UPS2000-G-6KRTLL

User Manual

Issue	03
Date	2024-11-10

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About This Document

Purpose

This document describes the UPS2000-G-6KRTLL in terms of its features, performance specifications, appearance, structure, working principles, installation, operation, and maintenance. UPS is short for uninterruptible power system.

NOTE

- The UPS applies only to commercial and industrial use, rather than medical facilities and life support equipment.
- Figures provided in this document are for reference only.

Intended Audience

This document is intended for:

- Technical support engineers
- Hardware installation engineers
- Commissioning engineers
- Maintenance engineers

Symbol Conventions

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

Symbol	Description
DANGER	Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
WARNING	Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

Symbol	Description
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

Issue	Date	Description
03	2024-11-10	Updated **5.1 Checking Before Power-On**.
02	2022-06-30	• Updated "Control Panel" (the initial password is 000001) and added "Alarm Handling." • Updated "Operations" and optimized the figures in the operation procedure. • Added figures for installing PE cables. For details, see "Installation."
01	2020-08-06	This issue is the first official release.

Contents

1 Safety Information

Statement

Before transporting, storing, installing, operating, using, and/or maintaining the equipment, read this document, strictly follow the instructions provided herein, and follow all the safety instructions on the equipment and in this document. In this document, "equipment" refers to the products, software, components, spare parts, and/or services related to this document; "the Company" refers to the manufacturer (producer), seller, and/or service provider of the equipment; "you" refers to the entity that transports, stores, installs, operates, uses, and/or maintains the equipment.

The **Danger**, **Warning**, **Caution**, and **Notice** statements described in this document do not cover all the safety precautions. You also need to comply with relevant international, national, or regional standards and industry practices. **The Company shall not be liable for any consequences that may arise due to violations of safety requirements or safety standards concerning the design, production, and usage of the equipment.**

The equipment shall be used in an environment that meets the design specifications. Otherwise, the equipment may be faulty, malfunctioning, or damaged, which is not covered under the warranty. The Company shall not be liable for any property loss, personal injury, or even death caused thereby.

Comply with applicable laws, regulations, standards, and specifications during transportation, storage, installation, operation, use, and maintenance.

Do not perform reverse engineering, decompilation, disassembly, adaptation, implantation, or other derivative operations on the equipment software. Do not study the internal implementation logic of the equipment, obtain the source code of the equipment software, violate intellectual property rights, or disclose any of the performance test results of the equipment software.

The Company shall not be liable for any of the following circumstances or their consequences:

- Equipment damage due to force majeure such as earthquakes, floods, volcanic eruptions, debris flows, lightning strikes, fires, wars, armed conflicts, typhoons, hurricanes, tornadoes, and extreme weather conditions
- Operation beyond the conditions specified in this document

- Installation or use in environments that do not comply with international, national, or regional standards
- Installation or use by unqualified personnel
- Failure to follow the operation instructions and safety precautions on the product and in the document
- Unauthorized modifications to the product or software code or removal of the product
- Damage caused during transportation by you or a third party authorized by you
- Storage conditions that do not meet the requirements specified in the product document
- Failure to comply with local laws, regulations, or related standards due to the materials and tools prepared by you
- Damage caused by your or a third party's negligence, intentional breach, gross negligence, or improper operations or damage not caused by the Company

1.1 Personal Safety

DANGER

Do not work with power on during installation. Do not install or remove a cable with power on. Transient contact between the core of the cable and the conductor will generate electric arcs or sparks, which may cause a fire or personal injury.

DANGER

Non-standard and improper operations on the energized equipment may cause fire or electric shocks, resulting in property damage, personal injury, or even death.

DANGER

Before operations, remove conductive objects such as watches, bracelets, bangles, rings, and necklaces to prevent electric shocks.

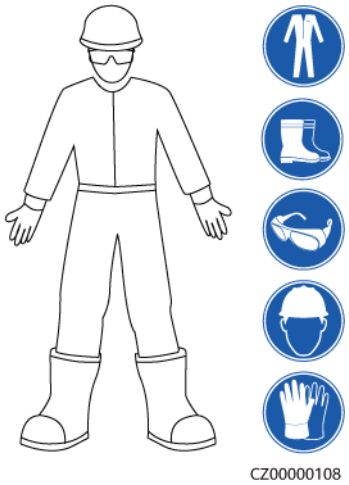
DANGER

During operations, use dedicated insulated tools to prevent electric shocks or short circuits. The insulation and voltage resistance must comply with local laws, regulations, standards, and specifications.

WARNING

During operations, wear personal protective equipment such as protective clothing, insulated shoes, goggles, safety helmets, and insulated gloves.

Figure 1-1 Personal protective equipment



General Requirements

- Do not stop protective devices. Pay attention to the warnings, cautions, and related precautionary measures in this document and on the equipment.
- If there is a likelihood of personal injury or equipment damage during operations, immediately stop, report the case to the supervisor, and take feasible protective measures.
- Do not power on the equipment before it is installed or confirmed by professionals.
- Do not touch the power supply equipment directly or with conductors such as damp objects. Before touching any conductor surface or terminal, measure the voltage at the contact point to ensure that there is no risk of electric shock.
- Do not touch a running fan with your hands, components, screws, tools, or boards. Otherwise, personal injury or equipment damage may occur.
- In the case of a fire, immediately leave the building or the equipment area and activate the fire alarm or call emergency services. Do not enter the affected building or equipment area under any circumstances.

Personnel Requirements

- Only professionals and trained personnel are allowed to operate the equipment.
  - Professionals: personnel who are familiar with the working principles and structure of the equipment, 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 trained in technology and safety, 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

- Personnel who plan to install or maintain the equipment must receive adequate training, be able to correctly perform all operations, and understand all necessary safety precautions and local relevant standards.
- 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 perform special tasks such as electrical operations, working at heights, and operations of special equipment must possess the required local qualifications.
- Only authorized professionals are allowed to replace the equipment or components (including software).
- Only personnel who need to work on the equipment are allowed to access the equipment.

1.2 Equipment Safety

1.2.1 UPS Safety

General Requirements

NOTICE

This is a category C2 UPS product. In a residential environment, this product may cause radio interference, in which case the user may be required to take additional measures.

- 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, 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.
- The UPS operating environment must meet the requirements for the climate indicator, mechanically active substance indicator, and chemically active substance indicator specified by ETSI EN 300 019-1 class 3.6.
- The UPS shall not be located in non-confined environments within 0–3.7 km away from the ocean or indoor or semi-indoor environments where the temperature and humidity are not controllable, such as shelters, civil houses, garages, corridors, and direct ventilation cabinets near the ocean; or houses with only roofs, railway station platforms, gymnasiums, and aquariums.

- It is recommended that the UPS be powered on as soon as possible after it is unpacked.
- The UPS can be used to serve resistive-capacitive loads, resistive loads, and micro-inductive loads. It is recommended that the UPS not be used for pure capacitive loads, pure inductive loads, or half-wave rectification loads. The UPS does not apply to regeneration loads.
- 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, attach 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.
- The upstream power distribution of the UPS must meet the requirements of protection against electric shock specified in IEC 60364-4-41.
- For the equipment that uses a three-pin socket, ensure that the ground terminal in the socket is connected to the protective ground point.
- A circuit breaker equipped with a residual current device (RCD) is not recommended.
- If the root mean square (RMS) of a phase voltage of the utility power exceeds 320 V AC, the UPS may be damaged.
- To ensure power supply to loads during UPS upgrade, set the output to maintenance bypass mode. To avoid power failure or load damage, ensure that the bypass input is within the specified power supply range.
- Exercise caution when manually shutting down the UPS inverter for transferring to bypass mode, or when adjusting the UPS output voltage level or output frequency. Doing so may affect the power supply to equipment.

1.2.2 Battery Safety

DANGER

Do not connect the positive and negative poles of a battery or battery string together. Otherwise, the battery may be short-circuited. Battery short circuits can generate high instantaneous current and releases a large amount of energy, which may cause battery leakage, smoke, flammable gas release, thermal runaway, fire, or explosion. To avoid battery short circuits, do not maintain batteries with power on.

DANGER

Do not expose batteries at high temperatures or around heat sources, such as scorching sunlight, fire sources, transformers, and heaters. Battery overheating may cause leakage, smoke, flammable gas release, thermal runaway, fire, or explosion.

DANGER

Protect batteries from mechanical vibration, falling, collision, punctures, and strong impact. Otherwise, the batteries may be damaged or catch fire.

DANGER

To avoid leakage, smoke, flammable gas release, thermal runaway, fire, or explosion, do not disassemble, alter, or damage batteries, for example, insert foreign matter into batteries, squeeze batteries, or immerse batteries in water or other liquids.

DANGER

There is a risk of fire or explosion if the model of the battery in use or used for replacement is incorrect. Use a battery of the model recommended by the vendor.

DANGER

Battery electrolyte is toxic and volatile. Do not get contact with leaked liquids or gases in the case of battery leakage or emission of abnormal odor. In such cases, stay away from the battery and contact professionals immediately. Professionals shall wear safety goggles, rubber gloves, gas masks, and protective clothing, power off the equipment, remove the battery, and contact technical engineers.

DANGER

A battery is an enclosed system and will not release any gases under normal operations. If a battery is used improperly, for example, burnt, needle-pricked, squeezed, struck by lightning, overcharged, or subject to other adverse conditions that may cause battery thermal runaway, the battery may be damaged or an abnormal chemical reaction may occur inside the battery, resulting in electrolyte leakage or release of gases such as CO and H_2. To prevent fire or equipment corrosion, ensure that flammable gases are properly exhausted.

DANGER

The gases generated by a burning battery may irritate your eyes, skin, and throat. Take protective measures.

WARNING

Install batteries in a dry area. Do not install them below areas prone to water leakage, such as air conditioner vents, ventilation vents, feeder windows of the equipment room, or water pipes. Ensure that no liquid enters the equipment to prevent faults or short circuits.

WARNING

Before installing and commissioning batteries, prepare fire fighting facilities, such as fire sand and carbon dioxide fire extinguishers, according to construction standards and regulations. Before putting the battery room into operation, ensure that it is equipped with a fire extinguishing system that complies with local laws and regulations, has been constructed and commissioned, and can work in automatic or manual control mode.

WARNING

Before unpacking, storage, and transportation, ensure that the packing cases are intact and correctly placed according to the labels on the packing cases. Do not place a battery upside down or vertically, lay it on one side, or tilt it. Stack the batteries according to the stacking requirements on the packing cases. Ensure that the batteries do not fall or get damaged. Otherwise, they will need to be scrapped.

WARNING

After unpacking batteries, place them in the required direction. Do not place a battery with its front panel facing upwards, put it upside down, tilt it, or stack it. Ensure that the batteries do not fall or get damaged. Otherwise, they will need to be scrapped.

WARNING

Tighten the screws on copper bars or cables to the torque specified in this document. Periodically confirm whether the screws are tightened, check for rust, corrosion, or other foreign objects, and clean them up if any. Loose screw connections will result in excessive voltage drops and batteries may catch fire when the current is high.

WARNING

After batteries are discharged, charge them in time to avoid damage due to overdischarge.

Statement

The Company shall not be liable for any battery damage, personal injury, death, property loss, and/or other consequences caused by the following reasons:

- Force majeure such as earthquakes, floods, volcanic eruptions, debris flows, lightning strikes, fires, wars, armed conflicts, typhoons, hurricanes, tornadoes, and other extreme weather conditions
- The battery warranty period has expired.
- Actions that do not follow instructions in the user manual or direct advice from the Company, including but not limited to the following scenarios:
  - The onsite equipment operating environment or external power parameters do not meet the environment requirements for normal operation, for example, the actual operating temperature of batteries is too high or too low, or the power grid is unstable and experiences outages frequently.
  - Batteries are dropped or incorrectly operated or connected.
  - Batteries are overdischarged due to delayed acceptance or power-on after battery installation.
  - Battery running parameters are incorrectly set.
  - Different types of batteries, for example, batteries of different brands or rated capacities, are used together without prior approval from the Company.
  - Batteries are frequently overdischarged due to improper battery maintenance.
  - Battery use scenarios are changed without prior approval from the Company.
  - Battery maintenance is not performed according to the instructions in the user manual, for example, failing to check battery terminals regularly.
  - Batteries are not transported, stored, or charged according to the instructions in the user manual.
  - Instructions from the Company are not followed during battery relocation or reinstallation.

General Requirements

NOTICE

This is a category C2 battery product. In a residential environment, this product may cause radio interference, in which case the user may be required to take additional measures.

NOTICE

To ensure battery safety and battery management accuracy, use batteries provided by the Company. The Company is not responsible for any faults of batteries provided by other vendors.

- Before installing, operating, and maintaining batteries, read the battery vendor's instructions and comply with their requirements. The safety precautions specified in this document are highly important and require special attention. For additional safety precautions, see the instructions provided by the battery vendors.
- Use batteries within the specified temperature range. When the ambient temperature of the batteries is lower than the allowed range, do not charge the batteries to prevent internal short circuits caused during low-temperature charging.
- Do not reversely connect the positive and negative battery terminals. Otherwise, a battery alarm will be generated and batteries may be damaged.
- To prevent dust buildup that may damage the equipment, install battery modules after dust-prone operations in the equipment room are completed.
- Before unpacking batteries, check whether the packaging is intact. Do not use batteries with damaged packaging. If any damage is found, notify the carrier and manufacturer immediately.
- Do not unpack batteries in an environment where the temperature and humidity are uncontrollable. Before unpacking batteries, keep them still for 24 hours in an environment where the temperature and humidity are under control.
- In an indoor scenario, you are advised to power on a battery within seven days after unpacking. If the battery cannot be powered on in time, put it in the original packing case and place it in a dry indoor environment without corrosive gas.
- Batteries shall not be located in non-confined environments within 0–3.7 km away from the ocean or indoor or semi-indoor environments where the temperature and humidity are not controllable, such as shelters, civil houses, garages, corridors, and direct ventilation cabinets near the ocean; or houses with only roofs, railway station platforms, gymnasiums, and aquariums.
- Do not use a damaged battery (such as damage caused when a battery is dropped, bumped, bulged, or dented on the enclosure), because the damage may cause electrolyte leakage or flammable gas release. In the case of electrolyte leakage or structural deformation, contact the installer or professional O&M personnel immediately to remove or replace the battery. Do not store the damaged battery near other devices or flammable materials and keep it away from non-professionals.
- Before working on a battery, ensure that there is no irritating or burning smell around the battery.
- When installing batteries, do not place installation tools, metal parts, or sundries on the batteries. After the installation is complete, clean up the objects on the batteries and the surrounding area.

- To safeguard against water intrusion and subsequent battery carbonization, ensure that the bottom of a battery remains more than 10 cm above ground level.
- If a battery is accidentally exposed to water, do not install it. Move it to a safe place for isolation and contact technical engineers in a timely manner.
- Check whether the positive and negative battery terminals are grounded unexpectedly. If so, disconnect the battery terminals from the ground.
- Do not perform welding or grinding work around batteries to prevent fire caused by electric sparks or arcs.
- If batteries will not be used for a long period of time, store and charge them according to the battery requirements.
- Do not charge or discharge batteries by using a device that does not comply with local laws and regulations.
- Keep the battery loop disconnected during installation and maintenance.
- Monitor damaged batteries during storage for signs of smoke, flame, electrolyte leakage, or heat.
- If a battery is faulty, its surface temperature may be high. Do not touch the battery to avoid scalds.

Short-Circuit Protection

- When installing and maintaining batteries, wrap the exposed cable terminals on the batteries with insulation tape.
- Avoid foreign objects (such as conductive objects, screws, and liquids) from entering a battery, as this may cause short circuits.

Leakage Handling

NOTICE

Electrolyte overflow may damage the equipment. It will corrode metal parts and boards, and ultimately damage the boards.

Electrolyte is corrosive and can cause irritation and chemical burns. If you come into direct contact with the battery electrolyte, do as follows:

- Inhalation: Evacuate from contaminated areas, get fresh air immediately, and seek immediate medical attention.
- Eye contact: Immediately wash your eyes with water for at least 15 minutes, do not rub your eyes, and seek immediate medical attention.
- Skin contact: Wash the affected areas immediately with soap and water and seek immediate medical attention.
- Intake: Seek immediate medical attention.

Recycling

- Dispose of waste batteries in accordance with local laws and regulations. Do not dispose of batteries as household waste. Improper disposal of batteries may result in environmental pollution or an explosion.

- If a battery leaks or is damaged, contact technical support or a battery recycling company for disposal.
- If batteries are out of service life, contact a battery recycling company for disposal.
- Do not expose waste batteries to high temperatures or direct sunlight.
- Do not place waste batteries in environments with high humidity or corrosive substances.
- Do not use faulty batteries. Contact a battery recycling company to scrap them as soon as possible to avoid environmental pollution.

1.3 Electrical Safety

DANGER

Before connecting cables, ensure that the equipment is intact. Otherwise, electric shocks or fires may occur.

DANGER

Non-standard and improper operations may result in fire or electric shocks.

DANGER

Prevent foreign matter from entering the equipment during operations. Otherwise, equipment short-circuits or damage, load power derating, power failure, or personal injury may occur.

WARNING

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.

CAUTION

Do not route cables near the air intake or exhaust vents of the equipment.

CAUTION

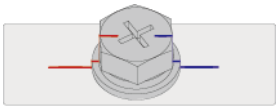
Do not directly connect aluminum cables to prevent electrochemical corrosion of copper and aluminum.

⚠ CAUTION

Stay away from the equipment when preparing cables to prevent cable scraps from entering the equipment. Cable scraps may cause sparks and result in personal injury and equipment damage.

General Requirements

- Follow the procedures described in the document for installation, operation, and maintenance. Do not reconstruct or alter the equipment, add components, or change the installation sequence without permission.
- Install temporary fences or warning ropes and hang "No Entry" signs around the operation area to keep unauthorized personnel away from the area.
- Before installing or removing power cables, turn off the switches of the equipment and its upstream and downstream switches.
- If any liquid is detected inside the equipment, disconnect the power supply immediately and do not use the equipment.
- Before performing operations on the equipment, check that all tools meet the requirements and record the tools. After the operations are complete, collect all of the tools to prevent them from being left inside the equipment.
- Before installing power cables, check that cable labels are correct and cable terminals are insulated.
- When installing the equipment, use a torque tool of a proper measurement range to tighten the screws. When using a wrench to tighten the screws, ensure that the wrench does not tilt and the torque error does not exceed 10% of the specified value.
- Ensure that bolts are tightened with a torque tool and marked in red and blue after double-check. Installation personnel mark tightened bolts in blue. Quality inspection personnel confirm that the bolts are tightened and then mark them in red. (The marks must cross the edges of the bolts.)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- After the installation is complete, ensure that protective cases, insulation tubes, and other necessary items for all electrical components are in position to avoid electric shocks.
- If the equipment has multiple inputs, disconnect all the inputs before operating the equipment.
- Before maintaining a downstream electrical or power distribution device, turn off the output switch on the power supply equipment.
- During equipment maintenance, attach "Do not switch on" labels near the upstream and downstream switches or circuit breakers as well as warning signs to prevent accidental connection. The equipment can be powered on only after troubleshooting is complete.
- If fault diagnosis and troubleshooting need to be performed after power-off, take the following safety measures: Disconnect the power supply. Check whether the equipment is live. Install a ground cable. Hang warning signs and set up fences.

- Check equipment connections periodically, ensuring that all screws are securely tightened.
- Only qualified professionals can replace a damaged cable.
- Do not scrawl, damage, or block any labels or nameplates on the equipment. Promptly replace labels that have worn out.
- Do not use solvents such as water, alcohol, or oil to clean electrical components inside or outside of the equipment.
- Wear personal protective equipment and use dedicated insulated tools to avoid electric shocks or short circuits.
- Do not use wet cloth to clean exposed copper bars or other conductive parts.

Grounding

- Ensure that the grounding impedance of the equipment complies with local electrical standards.
- Ensure that the equipment is connected permanently to the protective ground. Before operating the equipment, check its electrical connection to ensure that it is reliably grounded.
- Ensure that the protective ground point of the equipment is reliably connected to the ground screw of the metal enclosure (connection resistance: ≤ 0.1 ohms).
- Ensure that the ground resistance of the system for lightning protection is less than or equal to 10 ohms.
- Do not operate the equipment in the absence of a properly installed ground conductor.
- Do not damage the ground conductor.
- If high touch current may occur on the equipment, ground the protective ground terminal on the equipment enclosure before connecting the power supply; otherwise, electric shock as a result of touch current may occur.

Cabling

- When selecting, installing, and routing cables, follow local safety regulations and rules.
- The flame spread rating of cables shall meet the UL 1581 VW-1 or IEC 60332-3-22 (ZB) or higher requirements.
- When routing power cables, ensure that there is no coiling or twisting. Do not join or weld power cables. If necessary, use a longer cable.
- Ensure that all cables are properly connected and insulated, and meet specifications.
- Ensure that the slots and holes for routing cables are free from sharp edges, and that the positions where cables are routed through pipes or cable holes are equipped with cushion materials to prevent the cables from being damaged by sharp edges or burrs.
- If a 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.
- Ensure that cables of the same type are bound together neatly and straight and that the cable sheath is intact. When routing cables of different types, ensure that they are at least 30 mm away from each other.

- If the external conditions (such as the cable layout or ambient temperature) change, verify the cable usage in accordance with the IEC-60364-5-52 or local laws and regulations. For example, check that the current-carrying capacity meets requirements.
- When routing cables, reserve at least 30 mm clearance between the cables and heat-generating components or areas. This prevents deterioration or damage to the cable insulation layer.
- 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 below 0°C must be stored at room temperature for more than 24 hours before they are laid out.
- Do not perform any improper operations, for example, dropping cables directly from a vehicle. Otherwise, the cable performance may deteriorate due to cable damage, which affects the current-carrying capacity and temperature rise.

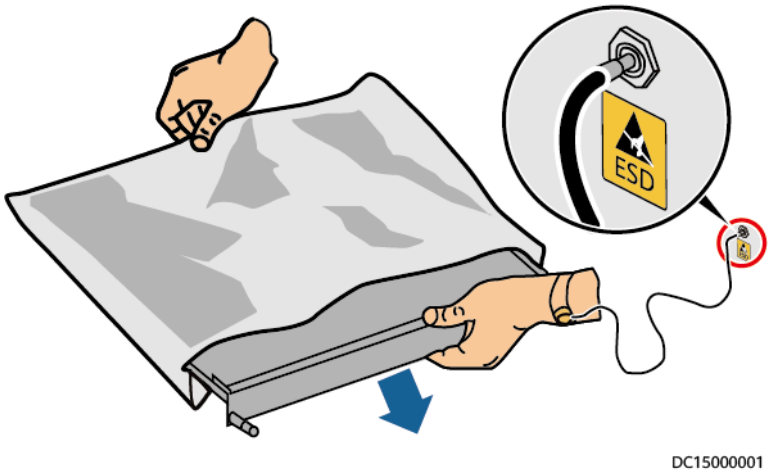
ESD

NOTICE

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

- When touching the equipment and handling boards, modules with exposed circuit boards, or application-specific integrated circuits (ASICs), observe ESD protection regulations and wear ESD clothing and ESD gloves or a well-grounded ESD wrist strap.

Figure 1-2 Wearing an ESD wrist strap



- When holding a board or a module with exposed circuit boards, hold its edge without touching any components. Do not touch the components with bare hands.
- Package boards or modules with ESD packaging materials before storing or transporting them.

