UPS5000-E-(200 kVA-300 kVA)

User Manual (50 kVA Power Modules)

Issue 17

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About This Document

Purpose

This document describes the UPS5000-E in terms of its features, performance specifications, working principles, appearance as well as instructions for installation, and operation and maintenance (O&M). UPS is short for uninterruptible power system.

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.
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.

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

Change History

Issue	Date	Description
17	2023-07-10	Added **3.1.4 SPD**. Updated **1.2.2 Battery Safety**. Updated **9 Technical Specifications**.
16	2022-12-30	Updated the description about initial startup.
15	2022-01-30	Updated the monitoring UIs.
14	2021-03-12	Updated the monitoring UIs.
13	2020-12-07	Updated the monitoring UIs.
12	2020-03-23	Adapted the UPS to lithium batteries and updated the monitoring UIs.
11	2019-12-20	Updated the safety information.
10	2019-11-11	Added SNMP descriptions to the sections about system settings and site configuration.
09	2019-10-16	Updated the instructions for startup over the app.
08	2019-08-15	Updated the monitoring UIs.
07	2019-02-15	Added the isolation protection model.
06	2018-10-19	Updated some MDU screenshots.
05	2018-01-08	Added the instructions for startup over the app.
04	2017-10-30	Updated the output electrical specifications, product weight, and typical configuration.
03	2017-04-28	Updated some MDU screenshots.
02	2017-02-25	Updated the voltage and current data of the monitoring interface card.
01	2016-10-20	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.

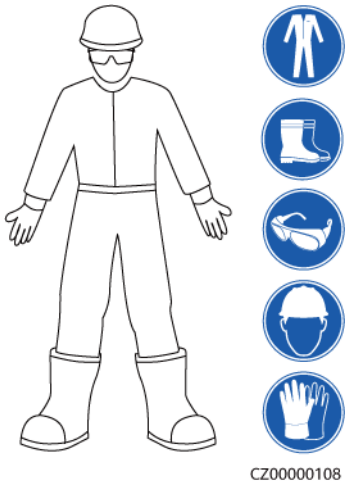
DANGER

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.
- 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 sundries 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 manufacturer.

DANGER

Battery electrolyte is toxic and volatile. Do not get contact with leaked liquids or inhale gases in the case of battery leakage or 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 improperly treated, for example, burnt, punctured, squeezed, struck by a 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 production of gases such as CO and H_2. To prevent fire or device corrosion, ensure that flammable gas is properly exhausted.

DANGER

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

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 extinguishing facilities, such as fire fighting sands 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 and manual control modes.

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 upside down or vertically, lay it on one side, 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.

WARNING

If the electrolyte leaks, absorb and neutralize the electrolyte immediately. Exercise caution when moving or handling a lead-acid battery with electrolyte leakage to avoid electrolyte hazards.

WARNING

Lead-acid batteries in use emit flammable gas. Ensure that batteries are installed in a well-ventilated area and fireproof measures are taken.

WARNING

Do not use unsealed lead-acid batteries.

Statement

The Company shall not be liable for any damage or other consequences to the batteries it provides due to the following reasons:

- Batteries are damaged 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.
- Batteries are damaged because 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 damaged, fall, leak, or crack due to improper operations or incorrect connection.
- After being installed and connected to the system, the batteries are not powered on in time due to your reasons, which causes damage to the batteries due to overdischarge.
- Batteries are damaged because they are not accepted in time due to your reasons.
- You set battery operating parameters incorrectly.
- You use batteries of different types together, causing acceleration of capacity attenuation. For example, you use our batteries together with batteries of other vendors or with batteries of different rated capacity.
- You maintain batteries improperly, causing frequent overdischarge; you expand the load capacity without notifying us; or you have not fully charged the batteries for a long time.
- You do not perform battery maintenance based on the operation guide, such as failure to check battery terminals regularly.
- Batteries are damaged because you do not store them in accordance with storage requirements (for example, in an environment that is damp or prone to rain).

- Batteries are not charged as required during storage due to your reasons, resulting in capacity loss or other irreversible damages to the batteries.
- Batteries are damaged due to your or a third party's reasons, for example, relocating or reinstalling the batteries without complying with the Company's requirements.
- You change the battery use scenarios without notifying the Company.
- You connect extra loads to the batteries.
- The battery storage period has exceeded the upper limit.
- The battery warranty period has expired.

General Requirements

NOTICE

This is a category C3 battery product for commercial and industrial application in the second environment – installation restrictions or additional measures may be needed to prevent disturbances.

NOTICE

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

- Before installing, operating, and maintaining batteries, read the battery manufacturer'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 manufacturer.
- 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.
- 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.
- 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.
- 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 irritant or scorched 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.
- 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 are left unused 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.

Special requirements for lead-acid batteries:

NOTICE

When the battery temperature exceeds 60°C, check whether the electrolyte leaks. If the electrolyte leaks, take proper measures promptly.

NOTICE

If the electrolyte leaks, follow the instructions of the battery manufacturer or use sodium bicarbonate ($NaHCO_3$) or sodium carbonate (Na_2CO_3) to neutralize the electrolyte.

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 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.

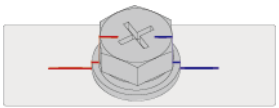
CAUTION

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.)



- 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.

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 subzero temperatures must be stored at room temperature for at least 24 hours before they are laid out.
- Do not perform any improper operations, for example, dropping cables directly from a vehicle. Otherwise, the cable performance may deteriorate due to cable damage, which affects the current-carrying capacity and temperature rise.

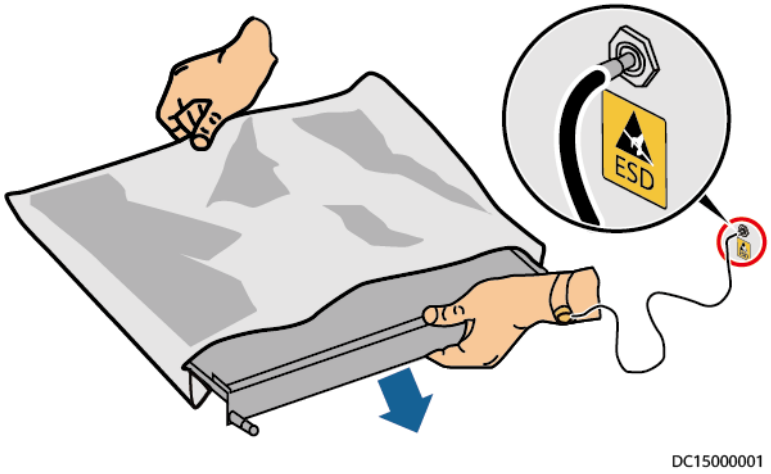
ESD

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

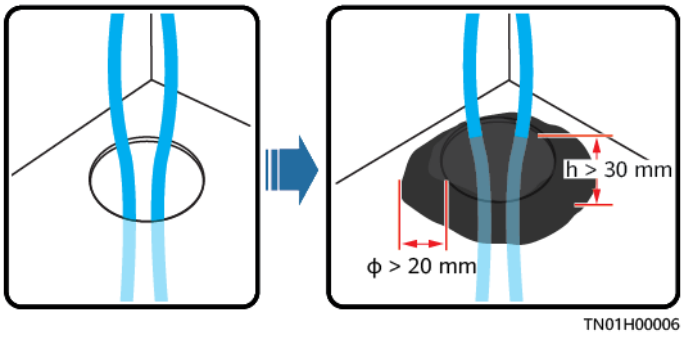
To prevent damage or fire due to high temperature, ensure that the ventilation vents or heat dissipation systems are not obstructed or covered by other objects while the equipment is running.

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 rodent guards at the door of the equipment room to prevent rodents and insects from entering the room.
- All cable holes must be sealed. Seal the used cable holes with sealing putty. Seal the unused cable holes with the caps delivered with the equipment. The following figure shows the criteria for correct sealing with sealing putty.



- After installing the equipment, remove idle packing materials such as cartons, foam, plastics, and cable ties from the equipment area.

