU will send the TRAP message to all connected RCCMD clients based on the sending mechanism. If you want to define the TRAP message by yourself, you can use the TRAP signal to display the UPS information. For example, if you enter **#INVOLT V**, the RCCMD client will receive the UPS input voltage value (for example, single-phase: 220 V; three-phase A: 220 V, B: 220 V, C: 220 V). [Table 4-24](#) lists the signal names that can be entered.

Figure 4-69 RCCMD TRAP

Table 4-24 RCCMD TRAP signal

Signal Name	Description	Unit in the UPS
#MODEL	Device name	N/A
#OUTPOWER	Active power	kW
#OUTVOLT	Output voltage	V
#OUTCURR	Output current	A
#OUTLOAD	Output load rate	%
#BATTCAP	Remaining battery capacity	%
#INVOLT	Input voltage	V
#BYPASSINVOLT	Bypass input voltage	V
#TEMPDEG	Temperature inside the UPS	Celsius
#AUTONOMTIME	Battery backup time	minutes
#STATUS	UPS status	N/A
#RUNTIME	UPS operating time	minutes
#BATTVOLT	Battery voltage	V
#INFREQ	Input frequency	Hz
#BYPASSINFREQ	Bypass input frequency	Hz
#OUTFREQ	Output frequency	Hz

Signal Name	Description	Unit in the UPS
#CNT_PF	Power supply failure times	N/A
#CNT_BL	Low battery voltage times	N/A
#INPHASES	Input phases	N/A
#OUTPHASES	Output phases	N/A

When you add a job, five sending methods are available. The latter three methods can take effect only when the event condition is still true after the specified seconds.

- **Immediately, once:** After the event happens, the job will be sent to the RCCMD client immediately.
- **Scheduled in X seconds:** After the event happens, the job will be sent to the RCCMD client once in X seconds. No matter whether the event disappears or not within X seconds, the job will be sent.
- **After X seconds, repeat all Y Specify the interval:** After the event happens, the job will be sent once in X seconds, and then be sent once every Y seconds.
- **After X seconds on Battery:** After the battery mode is activated for X seconds, the job will be sent to the RCCMD client once.
- **At X seconds remaining time:** When the battery backup time has only X seconds left, the job will be sent to the RCCMD client once.

 **NOTE**

X and Y are variables and stand for time.

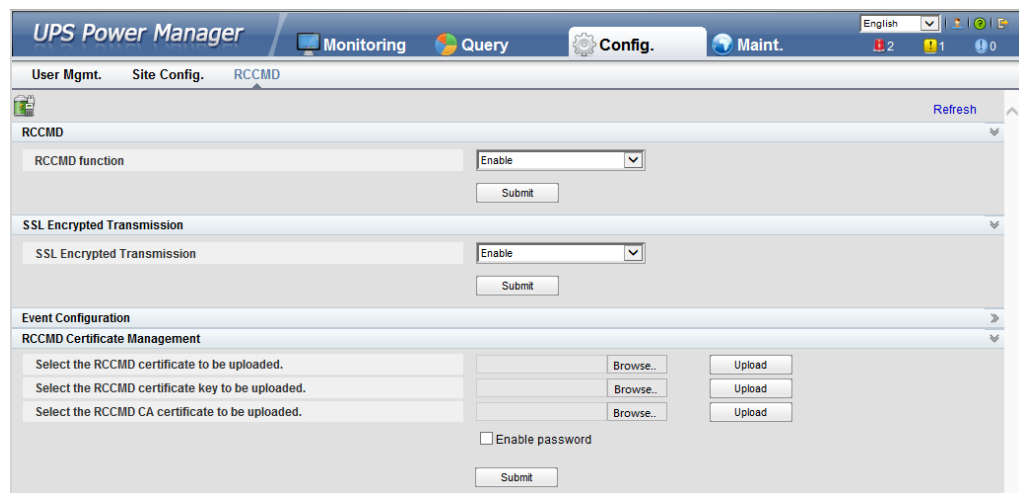
RCCMD Certificate Management

NOTICE

- After replacing the certificate on the MDU WebUI, replace the certificate on the RCCMD client too. Otherwise, communication will fail. For details about the replacing method, see the RCCMD user manual.
- The default certificate provided by the system has expired. Replace the certificate immediately.

After **SSL Encrypted Transmission** is set to **Enable**, **RCCMD Certificate Management** is displayed. The RCCMD certificate, RCCMD certificate key, and RCCMD CA certificate can be uploaded, as shown in [Figure 4-70](#). If the RCCMD certificate or RCCMD CA certificate is not uploaded, the default certificate provided by the system is used for communication. After the certificate is uploaded successfully, click **Submit**. The WebUI of the MDU will restart, and the uploaded certificate will be used for communication.

Figure 4-70 RCCMD certificate management



NOTE

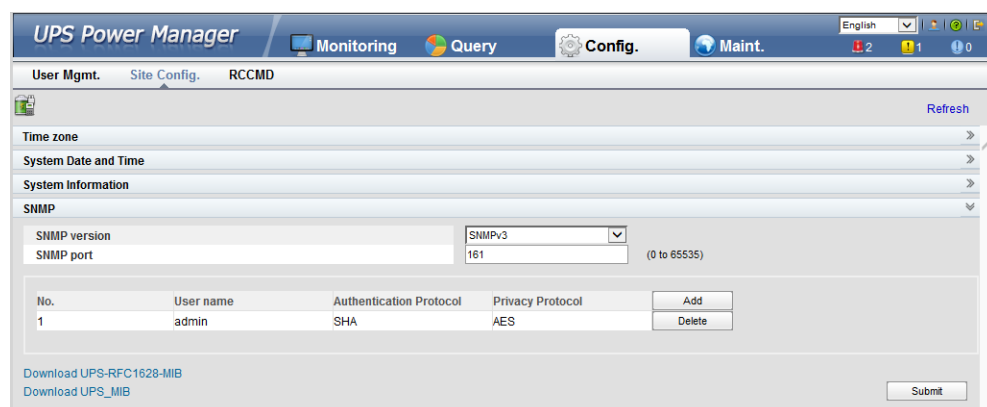
If the RCCMD certificate key has been encrypted, enable and enter the key password.

4.2.4.4 Managing the UPS by Using the NMS Complying with RFC1628 Standard

Installing the UPS MIB

The MIB is in the MDU. Click **Download UPS-RFC1628-MIB** on the page of the web browser to download the MIB file which allows the third-party NMS to manage the UPS remotely.

Figure 4-71 Download the MIB



NOTE

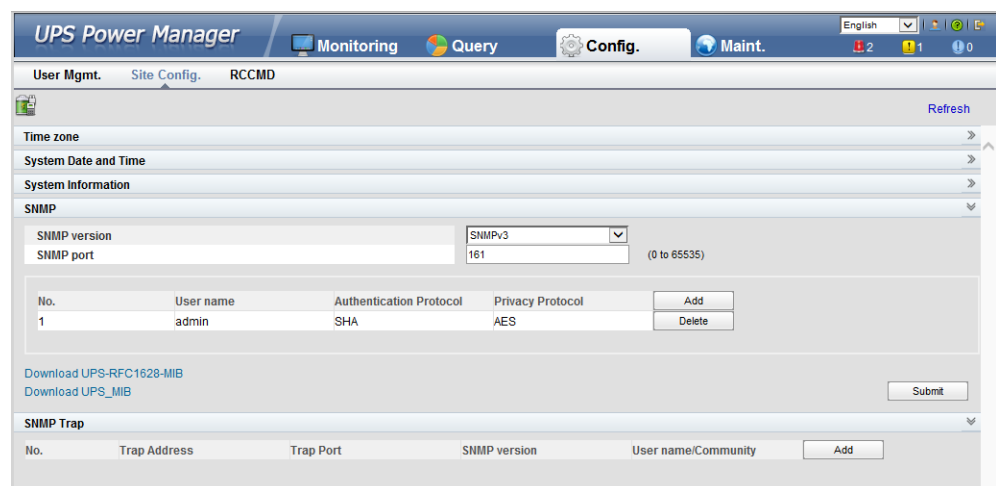
The UPS-RFC1628-MIB has more alarms than RFC1628. Download the UPS-RFC1628-MIB before using.

Managing the UPS by Using the NMS

- Applying for Access Rights

To manage the UPS by using the UNMS II of Generex over the MDU, apply to the system administrator of the MDU for access rights and add the NMS information to the NMS access list of the MDU. The NMS address and access right settings are used for adding information about the NMS accessing the MDU, including the NMS address, access right, and Trap port. For details about how to add an NMS over a web browser, see [Figure 4-72](#).

Figure 4-72 Setting the SNMP Trap



- Managing the UPS

Take the UNMS II of Generex for example. The method for managing the UPS by using the UNMS II is the same as the method for managing other devices by using the UNMS II. For details, see the UNMS II user manual.

4.2.5 Protecting the Server by Using the RCCMD Software

4.2.5.1 Introduction to the Software

The RCCMD shutdown software is part of the centralized monitoring system of the Generex network. The UPS5000 MDU integrates the functions of the Generex RCCMD server:

- Sends the shutdown command, notification message, and Trap message to the RCCMD client if the UPS system generates an alarm; executes commands on the RCCMD client.
- Receives the message "UPS alive check" sent by the RCCMD client and replies with the system status.
- Configures and saves the address and port for receiving the shutdown command, and the message sending mechanism.