1.4 Environmental Requirements

DANGER

Do not expose the equipment to flammable or explosive gas or smoke. Do not perform any operation on the equipment in such environments.

DANGER

Do not store any flammable or explosive materials in the equipment area.

DANGER

Do not place the equipment near heat sources or fire sources, such as smoke, candles, heaters, or other heating devices. Overheat may damage the equipment or cause a fire.

WARNING

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.

WARNING

To prevent damage or fire due to high temperature, ensure that the ventilation vents or heat dissipation systems are not obstructed or covered by other objects while the equipment is running.

General Requirements

- Ensure that the equipment is stored in a clean, dry, and well ventilated area with proper temperature and humidity and is protected from dust and condensation.

- Keep the installation and operating environments of the equipment within the allowed ranges. Otherwise, its performance and safety will be compromised.
- 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, performing outdoor installation, and opening doors) in harsh weather conditions such as lightning, rain, snow, and level 6 or stronger wind.
- Do not install the equipment in an environment with direct sunlight, dust, smoke, volatile or corrosive gases, infrared and other radiations, organic solvents, or salty air.
- Do not install the equipment in an environment with conductive metal or magnetic dust.
- Do not install the equipment in an area conducive to the growth of microorganisms such as fungus or mildew.
- Do not install the equipment in an area with strong vibration, noise, or electromagnetic interference.
- Ensure that the site complies with local laws, regulations, and related standards.
- Ensure that the ground in the installation environment is solid, free from spongy or soft soil, and not prone to subsidence. The site must not be located in a low-lying land prone to water or snow accumulation, and the horizontal level of the site must be above the highest water level of that area in history.
- Before opening doors during the installation, operation, and maintenance of the equipment, clean up any water, ice, snow, or other foreign objects on the top of the equipment to prevent foreign objects from falling into the equipment.
- When installing the equipment, ensure that the installation surface is solid enough to bear the weight of the equipment.
- Ensure that the equipment room provides good heat insulation, and that the walls and floor are dampproof.
- Install protective devices at the door of the equipment room to prevent rodents and insects from entering the room.
- After installing the equipment, remove idle packing materials such as cartons, foam, plastics, and cable ties from the equipment area.
- Do not perform construction that will adversely affect the operating environment of the equipment during equipment operation, such as construction that generates dust, scraps, water mist, strong vibration, and corrosive materials. If such construction cannot be avoided, power off the equipment and take protective measures before the construction. Power on the equipment after the construction is complete and the construction site is cleaned up.

1.5 Mechanical Safety

WARNING

Ensure that all necessary tools are ready and inspected by a professional organization. Do not use tools that have signs of scratches or fail to pass the inspection or whose inspection validity period has expired. Ensure that the tools are secure and not overloaded.

WARNING

Before installing equipment in a cabinet, ensure that the cabinet is securely fastened with a balanced center of gravity. Otherwise, tipping or falling cabinets may cause bodily injury and equipment damage.

WARNING

When pulling equipment out of a cabinet, be aware of unstable or heavy objects in the cabinet to prevent injury.

WARNING

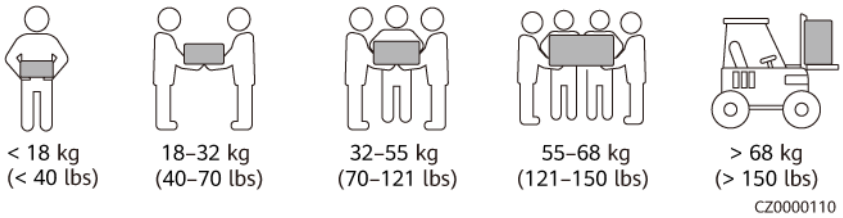
Do not drill holes into the equipment. Doing so may affect the sealing and electromagnetic interference shield performance of the equipment and damage components or cables inside. Metal shavings from drilling may short-circuit boards inside the equipment.

General Requirements

- Repaint any paint scratches caused during equipment transportation or installation in a timely manner. Equipment with scratches cannot be exposed for an extended period of time.
- Do not perform operations such as arc welding and cutting on the equipment without evaluation by the Company.
- Do not install other devices on the top of the equipment without evaluation by the Company.
- When performing operations above the equipment, take measures to protect the equipment against damage.
- Use correct tools and operate them in the correct way.

Moving Heavy Objects

- Be cautious to prevent injury when moving heavy objects.



- If multiple persons need to move a heavy object together, determine the manpower and work division with consideration of height and other conditions to ensure that the weight is evenly distributed.
- If two persons or more move a heavy object together, ensure that the object is lifted and landed simultaneously and moved at a uniform pace under the supervision of one person.
- Wear personal protective gears such as protective gloves and shoes when manually moving the equipment.
- To move an object by hand, approach the object, squat down, and then lift the object slowly and stably by the force of the legs instead of your back. Do not lift it suddenly or turn or twist your body.
- Move or lift the equipment by holding its handles or lower edges. Do not hold the handles of modules that are installed in the equipment.
- Slowly lift a heavy object above your waist. Place the object on a workbench that is half-waist high or any other appropriate place, adjust the positions of your palms, and then lift it.
- Move a heavy object stably with balanced force at an even and low speed. Put down the object stably and slowly to prevent any collision or drop that may cause scratches on the surface of the equipment or damage to the components and cables.
- When moving a heavy object, be aware of the workbench, slope, staircase, and slippery places. When moving a heavy object through a door, ensure that the door is wide enough to move the object and avoid bumping or injury.
- When transferring a heavy object, move your feet instead of twisting your waist. When lifting and transferring a heavy object, ensure that your feet point to the target direction of movement.
- When transporting the equipment using a forklift truck, ensure that the forks are properly positioned so 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 sea or roads in good conditions for transportation. Do not transport batteries by railway or air. Avoid tilt or jolt during transportation.

2 Purpose

2.1 Model Description

This document describes the following UPS model.

Table 2-1 UPS model

Model	Represented By	Remarks
UPS2000-G-6KRTLL	6 kVA	This model is abbreviated to a 6 kVA UPS in this document.

Figure 2-1 UPS model number

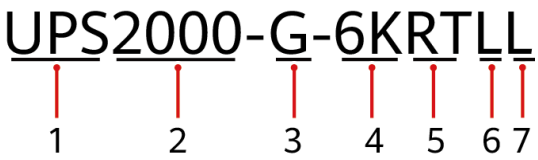


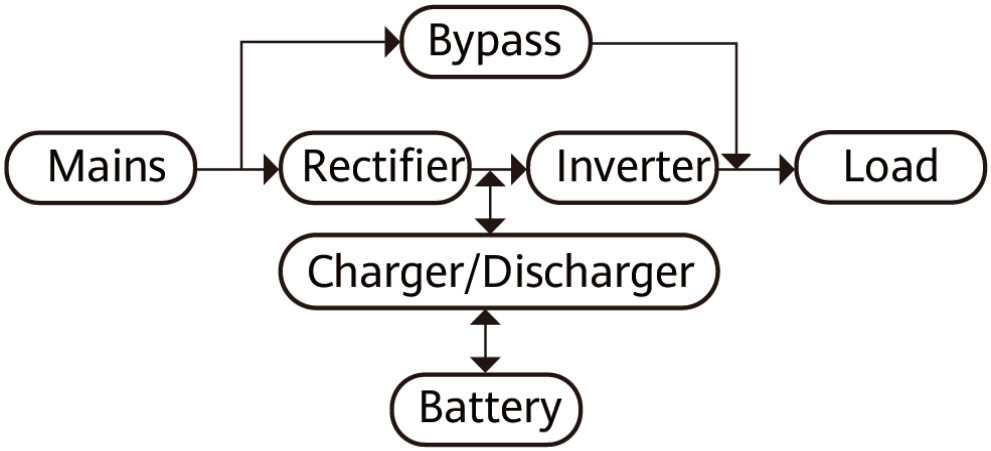
Table 2-2 UPS model number details

No.	Meaning	Description
1	Product category	UPS: uninterruptible power system
2	Product family	2000
3	Product series	G: series name
4	Output capacity	6K: 6 kVA

No.	Meaning	Description
5	UPS type	RT: rack-mounted or tower-mounted
6	Long backup time model	L: long backup time model, using external large-capacity batteries that provide long backup time
7	External battery type	L: LFP battery

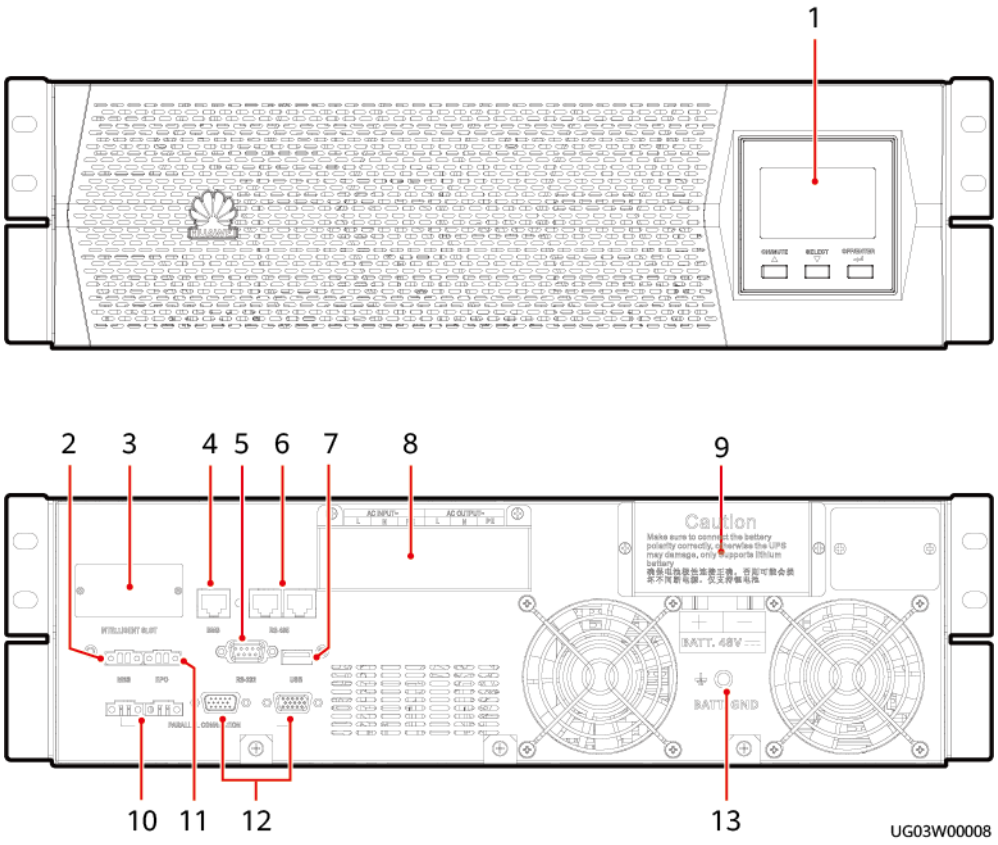
2.2 Working Principle

Figure 2-2 Conceptual diagram



2.3 Product Structure

Figure 2-3 Front and rear views of a 6 kVA UPS



(1) Liquid crystal display (LCD)	(2) Maintenance bypass (MBS) port	(3) Optional card slot (reserved)
(4) Battery management system (BMS) port	(5) RS232 communications port[b]	(6) RS485 communications ports (connect to northbound devices)
(7) USB port[a]	(8) AC input and output terminals (behind the cover)	(9) Battery wiring terminal (behind the cover)
(10) Parallel current equalization port	(11) Emergency power-off (EPO) port	(12) Parallel communications ports
(13) Battery PE terminal		

NOTE

- The RS485 port supports only the Modbus RTU protocol.
- The USB port and RS232 port cannot be used at the same time.

  a: The USB port supports the serial port communications protocol. The USB port can be used to export logs and send serial port commissioning commands.

  b: The RS232 port supports the serial port communications protocol. The RS232 port can be used to export logs, send serial port commissioning commands, and upgrade the UPS main power program online.

2.4 Communications Ports

Figure 2-4 RS232 port pins

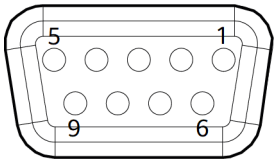


Table 2-3 RS232 port pin definitions

Pin	Meaning
1	Reserved
2	UPS transmit terminal for RS232 data communication
3	UPS receive terminal for RS232 data communication
4	Reserved
5	Common terminal for RS232 data communication
6–9	Reserved

Figure 2-5 RS485/BMS port pins

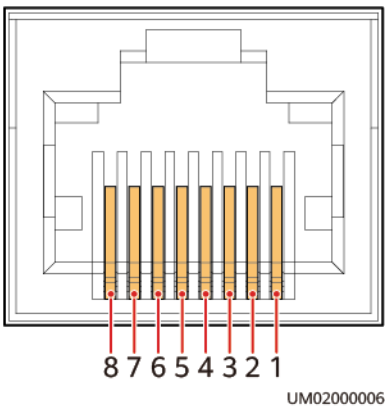


Table 2-4 RS485 port pin definitions

Pin	Signal	Meaning	Description
1–3	NC	Reserved	Northbound port, two-wire RS485 communication Support the baud rate of 9600 bit/s. There is no parity check and end bit for the communications address, which can be set under item #18. For details, see *UPS2000-G-(1–6K)RTLL Modbus Background Communications Protocol Development Guide*.
4	A	Data+	
5	B	Data–	
6	NC	Reserved	
7	NC	Reserved	
8	GND	Signal ground	

Table 2-5 BMS port pin definitions

Pin	Signal	Meaning	Description
1	A	Data+	The UPS communicates with the lithium battery over a standard network cable. Support the baud rate of 9600 bit/s.
2	B	Data–	
3	NC	Reserved	
4	A	Data+	
5	B	Data–	
6	NC	Reserved	
7	NC	Reserved	
8	GND	Signal ground	

2.5 Battery Module

The UPS uses 48 V lithium battery modules to provide backup power. Only the ESM-48100B1 and ESM-48150B1 are applicable to the 6 kVA UPS. The 100 Ah and 150 Ah ESMs have the same panels and ports but different dimensions.

Figure 2-6 ESM-48100B1/48150B1 panel and ports

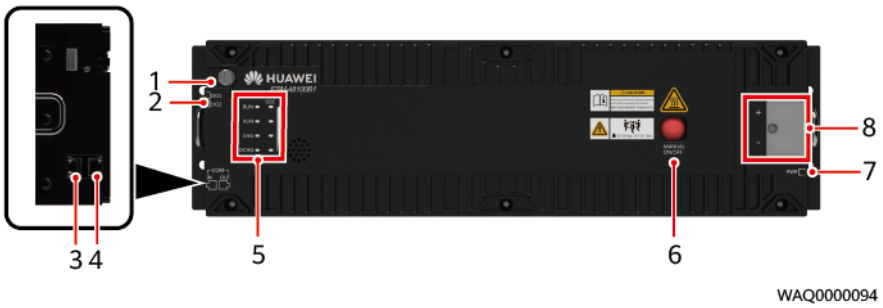


Table 2-6 Port pin definitions

No.	Silk Screen	Name	Description
1	GND	Protective ground	M6 screw
2	DO1 DO2	ESM digital output (DO)	Reserved
3	COM_IN	Communications port	1. The ports are used for information reporting and communication cascading. 2. The ports use RJ45 terminals and provide the 1000 A surge protection capability.
4	COM_OUT	Communications port	
5	RUN	Running indicator	For details about indicator functions, see the LED indicator description.
	ALM	Alarm indicator	
	CHG	Charge indicator	
	DCHG	Discharge indicator	
	SOC	State of charge (SOC) indicator	
6	MANUAL ON/OFF	Button for manual power-on/off	This is a contact button used for manual power-on/off and maintenance.
7	PWR	ESMU port for connecting to an external power source	Reserved

No.	Silk Screen	Name	Description
8	+	ESM positive terminal	Positive and negative ports of the ESM. They are secured by M6 screws. Appropriate OT terminals should be used. The required torque is 4.5–5.5 N·m and the recommended cable cross-sectional area is 25 mm^2. If the ESM is used at a temperature below 45°C, the cable cross-sectional area can be smaller but should be at least 16 mm^2.
	-	ESM negative terminal	

LED Indicators

Figure 2-7 LED indicators

Table 2-7 LED indicator description

Silk Screen	Meaning	Color	Description
RUN	Running indicator	Green	Steady on: Communication is normal (including board startup, self-check, software loading, and board power-on when not loaded; excluding sleep when the input/output power port or activation port is energized). Off: The ESM is in sleep mode. Blinking fast: Communication is interrupted.
ALM	Fault indicator	Red	Steady on: There is a fault or major alarm. Off: There is no fault or major alarm.
CHG	Charge indicator	Green	Steady on: The ESM is being charged. Off: The ESM is open-circuited or discharging.

Silk Screen	Meaning	Color	Description
DCHG	Discharge indicator	Green	Steady on: The ESM is discharging. Off: The ESM is open-circuited or being charged.
SOC	SOC indicators	Green	1. 0–24% SOC 25% indicator: blinking Other SOC indicators: off 2. 25%–49% SOC 25% indicator: steady on 50% indicator: blinking Other SOC indicators: off 3. 50%–74% SOC 25% indicator: steady on 50% indicator: steady on 75% indicator: blinking 100% indicator: off 4. 75%–99% SOC 25% indicator: steady on 50% indicator: steady on 75% indicator: steady on 100% indicator: blinking 5. 100% SOC The four SOC indicators are steady on.

Note:

- Major alarm: The ESM needs to be maintained immediately.
- Minor alarm: The ESM does not require maintenance, but sends a reminder to remote maintenance personnel.
- Blinking slowly: on for 1s and then off for 1s.
- Blinking fast: on for 0.125s and then off for 0.125s
- If the SOC indicators are off and other indicators are blinking, the ESM enters the maintenance mode.
- When the ESM is in sleep mode, the fault indicator is off except for reverse-connection protection.

Activation and Startup

An ESM can be activated in the following two modes. After being activated, the ESM switches from sleep mode to disconnected mode.

- Activation through the MANUAL ON/OFF button: Hold down the MANUAL ON/OFF button on the ESM panel for at least 5s and less than 15s.

- Activation through the power port: Supply a DC input voltage of 43.2–58 V (50 Ah), 43.2–58 V (100 Ah), or 43.2–59 V (150 Ah) to the power terminal on the front panel for at least 5s.

NOTE

- The MANUAL ON/OFF button is a contact button. The interval for pressing the button should be greater than 0.5s; otherwise, the operation is ineffective.
- If you have powered off the ESM that is in charging, discharging, or disconnected mode by holding down the MANUAL ON/OFF button, you need to hold down this button again to reactivate the ESM.
- If the UPS is configured with 48 V lithium batteries, other optional components and independent communications with lithium batteries are not supported.

3 Installation

3.1 Installation Preparations

Floor Loading Capacity

The floor should be able to bear the weight of the UPS and its optional components. In the case of rack-mounted installation, ensure that the floor can also bear the weight of the rack.

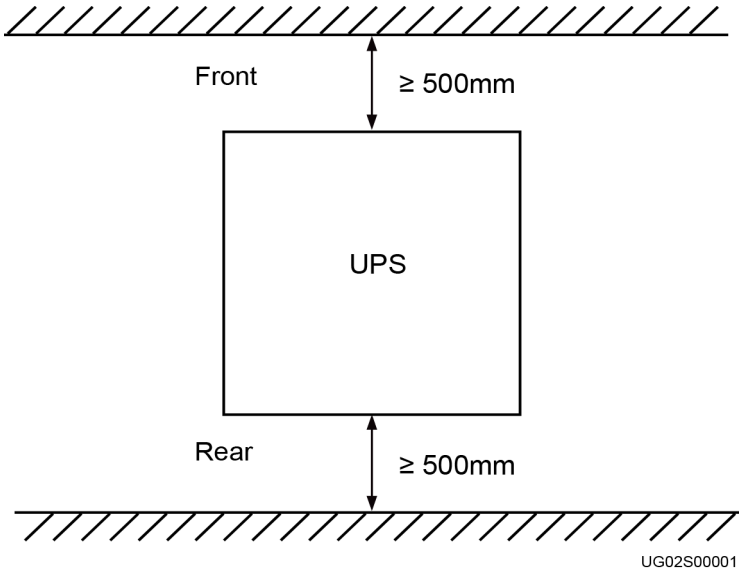
Installation Environment

- Do not install the UPS in a high-temperature, low-temperature, or damp place that is beyond the technical specifications.
- Keep the UPS far away from water, heat sources, and flammable and explosive substances. Install the UPS in an environment free of dust, volatile gas, salt, and corrosive materials. Avoid direct sunlight.
- Do not install the UPS in environments with conductive metal scraps in the air.
- The optimal operating temperatures for 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.
- If the installation environment is poor, take dustproof measures (for example, use a dust cover) after unpacking to prevent equipment damage due to dust buildup inside it.
- If the installation environment is poor, take anti-condensation measures after unpacking and keep the air conditioner running. Do not store the equipment in an environment where the temperature and humidity are uncontrollable for a long period of time. Otherwise, the equipment may be damaged due to condensation.

Installation Clearances

Reserve a clearance of at least 500 mm from the front and rear of the chassis.

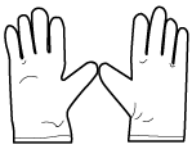
Figure 3-1 Clearances



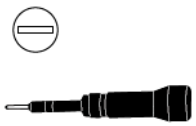
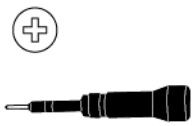
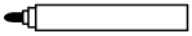
3.2 Tools

The onsite operation personnel can select tools based on the site requirements.

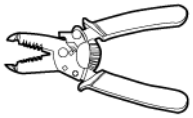
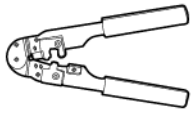
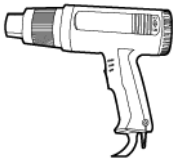
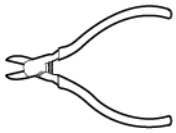
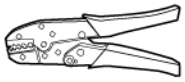
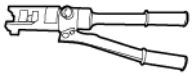
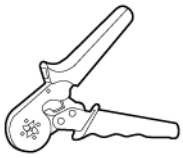
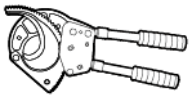
Personal protective equipment

 Safety helmet	 Goggles	 Protective shoes	 Reflective vest
 ESD gloves	 Insulated gloves	 Protective gloves	-

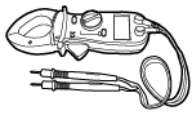
Hardware installation tools

 Flat-head insulated torque screwdriver (2 mm)	 Phillips insulated torque screwdriver (M4/M6)	 Utility knife	 Marker

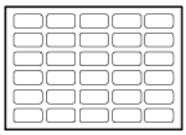
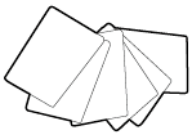
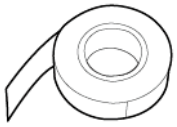
Cable installation tools

 Wire stripper	 RJ45 crimping tool	 Electro-hydraulic pliers	 Heat gun
 Diagonal pliers	 Crimping tool	 Hydraulic pliers	 Cord end terminal crimping tool
 Cable cutter	-	-	-

Measurement instruments

 Clamp meter	 Multimeter	 Network tester	-

Engineering auxiliary materials

 Label	 Cable tie	 Cotton cloth	 Heat-shrink tubing
 Insulation tape	-	-	-

Other tools

 Electrician's knife	 Tweezers	 Brush	 Vacuum cleaner

3.3 Installing a UPS

Rack-Mounted Installation

NOTE

- Reserve 1 U space in the middle of four batteries for routing battery power cables.
- Reserve 50 mm space between the battery communications port and the cabinet for installing communications cables.
- Reserve 44 mm space between the battery edge and the rack edge for installing battery power cables.
- In rack-mounted installation scenarios, the front panels of the UPS and lithium batteries are not on the same plane.
- The guide rails for the UPS2000-6KRTLL are 592.37–807.37 mm long, 30 mm wide, and 87 mm high. The guide rails are scalable and support Huawei M-shaped cabinets.
- If the equipment will not be powered on after installation, take dustproof measures (for example, use a dust cover) to prevent equipment damage due to dust buildup inside it. Remove the dust cover only when the equipment is ready for operation.
- After the installation is complete, take anti-condensation measures and keep the air conditioner running. Do not store the equipment in an environment where the temperature and humidity are uncontrollable for a long period of time. Otherwise, the equipment may be damaged due to condensation.