1.5 Mechanical Safety

DANGER

When working at heights, wear a safety helmet and safety harness or waist belt and fasten it to a solid structure. Do not mount it on an insecure moveable object or a metal object with sharp edges. Make sure that the hooks will not slide off.

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

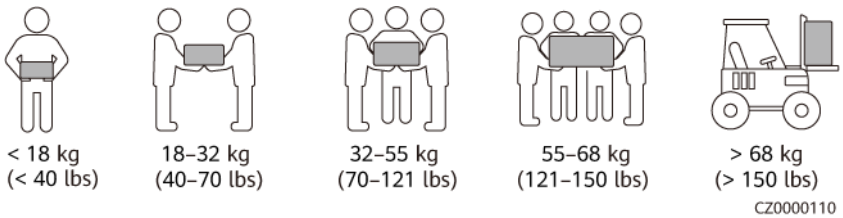
Do not drill holes into the equipment. Doing so may affect the sealing performance and electromagnetic containment of the equipment and damage components or cables inside. Metal shavings from drilling may short-circuit boards inside the equipment.

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 over the top of the equipment, take measures to protect the equipment against damage.
- Use correct tools and operate them in the correct way.

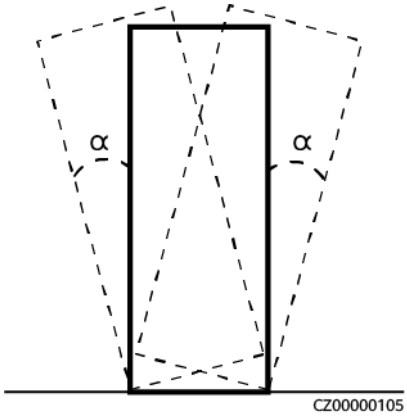
Moving Heavy Objects

- 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.
- Do not quickly 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.
- When transporting a cabinet, ensure that its tilt angle meets the requirements shown in the figure. The tilt angle α of a cabinet with packaging shall be less than or equal to 15°. After the cabinet is unpacked, its tilt angle α shall be less than or equal to 10°.



Working at Heights

- Any operations performed 2 meters or higher above the ground must be supervised properly.
- Only trained and qualified personnel are allowed to work at heights.
- Do not work at heights when steel pipes are wet or other risky situations exist. After the preceding conditions no longer exist, the safety owner and

relevant technical personnel need to check the involved equipment. Operators can begin working only after safety is confirmed.

- Set a restricted area and prominent signs for working at heights to warn irrelevant personnel away.
- Set guard rails and warning signs at the edges and openings of the area involving working at heights to prevent falls.
- Do not pile up scaffolding, springboards, or other sundries on the ground under the area involving working at heights. Do not stay or pass under the area involving working at heights.
- Carry operation machines and tools properly to prevent equipment damage or personal injury caused by falling objects.
- Personnel involving working at heights are not allowed to throw objects from the height to the ground, or vice versa. Objects shall be transported by slings, hanging baskets, highline trolleys, or cranes.
- Do not perform operations on the upper and lower layers at the same time. If unavoidable, install a dedicated protective shelter between the upper and lower layers or take other protective measures. Do not pile up tools or materials on the upper layer.
- Dismantle the scaffolding from top down after finishing the job. Do not dismantle the upper and lower layers at the same time. When removing a part, ensure that other parts will not collapse.
- Ensure that personnel working at heights strictly comply with the safety regulations. The Company is not responsible for any accident caused by violation of the safety regulations on working at heights.
- Behave cautiously when working at heights. Do not rest at heights.

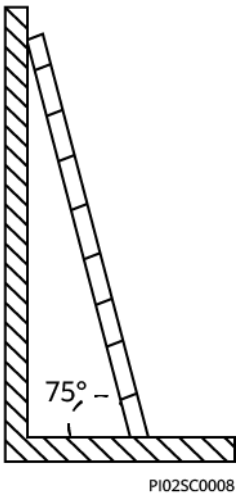
Using Ladders

- Use wooden or insulated ladders when you need to perform live-line working at heights.
- Platform ladders with protective rails are preferred. Single ladders are not recommended.
- Before using a ladder, check that it is intact and confirm its load bearing capacity. Do not overload it.
- Ensure that the ladder is securely positioned and held firm.

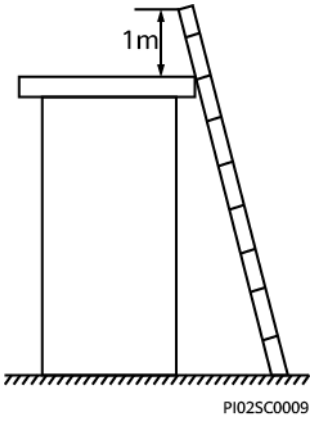
CZ00000107

- When climbing up the ladder, keep your body stable and your center of gravity between the side rails, and do not overreach to the sides.

- When a step ladder is used, ensure that the pull ropes are secured.
- If a single ladder is used, the recommended angle for the ladder against the floor is 75 degrees, as shown in the following figure. A square can be used to measure the angle.



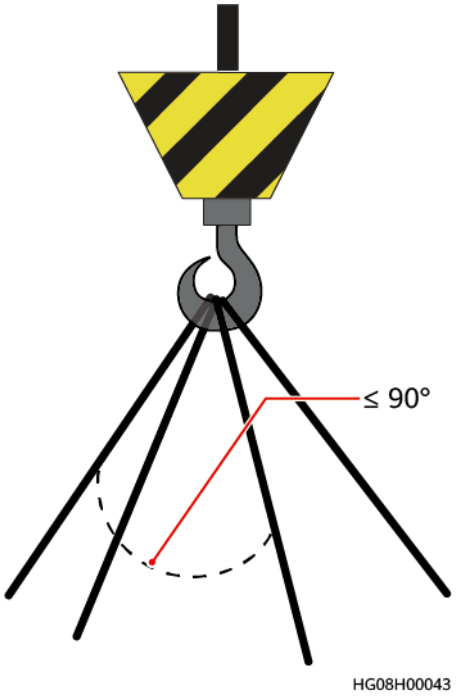
- If a single ladder is used, ensure that the wider end of the ladder is at the bottom, and take protective measures to prevent the ladder from sliding.
- If a single ladder is used, do not climb higher than the fourth rung of the ladder from the top.
- If you use a single ladder to climb up to a platform, ensure that the ladder is at least 1 m higher than the platform.



Hoisting

- Only trained and qualified personnel are allowed to perform hoisting operations.
- Install temporary warning signs or fences to isolate the hoisting area.
- Ensure that the foundation where hoisting is performed meets the load-bearing requirements.
- Before hoisting objects, ensure that hoisting tools are firmly secured onto a fixed object or wall that meets the load-bearing requirements.
- During hoisting, do not stand or walk under the crane or the hoisted objects.
- Do not drag steel ropes and hoisting tools or bump hoisted objects against hard objects during hoisting.

- Ensure that the angle between two hoisting ropes is no more than 90 degrees, as shown in the following figure.



Drilling Holes

- Obtain consent from the customer and contractor before drilling holes.
- Wear protective equipment such as safety goggles and protective gloves when drilling holes.
- To avoid short circuits or other risks, do not drill holes into buried pipes or cables.
- When drilling holes, protect the equipment from shavings. After drilling, clean up any shavings.

2 Product Overview

2.1 Model Description

Figure 2-1 UPS model number

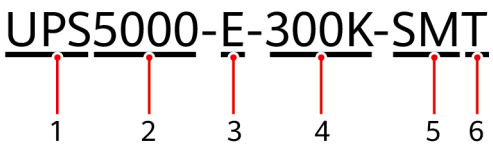


Table 2-1 Model number details

No.	Item	Description
1	Product category	UPS
2	UPS family	5000
3	UPS subcategory	E series
4	Output capacity	• 200K: 200 kVA • 300K: 300 kVA
5	Configuration type	• SM: standard configuration • FM: full configuration
6	Cable routing	Routed from the top (only the UPS5000-E-300K-SMT model contains "T")

This document describes the following UPS models:

- UPS5000-E-200K-SM/FM

  The models provide four configurations: 50 kVA, 100 kVA, 150 kVA, and 200 kVA.