For the method of installing the RCCMD client, see the manual related to the RCCMD.

4.2.5.2 RCCMD Event Shutdown and Message Sending

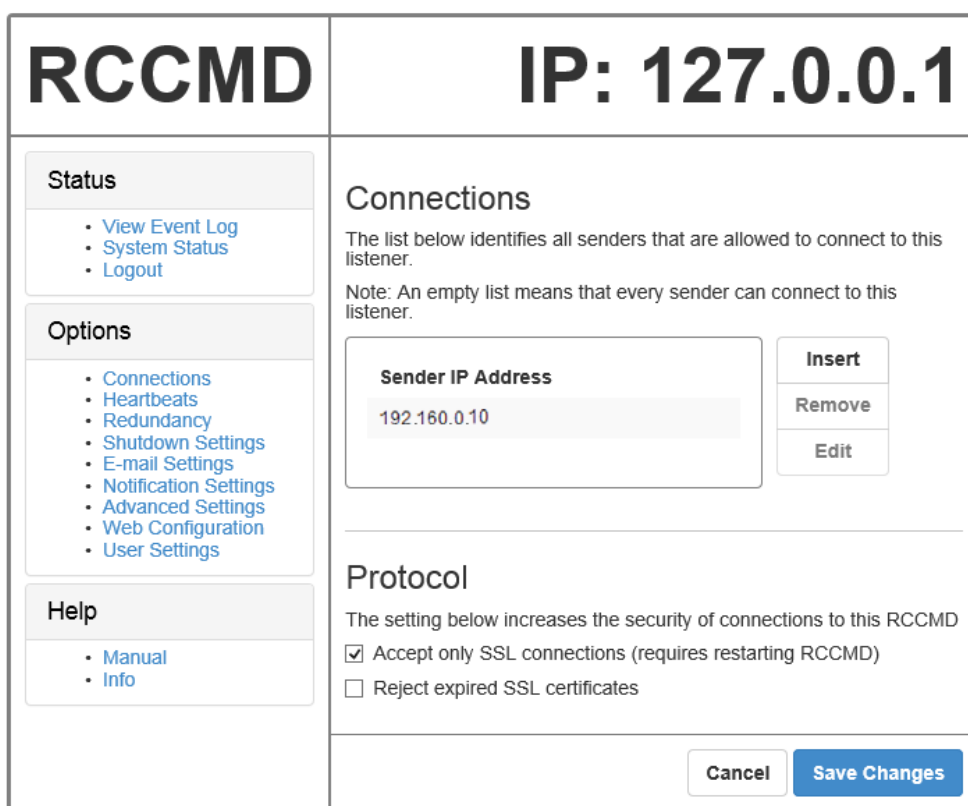
Procedure

Step 1 On the RCCMD client, choose **Connections**, add the server IP address, and set the encryption mode to encryption.

 **NOTE**

- If encryption is disabled, you do not need to select the encrypted transmission.
- All configurations take effect only after restart.

Figure 4-73 Setting the MDU IP address and SSL encrypted transmission mode on the RCCMD client



The screenshot shows the RCCMD client interface. At the top left, it says "RCCMD". At the top right, it displays "IP: 127.0.0.1". The interface is divided into several sections:

- Status:** Includes links for "View Event Log", "System Status", and "Logout".
- Options:** Includes links for "Connections", "Heartbeats", "Redundancy", "Shutdown Settings", "E-mail Settings", "Notification Settings", "Advanced Settings", "Web Configuration", and "User Settings".
- Help:** Includes links for "Manual" and "Info".
- Connections:**
 - Text: "The list below identifies all senders that are allowed to connect to this listener." and "Note: An empty list means that every sender can connect to this listener."
 - A table with one entry: "Sender IP Address" with the value "192.160.0.10". To the right of the table are buttons for "Insert", "Remove", and "Edit".
- Protocol:**
 - Text: "The setting below increases the security of connections to this RCCMD"
 - Checkboxes:
 - Accept only SSL connections (requires restarting RCCMD)
 - Reject expired SSL certificates

At the bottom right, there are "Cancel" and "Save Changes" buttons.

Step 2 On the MDU WebUI, choose **Config. > RCCMD**, and set **RCCMD function** to **Enable**.

Step 3 On the WebUI of the MDU, the SSL encryption is set to **Enable** by default and does not need to be set. If the RCCMD client is set to the unencrypted mode, you need to set the SSL encryption to **Disable** on the server WebUI.

Step 4 Configure events. If you set the job type to **RCCMD Message** under **Inverter on**, specify the IP address and port of the RCCMD client. The port is 6003 by default. If you need to modify the port, modify the port on the RCCMD client at the same time to keep them the same. Enter the message to be sent and set the message sending mechanism. For example, set it to **Immediately, once**.

Step 5 On the **Monitoring > Control** page, start the UPS, and the inverter mode will be triggered. Send the message to the RCCMD client, indicating that the inverter is on.

Step 6 On the RCCMD client, you can view messages through the **View Event Log** at the upper left corner.

----End

4.2.5.3 UPS Alive Check Function

Context

NOTICE

Whether the RCCMD SSL encrypted transmission is enabled on the WebUI of UPS5000 MDU and RCCMD client is irrelevant to the heartbeat detection function. Only when the SSL encryption is enabled on the RCCMD client, the logs recorded by the RCCMD client are marked with "(SSL...)".

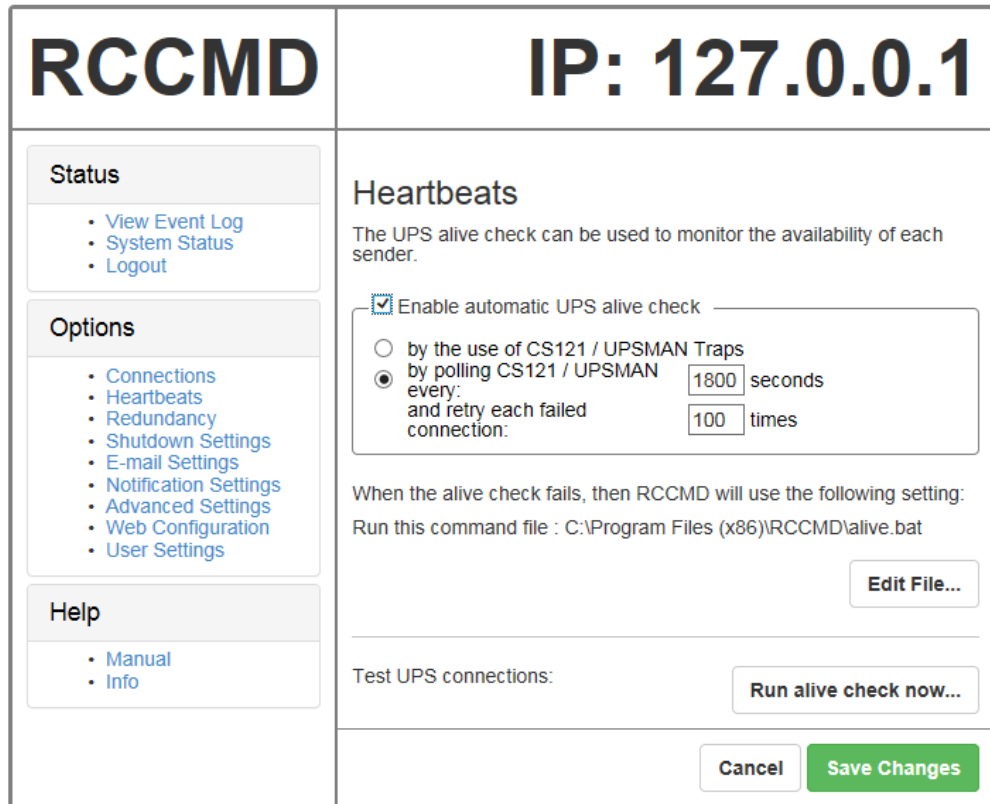
On the RCCMD client, the IP address of the MDU that detects heartbeat needs to be added. Then the UPS alive check function is supported; the RCCMD can check whether the UPS and RCCMD communicate properly; the RCCMD can receive messages sent by the MDU.

Procedure

Step 1 On the RCCMD client, add the IP address of the MDU that detects heartbeat, as shown in [Figure 4-74](#).

Step 2 The UPS5000 MDU supports both ways of heartbeat detection. If the job configured for the MDU event is set to **RCCMD TRAP**, the RCCMD client needs to be set to **by the use of CS121/UPSMAN Traps**. If **by polling CS121/UPSMAN every x seconds...** is selected as the method of detecting heartbeats, set the detection method. The default interval is 1800s and detection is performed 100 times, as shown in [Figure 4-74](#).