1. Install the mounting ears on both sides of the UPS.
2. Install the guide rails on the rack, and then install the UPS and batteries with mounting ears on the rack.

Figure 3-2 Rack-mounted installation (two UPSs and four lithium batteries)

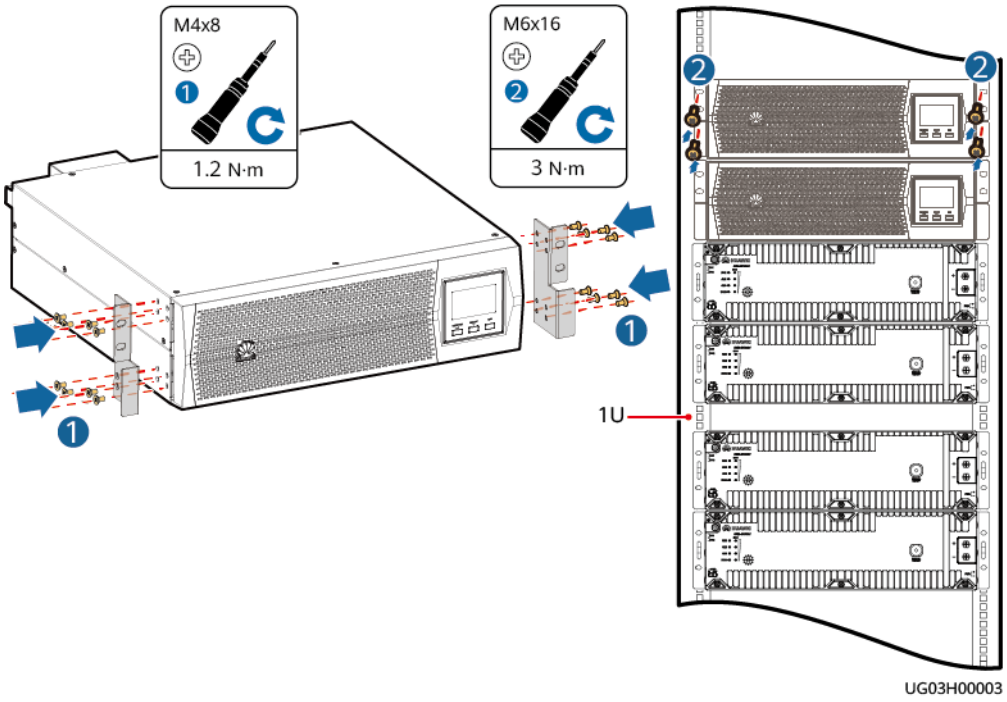
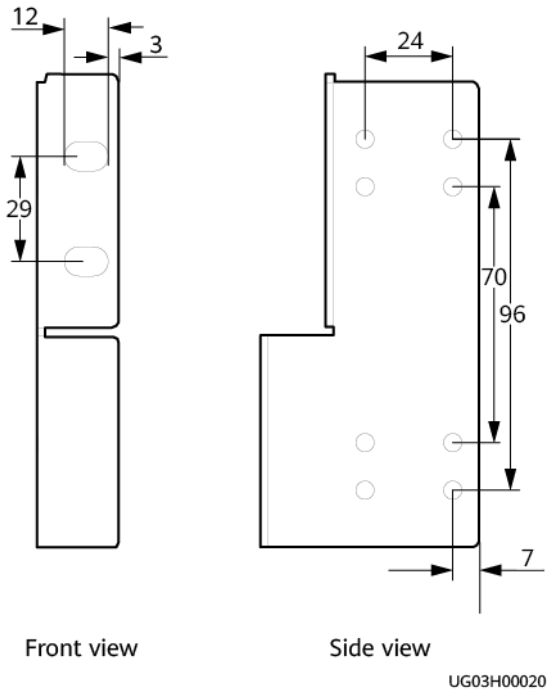


Figure 3-3 UPS mounting ear dimensions (unit: mm)



3.4 Preparing Power Cables

NOTICE

- You are advised to install a disconnector for the UPS input.
- A 2-pole disconnector must be used if the UPS is used to power IT systems.
- The UPS can generate large leakage currents. A residual current device (RCD) is not recommended. If leakage protection is required, select a recommended circuit breaker.
- The leakage current of the 6 kVA UPS is less than 100 mA.
- When selecting an earth leakage circuit breaker, consider the leakage current of the UPS and downstream loads.
- Battery cables should not be longer than 10 m.
- For the 6 kVA model, use PE cables that have a cross-sectional area of 6 mm^2 and 6 mm^2 M4 OT terminals.
- The UPS battery input terminal has a voltage of 56 V 10 seconds before batteries are connected.

Table 3-1 Recommended power cable specifications

Model	Wiring Terminal	Number of Phases	Rated Voltage	External Circuit Breaker	Cable Cross-sectional Area	Terminal Type	Torque for Tightening Screws
6 kVA	AC input and output	1	220 V AC/230 V AC/240 V AC	32 A (type D)	6 mm^2	OT-6 mm^2-M5 terminal	2 N·m
	Battery	-	48 V DC	125 A (type D)	25 mm^2	OT-25 mm^2-M8 terminal	7 N·m

NOTE

- If customers purchase input and output power cables by themselves, use the cables that comply with standards proposed by the Underwriters Laboratories (UL) or International Electrotechnical Commission (IEC).
- When selecting, connecting, and routing power cables, follow local safety regulations and rules.

3.5 Installing Cables for a Single UPS

3.5.1 Installing Cables

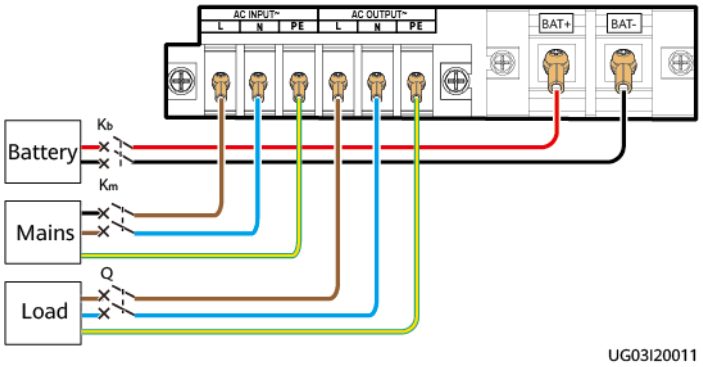
Procedure

Step 1 Switch off the upstream AC circuit breaker for the UPS.

Step 2 Remove the AC input, output, and battery terminal covers from the UPS.

Step 3 Install AC output power cables, AC input power cables, and battery cables in sequence.

Figure 3-4 AC input, output, and battery wiring diagram



NOTE

K_m indicates the general AC input circuit breaker, Q indicates the general AC output circuit breaker, and K_b indicates the battery circuit breaker.

----End

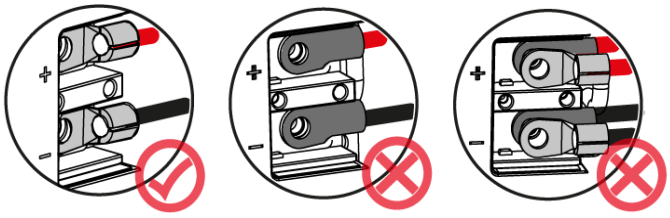
3.5.2 Installing Battery Cables

Prerequisites

CAUTION

- When installing a power cable to the lithium battery, ensure that the protruding part of the OT terminal on the cable faces outwards.
- Do not connect two or more cables to the positive or negative power port of the batteries in parallel.

Figure 3-5 Installing battery power cables



NOTE

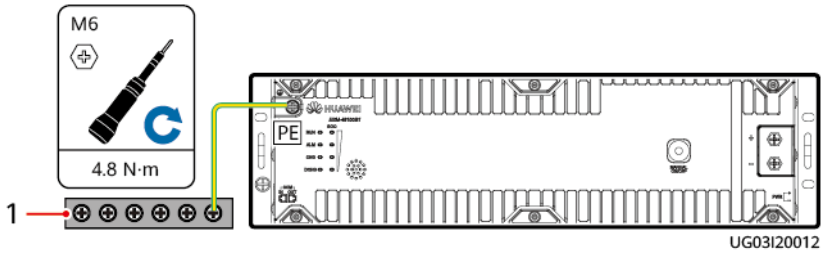
- The UPS2000-G-6KRTLL needs to connect to external lithium batteries. Each UPS supports a maximum of 16 batteries connected in parallel. This document uses four lithium batteries connected in parallel as an example.
- If the UPS connects to only one lithium battery, the maximum load power is 4.0 kW.
- When lithium batteries are connected, it is recommended that a DC circuit breaker (150 A/80 V DC circuit breaker for the 6 kVA UPS) be installed between the lithium batteries and the UPS.
- Before connecting cables to the UPS, ensure that the battery circuit breakers are OFF to prevent operations with power on.
- If the UPS connects to multiple batteries, configure the PE bar and battery busbar.
- If busbar terminals are insufficient, cascade the busbars.
- Busbar dimensions (H x W x D): 76 mm x 465 mm x 70 mm

Procedure

Step 1 Remove the battery terminal covers.

Step 2 Connect the PE cable to the cabinet ground bar.

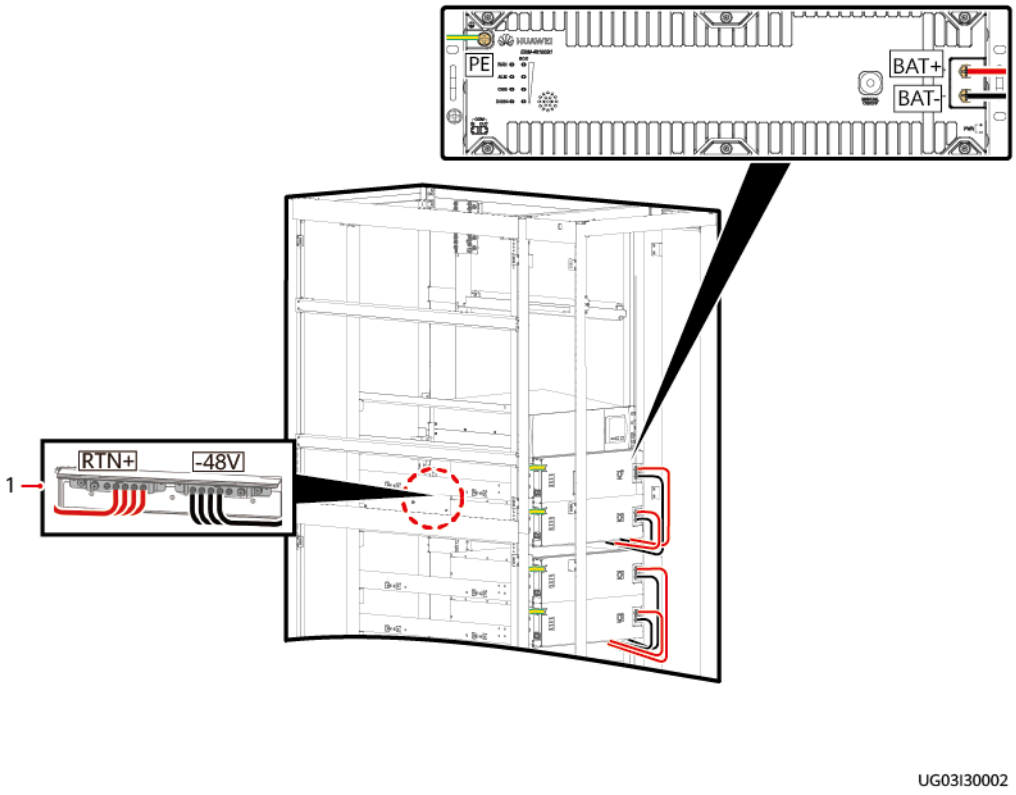
Figure 3-6 Installing the battery PE cable



(1) Ground bar

Step 3 Install positive and negative battery cables.

Figure 3-7 Installing battery cables (rack-mounted, front view)



(1) Busbar

Figure 3-8 Installing battery cables (rack-mounted, rear view)

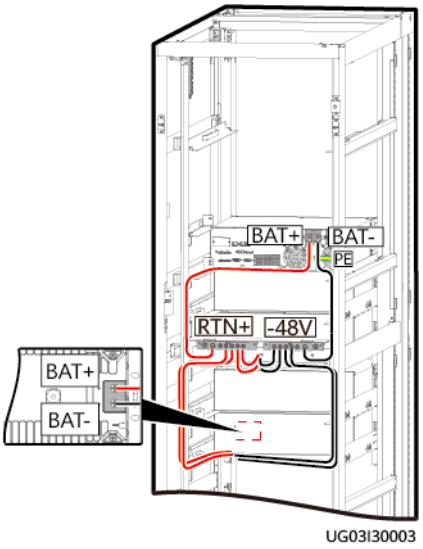
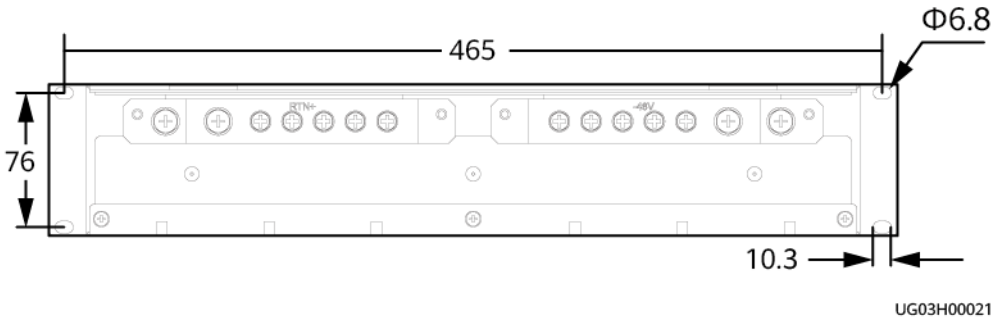


Figure 3-9 Busbar mounting hole dimensions (unit: mm)



----End

3.5.3 Installing Communications Cables

Procedure

Step 1 Install communications cables.

Step 2 Install a build-out resistor at the COM_OUT port on the last lithium battery.

Figure 3-10 Installing battery communications cables

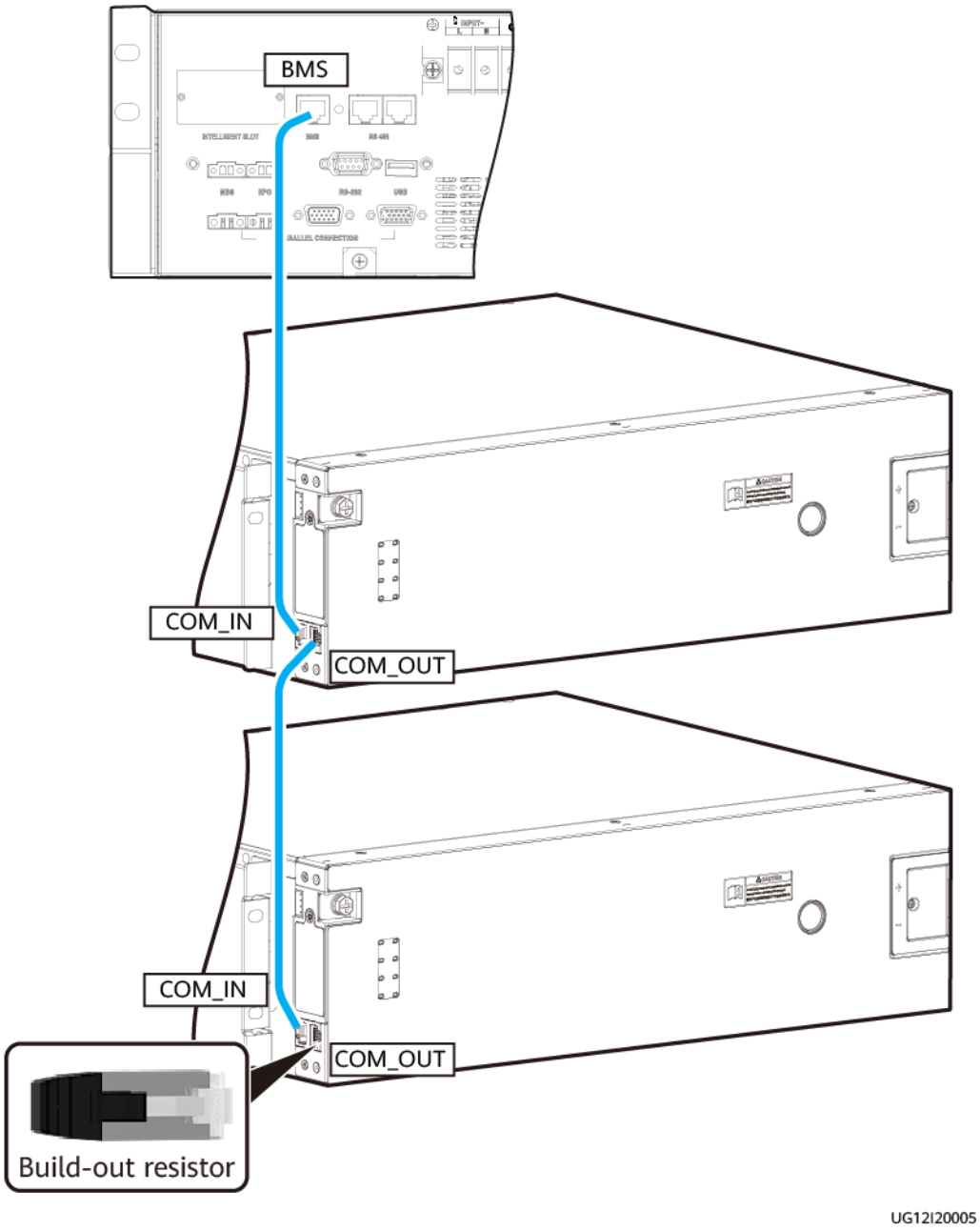
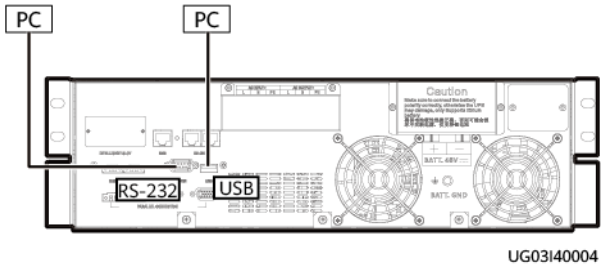


Figure 3-11 Installing communications cables



NOTE

- The USB channel supports serial data communications between the UPS and the PC.
- The RS232 port supports serial data communications between the UPS and the PC over the DB9 port.
- You can use either USB or RS232.

----End

3.6 Installing Cables for Parallel UPSs

Prerequisites

NOTICE

- Before parallel running, ensure that all output circuit breakers for each UPS are ON. Otherwise, a UPS fault (error code #72) will occur.
- Batteries must be connected for parallel running.

3.6.1 Installing AC Power Cables

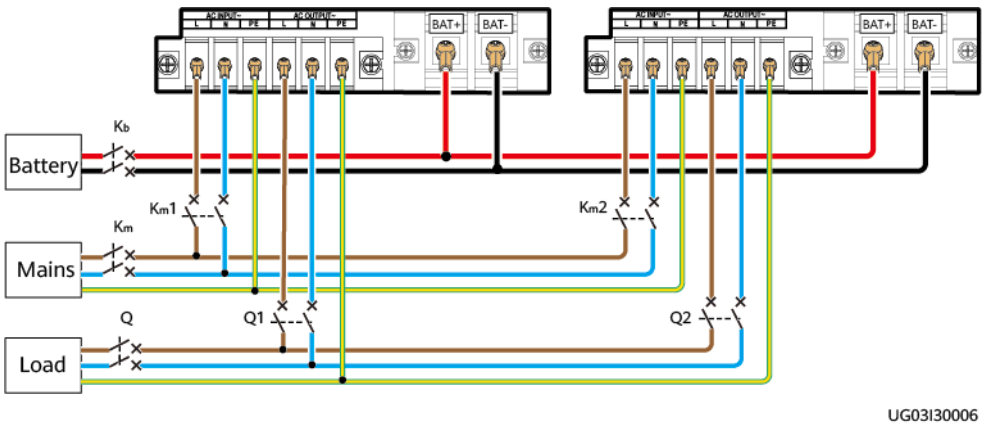
Procedure

Step 1 Switch off the upstream AC circuit breakers for the UPSs.

Step 2 Remove the AC input and output terminal covers from each UPS.

Step 3 Install AC output power cables and then AC input power cables in sequence.

Figure 3-12 Connecting AC input and AC output power cables (two parallel UPSs sharing batteries)



NOTE

K_m indicates the general AC input circuit breaker, K_m1 indicates the UPS 1 input circuit breaker, K_m2 indicates the UPS 2 input circuit breaker, Q indicates the general AC output circuit breaker, Q1 indicates the UPS 1 output circuit breaker, Q2 indicates the UPS 2 output circuit breaker, K_b indicates the general battery circuit breaker, K_b1 indicates the UPS 1 battery circuit breaker, and K_b2 indicates the UPS 2 battery circuit breaker.

----End

3.6.2 Installing Battery Cables

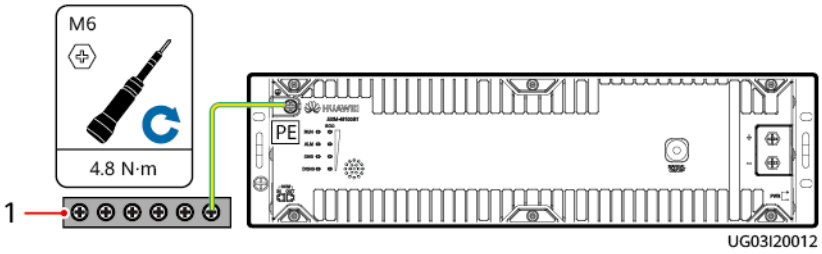
Procedure

Step 1 Switch off the upstream AC circuit breakers for the UPSs.

Step 2 Remove the battery terminal covers.

Step 3 Connect a cable between the PE terminal and the cabinet ground bar.