- UPS5000-E-300K-SM/SMT

  The models provide six configurations: 50 kVA, 100 kVA, 150 kVA, 200 kVA, 250 kVA, and 300 kVA.

NOTE

- The UPS5000-E-200K-SM supports cable routing from the top or bottom.
- The UPS5000-E-200K-FM supports cable routing from the top and can support cable routing from the bottom if a cable entry cabinet is installed for the non-isolation protection model.
- The UPS5000-E-300K-SM supports cable routing from the bottom.
- The UPS5000-E-300K-SMT supports cable routing from the top.

2.2 Working Principle

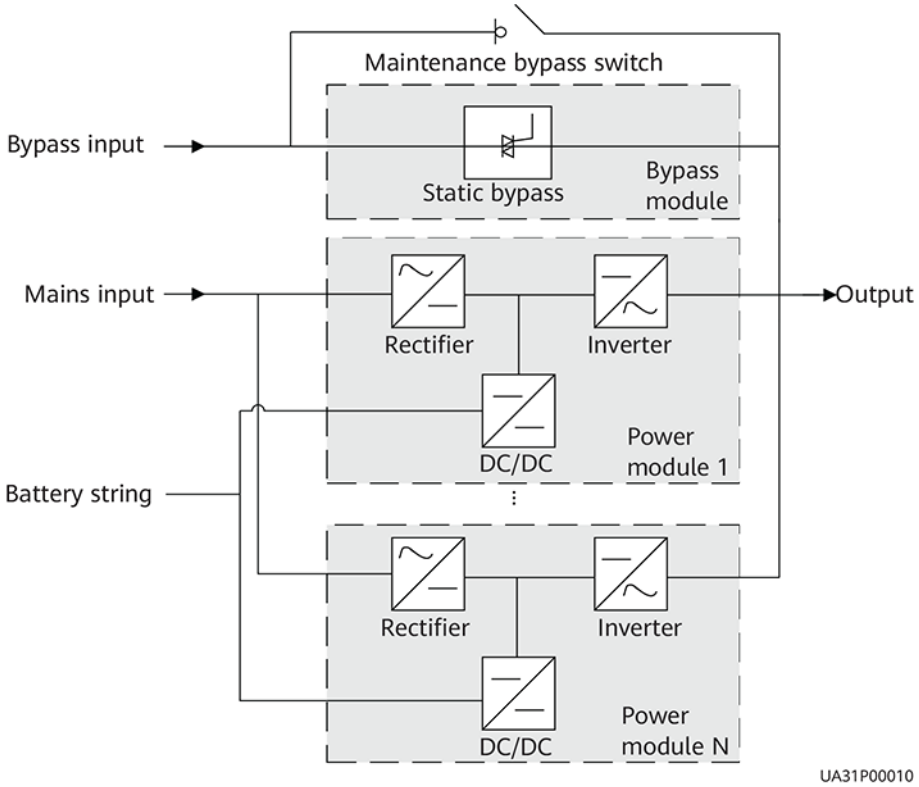
NOTE

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

2.2.1 Conceptual Diagram

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

Figure 2-2 UPS conceptual diagram

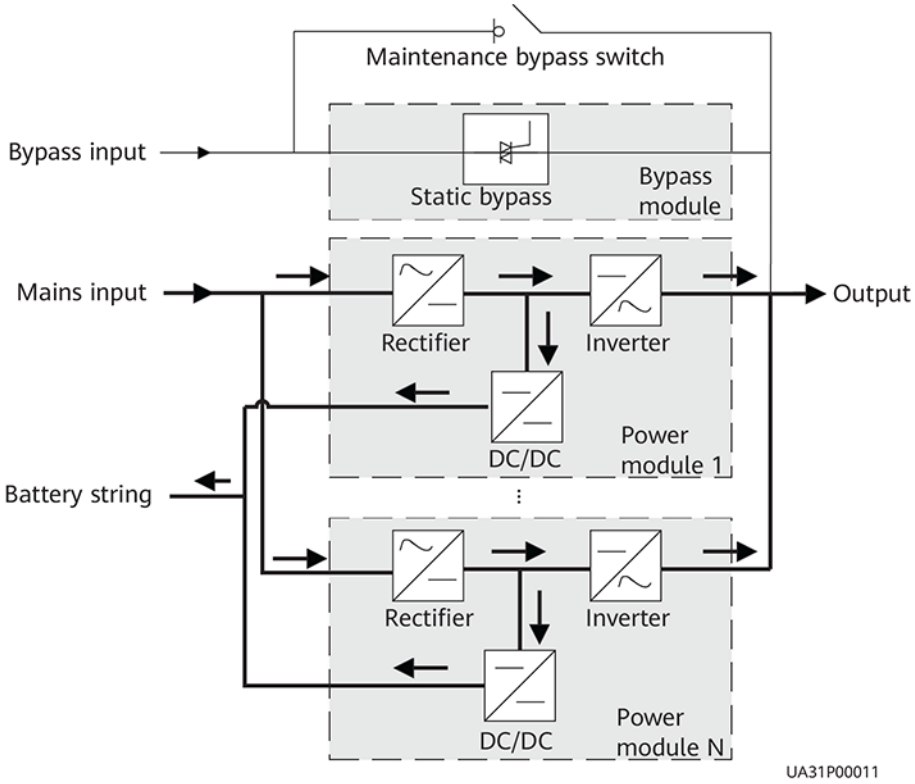


2.2.2 Working Modes

2.2.2.1 Normal Mode

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

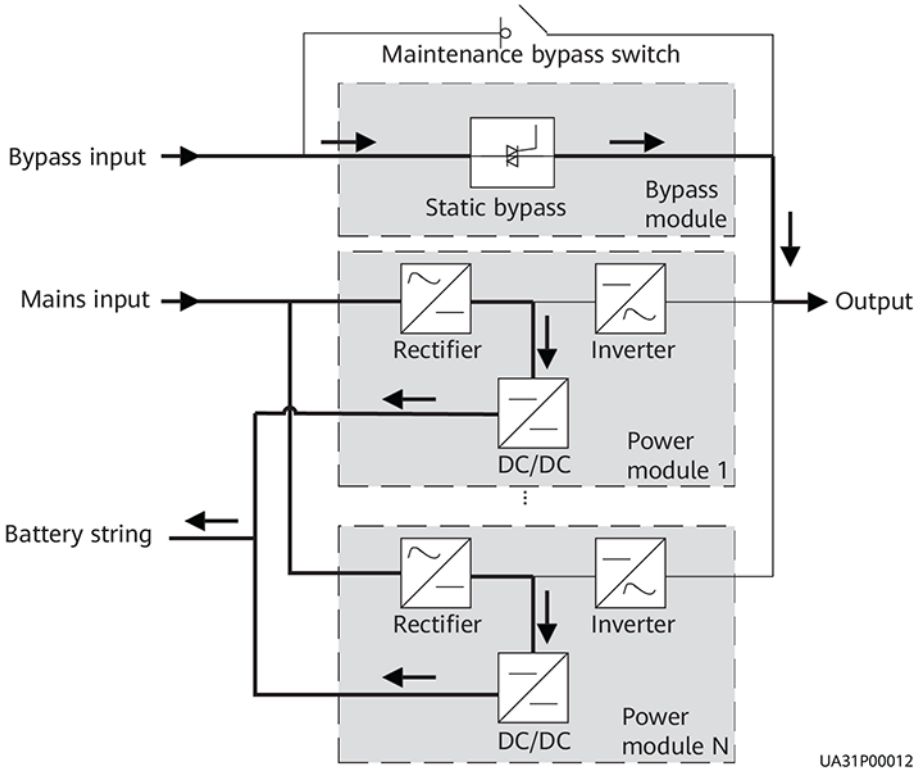
Figure 2-3 UPS conceptual diagram in normal mode



2.2.2.2 Bypass Mode

The UPS automatically transfers to bypass mode upon detecting power module overtemperature, overload, or other faults that may cause the inverter to shut down. In bypass mode, loads are powered by the bypass module. The bypass power supply is not protected by the UPS and therefore is prone to the mains outage, abnormal AC voltage waveform, or abnormal frequency.