Figure 4-74 Heartbeat detecting mode on the RCCMD client



You can also manually detect heartbeat by clicking **Run alive check now...**

Figure 4-75 Detecting heartbeat manually

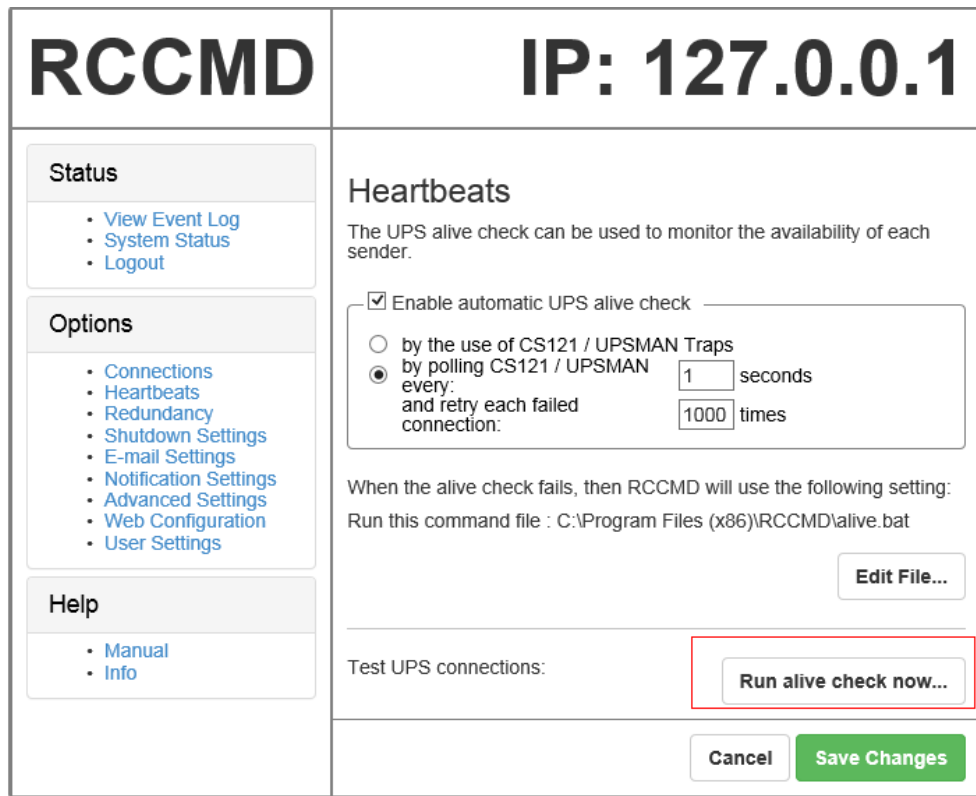
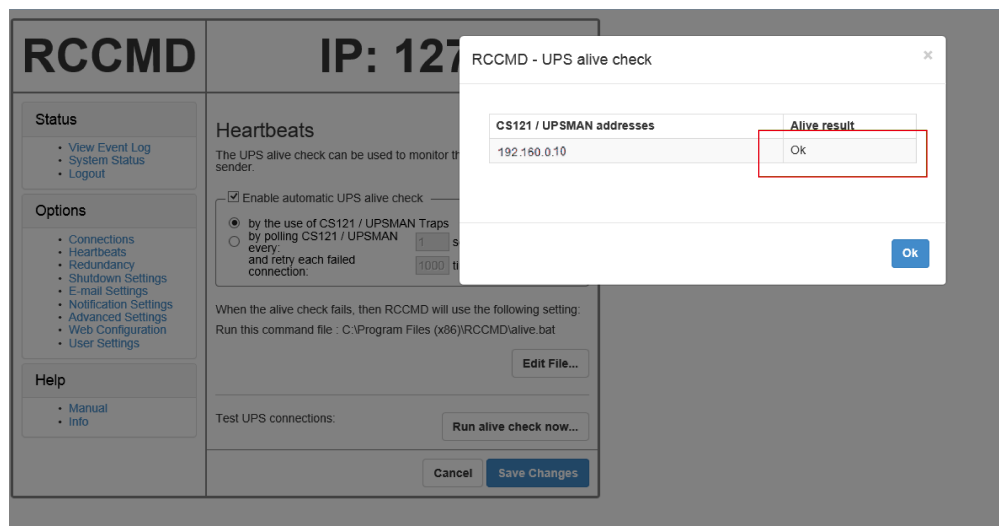


Figure 4-76 Detecting heartbeat manually and successfully



----End

5 Operations

5.1 Powering On and Starting the UPS

5.1.1 Powering On the UPS

Prerequisites

- Before powering on the UPS, ensure that the UPS has passed all check items in the section "Installation Verification."
- Before powering on the UPS, ensure that there is no voltage at the UPS input switch and upstream input switch by measuring.
- Before powering on the UPS, ensure that all the UPS switches and upstream switch are OFF.

Procedure

Step 1 Close the upstream bypass and mains input switches.

NOTICE

Measure the voltage and frequency of the UPS input switch and upstream input switch. The line voltage range is 138–485 V AC, and the frequency range is 40–70 Hz.

Step 2 Turn on SPD switch 1QFS and 2QFS.

Step 3 Turn on output circuit breaker 1 (Q5-1) and output circuit breaker 2 (Q5-2).

Step 4 Turn on mains input circuit breaker 1 (Q1-1), mains input circuit breaker 2 (Q1-2), and bypass input switch (Q2).

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.

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 normal UPS operation.

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

Figure 5-1 Settings Wizard



 **NOTE**

- Set the time and date correctly. Incorrect time and date will cause false fault analysis during maintenance or repair.
- After you set network parameters, connect the UPS to the network over a network cable, which enables you to remotely manage the UPS. If you do not need remote management, retain the default network parameter settings.

Step 2 (Optional) On the LCD of the system, choose **System Info > Settings > DST Settings** and set the DST mode as required.

Step 3 After you set parameters on the **Settings Wizard** screen, the system displays the **Bypass mode** and **No battery** alarms, which do not need to be handled. If there is any other alarm, you need to rectify the fault.

 **NOTE**

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

Step 4 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 5 View the system running diagram on the MDU to check that the UPS is working in bypass mode.

----End

5.1.3 Starting the Inverter

Starting the UPS 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 In the displayed login screen, select a user name and enter the password.

Step 3 In the displayed dialog box, tap **Yes** to start the inverter.

----End

Starting the UPS on the WebUI

Step 1 Open a browser (Internet Explorer 11 for 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 then click **OK**.

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**.

Figure 5-2 Logging in to the WebUI



Step 5 On the home page of the WebUI, choose **Monitoring** > **Control**, click **Inv. ON**, and confirm the operation to start the inverter.

NOTE

If the power module receives a startup command when it cannot be started, the startup command will be kept for 1 minute. If the startup command is not cleared within 1 minute (for example, other faults occur on the module, or you perform shutdown or rectify faults) and the module can be started, the module responds to the startup command.

----End

5.1.4 Powering On Loads

Context

After the inverter starts, the UPS works in normal mode. The **Bypass mode** alarm disappears.

Procedure

Step 1 After confirming that the battery strings are properly connected, close the battery string input circuit breaker. If there are multiple battery strings, close the circuit breaker for each battery string and then the general circuit breaker between battery strings and the UPS. The **No battery** alarm disappears from the MDU.

Step 2 Turn on the system output switch (Q5) to supply power to loads.

----End

5.1.5 (Optional) Setting Parameters for the BCB Box

Prerequisites

A BCB box is installed.

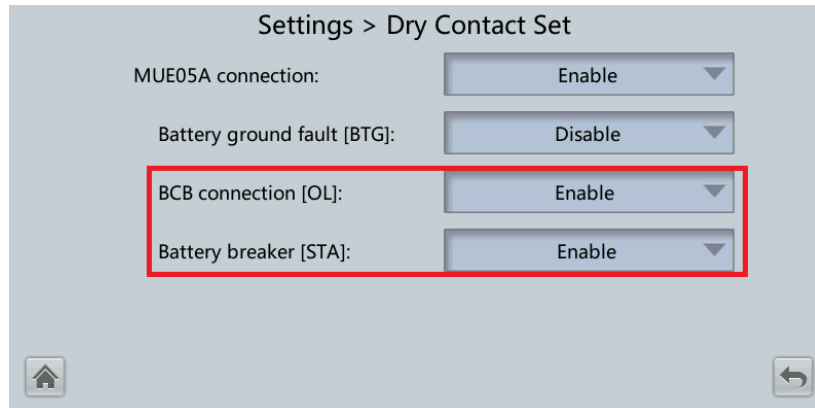
- If the power units share battery strings, you need to set BCB box parameters only on the LCD of power unit 1.

- If the power units do not share battery strings, you need to set BCB box parameters on the LCD of both power units.

Procedure

- Step 1** On the LCD of each power unit, choose **Power Unit N Info. > Settings > Dry Contact Set**, set **MUE05A connection** to **Enable**, and set **BCB connection [OL]** and **Battery breaker [STA]** to **Enable**.

Figure 5-3 BCB connection setting



----End

5.1.6 (Optional) Setting Parameters for the Maintenance Bypass Unit

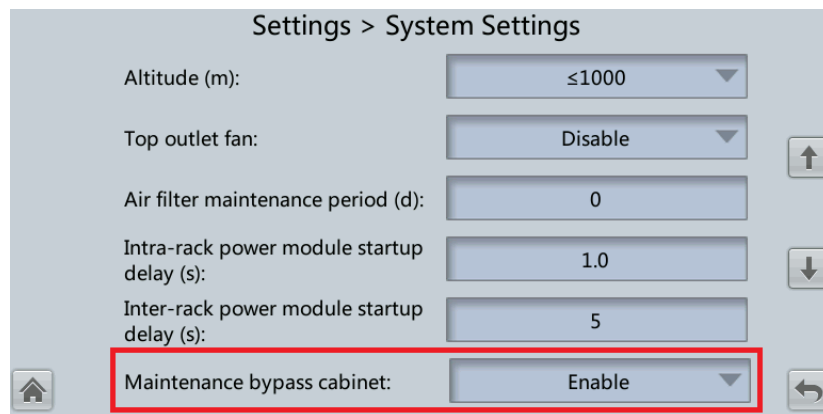
Prerequisites

The maintenance bypass cabinet has been configured.