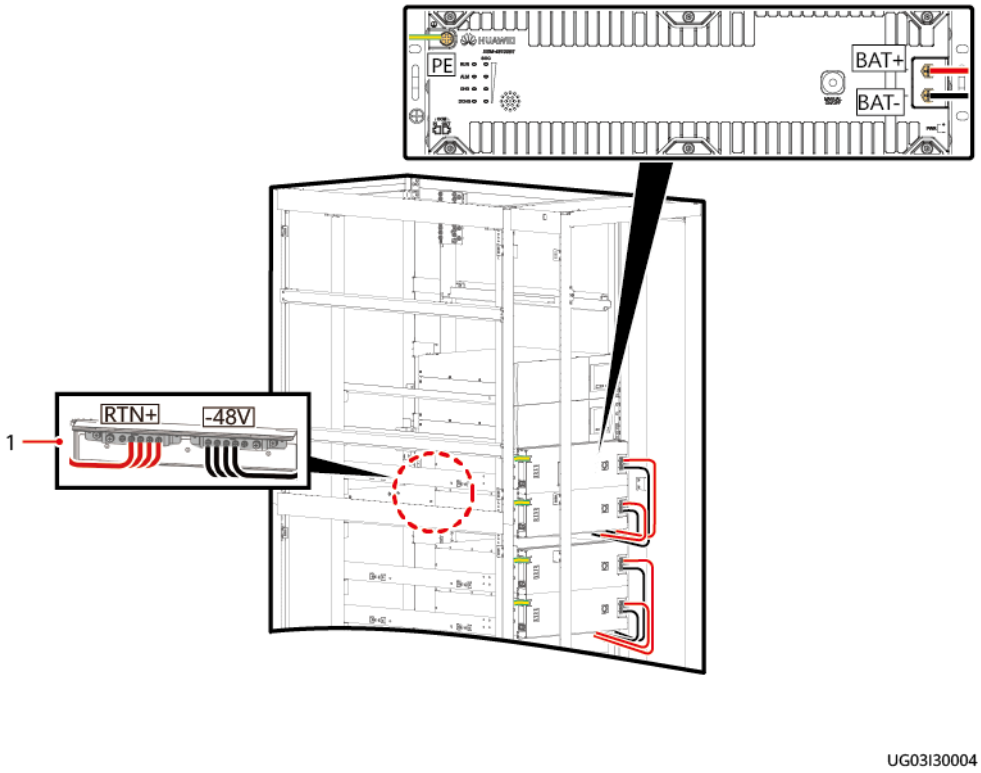
Figure 3-13 Installing the battery PE cable



(1) Ground bar

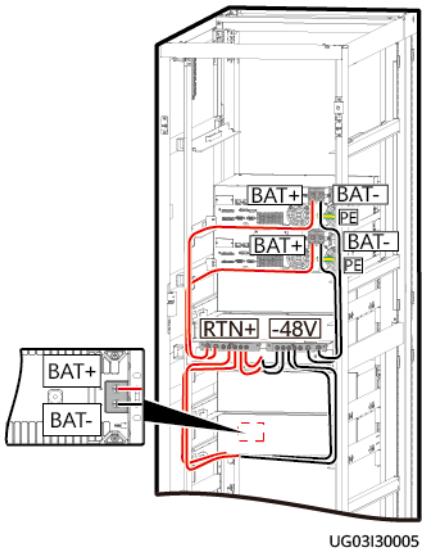
Step 4 Install positive and negative battery cables.

Figure 3-14 Installing battery cables (rack-mounted, front view)



(1) Busbar

Figure 3-15 Installing battery cables (rack-mounted, rear view)



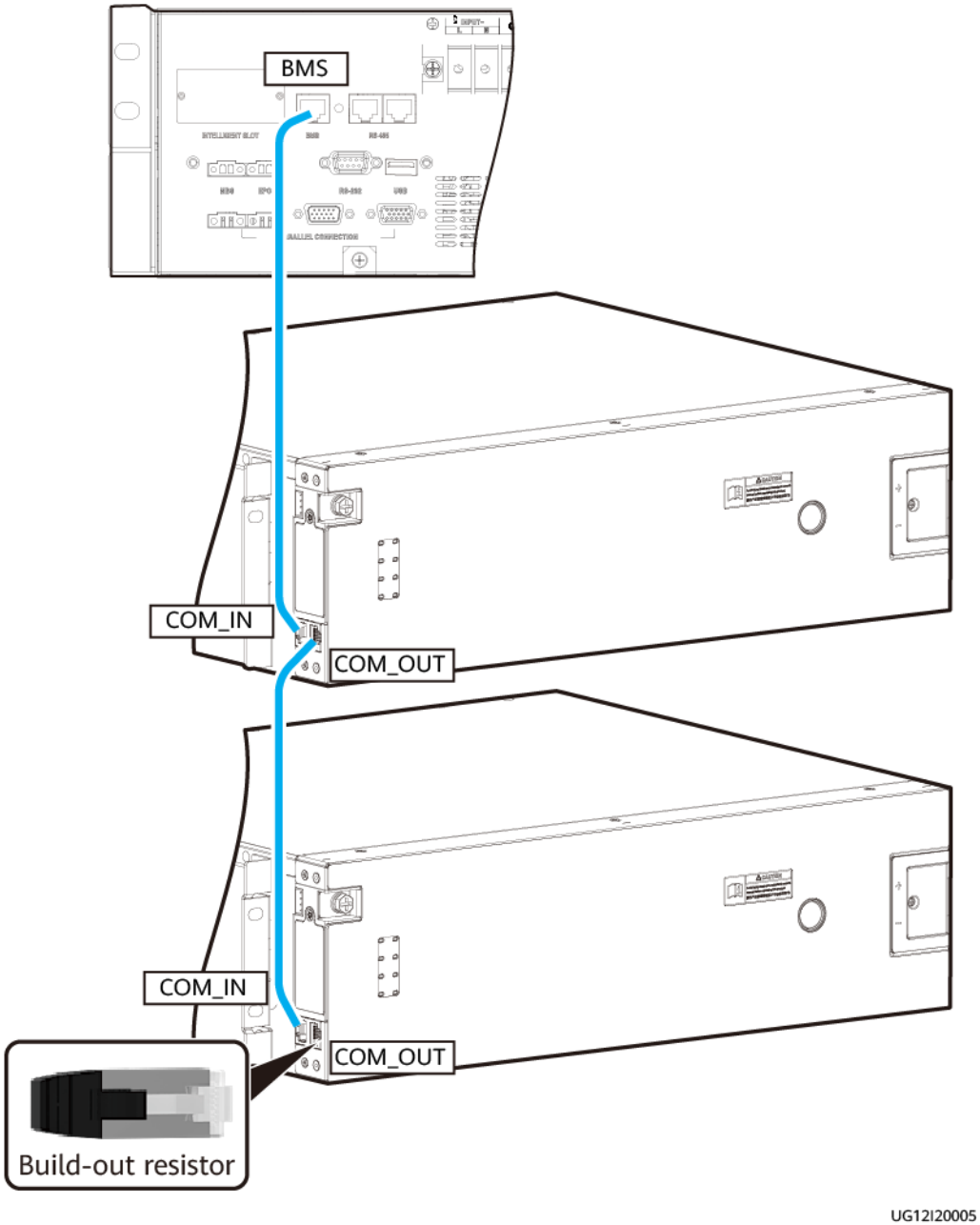
----End

3.6.3 Installing Communications Cables

Procedure

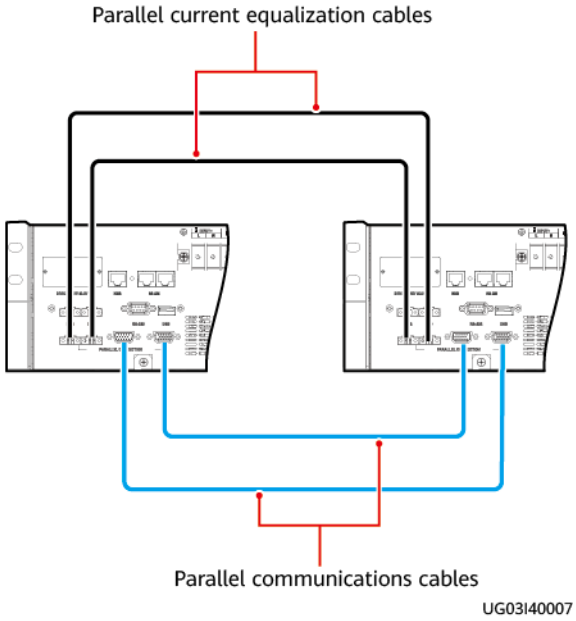
Step 1 Install battery communications cables and install a build-out resistor at the COM_OUT port on the last lithium battery.

Figure 3-16 Installing battery communications cables



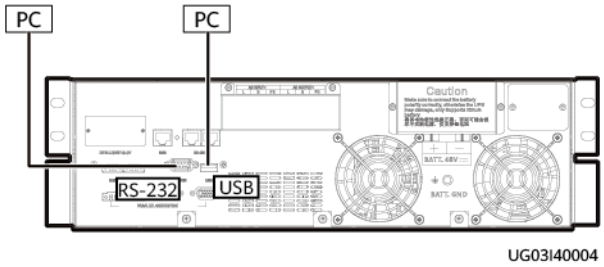
Step 2 Install parallel communications cables and parallel current equalization cables.

Figure 3-17 Installing parallel communications cables and parallel current equalization cables



Step 3 Install communications cables.

Figure 3-18 Installing communications cables



NOTE

- The USB channel supports serial data communications between the UPS and the PC.
- The RS232 port supports serial data communications between the UPS and the PC over the DB9 port.
- You can use either USB or RS232.

----End

3.7 Verifying the Installation

Table 3-2 Post-installation checklist

No.	Item	Expected Result
1	Cable routing	Cables are routed properly according to engineering requirements.

No.	Item	Expected Result
2	Cable connection	All cables are connected securely and correctly, and they are free of damage. Bolts are tightened to specified torque using a torque wrench.
3	Cable connection to USB, network, and other ports	Signal cables to USB, network, and other ports are connected securely and correctly.
4	Cable labels	Labels are neatly attached to both ends of each cable, and the information on the labels is concise and legible.
5	Ground cable connection	The UPS ground cable is securely connected to the equipment room ground bar. Use a multimeter to measure the resistance between the UPS ground cable and the equipment room ground bar. The resistance is less than 0.1 ohm.
6	Spacing between cable ties	Distances between cable ties are the same, and no burr exists.
7	Operating environment	The inside and outside of the cabinet are free from conductive dust or other sundries.

4 Control Panel

4.1 LCD Introduction

The UPS control panel is located on the front panel of the chassis. The control panel allows you to control and operate the UPS, view the running status, set parameters, and view alarms.

4.1.1 LCD Panel

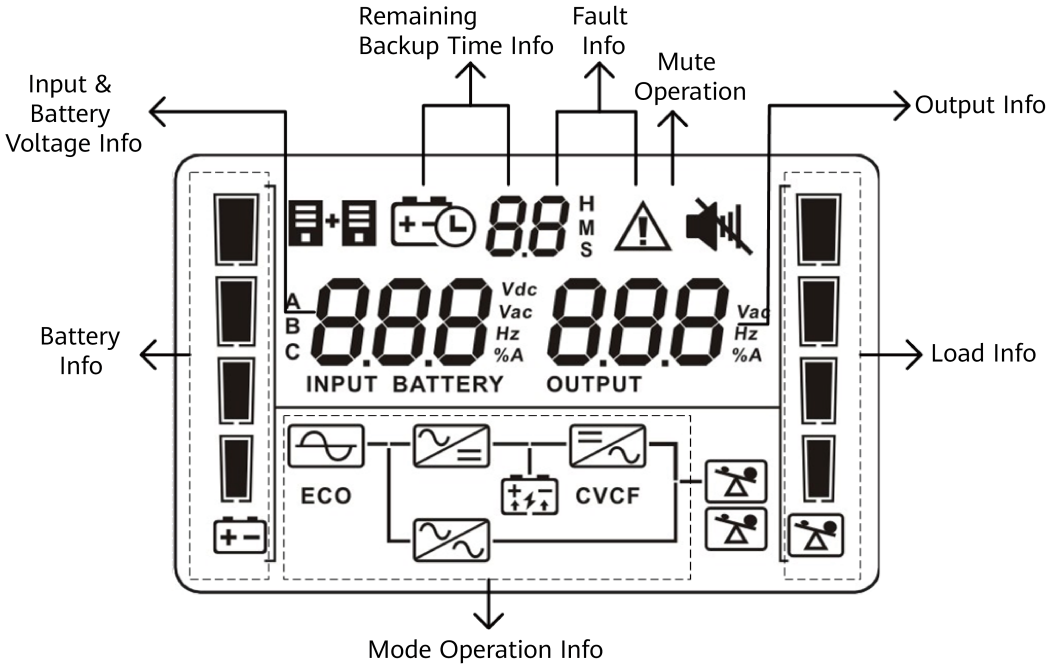
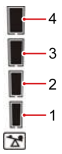
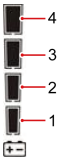


Table 4-1 LCD panel description

Display	Function
	Displays the input voltage, input frequency, charge current, battery voltage, and battery SOC. Vac: input voltage; Vdc: battery voltage; Hz: input frequency; %: battery SOC
	Displays the current alarm and its ID.
	Displays the output voltage, output frequency, load percentage, battery discharge current, and AC discharge current. Vac: output voltage; Hz: output frequency; %: load percentage; A: output current
  Displays the current load percentage by level: 0%–24%: Indicator 1 is steady on. 25%–49%: Indicators 1 and 2 are steady on. 50%–74%: Indicators 1, 2, and 3 are steady on. 75%–100%: Indicators 1, 2, 3, and 4 are steady on.	
	Indicates that the mains is connected.
	Indicates that batteries are discharging.
	Indicates that batteries are being charged.
	Indicates that the UPS is in bypass mode.
ECO	Indicates that the UPS is in ECO mode.
	Indicates that the DC/AC inverter circuit is operating.
	Indicates that the output terminal is supplying power.

Display	Function
	 Displays the battery SOC by level: 0%–24%: Indicator 1 is steady on. 25%–49%: Indicators 1 and 2 are steady on. 50%–74%: Indicators 1, 2, and 3 are steady on. 75%–100%: Indicators 1, 2, 3, and 4 are steady on. When batteries are connected in parallel, this area displays the lowest SOC among the connected batteries.
	Indicates the remaining battery backup time. H: hour; M: minute; S: second
	• Indicates the UPS parallel connection status. • If the icon is not displayed, the UPS is in single mode.
	Indicates that the UPS is muted.

4.1.2 Buttons

Figure 4-1 Buttons on the UPS control panel

NOTE

If you do not press any button on the UPS control panel, the default screen is displayed after 60s.

Table 4-2 Button description

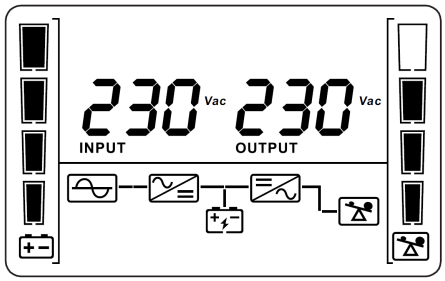
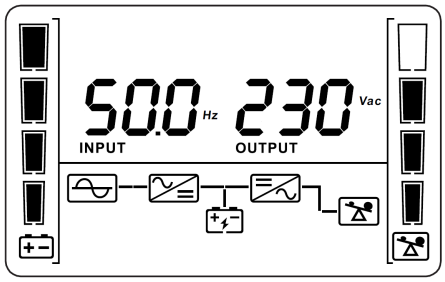
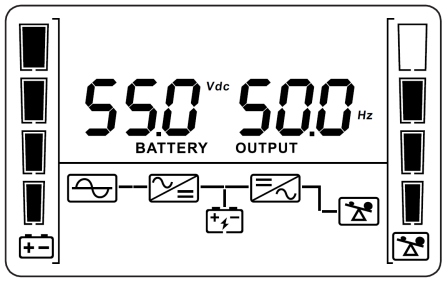
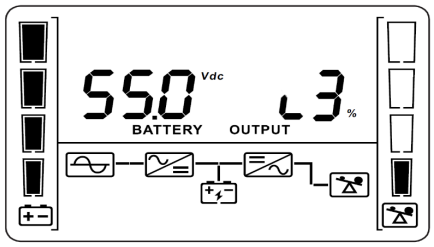
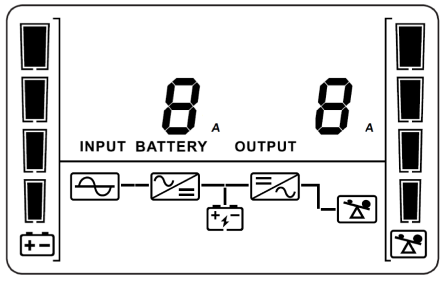
No.	Button	Function
1	ON/MUTE	• Start the UPS: Press ON/MUTE. The UPS LCD lights up. • Start the UPS inverter: Hold down ON/MUTE for more than 5s. The UPS inverter starts. • Stop the buzzer: If there is an alarm, hold down ON/MUTE for more than 2s in non-setting mode to mute the current alarm. When the UPS reports a new alarm, the mute function becomes ineffective. If you need to mute the alarm, perform the mute operation again. • Go to the previous item: When the LCD is on, press ON/MUTE to go to the previous item.

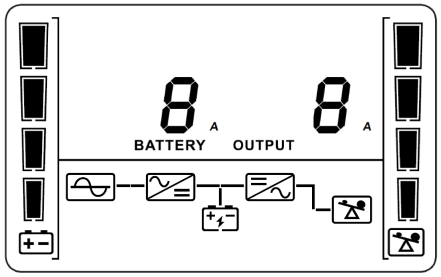
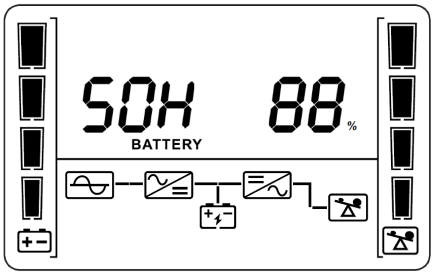
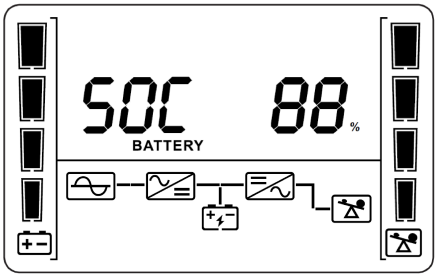
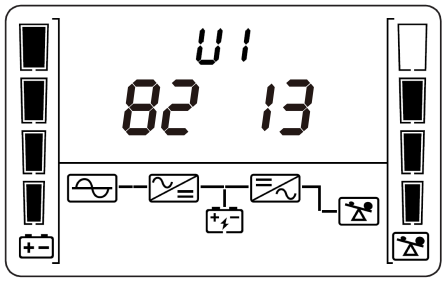
No.	Button	Function
2	SELECT	• Go to the next item: Press SELECT in setting mode to go to the next item. • Go to the setting screen: Hold down SELECT for 1s on a non-setting screen.
3	OFF/ENTER	• Shut down the UPS: Hold down OFF/ENTER for more than 5s. The UPS inverter shuts down. The UPS transfers to bypass mode when the mains is available. • Confirm: In UPS setting mode, press OFF/ENTER to confirm the selection.
4	ON/MUTE+SELECT+OFF/ENTER	Restore the initial password: Hold down ON/MUTE, SELECT, and OFF/ENTER at the same time for 3s on the password login screen.
5	ON/MUTE+SELECT	Exit: Press ON/MUTE and SELECT at the same time to exit the current screen (go to the upper-level menu from the setting screen or go to the default screen from the selection screen).

4.1.3 LCD Screen Information

You can press **SELECT** to switch the information displayed on the LCD in sequence. The information is displayed in the following sequence: input voltage, input frequency, charge current, battery voltage, output voltage, output frequency, load percentage, DC discharge current, battery SOH, battery SOC, AC discharge current, and CPU version.

Table 4-3 LCD screen information

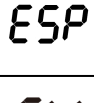
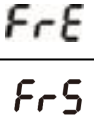
Display	Description
	Input voltage/Output voltage (default screen)
	Input frequency/Output voltage
	Battery voltage/Output frequency
	Battery voltage/Load percentage (< 3% as shown in the figure)
	Charge current/AC discharge current

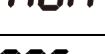
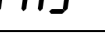
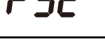
Display	Description
	Battery DC discharge current/AC discharge current
	Battery SOH
	Battery SOC
	CPU version, for example, 82.13

4.2 LCD Character Display

Table 4-4 LCD character display

Acronyms and Abbreviations	Display	Meaning
ADS	AdS	Communications address
BP	bP	Battery not connected

Acronyms and Abbreviations	Display	Meaning
BUZ		Buzzer off
CBT		Deep discharge test
CL		Maximum charge current
COV		Battery cut-off voltage
CV		Equalized charge voltage
DAY		Day
DCP		Discharge percentage
DIS		Disabled
DT		Battery discharge time
ECO		ECO mode
ENA		Enabled
Err		Error
ESC		Exit the setting mode
ESP		Automatically return to the default screen
FBT		Shallow discharge test
FLV		Float charge voltage
FrE		Frequency
FrS		Manual alarm clearance
HOU		Hour
HS		Host
MIN		Minute

Acronyms and Abbreviations	Display	Meaning
MON		Month
NE		New (not connected to the parallel system)
NUM		Set the number of parallel UPSs
PAS		Password input
rST		Restore default settings
SBT		Battery string sharing
SL		Slave
VOT		Voltage
YEA		Year
<		Less-than sign

4.3 Parameter Settings

Press and hold SELECT for 1s on a non-setting screen to access the login screen for parameter settings. The initial password is 000001. Enter the correct password to access the UPS setting mode. Press SELECT to select a parameter, and then press OFF/ENTER to confirm the setting.

If you forgot the password, press and hold ON/MUTE, SELECT, and OFF/ENTER at the same time for 3s on the password login screen to reset the password.

You will be locked out after multiple failed attempts. For details, see the following table.

Table 4-5 Mapping between incorrect password attempts and lockout duration

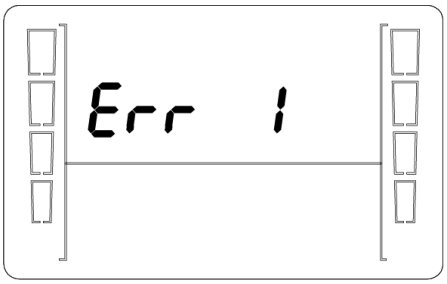
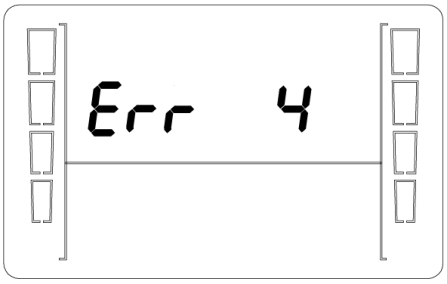
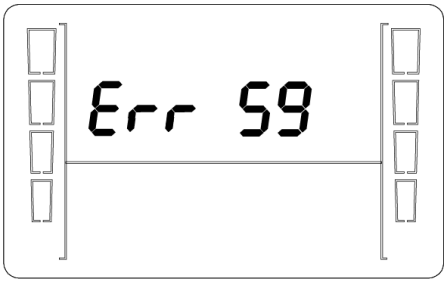
Incorrect Password Attempts	Lockout Duration	Display
3 ≤ Attempts < 5	1 minute	
5 ≤ Attempts < 10	5 minutes (4 minutes and 59 seconds are displayed as 4, and seconds are not displayed.)	
10 ≤ Attempts	60 minutes (59 minutes and 59 seconds are displayed as 59, and seconds are not displayed.)	