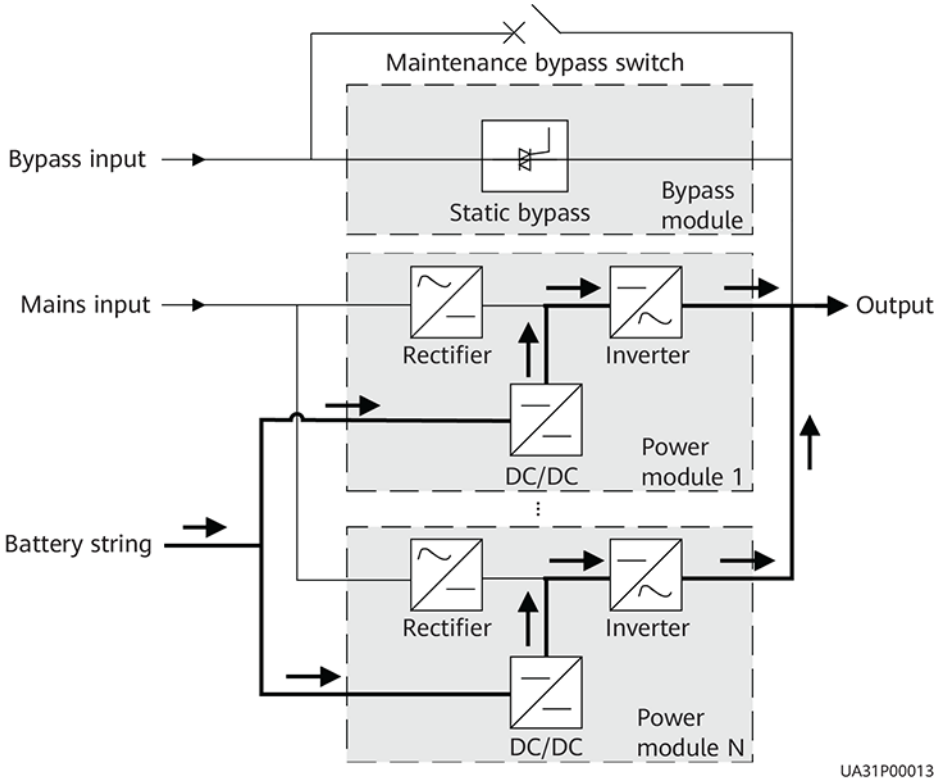
Figure 2-4 UPS conceptual diagram in bypass mode



2.2.2.3 Battery Mode

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

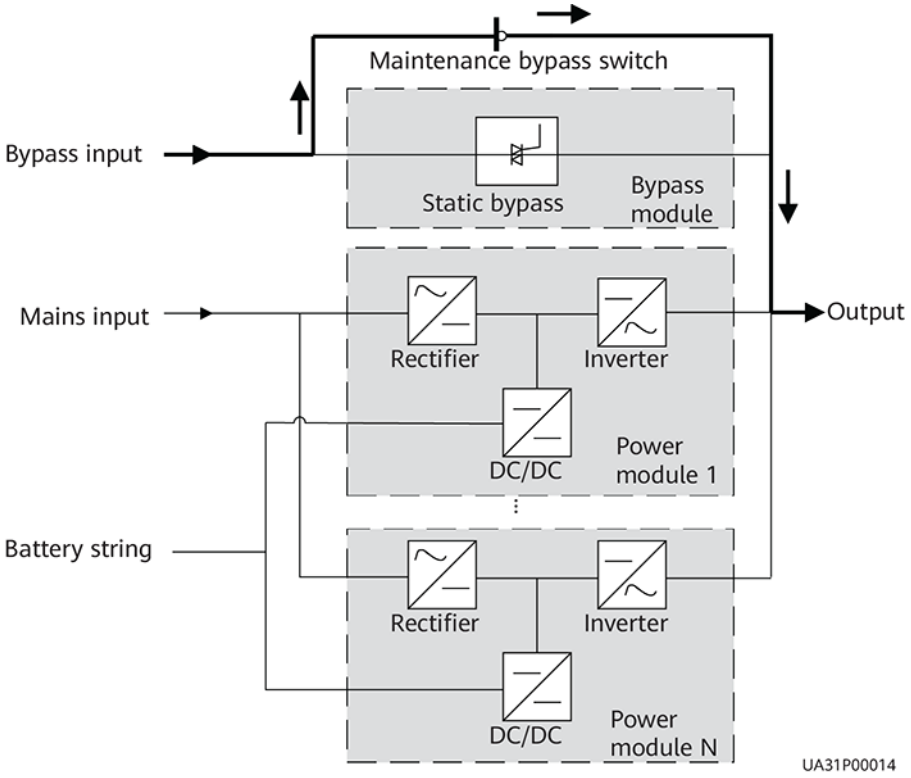
Figure 2-5 UPS conceptual diagram in battery mode



2.2.2.4 Maintenance Bypass Mode

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

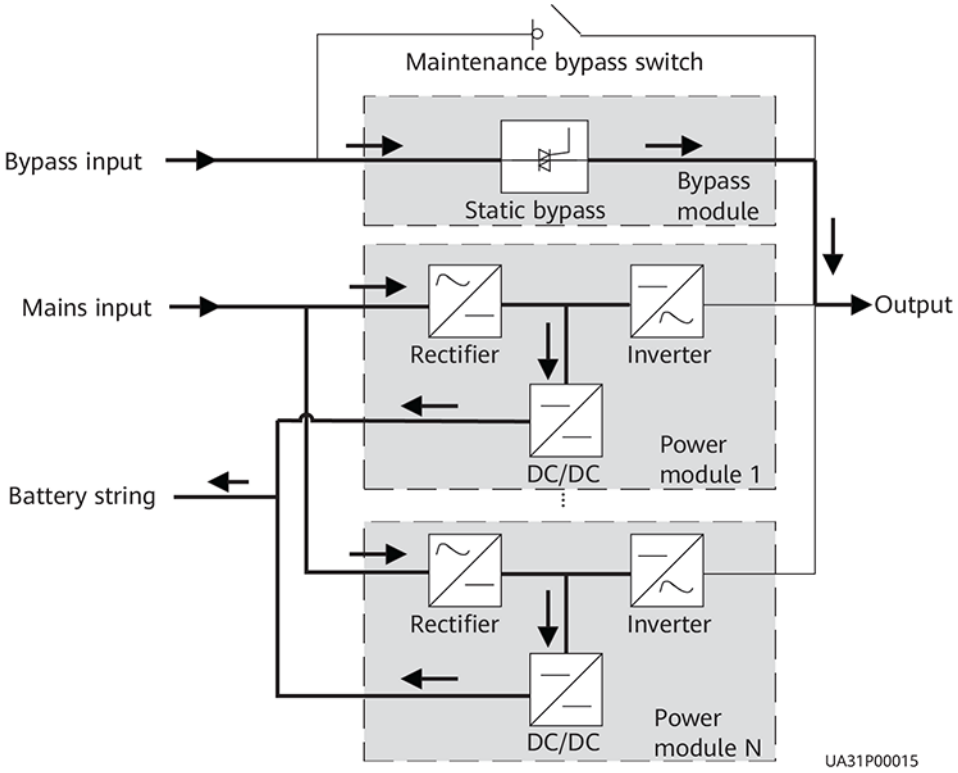
Figure 2-6 UPS conceptual diagram in maintenance bypass mode