Procedure

- Step 1** Choose **System Info > Settings > System Settings**. Set **Maintenance bypass cabinet** to **Enable**.

Figure 5-4 Setting parameters for the maintenance bypass cabinet



----End

5.1.7 (Optional) Setting Parameters for the Fan Unit

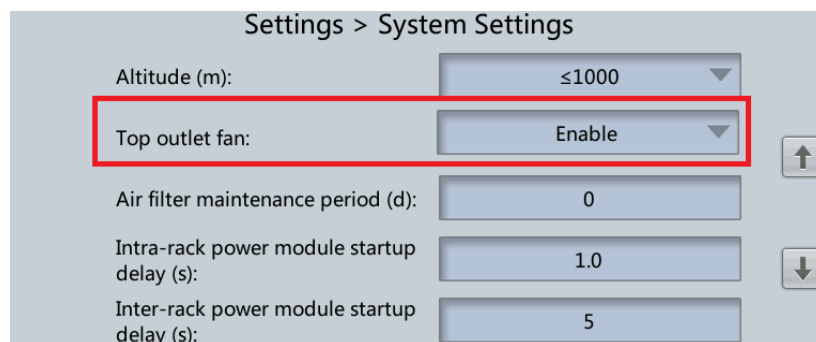
Prerequisites

The fan unit has been configured.

Procedure

- Step 1** Choose **System Info > Settings > System Settings**. Set **Top outlet fan** to **Enable**.

Figure 5-5 Setting parameters for the top outlet fan



----End

5.2 Shutting Down and Powering Off the UPS

Context

NOTICE

After the inverter is shut down, if the bypass is normal, the UPS transfers to bypass mode; if the bypass is not normal, the UPS supplies no power. Before shutting down the UPS, ensure that all loads have shut down.

Procedure

Step 1 Shut down the inverter.

- Shutting down the inverter on the LCD

On the system 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

On the system WebUI, choose **Monitoring** > **Control**, and click **Inv. OFF**. After confirmation, the inverter is shut down.

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 5-6 Normal bypass

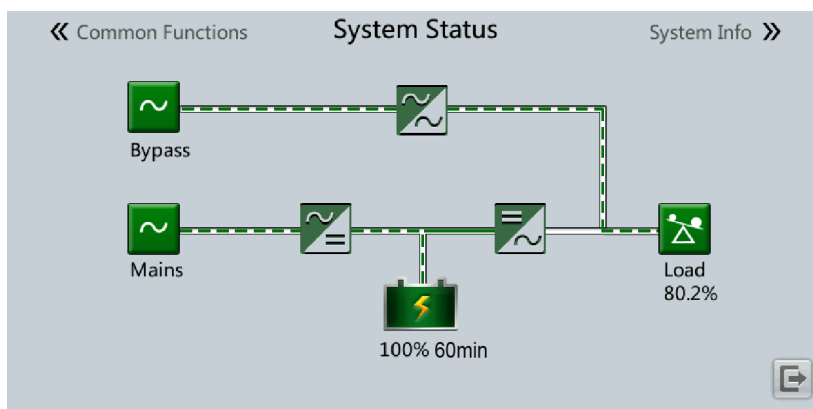
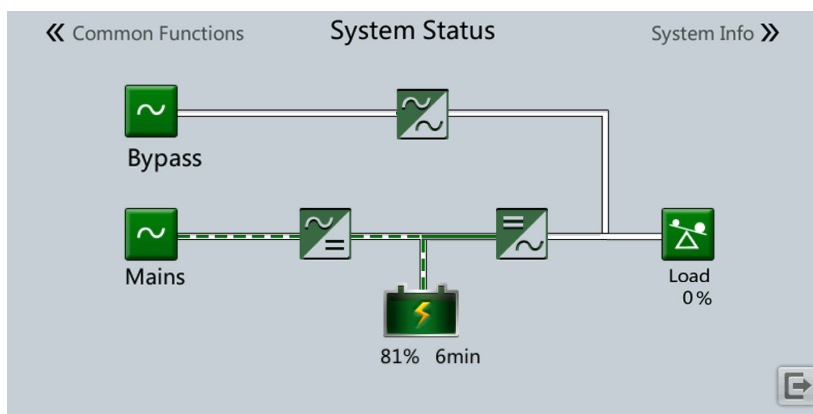


Figure 5-7 Abnormal bypass



Step 2 After the inverter shuts down, turn off the downstream output switch (Q5).

Step 3 Turn off the UPS mains input circuit breaker 1 (Q1-1), mains input circuit breaker 2 (Q1-2), bypass input switch (Q2), output circuit breaker 1 (Q5-1), and output circuit breaker 2 (Q5-2).

Step 4 Turn off the battery string circuit breaker of each power unit. If there are multiple battery strings, turn off the general circuit breaker between battery strings and the UPS and then turn off the circuit breaker for each battery string.

Step 5 Turn off the upstream bypass and mains input switches for the UPS.

----End

5.3 Starting the UPS in Battery Mode

Lead-Acid Battery Cold Start

Step 1 Ensure that batteries have been connected properly. Use a multimeter to check that the voltage of a battery string is greater than a certain value (single battery voltage x number of batteries in the battery string).

Step 2 Turn off mains input circuit breaker 1 (Q1-1), mains input circuit breaker 2 (Q1-2), and bypass input switch (Q2). Turn on the battery circuit breaker. If there are multiple battery strings, turn on the circuit breaker for each battery string and then the general circuit breaker between battery strings and the UPS.

Step 3 Use a multimeter to check that the voltage of battery strings at the UPS end is greater than a certain value (single battery voltage x number of batteries in the battery string), which indicates that the batteries are connected properly.

Step 4 Press and hold down the **BATT START** button on the bypass module for at least 2 seconds. The system automatically enters the battery cold start status. The LCD displays the Huawei logo and an initialization progress bar.

Step 5 After LCD initialization, start the inverter.

----End

Lithium Battery Cold Start

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

Step 2 Turn off mains input circuit breaker 1 (Q1-1), mains input circuit breaker 2 (Q1-2), and bypass input switch (Q2).

Step 3 Power on the lithium battery cabinet. For details, see the user manual for the lithium battery cabinet.

Step 4 Use a multimeter to measure the voltages of the positive and negative battery strings connected to the UPS battery input terminals. If the measured values are consistent with the voltages displayed on the **System Status** screen of the lithium battery cabinet, the batteries are properly connected.

Step 5 Check that the green indicator on the battery control unit in the lithium battery cabinet blinks at 1 Hz or is steady on. Then, press and hold down the **BATT START** button on the bypass module for at least 2 seconds. The system automatically enters the battery cold start status. The LCD displays the Huawei logo and an initialization progress bar.

Step 6 After LCD initialization, start the inverter on the LCD.

----End

5.4 Transferring to Bypass Mode

NOTICE

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

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

NOTE

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

5.5 Setting ECO Mode

Prerequisites

The system is working in inverter mode.

Context

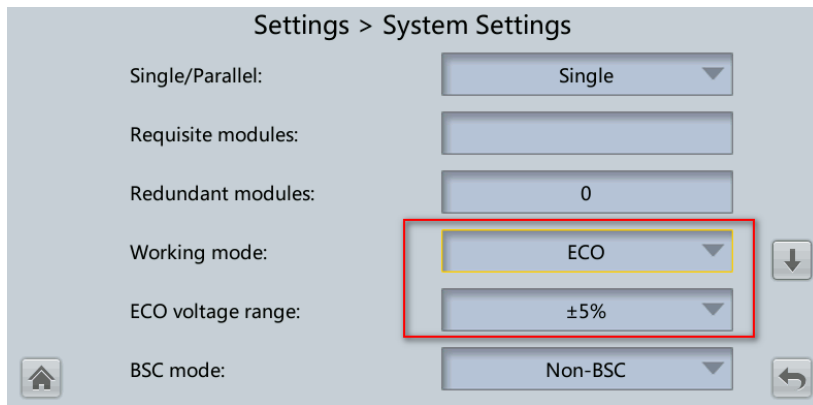
- The UPS is set to non-ECO mode by default. Set the UPS to ECO mode when energy saving is required.
- In ECO mode, the bypass takes priority over the inverter in supplying power. If the bypass is disconnected, the UPS transfers to normal mode.
- To avoid frequent transfer between ECO mode and normal mode, do not set the ECO mode when the bypass input is unstable or is sensitive to load changes.
- ECO mode is not recommended when the load is less than 10%.
- Before transferring the UPS to ECO mode, ensure that the bypass module works properly.