Figure 4-2 Entering the password (initial password: 000001)

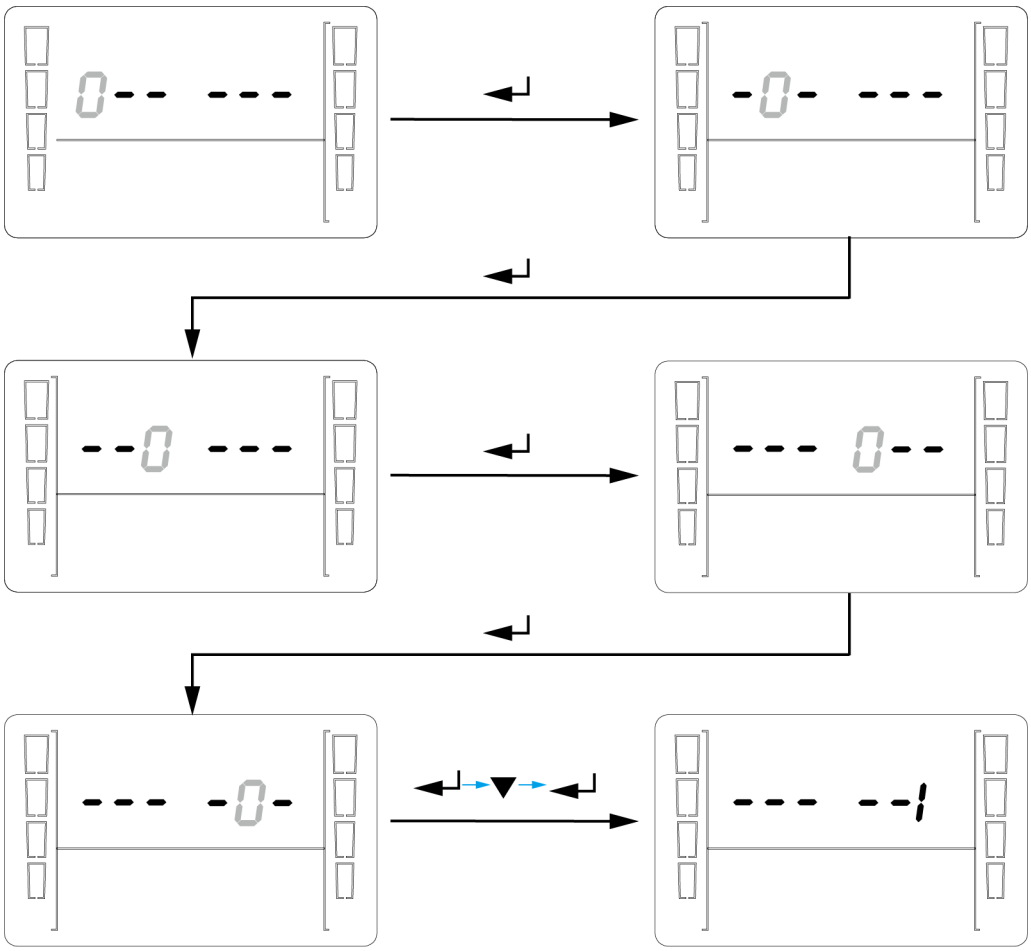
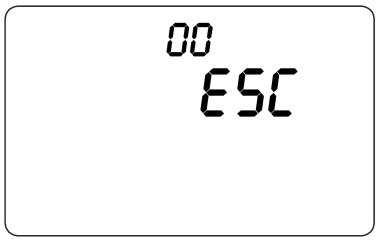
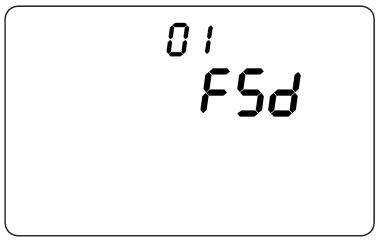
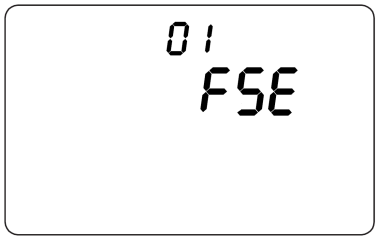
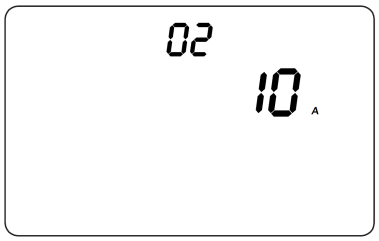
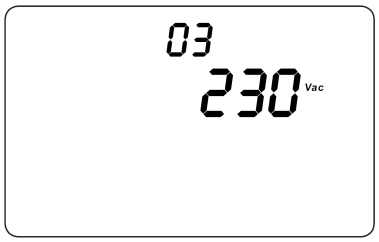
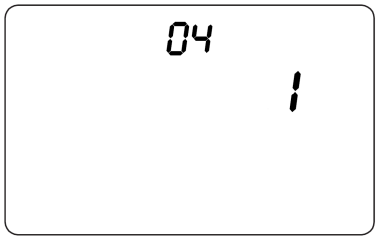
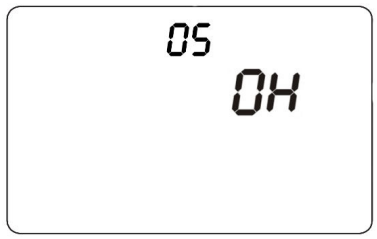
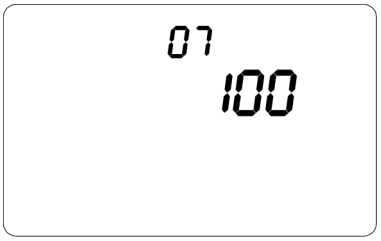
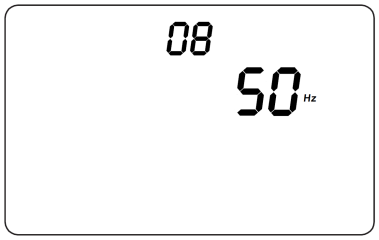
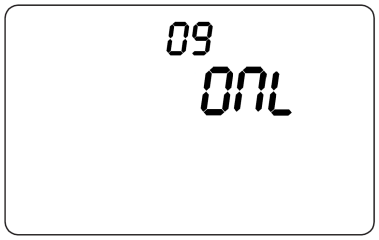
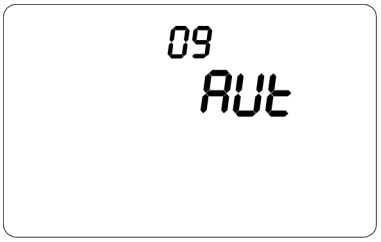
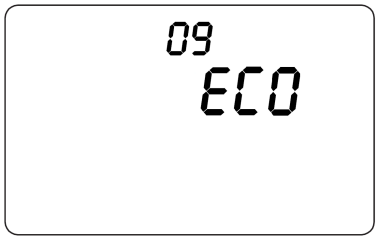
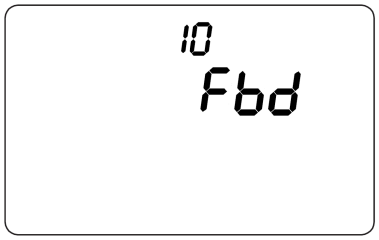
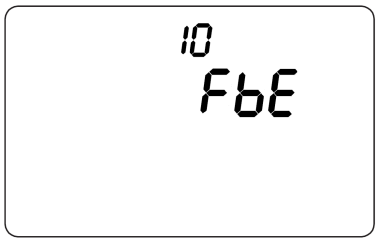
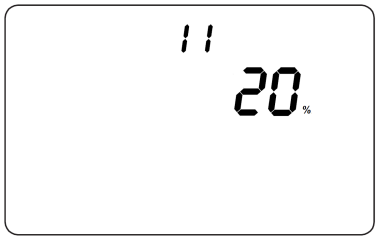
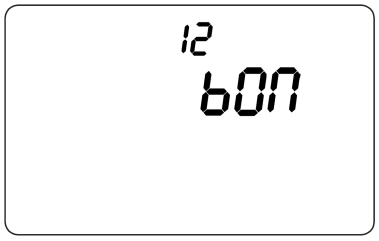
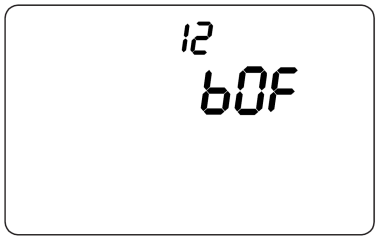


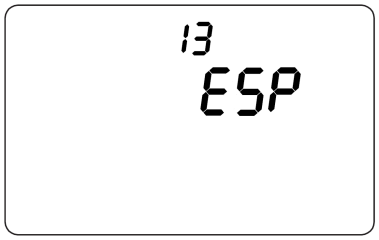
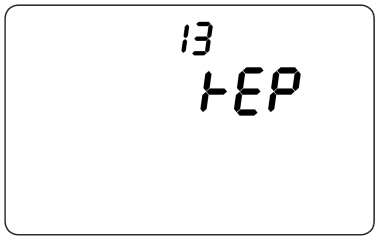
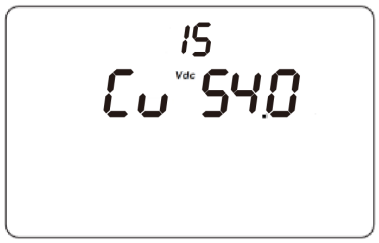
Table 4-6 Setting parameters

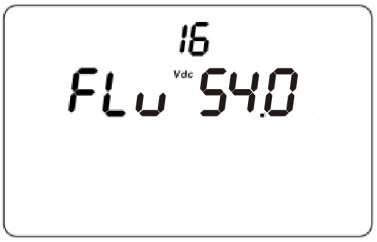
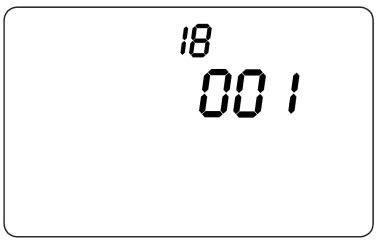
Name	Display	Description
Exiting the setting mode		ESC: Exit the setting mode.
Manual alarm clearance		FSD: manual alarm clearance (disabled by default)

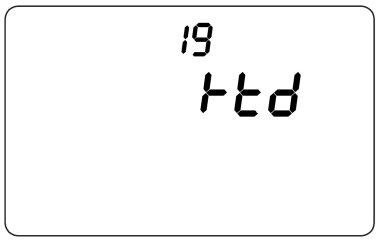
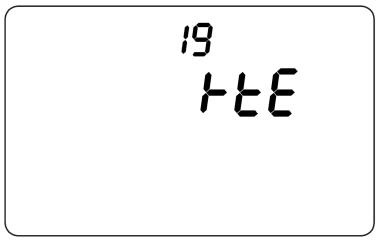
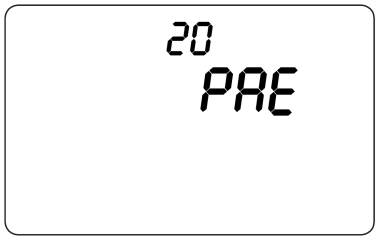
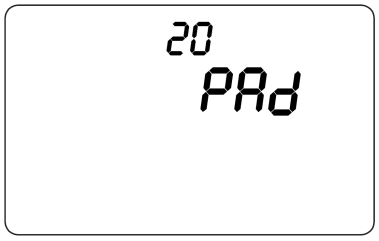
Name	Display	Description
		FSE: Manual alarm clearance enabled. Ten seconds after you exit the setting screen, the device restores the initial status of manual alarm clearance and cancels alarms.
Maximum charge current		• Default value: 10 A • Value range: 10–60 A. The value is incremented by 10 A each time you press SELECT.
Output voltage		You need to shut down the inverter before changing the output voltage. 220: The output voltage is 220 V AC. 230: The output voltage is 230 V AC (default). 240: The output voltage is 240 V AC.
Number of parallel UPSs		• Default value: 1 • Value range: 1–4
Battery discharge time		• Default value: 0 hours (indicating that this function is disabled) • Value range: 0–48 hours

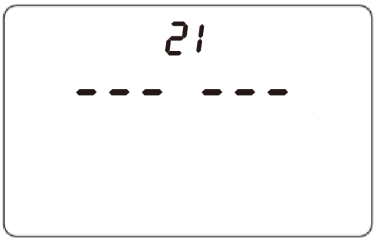
Name	Display	Description
Battery capacity		• Default value: 100 Ah • Value range: 50–2400 Ah. The value is incremented by 50 Ah each time you press SELECT. • Battery string sharing enabled: When setting the battery capacity, set the total battery string capacity for each UPS. • Battery string sharing disabled: When setting the battery capacity, set the capacity of the battery string connected to each UPS.
Output frequency		• 50 Hz (default) • 60 Hz
Operating mode		Normal mode (default): When the mains is available, the UPS works in normal mode. If the mains frequency is unstable, the UPS works in inverter mode.
		Auto mode: When the mains is available, the UPS works in normal mode. If the mains frequency is unstable, the UPS works in bypass mode.

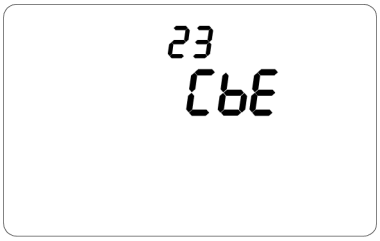
Name	Display	Description
		ECO mode: When the mains is available, the UPS works in ECO mode.
Battery discharge test		Battery discharge test disabled (default).
		Battery discharge test enabled. The battery discharge test time is controlled by the battery discharge time and SOC.
SOC		• 20% (default) • Value range: 0–100%. The value is incremented by 1% each time you press SELECT.
Buzzer		Buzzer enabled (default)
		Buzzer disabled

Name	Display	Description
Automatically return to the default screen		Return to the default screen (default): If no button is pressed within 1 minute in any mode, the default screen (input voltage/output voltage) is displayed.
		Stay on the current screen: The currently opened screen is displayed.
Equalized charge voltage		• Default value: 54.0 V • When the lithium battery communication is unavailable, the value range is 53.5–57.0 V. The value is incremented by 0.1 V each time you press SELECT. When the lithium battery communication is available, the UPS automatically adapts to the equalized charge voltage based on the connected lithium battery model. The value is fixed and cannot be changed.

Name	Display	Description
Float charge voltage		• Default value: 54.0 V • When the lithium battery communication is unavailable, the value range is 51.0–57.0 V. The value is incremented by 0.1 V each time you press SELECT. • When the lithium battery communication is available, the UPS automatically adapts to the float charge voltage based on the connected lithium battery model. The value is fixed and cannot be changed.
Low DC cut-off voltage		• Default value: 44.0 V • Value range: 44.0–46.0 V. The value is incremented by 0.1 V each time you press SELECT. The battery EOD threshold is fixed at the current value regardless of the load percentage.
Communications address		The default communications address is **001**, which is used for the RS485 communications ports (connect to northbound devices). Set different communications addresses for parallel UPSs.

Name	Display	Description
Restore default settings		Restore default settings disabled (default)
		Restore default settings enabled. The setting takes effect after you exit the setting screen.
LCD password control		LCD password control enabled (default): If the function is enabled, a password is required for accessing the settings screen.
		LCD password control disabled: If the function is disabled, no password is required for accessing the setting screen.

Name	Display	Description
Password setting		• Initial password: 000001 • You are advised to change the initial password after installation. • On the password login screen, press and hold ON/MUTE, SELECT, and OFF/ENTER at the same time for 3s to restore the initial password. • Changing the password: Press ON/MUTE or SELECT to set the first digit of the password, press OFF/ENTER to confirm the setting, set the remaining digits of the password in sequence in the same way, and press OFF/ENTER. The password is changed successfully.
Altitude-based derating		• Default value: 1000 m. When the altitude exceeds 1000 m, the output power is derated by 1% for each additional 100 m. The power can be derated down to 70%. • Value range: 1000–4000 m
Battery capacity test		Battery capacity test disabled (default)

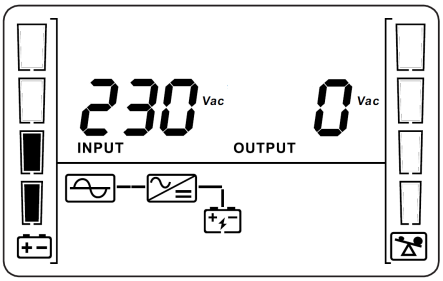
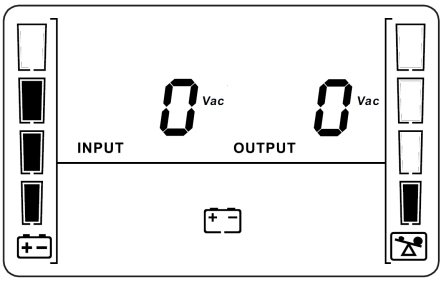
Name	Display	Description
		Battery capacity test enabled. This function can be enabled only when the battery SOC is 100%.

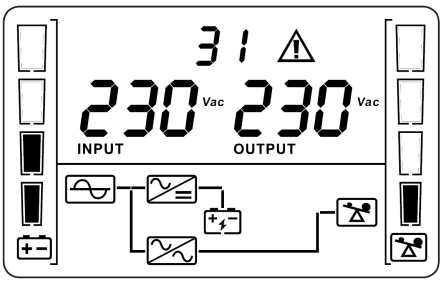
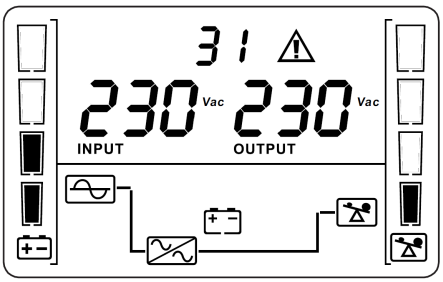
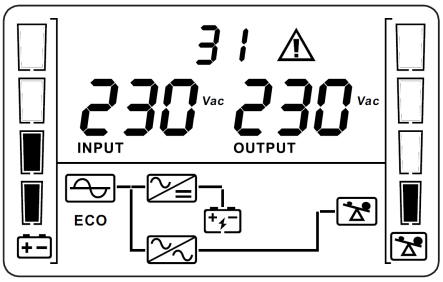
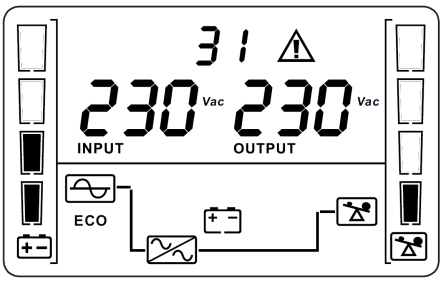
4.4 Operating Modes

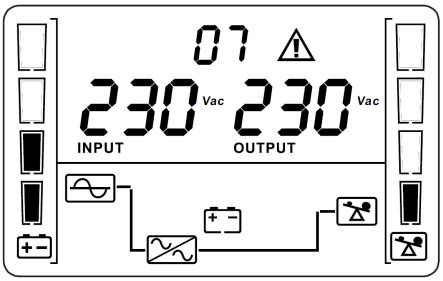
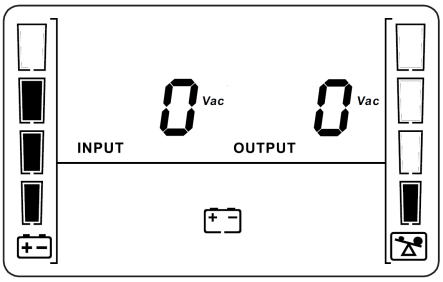
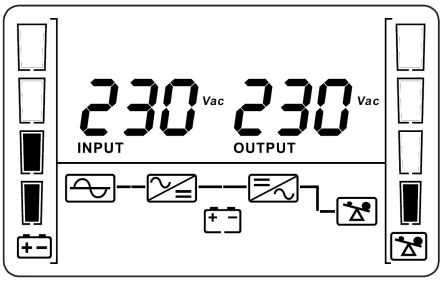
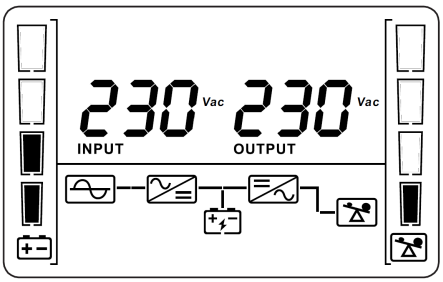
NOTICE

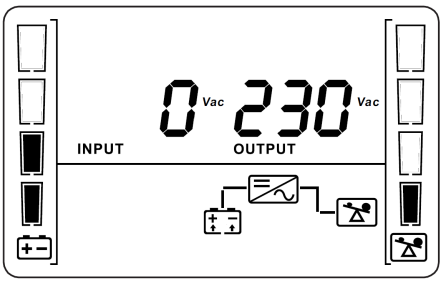
- Standby mode: The UPS is not started, but it can charge batteries when there is no AC output.
- Fault mode: The UPS enters the fault mode if there is an internal circuit fault or external fault such as overtemperature or output short-circuit.

Table 4-7 Operating mode description

Operating Mode	Description	Display
Standby mode	The UPS does not supply power, but it can still charge batteries.	Charging batteries with mains power  Not charging batteries 

Operating Mode	Description	Display
Bypass mode	The UPS supplies mains power. The mains power can be used to charge batteries.	Charging batteries with mains power 
		Not charging batteries 
ECO mode	The UPS supplies mains power. The mains power can be used to charge batteries.	Charging batteries with mains power 
		Not charging batteries 

Operating Mode	Description	Display
Fault mode	The UPS supplies mains power through the bypass.	Not charging batteries; supplying mains power through the bypass 
		Not charging batteries 
Normal mode	The UPS supplies primary power. The UPS also charges batteries if they are connected.	Not charging batteries 
		Charging batteries with mains power 

Operating Mode	Description	Display
Battery mode	The UPS supplies battery power.	Supplying only battery power 

4.5 Alarm Types

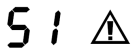
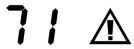
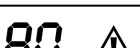
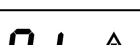
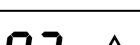
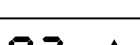
4.5.1 Critical Alarms

NOTE

- The LCD backlight automatically turns on when a critical alarm is generated.
- The buzzer keeps buzzing when there is a critical alarm. If manual alarm clearance is enabled, ten seconds after you exit the setting screen, the device restores the initial status of manual alarm clearance and cancels critical alarms.

Table 4-8 Critical alarms

Code	Display	Meaning
02	02 ⚠	Overtemperature
03	03 ⚠	Battery overvoltage
05	05 ⚠	Output short-circuit detected by the internal converter
06	06 ⚠	Output overvoltage
07	07 ⚠	Download timeout
08	08 ⚠	Bus overvoltage
09	09 ⚠	Bus soft-start failure
50	50 ⚠	PFC overcurrent

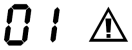
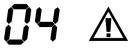
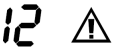
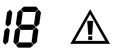
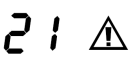
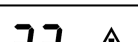
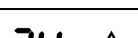
Code	Display	Meaning
51		Output overcurrent
52		Bus undervoltage
53		UPS soft-start failure
55		DC overvoltage in AC output
57		Current sensor fault
58		Output undervoltage
60		Load backfeed
71		Inconsistent parallel versions
72		Parallel current equalization fault
73		Inconsistent parallel output voltage settings
80		Parallel CAN communication fault
81		Parallel host signal lost
82		Parallel synchronization signal lost
83		Inconsistent parallel battery voltage detection
84		Inconsistent parallel mains detection
87		EPO triggered

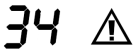
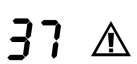
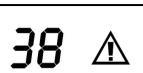
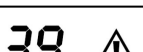
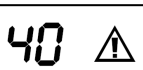
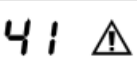
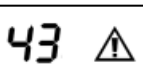
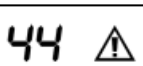
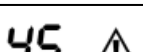
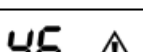
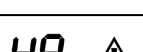
4.5.2 Minor Alarms

NOTE

- When a minor alarm is generated, the LCD automatically turns on the backlight and the buzzer sounds twice every 3s.
- If there is an alarm, press **ON/MUTE** for more than 2s in non-setting mode to mute the current alarm. When the UPS generates a new alarm, the mute function becomes ineffective. If you need to mute the alarm, perform the mute operation again.