2.2.2.5 ECO Mode

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

Figure 2-7 UPS conceptual diagram in ECO mode



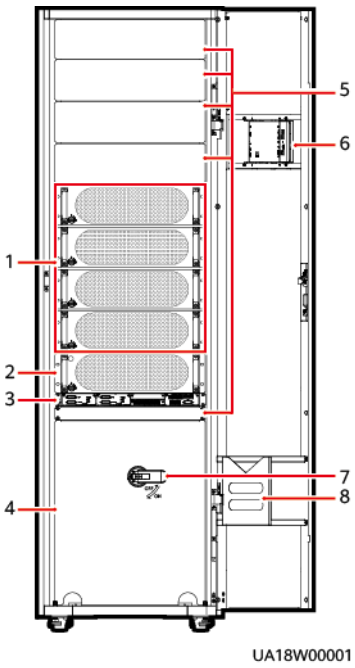
NOTE

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

2.3 Product Introduction

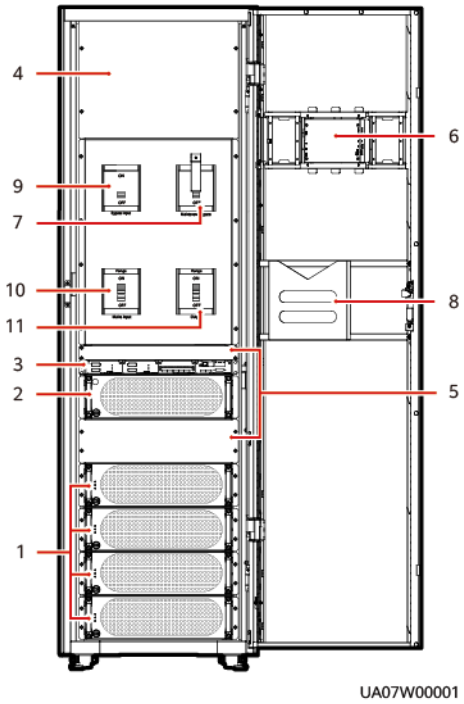
2.3.1 Structure

Figure 2-8 UPS5000-E-200K-SM front view



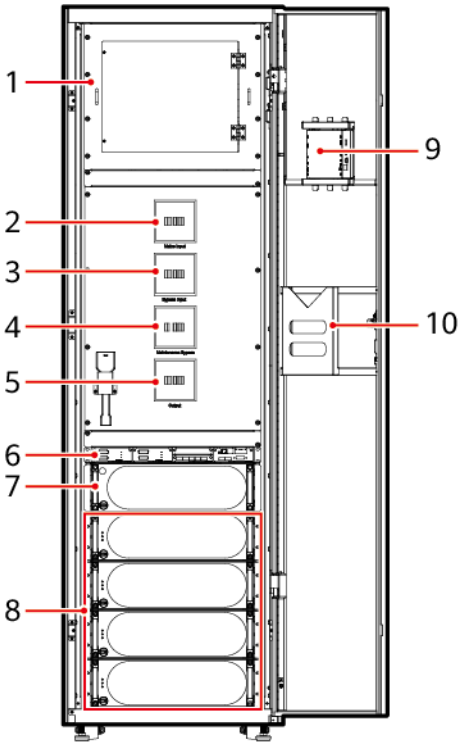
(1) Power modules	(2) Bypass module	(3) Control module	(4) Power distribution subrack cover
(5) Filler panels	(6) Monitor display unit	(7) Maintenance bypass switch	(8) Folder

Figure 2-9 UPS5000-E-200K-FM front view



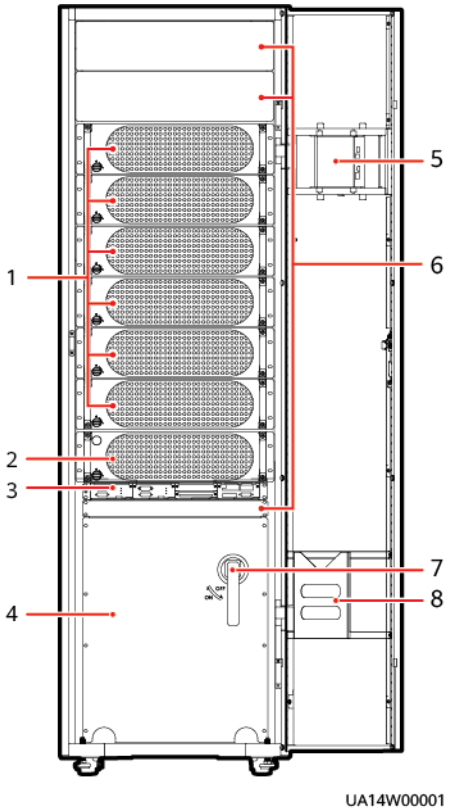
(1) Power distribution subrack cover	(2) Bypass input switch	(3) Maintenance bypass switch	(4) Mains input switch
(5) Output switch	(6) Control module	(7) Bypass module	(8) Power modules
(9) Monitor display unit	(10) Folder	(11) Filler panels	

Figure 2-10 UPS5000-E-200K-FM (isolation protection) front view



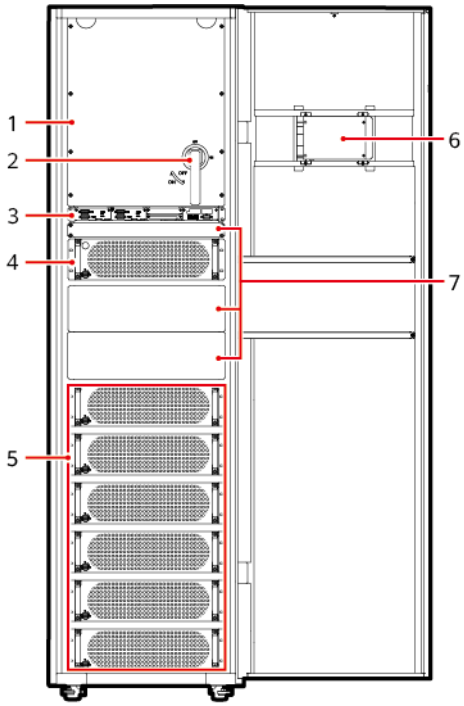
(1) Cover	(2) Mains input switch	(3) Bypass input switch	(4) Maintenance bypass switch
(5) Output switch	(6) Control module	(7) Bypass module	(8) Power modules
(9) Monitor display unit	(10) Folder		

Figure 2-11 UPS5000-E-300K-SM front view



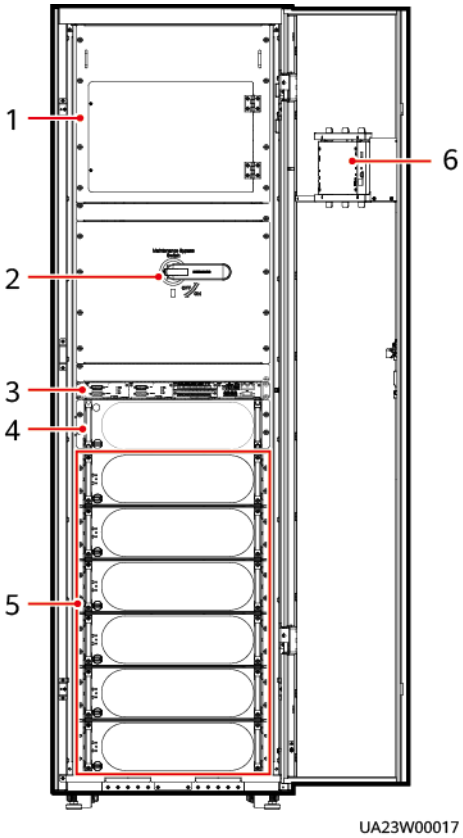
(1) Power modules	(2) Bypass module	(3) Control module	(4) Power distribution subrack cover
(5) Monitor display unit	(6) Filler panels	(7) Maintenance bypass switch	(8) Folder

Figure 2-12 UPS5000-E-300K-SMT front view



(1) Power distribution subrack cover	(2) Maintenance bypass switch	(3) Control module	(4) Bypass module
(5) Power modules	(6) Monitor display unit	(7) Filler panels	