Procedure

Step 1 On the LCD of the system, 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 5-8 ECO parameters

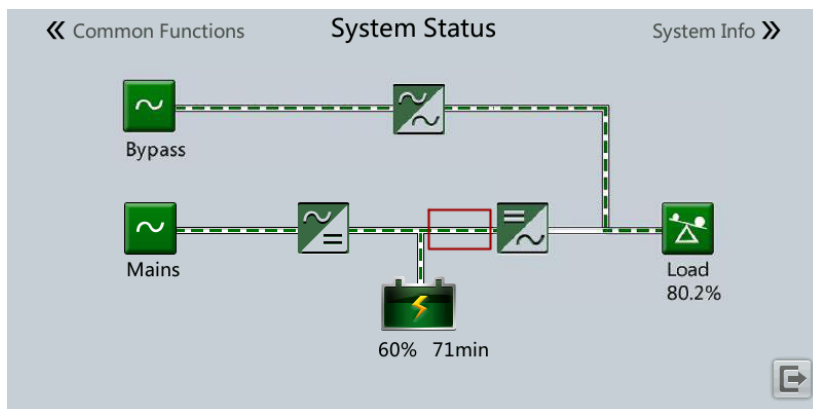


Step 3 If you set ECO mode in bypass mode, manually start the UPS inverter.

NOTICE

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

Figure 5-9 System status in ECO mode



----End

5.6 Testing Batteries

5.6.1 Lead-Acid Battery Test

5.6.1.1 Forced Equalized Charging Test

Context

NOTICE

Before a forced equalized charging test, ensure that:

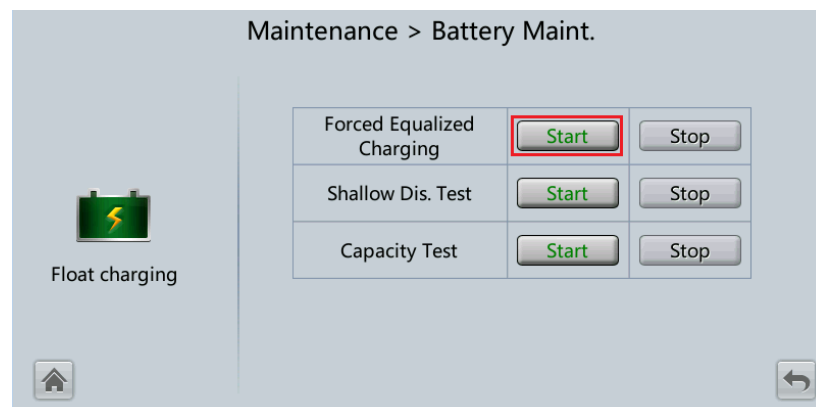
- The mains input is normal.
- Batteries are properly connected.
- Batteries are not in the equalized charging state.

If the battery strings of two power units are shared, you only need to perform the forced equalized charging test for one power unit to complete all battery tests. If the battery strings are not shared, you need to perform the forced equalized charging test on the LCD of both power units to complete all battery tests.

Procedure

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

Figure 5-10 Starting a forced equalized charging test



NOTE

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

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

----End

5.6.1.2 Shallow Discharge Test

NOTICE

Before performing a shallow discharge test, ensure that:

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

If the battery strings of two power units are shared, you only need to perform the shallow discharge test for one power unit to complete all battery tests. If the battery strings are not shared, you need to perform the shallow discharge charging test on the LCD of both power units to complete all battery tests.

Automatic Shallow Discharge Test

Step 1 On the main screen of the power unit LCD, choose **Power Unit N Info. > Settings > Battery Param.**, and set **Sched. shallow dis. test** to **Enable**.

Step 2 Set **Sched. shallow dis. test time** and **Sched. shallow dis. test interval** as required. After setting is complete, the system will perform automatic shallow discharge tests based on the settings.

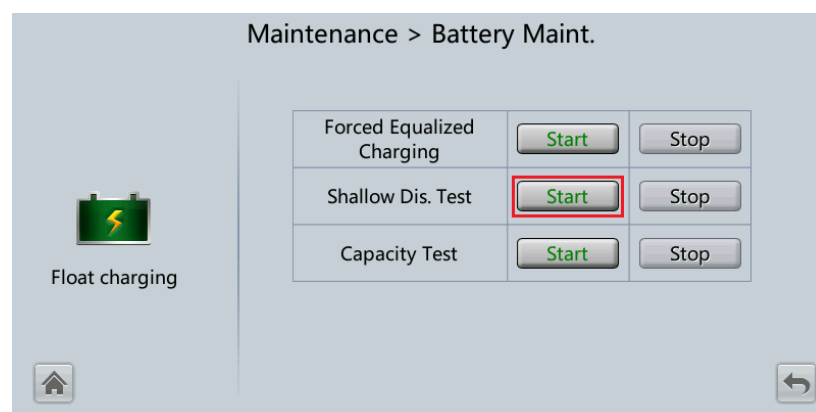
----End

Manual Shallow Discharge Test

Step 1 On the home screen of the power unit LCD, choose **Power Unit N Info. > Maintenance > Battery Maint.**

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

Figure 5-11 Starting the shallow discharge test



 **NOTE**

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

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

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

----End

5.6.1.3 Capacity Test

Context

NOTICE

Before a capacity test, ensure that:

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

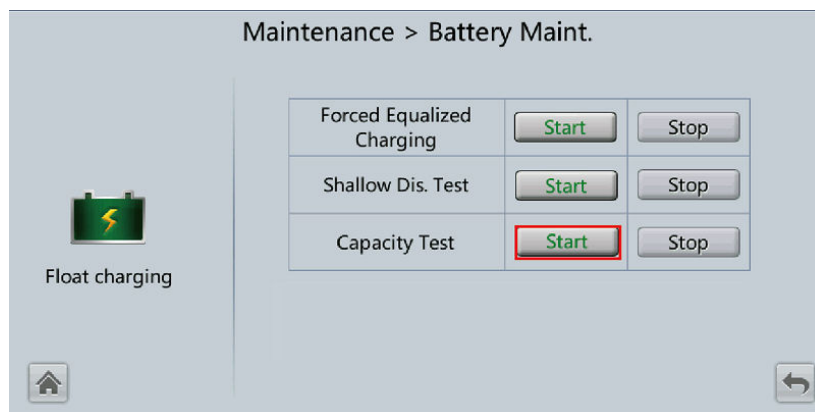
If the battery strings of two power units are shared, you only need to perform the capacity test for one power unit to complete all battery tests. If the battery strings are not shared, you need to perform the capacity charging test on the LCD of both power units to complete all battery tests.

Procedure

Step 1 On the home screen of the power unit LCD, choose **Power Unit N Info.** > **Maintenance** > **Battery Maint.**

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

Figure 5-12 Starting a capacity test



NOTE

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

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

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

----End

5.6.2 Lithium Battery Test

5.6.2.1 Shallow Discharge Test

NOTICE

Before performing a shallow discharge test, ensure that:

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

Automatic Shallow Discharge Test

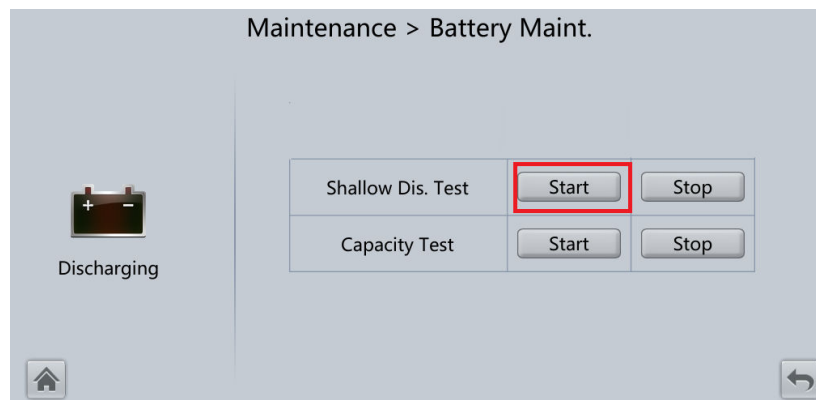
1. On the main screen of the power unit LCD, choose **Power Unit N Info. > Settings > Battery Param.**, and set **Sched. shallow dis. test** to **Enable**.

2. Set **Sched. shallow dis. test time** and **Sched. shallow dis. test interval** as required. After setting is complete, the system will perform automatic shallow discharge tests based on the settings.

Manual Shallow Discharge Test

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

Figure 5-13 Starting a shallow discharge test



NOTE

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

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

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

5.6.2.2 Capacity Test

Context

NOTICE

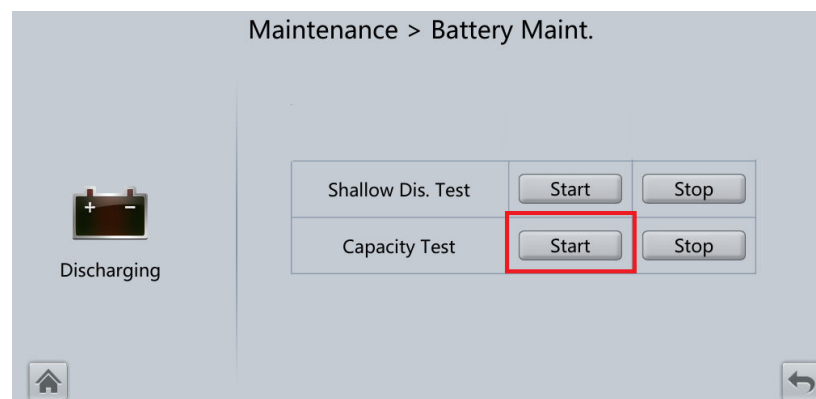
Before a capacity test, ensure that:

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

Procedure

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

Figure 5-14 Starting a capacity test



NOTE

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

- The minimum cell voltage reaches 2.6 V.
- The load fluctuation exceeds 10%.
- An alarm is generated.