Table 4-9 Minor alarms

Code	Display	Meaning
01		Fan locked during UPS startup
04		Battery voltage below the EOD threshold
12		Manual bypass activated
13		Phase lock failure
17		Bypass voltage or frequency abnormal
18		Low lithium battery level
19		Abnormal mains input
20		Lithium battery high temperature protection
21		Lithium battery low temperature protection
23		Lithium battery low voltage protection
24		Lithium battery overcurrent protection
27		Battery discharge test enabled
28		The battery discharge time reaches the maximum.
31		UPS working in bypass mode
32		UPS locked in bypass mode due to three transfers to bypass mode

Code	Display	Meaning
33		Overtemperature
34		Inconsistent number of parallel UPSs
35		Long-time inverter current imbalance
36		Overload
37		The inverter switch is off in ECO mode.
38		The number of started inverters is insufficient to carry the load.
39		Output in battery mode
40		Inconsistent battery capacity
41		Lithium battery high voltage protection
43		Lithium battery fault
44		Lithium battery exception protection
45		Lithium battery communication unavailable
46		Lithium battery reverse connection protection
48		ECO missing
49		Inconsistency between lithium battery capacity and battery capacity setting
59		Charger circuit overcurrent
BP		Battery not connected

4.6 Alarm Handling

Table 4-10 Alarm handling

Alarm ID	Alarm Name	Severity	Clearance Condition	Trigger Condition	Impact on the System	Suggestion
01	Fan blocked	Minor	The fan automatically recovers from blockage.	The fan blockage signal is at low level for 15s within 30s.	The current working status is not affected. If overtemperature protection is triggered, the system may transfer to bypass mode.	• Possible cause: The fan is blocked. Measure: Check the fan and remove sundries. • Possible cause: The fan is faulty. Measure: Replace the fan.

Alarm ID	Alarm Name	Severity	Clearance Condition	Trigger Condition	Impact on the System	Suggestion
02	Overtemperature	Critical	Fan blocked: The highest temperature of internal components is lower than 65°C. Fan not blocked: The highest temperature of internal components is lower than 50°C. After the temperature is restored to normal, the alarm can be automatically cleared for three times. After that, you need to manually clear the alarm.	Fan blocked: The highest temperature of internal components exceeds 90°C for 100 ms. Fan not blocked: The highest temperature of internal components exceeds 80°C for 100 ms.	The system shuts down the inverter and transfers to bypass mode.	• Possible cause: The temperature is too high. Measure: Decrease the ambient temperature or load. • Possible cause: The temperature sensor is faulty. Measure: Send the device to the maintenance center.

Alarm ID	Alarm Name	Severity	Clearance Condition	Trigger Condition	Impact on the System	Suggestion
03	High battery voltage	Critical	The alarm is automatically cleared when the battery voltage is lower than 58 V.	The battery voltage is greater than 60 V for 3s.	The system shuts down the inverter and transfers to bypass mode.	• Possible cause: The battery is faulty. Measure: Replace the battery or discharge the battery to a normal voltage. • Possible cause: The sampling is faulty due to environmental factors. Measure: Send the device to the maintenance center.

Alarm ID	Alarm Name	Severity	Clearance Condition	Trigger Condition	Impact on the System	Suggestion
04	Low battery voltage	Minor	The battery voltage is higher than the EOD threshold and the mains is connected properly.	The battery voltage is lower than the EOD threshold.	The system cannot supply power in battery mode. If this alarm is generated in battery mode, the power output will be disconnected.	• Possible cause: The battery is faulty. Measure: Replace the battery or charge the battery to a normal voltage. • Possible cause: The sampling is faulty due to environmental factors. Measure: Send the device to the maintenance center.
05	Output short-circuit	Critical	The alarm can be automatically cleared for three times. After that, you need to manually clear the alarm or restart the device.	The output voltage is lower than 50 V and the current is higher than 20 A for more than five cycles of time.	The system immediately disconnects the power output.	Possible cause: The load or cable is short-circuited. Measure: Power off the device to locate and rectify the short-circuit fault, and then power on the device.

Alarm ID	Alarm Name	Severity	Clearance Condition	Trigger Condition	Impact on the System	Suggestion
06	High output voltage	Critical	You need to manually rectify the fault or power off and restart the device.	The output voltage exceeds the rated voltage by 20 V for 3s.	The system shuts down the inverter and transfers to bypass mode.	• Possible cause: Load energy backfeed occurs. Measure: Locate the load and remove it. • Possible cause: The circuit is faulty. Measure: Send the device to the maintenance center.
07	Download timeout	Critical	You need to manually rectify the fault or power off and restart the device.	The output overload time exceeds the specification.	The system disconnects the power output.	Possible cause: The load exceeds the UPS capacity. Measure: Reduce the load.

Alarm ID	Alarm Name	Severity	Clearance Condition	Trigger Condition	Impact on the System	Suggestion
08	High bus voltage	Critical	When the bus voltage is lower than 360 V, the alarm can be automatically cleared twice. After that, you need to manually clear the fault or power off and restart the device.	The bus voltage is greater than 450 V for 200 ms or greater than 470 V for 1 ms.	The system shuts down the inverter and transfers to bypass mode.	• Possible cause: Power grid surge occurs. Measure: Improve the power grid quality. • Possible cause: The parallel cable is disconnected when UPSs are connected in parallel. Measure: Check that the parallel cable and current equalization cable are properly connected. • Possible cause: The circuit is faulty. Measure: Send the device to the maintenance center.

Alarm ID	Alarm Name	Severity	Clearance Condition	Trigger Condition	Impact on the System	Suggestion
09	Bus short-circuit	Critical	You need to manually rectify the fault or power off and restart the device.	The bus soft-start time exceeds 15s.	The system cannot start the inverter or transfer to bypass mode.	Possible cause: The circuit is faulty. Measure: Send the device to the maintenance center.
12	Manual bypass activated	Minor	The open-circuit status of the manual bypass is restored.	The manual bypass port is short-circuited.	The system transfers to bypass mode.	Restore the open-circuit status of the manual bypass port.
13	Phase lock failure	Minor	Phase locking is successful or the bypass is missing.	The inverter fails in phase locking within 10s.	The system cannot start PFC or enter normal mode.	Possible cause: The power grid frequency is unstable.
17	Bypass abnormal	Minor	The bypass voltage or frequency recovers to the normal range.	The bypass voltage or frequency exceeds the normal range.	• The system cannot transfer to bypass mode when a critical alarm is generated. • In bypass mode, the power output is disconnected.	• Check that the bypass connection is normal. • Check that the bypass voltage and frequency are within their normal ranges.

Alarm ID	Alarm Name	Severity	Clearance Condition	Trigger Condition	Impact on the System	Suggestion
18	Low lithium battery level	Minor	The battery voltage is higher than the battery EOD threshold plus 4 V and the SOC rises above the alarm threshold.	Communication is normal. An alarm is generated when the SOC is lower than 20% or the battery voltage is lower than the battery EOD threshold plus 2 V. Communication is abnormal, and the battery voltage falls to 47 V DC.	The battery level is close to the cutoff threshold. If there is no mains input, the system will shut down after the battery runs out.	Possible cause: The battery charge level is low. Measure: Charge the battery.

Alarm ID	Alarm Name	Severity	Clearance Condition	Trigger Condition	Impact on the System	Suggestion
19	Abnormal mains voltage	Minor	The mains voltage input recovers.	• The mains is disconnected or fails. • The mains input voltage harmonic exceeds 10% (square wave input is not supported). • The mains frequency change rate exceeds the phase lock rate defined in the specifications (2 Hz/s for a single UPS and 1 Hz/s for a parallel system).	The system cannot work in normal mode. If this alarm is generated in normal mode, the system transfers to battery mode.	Check whether the mains voltage input is normal. If the circuit is faulty, send the device to the maintenance center.

Alarm ID	Alarm Name	Severity	Clearance Condition	Trigger Condition	Impact on the System	Suggestion
20	Lithium battery high temperature protection	Minor	The cell temperature drops below the protection threshold.	• Charge high temperature protection: The maximum cell temperature is greater than 60°C. • Discharge high temperature protection: The maximum cell temperature is greater than 65°C.	• The internal switch circuit of the lithium battery is disconnected, and the battery cannot be charged or discharged. • The ALM indicator on the faulty lithium battery turns red.	Possible cause: The ambient temperature of the lithium battery is too high or there are abnormal heat sources around the lithium battery. Measure: If the lithium battery cannot be recovered due to protection against abnormality, contact local Huawei engineers to rectify the fault.

Alarm ID	Alarm Name	Severity	Clearance Condition	Trigger Condition	Impact on the System	Suggestion
21	Lithium battery low temperature protection	Minor	The cell temperature rises above the protection threshold.	• Charge low temperature protection: The minimum cell temperature is less than 0°C. • Discharge low temperature protection: The minimum cell temperature is less than –20°C.	• The internal switch circuit of the lithium battery is disconnected, and the battery cannot be charged or discharged. • The ALM indicator on the faulty lithium battery turns red.	Possible cause: The ambient temperature of the lithium battery is too low or the heater cannot work properly. Measure: If the lithium battery cannot be recovered due to protection against abnormality, contact local Huawei engineers to rectify the fault.

Alarm ID	Alarm Name	Severity	Clearance Condition	Trigger Condition	Impact on the System	Suggestion
23	Lithium battery low voltage protection	Minor	The cell voltage and battery string voltage rise above the respective protection thresholds.	The lithium battery voltage is less than 44 V. The minimum cell voltage is less than 2.5 V.	• The internal switch circuit of the lithium battery is disconnected, and the battery cannot be charged or discharged. • The ALM indicator on the faulty lithium battery turns red.	Possible cause: The mains power has failed for an extended period, or the cells are inconsistent and certain cells experience fast capacity attenuation or large internal resistance. Measure: If the lithium battery cannot be recovered due to protection against abnormality, contact local Huawei engineers to rectify the fault.

Alarm ID	Alarm Name	Severity	Clearance Condition	Trigger Condition	Impact on the System	Suggestion
24	Lithium battery overcurrent protection	Minor	The battery discharge current drops below the protection threshold.	Discharge current ≥ 0.93 times of the current limit and Vbus ≤ 40 V for 15s Discharge current ≥ 0.98 times of the current limit and Vbus < 17 V for 8s	• The internal switch circuit of the lithium battery is disconnected, and the battery cannot be charged or discharged. • The ALM indicator on the faulty lithium battery turns red.	Possible cause: The UPS is overloaded, or the number of working batteries is insufficient. Measure: Reduce the load, or add batteries.
27	Battery discharge test function enabled	Minor	The battery discharge test is complete.	The shallow or deep discharge function is enabled manually.	The system transfers to battery mode.	Measure: Switch off the battery shallow or deep discharge test mode.

Alarm ID	Alarm Name	Severity	Clearance Condition	Trigger Condition	Impact on the System	Suggestion
28	The battery discharge time reaches the maximum.	Minor	Set item 05 battery discharge time to 0 or restart the inverter.	The battery discharge time reaches the preset value.	The system cannot supply power in battery mode. If this alarm is generated in battery mode, the power output will be disconnected.	Check whether the mains input is normal.
31	UPS working in bypass mode	Minor	The UPS recovers the inverter output.	The UPS works in bypass mode.	The bypass power output alarm does not affect the system working status. The power supply will be disconnected if the bypass input is abnormal.	• Check whether the UPS transfers to bypass mode due to overload. • Check whether the inverter switch is turned on.
32	UPS locked in bypass state	Minor	The inverter switch is turned on again.	The UPS transfers to bypass mode more than three times within 30 minutes due to overload.	The system cannot automatically switch back to inverter mode.	Possible cause: The UPS is overloaded.

Alarm ID	Alarm Name	Severity	Clearance Condition	Trigger Condition	Impact on the System	Suggestion
33	Overtemperature	Minor	Fan blocked: The highest temperature of internal components is lower than 65°C. Fan not blocked: The highest temperature of internal components is lower than 50°C.	Fan blocked: The highest temperature of internal components exceeds 75°C for 100 ms. Fan not blocked: The highest temperature of internal components exceeds 87°C for 100 ms.	If the internal temperature of the system is close to the overtemperature protection threshold, a critical overtemperature alarm may be triggered and the system will transfer to bypass mode.	• Possible cause: The temperature is too high. Measure: Decrease the ambient temperature or load. • Possible cause: The temperature sensor is faulty. Measure: Send the device to the maintenance center.
34	Inconsistent number of parallel UPSs	Minor	The number of parallel UPSs is consistent with the setting.	The actual number of parallel UPSs is inconsistent with the setting.	The current operating status is not affected. Check whether the actual number of parallel UPSs is the same as the setting and whether parallel cables are disconnected.	Suggestion: Set the number of parallel UPSs to the actual value.

Alarm ID	Alarm Name	Severity	Clearance Condition	Trigger Condition	Impact on the System	Suggestion
35	Long-time current imbalance	Minor	The difference between the UPS load percentage and the parallel system load percentage is within 10% for 10s.	The difference between the UPS load percentage and the parallel system load percentage is greater than 20% for 10s.	The current working status is not affected. The system may transfer to bypass mode if it is overloaded.	Possible cause: The current equalization sampling circuit is faulty. Measure: Send the device to the maintenance center.
36	Overload	Minor	The load percentage exceeds 10%.	The load percentage exceeds 105%.	The system transfers to bypass mode when the overload time expires.	Possible cause: The UPS is overloaded.
37	The inverter switch is off in ECO mode.	Minor	The inverter switch is turned on.	The inverter switch is off in ECO mode.	When the mains input exceeds the ECO range, the power supply is disconnected.	Turn on the inverter output switch.
38	The number of started inverters is insufficient to carry the load.	Minor	The inverter switches of other UPSs in the parallel system are turned on.	In parallel mode, the number of started inverters is insufficient to support the actual load.	The system keeps working in bypass mode and cannot transfer back to inverter mode.	Turn on the inverter switches of other UPSs.

Alarm ID	Alarm Name	Severity	Clearance Condition	Trigger Condition	Impact on the System	Suggestion
39	Output in battery mode	Minor	The mains input recovers.	The mains input is abnormal. (Refer to the description of minor alarm 19.)	The current working status is not affected. When the battery backup time or discharge time reaches the preset value, the system will disconnect the power output.	Check whether the mains input is normal. Possible cause: The circuit is faulty and needs to be returned for repair.
40	Battery capacity mismatch	Minor	Increase the lithium battery capacity or reduce the load.	The maximum discharge power of lithium batteries is less than the actual load power of the UPS.	After the UPS transfers to battery mode, the lithium battery overcurrent protection may be triggered, which causes the system to power off.	Reduce the load or add lithium batteries in a timely manner.

Alarm ID	Alarm Name	Severity	Clearance Condition	Trigger Condition	Impact on the System	Suggestion
41	Lithium battery high voltage protection	Minor	The cell or battery string voltage drops below the protection threshold.	• The busbar voltage is greater than 59.4 V in charging state. • The maximum cell voltage is greater than 3.8 V. **NOTE** Considering cell difference, the maximum cell voltage can be 3.9 V. • The battery string voltage is greater than 55 V.	• The internal switch circuit of the lithium battery is disconnected, and the battery cannot be charged or discharged. • The ALM indicator on the faulty lithium battery turns red.	Possible cause: The busbar input voltage exceeds the normal range, or the cells are inconsistent and certain cells experience fast capacity attenuation or large internal resistance. Measure: If the lithium battery cannot be recovered due to protection against abnormality, contact local Huawei engineers to rectify the fault.

Alarm ID	Alarm Name	Severity	Clearance Condition	Trigger Condition	Impact on the System	Suggestion
43	Lithium battery fault	Minor	The alarm is not cleared. After batteries are reset, check the status again.	The cell voltage sampling circuit is faulty. The cell temperature sampling circuit is faulty. The cell voltage is too high or too low. The cell temperature increases abnormally. The cell voltage is severely unbalanced. The BMS board circuit is faulty.	• The internal switch circuit of the lithium battery is disconnected, and the battery cannot be charged or discharged. • The ALM indicator on the faulty lithium battery turns red.	Possible cause: sampling fault (see the telecom power manual); cell or equalization circuit fault; charger converter short-circuit, relay fault; switch tube fault Measure: Restart the lithium battery. If the fault persists, replace the lithium battery.

Alarm ID	Alarm Name	Severity	Clearance Condition	Trigger Condition	Impact on the System	Suggestion
44	Lithium battery exception protection	Minor	Check again after the fault is rectified.	The busbar voltage is too high. The temperature of the board relay and switch tube is too high. The output is short-circuited. Batteries are reversely connected. The output is overloaded.	• The internal switch circuit of the lithium battery is disconnected, and the battery cannot be charged or discharged. • The ALM indicator on the faulty lithium battery turns red.	Possible cause: The UPS is overloaded, the host charger is abnormal, or battery cables are incorrectly connected. Measure: Check the cable connection, check the host status, or reduce the load.
45	Charger shutdown due to lithium battery communication failure	Minor	Lithium battery communication recovers.	Lithium battery communication is unavailable for 40s.	The displayed SOC data and backup time are inaccurate, and the BMS functions (lithium battery voltage boosting and current limiting) fail.	Check whether the communications cable is properly connected. For details, see **3.6.3 Installing Communications Cables**.

Alarm ID	Alarm Name	Severity	Clearance Condition	Trigger Condition	Impact on the System	Suggestion
46	Lithium battery reverse connection protection	Minor	The lithium battery communication is interrupted or the alarm **BP** is generated.	When the lithium battery communication is normal, the battery voltage is less than 10 V.	The UPS cannot work in battery mode.	Possible cause: The battery has shut down or has no output. Measure: Check the battery switch status and battery cable connection.
47	UPS locked in inverter mode	Minor	The mains is within the ECO range. Shut down the inverter and the UPS transfers to bypass mode; then restart the inverter and the UPS transfers to ECO mode.	The UPS exits ECO mode for three times within 30 minutes.	The system cannot automatically switch back to ECO mode.	Possible cause: The mains exceeds the ECO range.
48	ECO missing	Minor	The input voltage and frequency restore to the normal range in ECO mode.	The input voltage or frequency exceeds the normal range in ECO mode.	The UPS cannot transfer to bypass mode. If the UPS is working in bypass mode, it transfers to another working mode.	Possible cause: The ECO input is abnormal. Measure: Check whether the ECO input voltage or frequency exceeds the normal range.

Alarm ID	Alarm Name	Severity	Clearance Condition	Trigger Condition	Impact on the System	Suggestion
49	Inconsistency between the lithium battery capacity and UPS setting	Minor	The lithium battery capacity is consistent with the UPS setting, or lithium battery communication is unavailable.	The lithium battery capacity is inconsistent with the UPS setting.	The system working mode is not affected. If the actual capacity of lithium batteries connected is insufficient, the battery backup time may be shortened.	• Check that the UPS battery capacity setting matches the lithium battery capacity. • Check whether abnormal lithium battery communication causes an error in capacity reading.
50	PFC overcurrent	Critical	The alarm is automatically cleared.	• Inverter not started: The PFC current exceeds 65 A for 10 ms. • Inverter started: The PFC current exceeds 65 A for 260 μs.	The system shuts down the inverter and transfers to bypass mode.	• Possible cause: Power grid surge occurs. Measure: Improve the power grid quality. • Possible cause: The circuit is faulty. Measure: Send the device to the maintenance center.

Alarm ID	Alarm Name	Severity	Clearance Condition	Trigger Condition	Impact on the System	Suggestion
51	Output overcurrent	Critical	You need to manually rectify the fault or power off and restart the device.	The output current exceeds 80 A for 1 ms.	The system shuts down the inverter and transfers to bypass mode.	• Possible cause: The transient load power is too high. Measure: Locate the load and remove it. • Possible cause: The circuit is faulty. Measure: Send the device to the maintenance center.
52	Bus undervoltage	Critical	You need to manually rectify the fault or power off and restart the device.	• Battery mode: The bus voltage is less than 7 times the battery voltage by over 100 V. • Normal mode: The bus voltage is less than the peak mains voltage by over 80 V.	The system shuts down the inverter and transfers to bypass mode.	• Possible cause: The transient load power is too high. Measure: Locate the load and remove it. • Possible cause: The circuit is faulty. Measure: Send the device to the maintenance center.

Alarm ID	Alarm Name	Severity	Clearance Condition	Trigger Condition	Impact on the System	Suggestion
53	Timeout in approaching rated output voltage during startup	Critical	You need to manually rectify the fault or power off and restart the device.	The inverter voltage is not soft-started to the rated output voltage within 10s.	The system shuts down the inverter and transfers to bypass mode.	Possible cause: The circuit is faulty. Measure: Send the device to the maintenance center.
55	Excessive DC component	Critical	The alarm can be automatically cleared for three times. After that, you need to manually clear the fault or power off and restart the device.	The DC component of the output voltage is greater than 200 mV for 20s.	The system shuts down the inverter and transfers to bypass mode.	• Possible cause: The half-wave load power is too high. Measure: Locate the load and remove it. • Possible cause: The circuit is faulty. Measure: Send the device to the maintenance center.
57	Current sensor fault	Critical	You need to manually rectify the fault or power off and restart the device.	In power-on mode, the current sampling deviation exceeds 10% of the total sampling range.	The system cannot start the inverter and directly delivers output in bypass mode.	Possible cause: The circuit is faulty. Measure: Send the device to the maintenance center.

Alarm ID	Alarm Name	Severity	Clearance Condition	Trigger Condition	Impact on the System	Suggestion
58	Low output voltage	Critical	You need to manually rectify the fault or power off and restart the device.	The output voltage is lower than the rated voltage by 50 V for 3s.	The system shuts down the inverter and transfers to bypass mode.	• Possible cause: The transient load power is too high. Measure: Locate the load and remove it. • Possible cause: The circuit is faulty. Measure: Send the device to the maintenance center.
59	Charger circuit overcurrent	Critical	You need to manually rectify the fault or power off and restart the device.	The charge current is greater than 105 A.	The system shuts down the inverter and transfers to bypass mode.	Possible cause: Power grid surge occurs. Measure: Improve the power grid quality. Possible cause: The charger circuit is damaged. Measure: Replace the charger circuit.

Alarm ID	Alarm Name	Severity	Clearance Condition	Trigger Condition	Impact on the System	Suggestion
60	Load backfeed detected	Critical	You need to manually rectify the fault or power off and restart the device.	When UPSs are connected in parallel, the output backfeed power exceeds 1200 W for 100 ms.	The system shuts down the inverter and transfers to bypass mode. If other UPSs in the parallel system can deliver output in inverter mode, the UPS that has generated the alarm delivers no output.	Possible cause: Load backfeed occurs. Measure: Disconnect the load and restart the device.
71	Inconsistent parallel versions	Critical	You need to manually rectify the fault or power off and restart the device.	Parallel UPS protocols are inconsistent.	If the versions are inconsistent, the non-master UPS exits the parallel system. Otherwise, the UPS transfers to bypass mode because the number of parallel UPSs is inconsistent.	Possible cause: The UPS software versions are inconsistent. Measure: Upgrade the software to the same version.