Figure 2-13 UPS5000-E-300K-SMT (isolation protection) front view

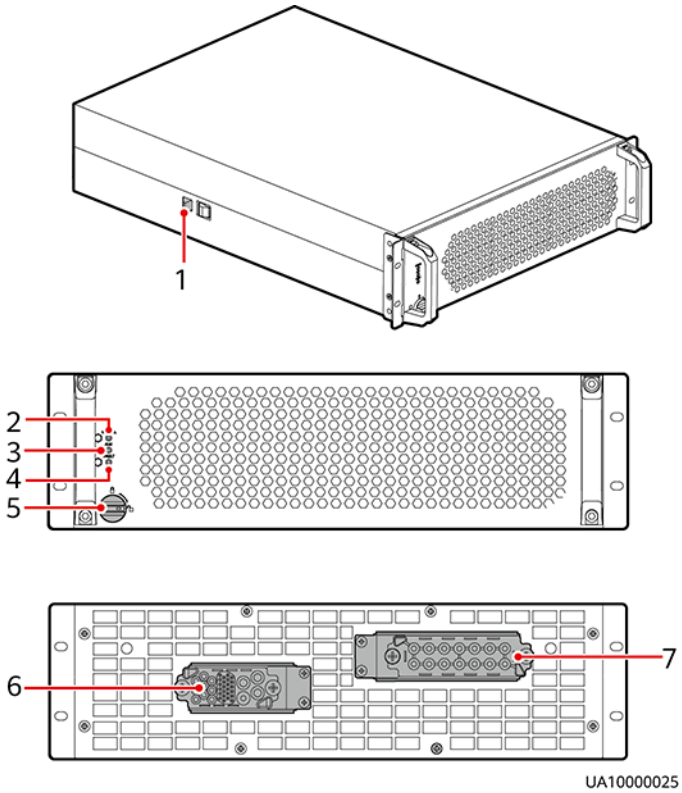


(1) Cover
(2) Maintenance bypass switch
(3) Control module
(4) Bypass module
(5) Power modules
(6) Monitor display unit

2.3.2 Power Module

Appearance

Figure 2-14 Power module



(1) Positioning lock (2) Run indicator (3) Alarm indicator (4) Fault indicator

(5) Ready switch (6) Output port (7) Input port

Table 2-2 Indicator description

Indicator	Color	Status	Description
Run indicator	Green	Steady on	The system is working in inverter mode.
		Blinking slowly	• The inverter is ready and in standby state (blinking at 0.5 Hz, on for 1s and off for 1s). • The inverter is not started (blinking at 0.2 Hz, on for 2.5s and off for 2.5s).
		Blinking fast	The module is not configured, the inverter software and rectifier software are being upgraded, or the inverter software is being upgraded (blinking at 4 Hz, on for 0.125s and off for 0.125s).

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

Functions

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

Specifications

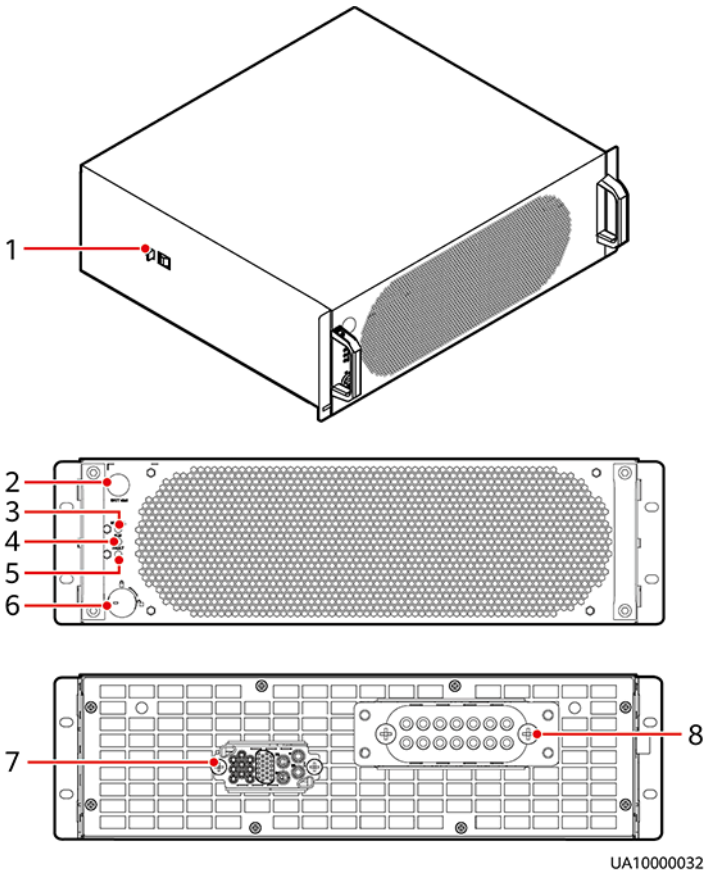
- Dimensions (H x W x D): 130 mm x 442 mm x 620 mm
- Weight: ≤ 35 kg
- Rated output capacity: 50 kVA/50 kW
- Power density: 50 kVA/3 U

2.3.3 Bypass Module

Appearance

Figure 2-15 shows a bypass module of a 200 kVA UPS.

Figure 2-15 Bypass module

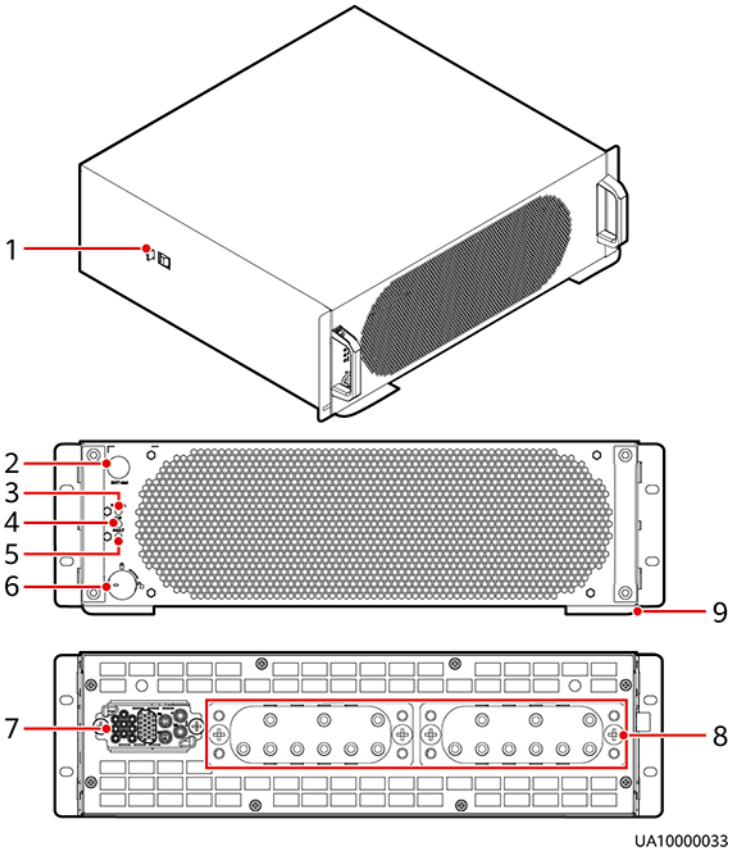


(1) Positioning lock (2) Cold start button (3) Run indicator (4) Alarm indicator

(5) Fault indicator (6) Ready switch (7) Signal port (8) Input and output ports

Figure 2-16 shows a bypass module of a 300 kVA UPS.

Figure 2-16 Bypass module



(1) Positioning lock (2) Cold start button (3) Run indicator (4) Alarm indicator

(5) Fault indicator (6) Ready switch (7) Signal port (8) Input and output ports

(9) Crowbar

Table 2-3 Indicator description

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

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

Functions

The bypass module supplies power in the following cases:

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

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

Both the active and standby ECMs are abnormal.

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

A manual operation is performed to transfer to bypass mode.

Specifications

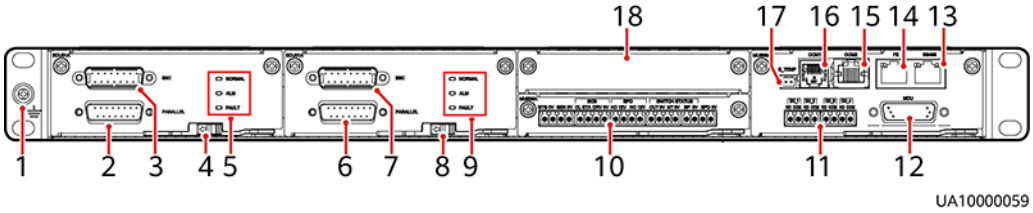
- Dimensions (H x W x D): 130 mm x 420 mm x 500 mm
- Weight
  - 200 kVA: 19 kg
  - 300 kVA: 23.8 kg

2.3.4 Control Module

2.3.4.1 Overview

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

Figure 2-17 Signal panel on the control module



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

NOTE

Ports are protected by a security mechanism.