The test is complete when the minimum cell voltage reaches 2.6 V. Data about the most amount of energy discharged is stored once a month for 36 months.

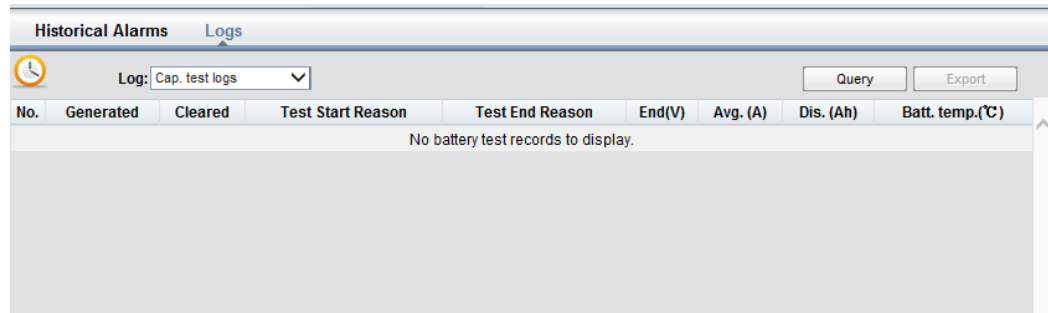
----End

5.6.3 Test Data Download

Procedure

- Step 1** On the WebUI of the power unit, choose **Query > Logs**, choose logs that need to be exported from the **Log** drop-down list box, and click **Query**.

Figure 5-15 Log



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

----End

5.7 Transferring to Maintenance Bypass Mode

Prerequisites

The maintenance bypass unit has been installed.

Context

NOTICE

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

Procedure

- Step 1** Manually switch the UPS to bypass mode.
- Step 2** Turn on the maintenance bypass switch.

NOTE

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

----End

5.8 Transferring from Maintenance Bypass Mode to Normal Mode

Prerequisites

The maintenance bypass unit has been installed.

NOTICE

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

Procedure

Step 1 Turn off the maintenance bypass switch.

NOTE

The **Maint. breaker closed** alarm disappears from the MDU.

Step 2 Start the inverter.

----End

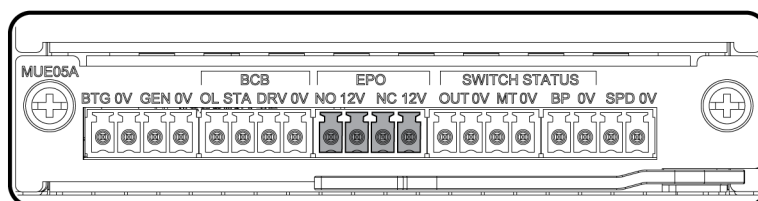
5.9 Performing EPO

NOTICE

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

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

Figure 5-16 EPO ports



UA1000097

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

5.10 Clearing the EPO State

Procedure

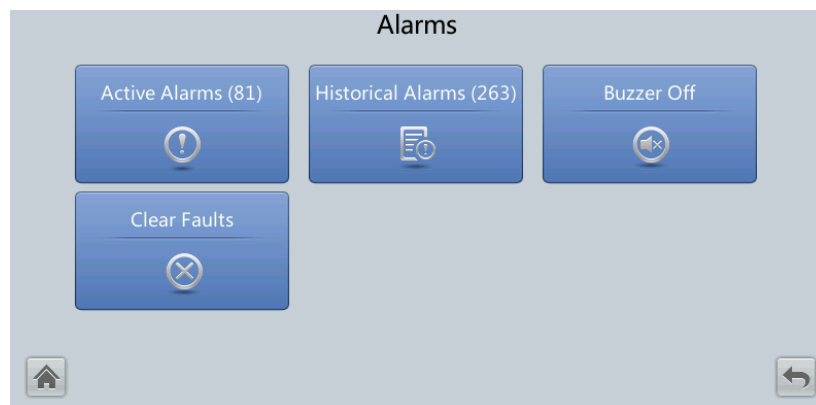
Step 1 Clear the EPO state of the system. Ensure that the external EPO switch connected to the dry contact is in non-EPO state or insert the 4-pin terminal on the EPO port of the dry contact card of the bypass unit.

Step 2 Clear the EPO alarm.

- On the LCD

On the LCD of the system, choose **System Info** > **Alarms**, and tap **Clear Faults**. After confirmation, the EPO alarm will be cleared.

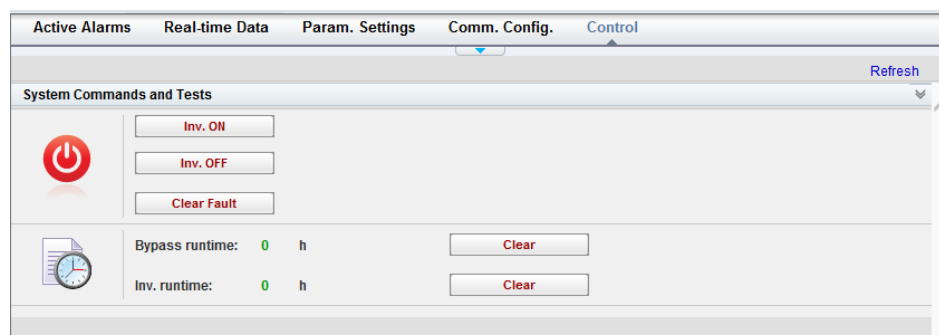
Figure 5-17 Clear Faults



- On the WebUI

On the WebUI of the system, choose **Monitoring** > **Control** > **System Commands and Tests**, and click **Clear Fault** to clear the EPO alarm.

Figure 5-18 Clear Fault



Step 3 Check that the EPO alarm is cleared by viewing active alarms. If the system bypass input is normal, the UPS transfers to bypass mode.

- Viewing active alarms on the LCD

On the LCD of the system, choose **System Info > Alarms > Active Alarms** to check that the EPO alarm has been cleared.

- Viewing active alarms on the WebUI

On the WebUI of the system, choose **Monitoring > Active Alarms** to check that the EPO alarm has been cleared.

Step 4 Start the inverter.

----End

5.11 Data Export

Prerequisites

You have logged in to the WebUI.

Context

The following data can be exported:

- Historical alarms
- Logs
- E-Label
- Fault Data

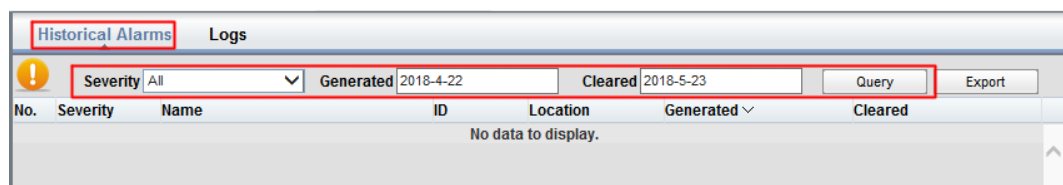
NOTE

This topic describes how to export **Historical Alarms**.

Procedure

Step 1 Choose **Query > Historical Alarms**, and set **Severity**, **Generated**, and **Cleared**.

Figure 5-19 Querying historical alarms



NOTE

You do not need to query logs. Choose **Query > Logs**, click **Export**, and save the file.

Step 2 Click **Query**, and you can see the corresponding historical alarms.

Step 3 Click **Export** and save the displayed web page.

----End

5.12 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 9.17 kVA for a 55 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 all the 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 of the system, choose **Monitoring > Param. Settings > System Settings** and set **Paral. sys. hibernate** to **Enable**.
- Step 2** Set the module cycle hibernation period to an integer ranging from 1 to 100. The default value is 30.

Figure 5-20 System settings

Active Alarms	Real-time Data	Param. Settings	Comm. Config.	Control
				Refresh
System Settings				
Single/Parallel		Single		
Requisite modules		22		
Redundant modules		0		
Working mode		Normal mode		
ECO voltage range		±5%		
BSC mode		Non-BSC		
High ambient temperature alarm threshold (°C)		55		
Low ambient temperature alarm threshold (°C)		-10		
Altitude (m)		≤1000		
Top outlet fan		Disable		
Air filter maintenance period (d)		0		
EPO detection		Disable		
Bus Capa. Life		Disable		
Paral. sys. hibernate		Enable		<input type="button" value="Submit"/>
Module cycle hiber. period (d)		30		

 **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) • Output voltage: 380 V AC, 400 V AC, or 415 V AC (tolerance $\pm 1\%$, line voltage) • Frequency: 40–70 Hz 	<ul style="list-style-type: none"> • If the input voltage is abnormal, check the power grid status and input cable connection. • 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.

Check Item	Expected Result	Troubleshooting
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 and noticeable sparks.	<ul style="list-style-type: none"> • Replace the cables. • Secure the output terminals.
Cables and circuit breaker through-current capacity	<p>The circuit breakers and cables meet load requirements.</p> <p>The actual cable through-current capacity is greater than the circuit breaker specifications.</p>	<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 battery temperature $+20^{\circ}\text{C}$. 3. Battery charge and discharge conditions meet the requirements specified in the battery specifications. 	<ol style="list-style-type: none"> 1. Identify the cause of an abnormal battery operating temperature. 2. If the fault persists, contact Huawei technical support.