Alarm ID	Alarm Name	Severity	Clearance Condition	Trigger Condition	Impact on the System	Suggestion
72	Parallel current equalizatio n fault	Critical	You need to manually rectify the fault or power off and restart the device.	Equalized current sampling is abnormal.	The system shuts down the inverter and transfers to bypass mode. If other UPSs in the parallel system can deliver output in inverter mode, the UPS that has generated the alarm delivers no output.	Possible cause: The circuit is faulty. Measure: Send the device to the maintenanc e center.
73	Inconsistent parallel output voltage settings	Critical	You need to manually rectify the fault or power off and restart the device.	The output voltage settings of parallel UPSs are inconsistent .	If the output voltage settings are inconsistent , the non-master UPS exits the parallel system. Otherwise, the UPS transfers to bypass mode because the number of parallel UPSs is inconsistent .	Possible cause: The output settings are inconsistent . Measure: Set the output voltages to the same value.

Alarm ID	Alarm Name	Severity	Clearance Condition	Trigger Condition	Impact on the System	Suggestion
80	Parallel CAN signal fault	Critical	You need to manually rectify the fault or power off and restart the device.	CAN communication signals are lost for 6s in a parallel system.	The system shuts down the inverter and transfers to bypass mode. If other UPSs in the parallel system can deliver output in inverter mode, the UPS that has generated the alarm delivers no output.	• Possible cause: The circuit is faulty. Measure: Send the device to the maintenance center. • Possible cause: The parallel cable is disconnected. Measure: Check the cable connection.
81	Parallel UPS host signal fault	Critical	You need to manually rectify the fault or power off and restart the device.	The UPS host signal is lost for more than 60 ms in a parallel system.	The system shuts down the inverter and transfers to bypass mode. If other UPSs in the parallel system can deliver output in inverter mode, the UPS that has generated the alarm delivers no output.	Possible cause: The circuit is faulty. Measure: Send the device to the maintenance center.

Alarm ID	Alarm Name	Severity	Clearance Condition	Trigger Condition	Impact on the System	Suggestion
82	Parallel synchronization signal fault	Critical	You need to manually rectify the fault or power off and restart the device.	The synchronization zero-crossing signal is lost for more than 200 ms.	The system shuts down the inverter and transfers to bypass mode. If other UPSs in the parallel system can deliver output in inverter mode, the UPS that has generated the alarm delivers no output.	Possible cause: The circuit is faulty. Measure: Send the device to the maintenance center.
83	Parallel battery voltage deviation exceeding 4 V	Critical	The voltage difference is less than 3 V or the UPS is set to standalone mode.	The battery voltage deviation between UPSs in a parallel system is greater than 4 V for 120 ms.	The system shuts down the inverter and transfers to bypass mode. If other UPSs in the parallel system can deliver output in inverter mode, the UPS that has generated the alarm delivers no output.	Possible cause: Batteries are not shared. Measure: Ensure that all UPSs share one battery string.

Alarm ID	Alarm Name	Severity	Clearance Condition	Trigger Condition	Impact on the System	Suggestion
84	Inconsistent AC input voltage and frequency	Critical	The voltage difference is less than 20 V or the UPS is set to standalone mode.	The mains voltage deviation between UPSs in a parallel system ranges from 40 V to 100 V for 120 ms.	The system shuts down the inverter and transfers to bypass mode. If other UPSs in the parallel system can deliver output in inverter mode, the UPS that has generated the alarm delivers no output.	Possible cause: The UPSs do not share one mains supply. Measure: Ensure that all UPSs share one mains supply.
87	EPO triggered	Critical	The EPO open-circuit status needs to be restored and the alarm needs to be manually cleared.	The EPO port is short-circuited.	The system switches off the output and enters the fault mode.	Check and restore the EPO port status.
BP	Battery not connected	Minor	The battery voltage is higher than 36 V.	• The battery voltage is lower than 36 V. • Batteries are reversely connected.	If batteries are not connected, the output may be interrupted after mains outage.	Check whether battery cables are correctly connected.

5 Operations

5.1 Checking Before Power-On

- AC power cable colors comply with local regulations.
- The input and output are not short-circuited.
- Cables and terminals are securely connected.
- Battery cables and terminals are connected correctly, and voltages comply with industry standards.
- The UPSs are properly connected to battery strings.
- Power cables and signal cables are correctly identified.
- Cables are neatly routed and securely bound.
- Devices are installed and cables are routed in ways that facilitate modification, capacity expansion, and maintenance.
- The UPS is properly grounded.
- The environment complies with the requirements. The torque of the installation tool is correct.
- The voltage between the neutral wire and the ground cable is less than 5 V AC.

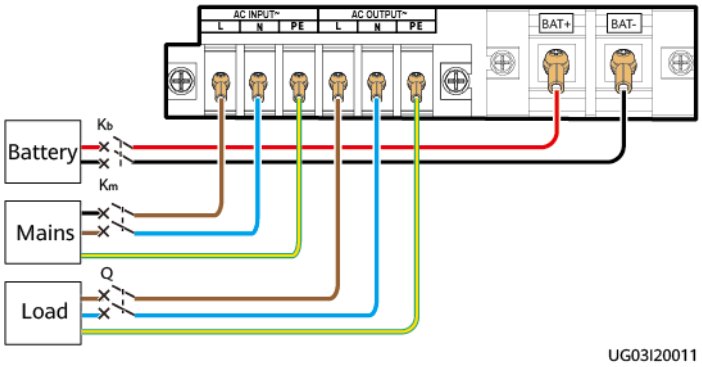
5.2 Single UPS Operations

5.2.1 Starting a UPS

NOTICE

- If no button is pressed within 20s in UPS setting mode, the LCD home screen is displayed.
- If no batteries are connected to the UPS with long backup time, the buzzer keeps buzzing.
- To prevent triggering overload protection, start the loads with higher power and then loads with lower power.

Figure 5-1 AC input, output, and battery wiring diagram



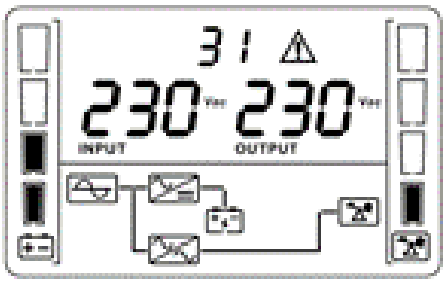
5.2.1.1 Starting the UPS Using Mains Power

Procedure

Step 1 Switch on the external battery circuit breaker (if any).

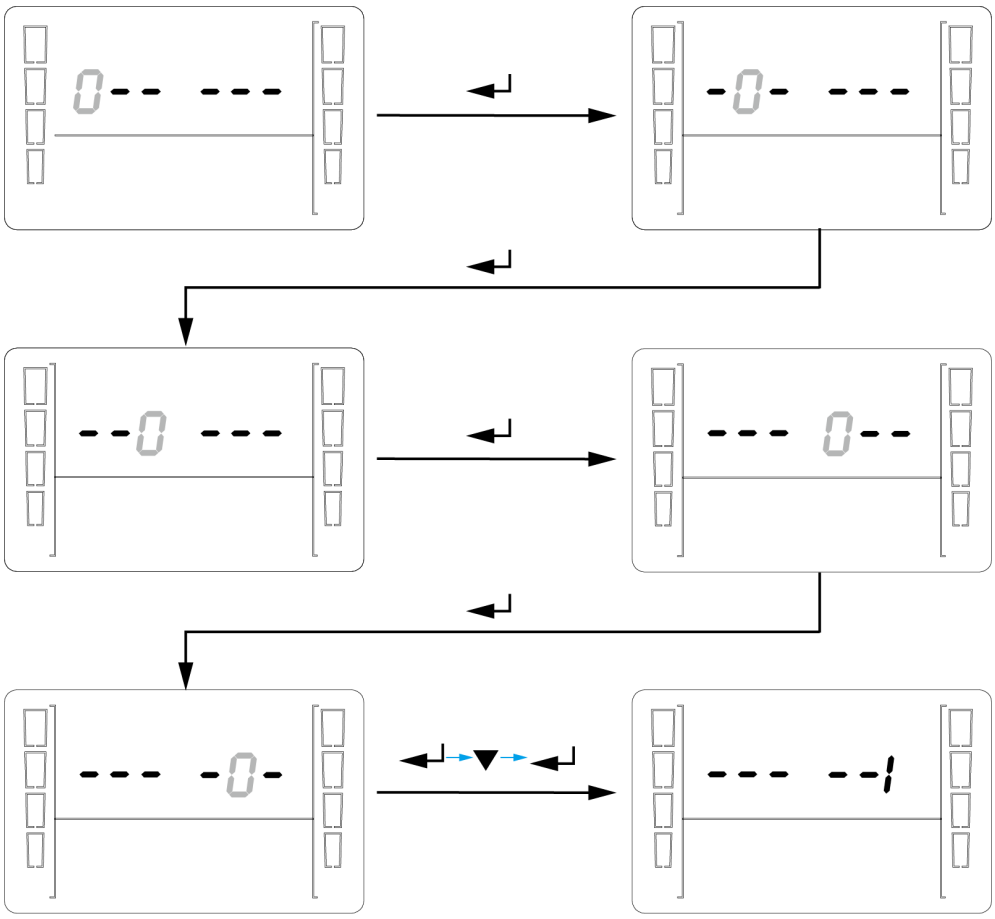
Step 2 Switch on the external AC input circuit breaker K_m for the UPS. The UPS will enter bypass mode.

Figure 5-2 Bypass mode

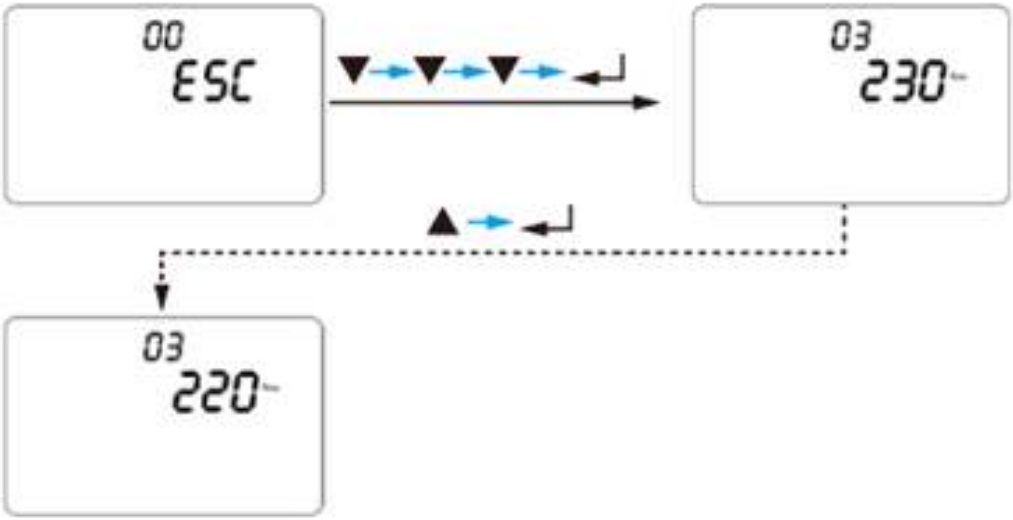


Step 3 Press and hold SELECT for 1s on a non-setting screen to access the login screen for parameter settings. The initial password is 000001. Enter the correct password to access the UPS setting mode.

Figure 5-3 Entering the password (initial password: 000001)



Step 4 Set the output voltage to 220 V or other values based on site requirements.



NOTE

- 220: The output voltage is 220 V AC.
- 230: The output voltage is 230 V AC (default).
- 240: The output voltage is 240 V AC.

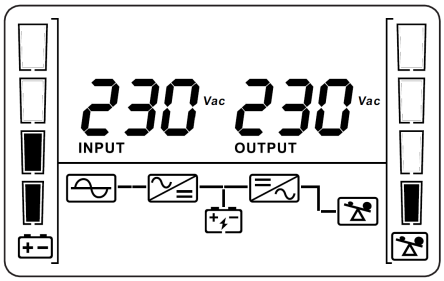
Step 5 Set the battery capacity to 100 Ah (or other values based on site requirements) and press ON/MUTE+SELECT to return to the standby screen.

NOTE

- Default value: 100 Ah
- Value range: 50–2400 Ah. The value is incremented by 50 Ah each time you press SELECT.
- When setting the battery capacity, set the capacity of the battery string connected to the UPS.

Step 6 Press and hold ON/MUTE for more than 5s. Release the button when you hear a beep sound. The UPS starts to work in normal mode.

Figure 5-4 Normal mode



Step 7 After you ensure that the UPS runs properly, switch on the AC output circuit breaker Q for the UPS to start the load.

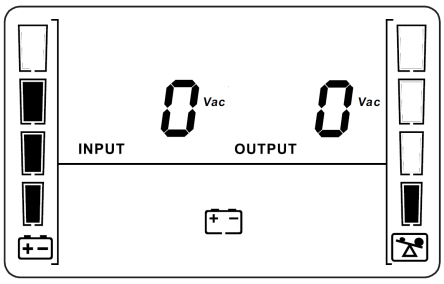
----End

5.2.1.2 Cold-Starting the UPS Using Batteries

Step 1 Switch on the external battery circuit breaker (if any).

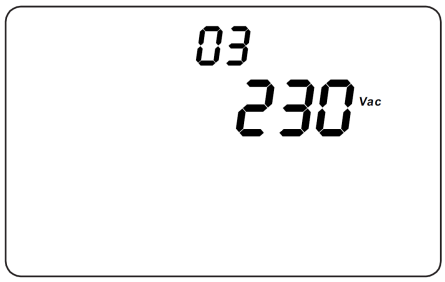
Step 2 Press ON/MUTE to start the UPS. The UPS will enter standby mode.

Figure 5-5 Standby mode

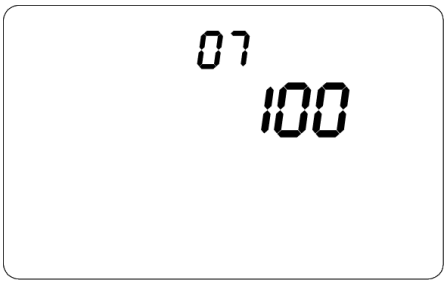


Step 3 Press and hold SELECT for 1s on a non-setting screen to access the login screen for parameter settings. The initial password is 000001. Enter the correct password to access the UPS setting mode.

Step 4 Set the output voltage based on site requirements.

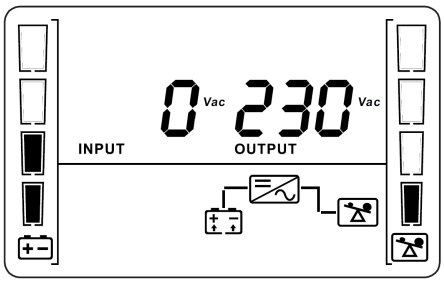
Output Voltage	Description
	220: The output voltage is 220 V AC. 230: The output voltage is 230 V AC (default). 240: The output voltage is 240 V AC.

Step 5 Set the battery capacity.

Battery Capacity	Description
	• Default value: 100 Ah • Value range: 50–2400 Ah. The value is incremented by 50 Ah each time you press SELECT. • When setting the battery capacity, set the capacity of the battery string connected to the UPS.

Step 6 Press and hold ON/MUTE for more than 5s. Release the button when you hear a beep sound. The UPS starts to work in battery mode.

Figure 5-6 Battery mode



Step 7 After you ensure that the UPS runs properly, switch on the AC output circuit breaker Q for the UPS to start the load.

----End

5.2.2 Shutting Down a UPS

Normal Mode

On the default screen, press and hold OFF/ENTER for more than 5s. Release the button when you hear the buzzer buzzing. The UPS inverter is shut down. The UPS transfers to bypass mode when the mains is available.

Battery Mode

In battery mode, press and hold OFF/ENTER for more than 5s. Release the button when you hear the buzzer buzzing. The UPS in battery mode is shut down.

Shutting Down the Inverter to Transfer the UPS to the No Output State

Step 1 Shut down loads.

Step 2 Perform the shutdown operation on the UPS. The UPS shuts down the inverter and transfers to bypass mode. If mains parameters are inconsistent with bypass parameters, the UPS transfers to standby mode.

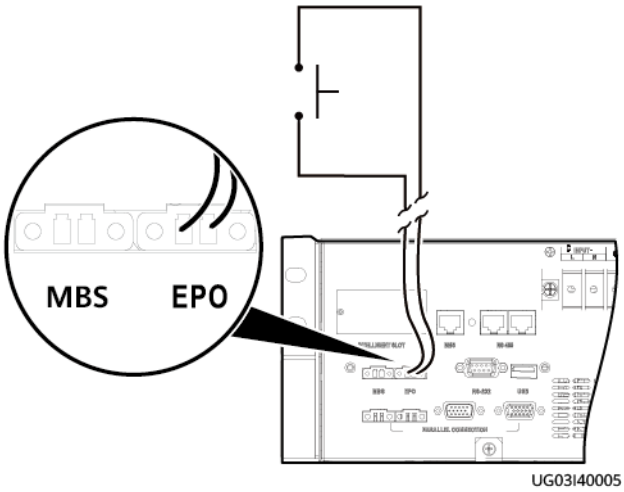
Step 3 Switch off the AC input circuit breaker K_m and output circuit breaker Q for the UPS. After all indicators turn off and fans stop, the UPS shuts down and the loads power off.

----End

5.2.3 Performing EPO

Turn on the EPO switch (provided by the customer). The UPS enters the EPO state. That is, the UPS shuts down the inverter, and does not transfer to bypass mode.

Figure 5-7 EPO cable connection on a single UPS



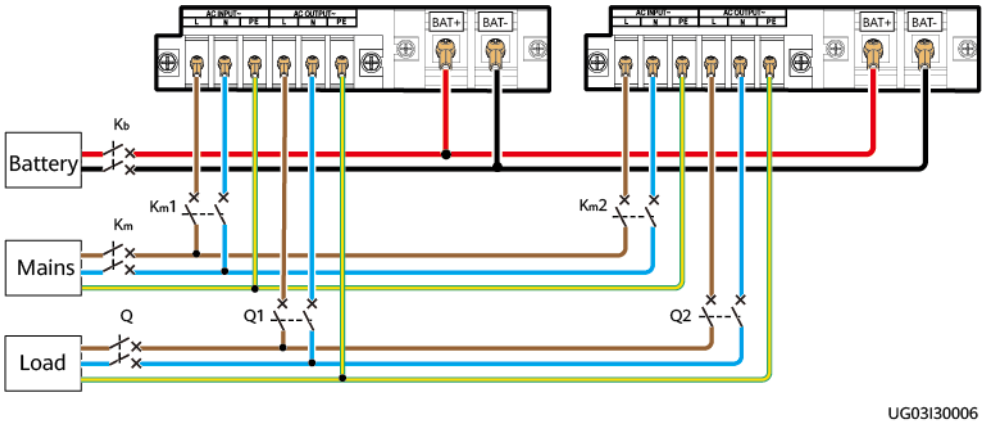
5.3 Parallel System Operations

5.3.1 Starting a Parallel System

NOTICE

- A parallel system of 6 kVA UPSs can share or not share battery strings.
- Before starting the parallel system, ensure that the external output circuit breakers for each UPS are ON. In addition, ensure that the output neutral wires of all UPSs are connected together.
- Check that parallel system parameters have been synchronized.
- Before starting the parallel system, ensure that all circuit breakers on the output side are OFF, and do not start loads.
- To prevent triggering overload protection, start the loads with higher power and then loads with lower power.

Figure 5-8 AC input, output, and battery wiring diagram (two parallel UPSs sharing batteries)



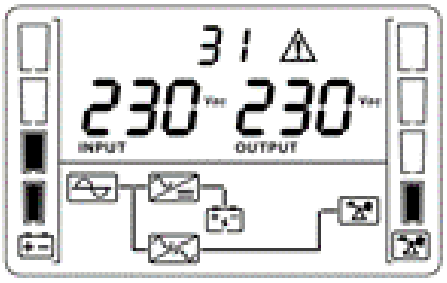
5.3.1.1 Starting the UPSs Using Mains Power

Procedure

Step 1 Switch on the external battery circuit breaker (if any).

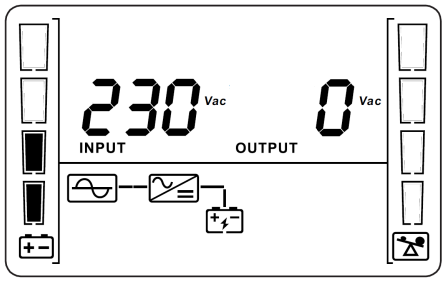
Step 2 Switch on the AC input circuit breakers K_m1 and K_m2 and general AC input circuit breaker K_m for the UPSs. The UPSs will enter bypass mode.

Figure 5-9 Bypass mode



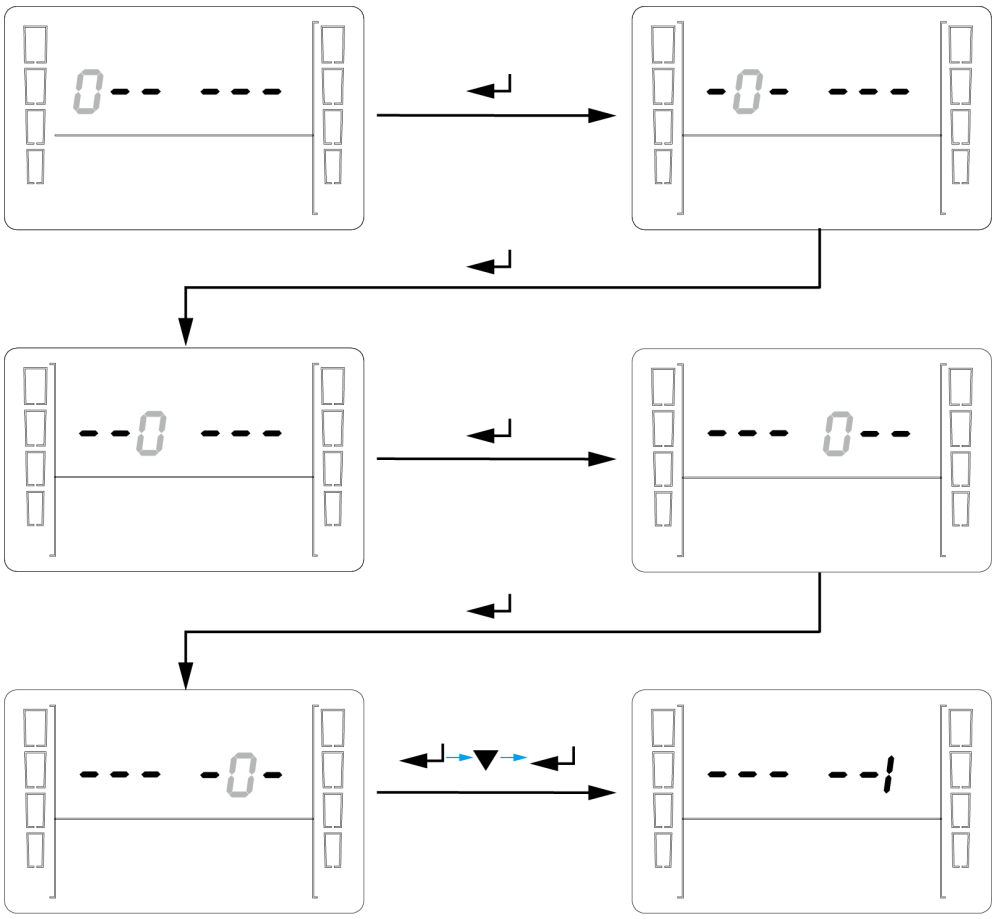
Step 3 Switch on the AC output circuit breakers Q1 and Q2. The UPSs enter the standby screen, and the parallel system works in bypass mode.