2.3.4.2 ECM

Appearance

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

Figure 2-18 ECM

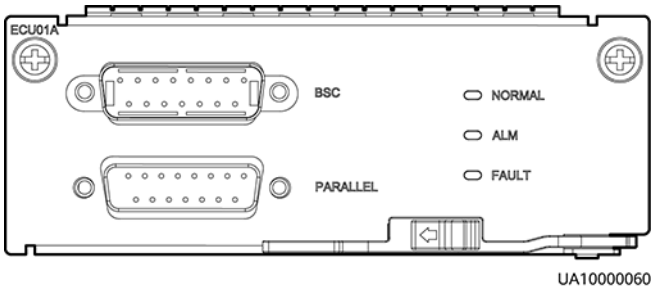


Table 2-4 Ports on the ECM

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

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

NOTE

For a single UPS, the parallel cable is not needed.

Table 2-5 Indicator description

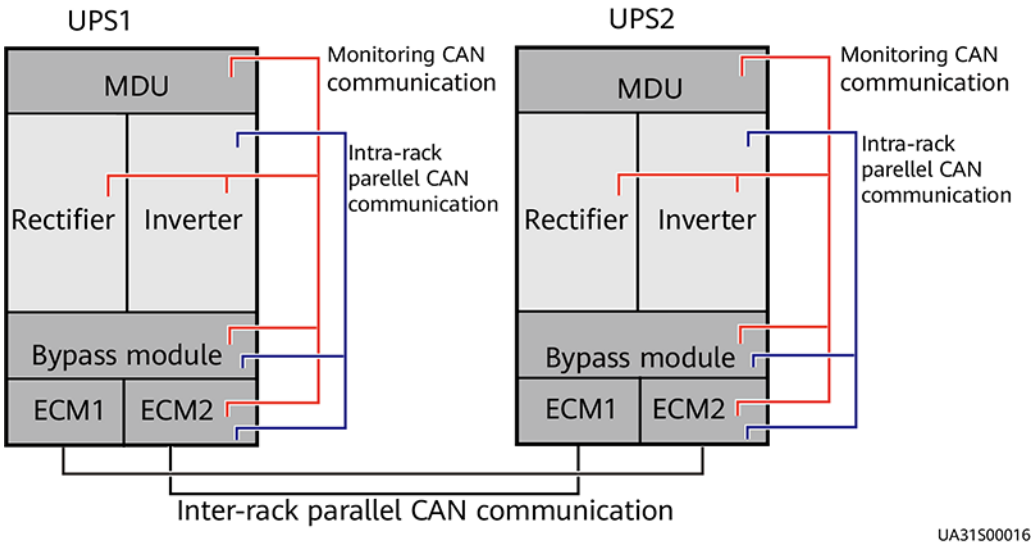
Indicator	Color	Status	Description
NORMAL	Green	Steady on	This ECM is the active ECM.
		Blinking at 0.5 Hz	This ECM is the standby ECM and it is ready.
		Off	This ECM is not ready or the software of this ECM is being upgraded.
		Blinking at 4 Hz	The software of the ECM is being upgraded or not configured.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

Functions

- As a control interface for the entire system, the ECM communicates with each module and provides a bus for communication between the dry contact card and the system control card. The ECM ensures equalized output currents between modules so that load power is equally shared.
- Provides module running information for the MDU.
- Controls the running of a single UPS5000 and a parallel system, and reports the UPS5000 status information to other monitoring modules.

- The system provides three types of CAN communication: monitoring CAN communication, intra-rack parallel CAN communication, and inter-rack parallel CAN communication.

Figure 2-19 Logical connections for CAN communication



Specifications

- Hot-swappable
- 1 U high

2.3.4.3 Dry Contact Card

- The dry contact card allows the UPS to detect and manage the switch status of the battery system (including the external battery switch) and implement remote emergency power off (EPO).
- Hot-swappable, 0.5 U high.

NOTICE

- A dry contact card port takes effect only after you set it in the software. You need to disable unused dry contact signals..
- Set the EPO port to normally open (NO) or normally closed (NC) as required.
- If multiple UPSs are connected in parallel, connect all used dry contact signals to each UPS.
- Set remote EPO for the UPS separately. The UPS cannot share switch contacts with other devices.
- DI ports have built-in power supplies with a maximum voltage and current of 12 V DC/16 mA. During cable connection, ensure that the voltage and current do not exceed these maximum values.

Figure 2-20 Appearance

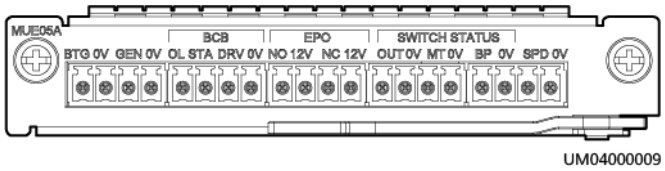
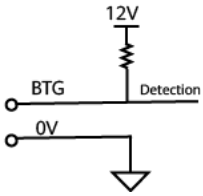
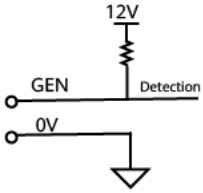
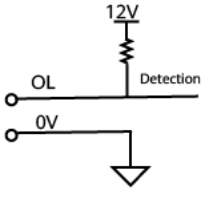
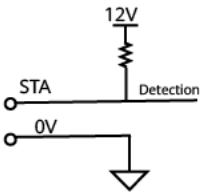
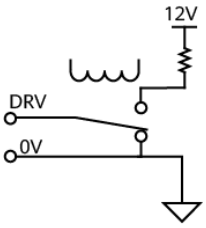
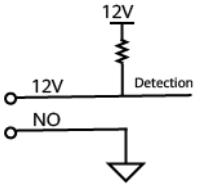
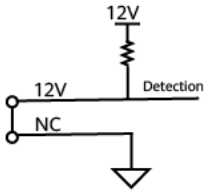
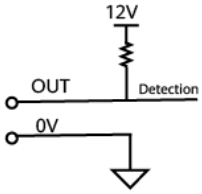
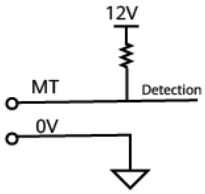
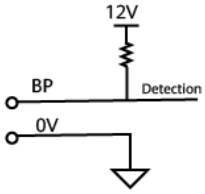
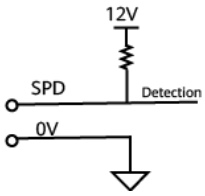


Table 2-6 Dry contact card port definitions

Silk Screen	Type	Working Principle	Signal Description	Status Description	System Action
BTG	DI		Port for detecting battery grounding faults	The default value is Open: • BTG port closed: battery grounding fault • BTG port open: no battery grounding fault The value can be changed to Closed: • BTG port open: battery grounding fault • BTG port closed: no battery grounding fault	After the setting takes effect, the system will generate a battery grounding fault alarm.
0V			Port for signal ground		
GEN	DI		Port for detecting diesel generator (DG) connection	The default value is Open: • GEN port closed: DG connected • GEN port open: DG not connected The value can be changed to Closed: • GEN port open: DG connected • GEN port closed: DG not connected	The port is used together with the generator power limiting function. After the setting takes effect, the system will limit the PFC power based on the preset generator power limit.
0V			Port for signal ground		
BCB_OL	DI		Port for detecting the BCB box	• Grounded: BCB box connected • Disconnected: BCB box not connected	After the setting takes effect, the system will detect whether the BCB is online.