Item	Expected Result	Troubleshooting
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.

Item	Expected Result	Troubleshooting
Battery voltage	<ul style="list-style-type: none"> Equalized charging voltage: 2.35 V/cell \pm0.02 V/cell Float charging voltage: 2.25 V/cell \pm0.02 V/cell 	<ol style="list-style-type: none"> Check whether the equalized charging voltage and float charging voltage of a battery are normal. 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.

Item	Expected Result	Troubleshooting
Battery connection reliability	<ol style="list-style-type: none"> 1. 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.) 2. 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"> 1. Rectify any abnormal connection. 2. 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 normal.	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 threshold 80 V.	Check whether the mains voltage exceeds the threshold. If yes, contact the electric 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.

Case	Symptom	Possible Cause	Measure
		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 Technical specifications

Item	Specifications
Cabling mode	Battery cables are routed in and out from the top, and input and output are connected using busbars.
Protection level	IP20
Communication	Supports dry contacts, RS485 ports, and FE ports. Supports Simple Network Management Protocol (SNMP).
Dimensions (H x W x D)	2200 mm x 2800 mm x 1000 mm (without a maintenance bypass unit and fan unit) 2200 mm x 3400 mm x 1000 mm (with a maintenance bypass unit) 2200 mm x 3600 mm x 1000 mm (with a fan unit)
Weight	2360 kg (without a maintenance bypass unit and fan unit) 2590 kg (with a maintenance bypass unit) 2660 kg (with a fan unit)

Table 8-2 Environmental specifications

Item	Specifications
Operating temperature	0°C to 40°C
Storage temperature	-40°C to +70°C
Relative humidity	0%–95% RH (non-condensing)

Item	Specifications
Altitude	0–1000 m The power is derated as described in IEC62040-3 when the altitude is from 1000 m to 4000 m. The upper limit of the altitude is 4000 m.

Table 8-3 Safety and EMC

Item	Specifications	
Safety compliance	CE	EN62040-1:2013
	CB	IEC62040-1:2013
	TUV	EN62040-1:2013
	CQC	CQC3108-2011
	TLC	YD/T2165-2010
Electromagnetic compatibility (EMC)	Conducted emission	EN/IEC62040-2
	Radiated emission (RE)	EN/IEC62040-2
	Low-frequency signal interference	IEC61000-2-2
	Electrostatic discharge immunity	IEC61000-4-2
	Conducted susceptibility	EN/IEC62040-2 EN/IEC61000-4-6
	Radiated susceptibility	EN/IEC62040-2 EN/IEC61000-4-3
	Electrical fast transient (EFT)	EN/IEC62040-2 IEC61000-4-4
	Surge protection	EN/IEC62040-2 IEC61000-4-5
	Power frequency magnetic field	IEC61000-4-8

Table 8-4 Mains input electrical specifications

Item	Specifications
System	Three-phase, four-wire, and PE

Item	Specifications
Rated voltage	380 V AC/400 V AC/415 V AC (line voltage)
Voltage range	80–280 V AC (phase voltage) At 0–40°C: not derated when the voltage is 187–280 V AC; derated to 35% load when the voltage is 187–80 V AC.
Rated frequency	50/60 Hz
Frequency range	40–70 Hz
Power factor	<ul style="list-style-type: none"> • > 0.99 (full load) • > 0.98 (half load)
Harmonic current	<ul style="list-style-type: none"> • THDi ≤ 3% (full linear load) • THDi ≤ 5% (full non-linear load)

Table 8-5 Bypass input electrical specifications

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

Table 8-6 Battery electrical specifications

Item	Specifications
Battery voltage (VRLA battery)	360 V DC to 600 V DC 12 V batteries, 30–50 batteries, 40 batteries by default <ul style="list-style-type: none"> • If there are 40 to 50 batteries, the output power is not derated. • If there are 36 to 39 batteries, the output power is derated to 90%. • If there are 32 to 35 batteries, the output power is derated to 80%. • If there are 30 to 31 batteries, the output power is derated to 70%. 2 V batteries, 180–300 batteries, 240 batteries by default <ul style="list-style-type: none"> • If there are 240 to 300 batteries, the output power is not derated. • If there are 239 to 216 batteries, the output power is derated to 90%. • If there are 215 to 192 batteries, the output power is derated to 80%. • If there are 191 to 180 batteries, the output power is derated to 70%.
Battery management	Intelligent battery management
Cold start by pressing one button	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.
Charger current limit	Maximum 32 A for a module
Battery string sharing (VRLA battery)	Battery strings can be shared when power units are connected in parallel. No battery is shared by default.
Charging voltage (VRLA battery)	<ul style="list-style-type: none"> • Equalized charging voltage: 2.3–2.4 V/cell. The default voltage is 2.35 V/cell. • Float charging voltage: 2.23–2.3 V/cell. The default voltage is 2.25 V/cell.
Minimum cell voltage (VRLA battery)	1.6–1.9 V/cell

NOTICE

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

Table 8-7 Output electrical specifications

Item	Specifications
System	Three-phase, four-wire, and 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 50/60 Hz with a tolerance of $\pm 0.05\%$.
THDv	<ul style="list-style-type: none"> • $\text{THDv} \leq 1\%$ (full linear load) • $\text{THDv} \leq 4\%$ (full non-linear load)
Power factor	1
Transfer time	<ul style="list-style-type: none"> • Uninterruptible transfer: 0 ms • Interruptible transfer: ≤ 20 ms
Output voltage imbalance	Voltage imbalance: $\pm 3\%$; phase imbalance: $\pm 2^\circ$

Item	Specifications
Overload capability	<p>Inverter overload capability:</p> <ul style="list-style-type: none"> • 100% < load ≤ 110%, at 40°C: transfer to bypass mode after 60 minutes • 110% < load ≤ 125%, at 0–30°C: transfer to bypass mode after 10 minutes; at 30–40°C: transfer to bypass mode after 3 minutes • 125% < load ≤ 150%, at 25°C: transfer to bypass mode after 1 minute; at 40°C: transfer to bypass mode after 30s • Load > 150% or a short circuit occurs: transfer to bypass mode after 200 ms <p>Bypass overload capability:</p> <ul style="list-style-type: none"> • The UPS runs continuously at 135% load at 30°C; generates only alarms and uses overtemperature protection at 135–150% load. • The UPS runs continuously at 125% load at 40°C; generates only alarms and uses overtemperature protection at 125–150% load. • The UPS runs for 5 minutes at bypass single-phase or three-phase load 150%–200% at 40°C; 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 is greater than 1000%.

Table 8-8 System electrical specifications

Item	Specifications
Parallel reliability of power units	Redundant parallel signals
Parallel ECO function of power units	Supported
Number of parallel UPSs	2

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 the terminal on the N bar.

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

Figure A-1 Short-circuiting the input N and PE



UA31H00041

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	Cause	Solution
0001-1	Mains voltage abnormal	Minor	<ul style="list-style-type: none"> • Cable connections are incorrect. • The mains is not normal. • 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 exceeds 280 V, the mains input is not normal; if the mains voltage is less than 272 V, the sampling circuit of the power module is not normal. Replace the faulty module. 3. Check whether the output or battery is incorrectly grounded.

Alarm ID (Alarm ID- Cause ID)	Alarm Name	Severity	Cause	Solution
0001-2			<ul style="list-style-type: none"> • Cable connections are incorrect. • The mains is not normal. • 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 less than 80 V, the mains voltage is not normal; if the mains voltage exceeds 88 V, the power module sampling circuit or fuse may not be working properly. Replace the faulty module.
0001-3			The mains is not normal.	Check the mains.
0004-1	Mains ph. Reversed	Minor	Cable connections are incorrect.	Verify the cable connections.
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 not normal. • The power module sampling circuit is not normal. 	Check whether the mains voltage ranges from 80 V (excluding 80 V) to 176 V. If no, the mains monitoring circuit for the power module is faulty. Replace the faulty module.
0010-1	Abnormal bypass voltage	Minor	<ul style="list-style-type: none"> • The bypass voltage range is not correctly set. • The bypass input voltage is not normal. 	<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.

Alarm ID (Alarm ID- Cause ID)	Alarm Name	Severity	Cause	Solution
0010-2			<ul style="list-style-type: none"> The bypass frequency range is not correctly set. The bypass input frequency is not normal. 	<ol style="list-style-type: none"> Check the bypass input voltage or cable connections with a multimeter. 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 using a multimeter. If no multimeter is available, exchange the positions of any two cables.
0012-1	Bypass neutral absent	Minor	The neutral wire of bypass input is not installed properly.	<ol style="list-style-type: none"> Secure or connect the neutral wire to the cabinet if it is loose or disconnected. 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"> Check whether battery polarities are correctly installed by using a multimeter. If no, correct the installation. Check whether the battery input voltage of the UPS is normal. If yes, the battery sampling circuit of the power module is faulty. Replace the power module.
0021-1	Battery EOD	Critical	The battery voltage reaches the EOD voltage threshold due to continuous discharge.	If the BCB box is configured, check whether the BCB box trips. If it trips, close the BCB box switch.