Figure 5-10 Standby screen

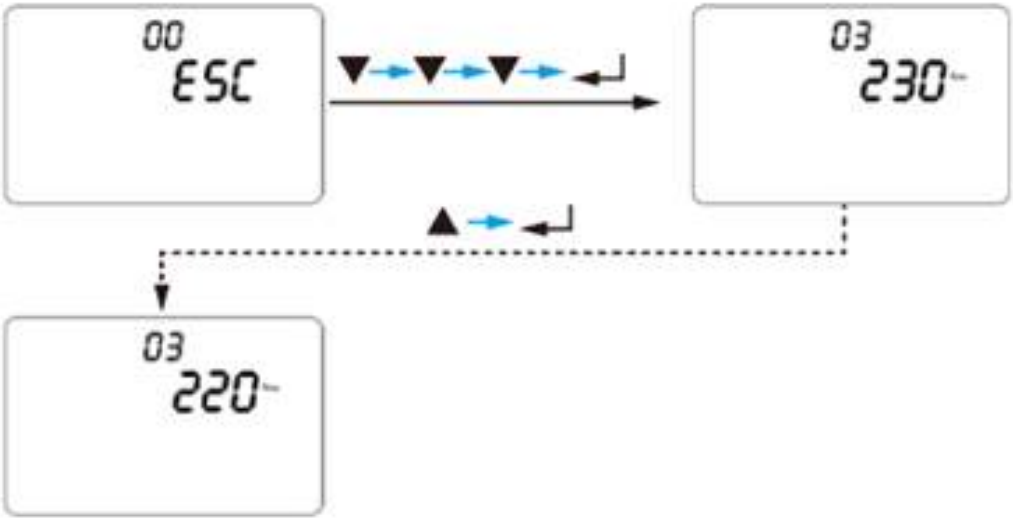


Step 4 Press and hold SELECT for 1s on a non-setting screen to access the login screen for parameter settings. The initial password is 000001. Enter the correct password to access the UPS setting mode.

Figure 5-11 Entering the password (initial password: 000001)



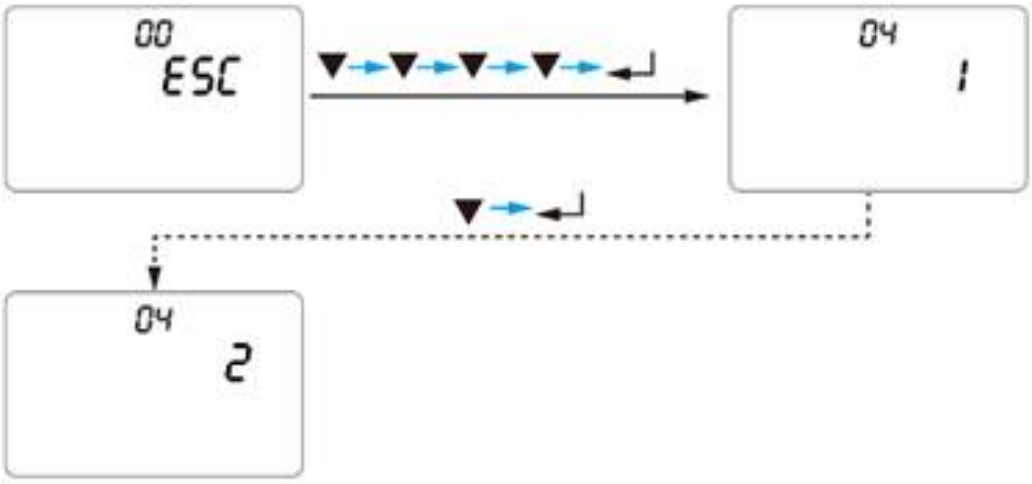
Step 5 Set the output voltage to 220 V AC or other values based on site requirements.



NOTE

- 220: The output voltage is 220 V AC.
- 230: The output voltage is 230 V AC (default).
- 240: The output voltage is 240 V AC.

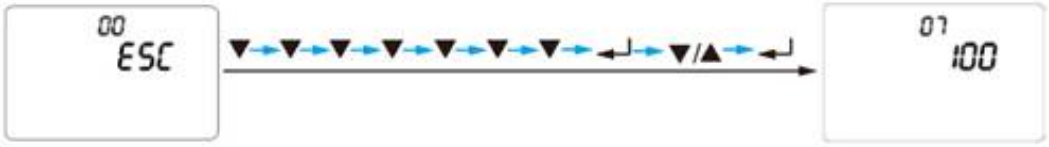
Step 6 Operate the UPSs one by one and set the number of UPSs connected in parallel to 2 or other values based on site requirements.



NOTE

- Default value: 1
- Value range: 1–4

Step 7 Set the battery capacity to 100 Ah (or other values based on site requirements) and press ON/MUTE+SELECT to return to the standby screen.

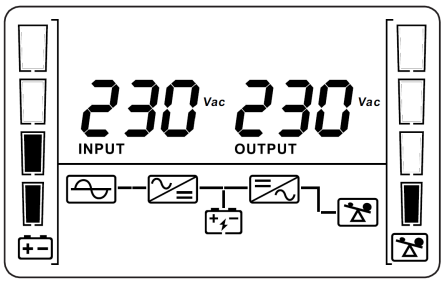


NOTE

- Default value: 100 Ah
- Value range: 50–2400 Ah. The value is incremented by 50 Ah each time you press SELECT.
- Battery string sharing enabled: When setting the battery capacity, set the total battery string capacity for each UPS.
- Battery string sharing disabled: When setting the battery capacity, set the capacity of the battery string connected to each UPS.

Step 8 Press and hold ON/MUTE on each UPS in the parallel system for more than 5s. The UPS parallel system transfers to normal mode.

Figure 5-12 Normal mode



Step 9 After checking that the system runs properly, switch on the general output circuit breaker Q and branch output circuit breakers for the parallel system to start loads one by one.

----End

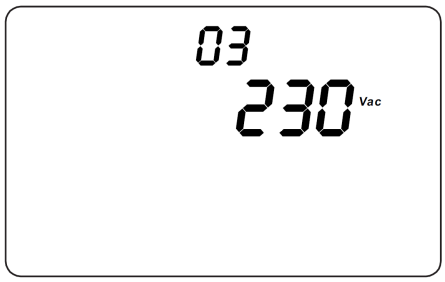
5.3.1.2 Cold-Starting the UPSs Using Batteries

Step 1 Switch on the external battery circuit breaker (if any).

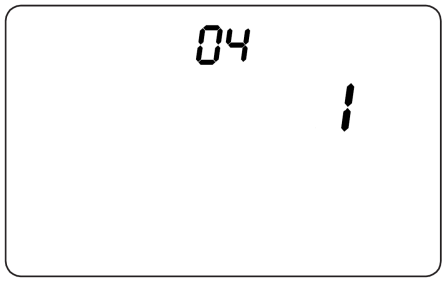
Step 2 Switch on the AC output circuit breakers Q1 and Q2 for the UPS system.

Step 3 Press ON/MUTE to start the UPS. The UPS will enter standby mode. Press and hold SELECT for 1s on a non-setting screen to access the login screen for parameter settings. The initial password is 000001. Enter the correct password to access the UPS setting mode.

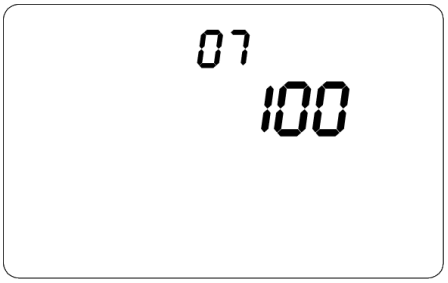
Step 4 Set the output voltage based on site requirements.

Output Voltage	Description
	220: The output voltage is 220 V AC. 230: The output voltage is 230 V AC (default). 240: The output voltage is 240 V AC.

Step 5 Operate the UPSs one by one to set the number of parallel UPSs in operation. Press SELECT to go to the setting screen, and set parallel system parameters.

Number of Parallel UPSs	Description
	• Default value: 1 • Value range: 1–4

Step 6 Set the battery capacity. Press ON/MUTE+SELECT to return to the standby screen.

Battery Capacity	Description
	• Default value: 100 Ah • Value range: 50–2400 Ah. The value is incremented by 50 Ah each time you press SELECT. • Battery string sharing enabled: When setting the battery capacity, set the total battery string capacity for each UPS. • Battery string sharing disabled: When setting the battery capacity, set the capacity of the battery string connected to each UPS.

Step 7 Perform the startup operation on each UPS. The UPS parallel system transfers to battery mode.

Step 8 After checking that the system runs properly, switch on the general output circuit breaker Q and branch output circuit breakers for the parallel system to start loads one by one.

----End

5.3.2 Shutting Down a Parallel System

Shutting Down a Single UPS in the Parallel System

Step 1 Perform the shutdown operation for a UPS in the parallel system. Then the UPS shuts down and generates no output. Other UPSs work without being affected.

Step 2 Switch off the AC input circuit breaker (K_m1 or K_m2) and AC output circuit breaker (Q1 or Q2) for the UPS.

Step 3 Switch off the external battery circuit breaker (if any), or disconnect battery power cables for the UPS. The UPS exits the parallel system.

----End

NOTE

- When one UPS in the parallel system is shut down while another UPS is still working, the UPS that has been shut down has no output.
- To shut down a UPS without removing it from the system, perform only step 1.

Transferring the Parallel System to Bypass Mode

Perform the shutdown operation on each UPS in the parallel system. All UPSs shut down the inverters and transfer to bypass mode.

Transferring the Parallel System to No Output State

Step 1 Shut down loads.

Step 2 Perform the shutdown operation on each UPS in the parallel system. All UPSs shut down the inverters and transfer to bypass mode.

Step 3 Switch off the AC input circuit breakers K_m1 and K_m2, general AC input circuit breaker K_m, AC output circuit breakers Q1 and Q2, and general AC output circuit breaker Q for the UPS system. After all indicators turn off and fans stop, the UPSs shut down, and the loads power off.

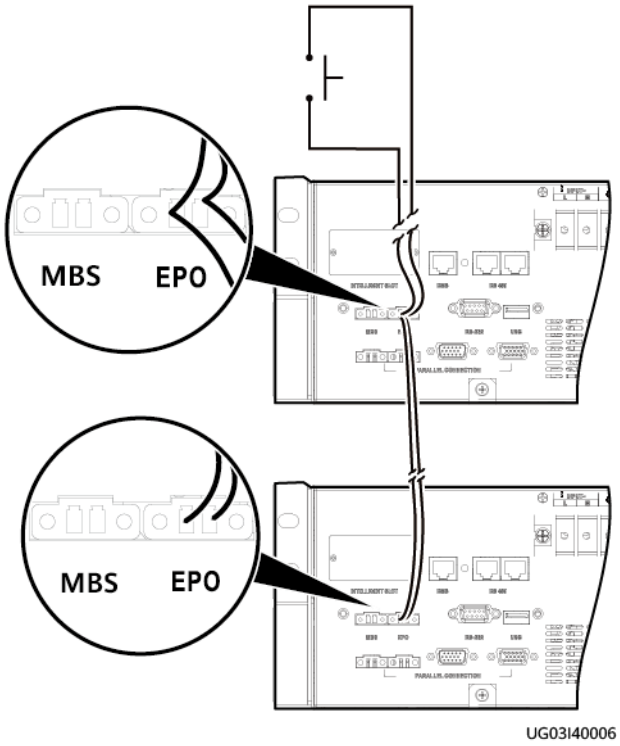
Step 4 Switch off the external battery circuit breaker for each UPS or the general battery circuit breaker (when all UPSs share a battery string). If no external battery circuit breaker is configured, disconnect battery power cables from each UPS.

----End

5.3.3 Performing EPO

Turn on the EPO switches (provided by the customer). The UPSs enter the EPO state. That is, the UPSs shut down the inverters, and do not transfer to bypass mode.

Figure 5-13 EPO cable connection in a parallel system



5.4 Transferring to Maintenance Bypass Mode

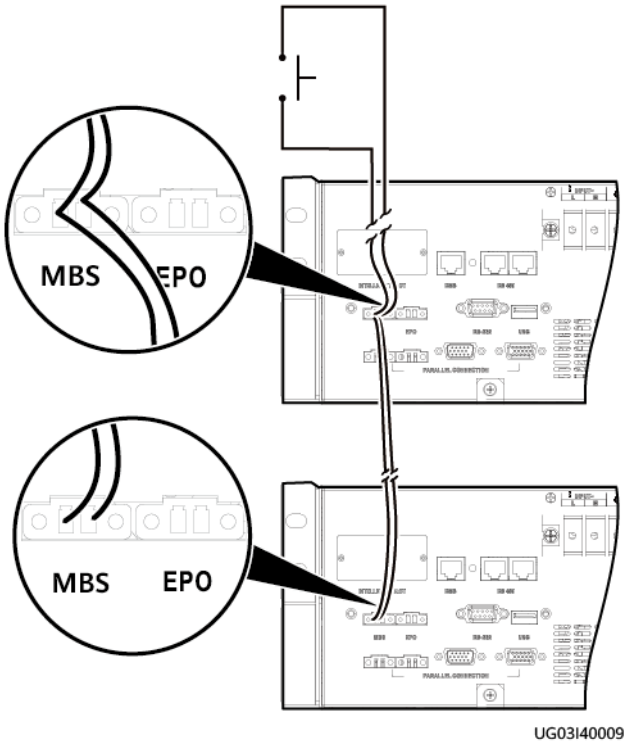
Context

The cable connection in a parallel system is used as an example.

Procedure

Step 1 Connect the dry contact signal controlled by the external maintenance bypass switch (provided by the customer) to the MBS.

Figure 5-14 MBS cable connection in a parallel system



Step 2 Press and hold OFF/ENTER for more than 5s. Release the button when you hear the buzzer buzzing. The UPS shuts down the inverter and transfers to bypass mode.

Step 3 Turn on the external maintenance bypass switch (provided by the customer). The UPS transfers to maintenance bypass mode.

----End

6 UPS Maintenance

NOTICE

- Only trained personnel are allowed to perform maintenance tasks. Before performing operations on devices, wear ESD clothes, ESD gloves, and an ESD wrist strap. Remove conductive objects such as jewelry and watches to avoid electric shocks or burns.
- Use insulated tools when maintaining components inside all devices. Only trained personnel are allowed to perform maintenance.
- Maintain UPSs regularly based on the following requirements. Otherwise, the UPSs may fail to operate properly and the lifespan may be shortened.

Table 6-1 UPS routine maintenance

Item	Expected Result	Troubleshooting	Maintenance Interval
Operating environment	• Ambient temperature: 0–40°C • Humidity: 0–95% RH (non-condensing)	• If the humidity and temperature are abnormal, check the air conditioner status. • If the input voltage is abnormal, check the power grid status and input cable connection.	Monthly

Item	Expected Result	Troubleshooting	Maintenance Interval
Check the monitoring panel.	According to the status icons on the LCD, all units are operating properly. No fault or alarm information is found in the active and historical alarm records.	If an alarm is present, rectify the fault by checking the device status and parameters.	Monthly
Cleanliness	When the device surface is wiped using white paper, the paper does not turn black.	Remove the dust, especially from the front panel.	Quarterly
Parameter settings	The settings of the output voltage level, frequency, and battery capacity meet requirements.	Reset the parameters.	Quarterly
Power cables and terminals (between the UPS and external power distribution equipment)	The insulation layers of cables are intact and terminals are free from noticeable sparks.	• Replace the cables. • Secure the output terminals.	Quarterly
Battery self-check	No battery alarm is generated.	Identify the causes based on the alarm information.	Yearly

7 Technical Specifications

7.1 Physical Specifications

Table 7-1 Physical specifications

Model	Net dimensions (H x W x D)	Net weight
UPS2000-G-6KRTLL	131 mm x 438 mm x 480 mm	15 kg

7.2 Environmental Specifications

Table 7-2 Environmental specifications

Item	Specifications
Operating temperature range	0–40°C: not derated; > 40°C: overtemperature protection triggered to ensure proper operation within the protection range
Humidity	0%–95% RH (non-condensing)
Altitude	0–1000 m When the altitude is greater than 1000 m but less than 4000 m, the power should be derated. For details, see IEC 62040-3.
Storage and transportation temperatures	–40°C to +70°C
Noise	< 60 dBA @ 1 m

Item	Specifications
IP rating	IP20

7.3 Mains Input Electrical Specifications

Table 7-3 Mains input electrical specifications

Item	Specifications
Rated input voltage	220 V AC/230 V AC/240 V AC
Input voltage range	110–280 V AC; < 176 V AC: derated; 110 V AC: 50% load
Rated input frequency	50 Hz/60 Hz
Input frequency range	50 Hz/60 Hz±4 Hz
Input power factor (100% resistive load)	0.99 (100% load)
Input harmonic current (100% resistive load)	≤ 5% (100% load)
Voltage detection precision	2%
Generator input capacity	≥ 1.5 times the UPS capacity
Inrush current	≤ five times the rated current
Static withstand voltage	320 V AC input, no damage to the UPS (at least 2 hours)

7.4 Bypass Input Electrical Specifications

Table 7-4 Bypass input electrical specifications

Item	Specifications
Bypass input voltage	220 V AC/230 V AC/240 V AC

Item	Specifications
Bypass voltage range	176–280 V AC
Bypass frequency	50 Hz/60 Hz
Input frequency range	50 Hz/60 Hz±4 Hz (When the input frequency exceeds the synchronization range, the output power is derated to 80%.)
Bypass overload capability	Load < 125%: continuous working 125% ≤ Load < 150%: Disconnect the output after 1 minute. 150% ≤ Load: Disconnect the output after 100 ms. Load = Output current/Rated output current
Transient withstand current	10 kA
Input mode	The mains input and bypass input share a power source.

7.5 Output Electrical Specifications

Table 7-5 Output electrical specifications

Item	Specifications
Rated capacity	6 kVA/5.4 kW
Output power factor	0.9
Rated output voltage	220 V AC/230 V AC/240 V AC
Output voltage precision	±1%
Output frequency	• When the mains is normal, the UPS automatically tracks the mains frequency. • When the mains is abnormal, the output frequency is 50 Hz/60 Hz (tolerance ±0.5%).
System efficiency	• Maximum efficiency: ≥ 93% • 100% resistive load: ≥ 92%; 50% resistive load: ≥ 93%; 30% resistive load: ≥ 91%
Waveform (battery mode)	Sine wave
THDv	• < 5% (non-resistive loads) • < 3% (resistive loads)

Item		Specifications
Overload capability		• Load ≤ 105%: continuous working • 105% < load ≤ 125%: transfer to bypass mode after 1 minute • 125% < load ≤ 150%: transfer to bypass mode after 30s • 150% < load: transfer to bypass mode after 0.1s
Maximum bypass transfer times		3
Transfer time	Transfer from normal mode to battery mode	0 ms
	Transfer from inverter mode to bypass mode	• Uninterruptible transfer: 0 ms • Interruptible transfer: < 10 ms
Average frequency tracking rate		Single UPS: 2 Hz/s; parallel system: 1 Hz/s
Output dynamic response		±5% (0–100%, 100%–0% load change)
Output regulated voltage precision		1%
Load detection precision		5%

7.6 Battery Electrical Specifications

Table 7-6 Battery electrical specifications

Item	Specifications
Battery type	Lithium battery (external); supported models: ESM-48100B1 and ESM-48150B1

Item	Specifications
Dimensions (H x W x D)	ESM-48100B1: • 130 mm x 442 mm x 396 mm (excluding mounting ears) • 130 mm x 482 mm x 396 mm (including mounting ears) ESM-48150B1: • 160 mm x 442 mm x 560 mm (excluding mounting ears) • 160 mm x 482 mm x 560 mm (including mounting ears)
Weight	ESM-48100B1: 44 kg; ESM-48150B1: 65 kg
Maximum charge/ discharge current of a single battery	100 A/100 A at 35°C
Maximum discharge power of a single battery	4.0 kW
Battery capacity	100–2400 Ah
Rated battery voltage	48 V DC (ESM-48100B1) 51.2 V DC (ESM-48150B1)
Battery quantity	A maximum of 16 batteries can be connected in parallel.
Charge current limit	10–60 A
Rated charge voltage	56 V
Operating temperature	Charge: 0°C to 45°C; discharge: –20°C to +45°C
Relative humidity	5%–95% RH

7.7 ECO Specifications

Table 7-7 ECO specifications

Specifications	Specifications
ECO voltage range	±10%
ECO frequency range	±2 Hz

Specifications	Specifications
Parallel system ECO	Not supported

7.8 Parallel System Specifications

Table 7-8 Parallel system specifications

Item	Specifications
Maximum number of parallel UPSs	4

7.9 Safety and EMC

Table 7-9 Safety and EMC

Item	Standards Compliance
Conducted emission (CE)	IEC 62040-2, C2
Radiated emission (RE)	IEC 62040-2, C2
Low-frequency signal immunity	IEC 61000-2-2
ESD immunity	IEC 61000-4-2
Conducted susceptibility (CS)	IEC 61000-4-6
Radiated susceptibility (RS)	IEC 61000-4-3
Electrical fast transient/burst	IEC 61000-4-4
Surge	IEC 61000-4-5
Power frequency magnetic field	IEC 61000-4-8
Harmonic current	IEC 61000-3-12
Voltage dip	IEC 61000-3-11

Item	Standards Compliance
Impact current (surge protection)	• IEC/EN 60240-2 • IEC/EN 61000-4-5 • YD/T 1095-2000 • YD/T 944-2007

A Lithium Battery Power Backup Time

Table A-1 Typical load rate and ESM-48100B1 power backup specifications (6 kVA UPS)

Load (%)	Load (W)	One ESM (h)	Two ESMs (h)	Three ESMs (h)	Four ESMs (h)
100%	6000	-	1.34	2.01	2.67
80%	4800	-	1.67	2.51	3.35
50%	3000	1.36	2.67	4.02	5.36
30%	1800	2.27	4.47	6.69	8.92

NOTE

- "/" indicates that the load power is greater than the battery discharge power. In this case, this configuration is not supported.
- The backup time listed above is the factory default. The battery backup time decreases with the battery capacity.

B Acronyms and Abbreviations

A	
ASIC	application-specific integrated circuit
C	
CAN	control area network
CPLD	complex programmable logical device
D	
DSP	digital signal processing
E	
EPO	emergency power-off
ECO	economy control operation
EOD	end of discharge
ESM	energy storage module
ESN	equipment serial number
H	
HTTPS	Hypertext Transfer Protocol Secure
L	
LCD	liquid crystal display
LSI	large-scale integrated
M	
MIB	management information base

N	
NMS	network management system
P	
PFC	power factor correction
PE	protective earthing
PL	parallel load
R	
RS232	Recommended Standard 232
RS485	Recommended Standard 485
S	
SELV	safety extra-low voltage
SSH	Secure Shell
T	
THDv	total harmonic distortion of output voltage
TNV	telecommunication network voltage
U	
UPS	uninterruptible power system
USB	Universal Serial Bus