Alarm ID (Alarm ID- Cause ID)	Alarm Name	Severity	Cause	Solution
0022-1	No battery	Minor	<ul style="list-style-type: none"> • There is no battery string. • The battery string is not properly installed. • The power module battery fuse is blown. 	<ol style="list-style-type: none"> 1. Check that battery cables are correctly connected. 2. Check that the battery terminal voltage is normal. 3. 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 not installed properly. 	<ol style="list-style-type: none"> 1. Check whether battery parameters are correctly set. 2. If they are correctly set, certain batteries may be faulty. 3. Check whether 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 not installed properly. • The charger is faulty. 	<ol style="list-style-type: none"> 1. If the low battery voltage alarm is generated in battery mode, check whether the mains voltage recovers. If yes, charge batteries immediately. 2. Check whether the battery neutral wire is correctly connected. 3. 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.

Alarm ID (Alarm ID- Cause ID)	Alarm Name	Severity	Cause	Solution
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. • The dry contact board is faulty. 	<ol style="list-style-type: none"> 1. Check whether the positive and negative terminals of the battery string are grounded or have sufficient resistance to the ground. 2. Check whether the battery grounding failure detector is faulty by replacing it with a new one. 3. If no battery grounding failure detector is available, check on the dry contact board whether the battery grounding failure detector is enabled. If yes, disable it and check whether the alarm is cleared. If the alarm persists, the dry contact board may be faulty. Replace the board.
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"> 1. Check the battery voltage. 2. Check that the configured number of batteries matches the actual number. 3. Check that the actual number of batteries meets requirements.
0036-2	Battery maintenance reminder	Warning	The time for maintenance arrives.	Maintain the batteries.

Alarm ID (Alarm ID- Cause ID)	Alarm Name	Severity	Cause	Solution
0037-1	Battery undervoltage	Critical	<ul style="list-style-type: none"> The UPS has worked in battery mode for an extended amount of time. The charger is faulty. 	<ol style="list-style-type: none"> Check whether the battery voltage is normal. Check whether the output is overloaded. Check whether any battery is damaged. If yes, replace the battery. Check whether any battery charger generates an alarm. If yes, replace the faulty module.
0040-7	Rectifier abnormal	Critical	<ul style="list-style-type: none"> The fan for the power module is not functioning properly. The air channel for the power module is obstructed. 	<ol style="list-style-type: none"> Check that the air channel for the module is free from blockage. Check whether the fans are functioning properly. Replace the power module if the fans are faulty.
0043-1	Fan abnormal	Critical	<ul style="list-style-type: none"> The fan for the power module is abnormal. The fan monitoring cable for the power module is not working properly. 	Replace the faulty power module.
0043-2			The fan is faulty.	Check the fan or replace the bypass module.
0043-3			<ul style="list-style-type: none"> The fan is faulty. 	1. Replace the fan.
0043-4			<ul style="list-style-type: none"> The fan monitoring cable is faulty. 	2. Check the fan monitoring cable.
0047-1	Not ready	Critical	The ready switch is OFF.	Close the ready switch.

Alarm ID (Alarm ID- Cause ID)	Alarm Name	Severity	Cause	Solution
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"> 1. Check load cable distributions. 2. Check whether the output is grounded. 3. 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 not normal. • The E2PROM is faulty. 	<ol style="list-style-type: none"> 1. Rectify the fault and check whether the alarm is cleared. 2. If the alarm is generated again, replace the power module.
0061-7	Inverter alarm	Minor	The bypass waveform is not normal.	<ul style="list-style-type: none"> • If not all modules generate the alarm, start the UPS, transfer it to normal mode, and replace the faulty module. • If all modules generate the alarm, open the bypass input circuit breaker. After the inverter relay is closed, close the bypass input circuit breaker 10 seconds later.

Alarm ID (Alarm ID- Cause ID)	Alarm Name	Severity	Cause	Solution
0564-1	Overload timeout	Critical	<ul style="list-style-type: none"> • The load is excessive. • Derating reduces the rated system power. • The module is damaged. • The output is incorrectly grounded. • The peak load current is too high. 	<ol style="list-style-type: none"> 1. Check that there is no overload. 2. Check that the module power is not derated due to a fan fault. 3. Check whether the power grid has a large asymmetric load. 4. Check whether the output is grounded. 5. Check whether the peak load ratio exceeds the upper limit. 6. 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"> 1. Check the load. 2. If the load is normal, replace the power module.
0566-1	Output overload	Minor	<ul style="list-style-type: none"> • The load is excessive. • Derating reduces the rated system power. • The module is damaged. 	<ol style="list-style-type: none"> 1. Check that there is no overload. 2. Check that the module power is not derated due to a fan fault. 3. If the alarm persists, replace the power module.

Alarm ID (Alarm ID- Cause ID)	Alarm Name	Severity	Cause	Solution	
0570-4	BPM module abnormal	Critical	<ul style="list-style-type: none"> The bypass fan is not functioning properly, or the air channel is blocked. The ambient temperature exceeds the upper threshold. The load is excessive. 	<ol style="list-style-type: none"> Check the bypass fan and air channel. If the fan is faulty, replace it. Check that the ambient temperature has not exceeded 40°C. Check that there is no overload. 	
0583-1	Inter-rack par. cable abnormal	Critical	<ul style="list-style-type: none"> The inter-rack parallel system CAN bus is disconnected or short-circuited. Only one rack works in a parallel system. An ECM is faulty. 	<ol style="list-style-type: none"> Check the inter-rack parallel system CAN bus. Rectify the disconnection or short-circuit fault. Replace the ECM. 	
0583-4			The inter-rack industrial frequency synchronization cable is broken.		Replace the inter-rack parallel cable.
0583-5			The inter-rack carrier synchronization cable is broken.		
0583-6			<ul style="list-style-type: none"> The intra-rack INVBYP cable is broken. The parallel CAN bus is broken. 		
0584-2	Inter-rack par. cable alarm	Minor	The inter-rack parallel cable is faulty.	Replace the inter-rack parallel cable.	

Alarm ID (Alarm ID- Cause ID)	Alarm Name	Severity	Cause	Solution
0584-4			The inter-rack industrial frequency synchronization cable is broken.	
0085-1	EPO	Critical	The EPO button is pressed.	Restore the EPO button status. Start the UPS after the alarm is cleared.
0086-1	Max. number of BPM transfers	Minor	The system frequently transfers to bypass mode due to overload timeout or load impact.	Check the load.
0087-1	System transfer-to-bypass	Warning	The neighboring UPS is not normal, and transfers to bypass mode.	Check the reason why the neighboring UPS transfers to bypass mode.
0088-1	Rack address 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 load is excessive. The rack capacity setting is not appropriate. 	<ul style="list-style-type: none"> Check the load and remove some loads or expand the UPS power capacity if the UPS is overloaded. Check that the configured rack capacity meets requirements.
0090-1	Dry contact board fault	Critical	I2C communication with the dry contact board MUE05A fails.	Replace the dry contact board MUE05A.
0090-2			I2C communication with the dry contact board MUE06A fails.	Replace the dry contact board MUE06A.

Alarm ID (Alarm ID- Cause ID)	Alarm Name	Severity	Cause	Solution
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.
0337	PDC bypass input breaker open	Critical	The bypass input circuit breaker on the PDC is OFF.	The running status is displayed. No further measures are required.
0338	PDC output breaker open	Critical	The output circuit breaker on 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 that PDC output breaker open alarm has disappeared. If the alarm persists, tap the Clear Fault button to clear the alarm.
0341	PDC Maint. breaker closed	Minor	The maintenance circuit breaker on the PDC 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.

Alarm ID (Alarm ID- Cause ID)	Alarm Name	Severity	Cause	Solution
0594-1	Insufficient redundant racks	Minor	<ul style="list-style-type: none"> The load is excessive. The configured number of redundant racks is incorrect. 	<ol style="list-style-type: none"> Reduce the load. Decrease the configured number of redundant racks.
0095-1	Insuffi. redundancy	Minor	<ul style="list-style-type: none"> The load is excessive. The configured number of redundant modules is incorrect. 	<ol style="list-style-type: none"> Reduce the load. Decrease the configured number of redundant modules.
0096-1	ECO volt. Abnormal	Minor	<ul style="list-style-type: none"> The ECO bypass voltage or frequency is out of the preset range. The ECO bypass voltage or frequency range is incorrectly set. The bypass input sequence is reverse or the neutral wire is disconnected. 	<ol style="list-style-type: none"> Check the bypass input voltage and frequency. Check that the rated voltage, rated frequency, ECO bypass voltage range, and frequency range are correctly set. 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 cables is incorrect. The bypass SCR open-circuits. 	<ol style="list-style-type: none"> Check that the output and bypass input circuit breakers on each rack are ON. Check that bypass input and output power cables on each rack meet the length requirements. Rectify any bypass SCR open-circuit.

Alarm ID (Alarm ID- Cause ID)	Alarm Name	Severity	Cause	Solution
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"> Check that the bypass output frequency does not change fast. 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"> Check the dual bus connector. Check the parameter settings. The master BSC system is not supplying power.
0102-1	Maint. breaker misoperation	Critical	The user operation is incorrect.	<ol style="list-style-type: none"> Shut down the inverter and then close the maintenance circuit breaker. After maintenance, open the maintenance circuit breaker and then start the inverter.
0380	In self-check	Warning	The inverter is in self-check.	Wait until the inverter self-check is complete.

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