Silk Screen	Type	Working Principle	Signal Description	Status Description	System Action
BCB_STA	DI		Port for monitoring the BCB	• Closed: BCB On • Open: BCB Off	
BCB_DRV	DO		Drives BCB tripping. When the voltage is +12 V, the circuit breaker trips.	• 0 V: not drive BCB tripping • 12 V: drive BCB tripping	Used to send a BCB tripping drive signal.
BCB_0V			Port for signal ground		
EPO_NO	DI		Emergency power-off (EPO) port	If the normally open (NO) signal port is connected to the EPO_12V port, EPO is triggered.	After the setting takes effect, the system will generate an EPO alarm and stop supplying power.
EPO_12V			+12V		
EPO_NC	DI		EPO port	If the normally closed (NC) port is disconnected from the EPO_12V port, EPO is triggered. Before delivery, a short-circuit cable has been installed on the NC and 12V ports.	After the setting takes effect, the system will generate an EPO alarm and stop supplying power.
EPO_12V			+12V		
SWITCH STATUS_OUT	DI		Port for monitoring the output switch on the power distribution cabinet (PDC)	The default value is Closed: • OUT port closed: The PDC output switch is ON. • OUT port open: The PDC output switch is OFF. The value can be changed to Open: • OUT port open: The PDC output switch is ON.	After the setting takes effect, the system will generate a PDC output circuit breaker open alarm and will also shut down the inverter on the rack in the parallel connection scenario.

Silk Screen	Type	Working Principle	Signal Description	Status Description	System Action
SWITCH STATUS_0V			Port for signal ground	• OUT port closed: The PDC output switch is OFF.	
SWITCH STATUS_MT	DI		Port for monitoring the maintenance switch on the PDC	The default value is Open: • MT port open: The PDC maintenance switch is ON. • MT port closed: The PDC maintenance switch is OFF. The value can be changed to Closed: • MT port closed: The PDC maintenance switch is ON. • MT port open: The PDC maintenance switch is OFF.	After the setting takes effect, the system will generate a PDC maintenance bypass closed alarm and transfer to static bypass mode.
SWITCH STATUS_0V			Port for signal ground		
SWITCH STATUS_BP	DI		Port for monitoring the PDC bypass input switch status (This port can also be defined as the port for monitoring the system maintenance switch status on the UI.)	The default value is Closed: • BP port closed: The bypass input switch or system maintenance switch is ON. • BP port open: The bypass input switch or system maintenance switch is OFF. The value can be changed to Open: • BP port open: The bypass input switch or system maintenance switch is ON. • BP port closed: The bypass input switch or system	PDC bypass input switch: After the setting takes effect, the system will generate a PDC bypass input open alarm. System maintenance switch: After the setting takes effect, the system will generate a system maintenance bypass circuit breaker closed alarm and transfer to static bypass mode.

Silk Screen	Type	Working Principle	Signal Description	Status Description	System Action
SWITCH STATUS_0V			Port for signal ground	maintenance switch is OFF.	
SPD	DI		Port for monitoring the PDC input AC SPD status (This port can also be defined as the port for monitoring the system output switch status on the UI.)	The default value is Closed: • SPD port closed: The PDC input AC SPD is normal or the system output switch is ON. • SPD port open: The PDC input AC SPD has failed or the system output switch is OFF. The value can be changed to Open: • SPD port open: The PDC input AC SPD is normal or the system output switch is ON. • SPD port closed: The PDC input AC SPD has failed or the system output switch is OFF.	PDC input AC SPD: After the setting takes effect, the system generates an input SPD alarm. System output switch: After the setting takes effect, the system will generate a system output circuit breaker open alarm and will also shut down the inverter on the rack in the parallel connection scenario.
0V			Port for signal ground		

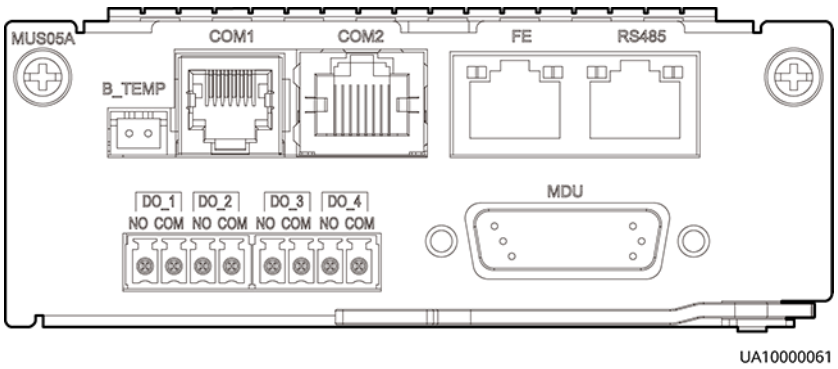
2.3.4.4 Monitoring Interface Card

NOTICE

- The FE port resembles the RS485 port. Therefore, follow the silk screens when you connect communications cables. If you mistake the RS485 port as the FE port during cable connection, the WebUI communication fails. Conversely, if the FE port is mistaken for the RS485 port during cable connection, RS485 communication fails.
- Dry contact signals take effect after you set them. Disable unused dry contact signals on the monitoring system.
- In a parallel system, ensure that used dry contacts properly connect to each UPS.
- The RS485 bus of each device is equipped with an independent build-out resistor. You are advised not to connect RS485 communications cables to multiple devices in parallel. If parallel connection is required, a maximum of four devices can be connected in parallel, or an RS485 repeater can be used for connection.

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

Figure 2-21 Monitoring interface card



NOTE

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

Table 2-7 Ports on the monitoring interface card

Port	Silk Screen	Description
DO_1	NO	• DO_1, DO_2, DO_3, and DO_4 indicate alarm outputs. The default values are **Critical alarm**, **Minor alarm**, **Bypass mode**, and **Battery mode**, respectively. • On the LCD, choose **System Info** > **Settings** > **Dry Contact Settings**. Set MUS05A DO_1, MUS05A DO_2, MUS05A DO_3, and MUS05A DO_4 to **Disable**, **Critical alarm**, **Major alarm**, **Minor alarm**, **Bypass mode**, **Battery mode**, **Low batt. volt.**, **Batt. SOC below thres.**, **Abnormal mains**, **Sys maint breaker enable**, **Sys outp breaker enable**, **Maint. breaker closed**, **No power supplied**, **Mains supplies power**, **ECO mode**, **Battery test**, **Batt. volt. below thres**, **Rack output overload**, **Battery temp. abnormal**, **Battery EOD**, and **BCB disconnected**. • Configure power segment settings based on backup time.
	COM	
DO_2	NO	
	COM	
DO_3	NO	
	COM	
DO_4	NO	
	COM	
DB26	MDU	Provides FE, RS485, I2C, and CAN signals.
Battery temperature sensor port	B_TEMP	Connects to an indoor battery temperature sensor.
Southbound communications port 1	COM1	• Supported protocol: Modbus-RTU. • Connects to an ambient temperature and humidity sensor over two wires.
Southbound communications port 2	COM2	• Supported protocol: Modbus-RTU. • Connects to a southbound device.
Network port	FE	• Supported protocols: Versions earlier than XXXX: Modbus-TCP, HTTPS, and SNMP. Versions later than XXXX: Modbus-TCP, HTTPS, BIN, and SNMP. • Connects to the network port on a PC. • Network port for connecting to the web service and for SNMP networking.
Northbound communications port	RS485	• Supported protocol: Modbus-RTU. • Connects to a northbound network management device or a third-party network management device over two wires.

NOTE

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

Figure 2-22 and **Figure 2-23** are recommended wiring methods for DO ports.

Figure 2-22 Wiring method 1

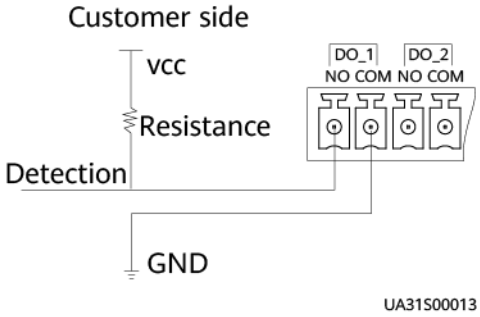


Figure 2-23 Wiring method 2

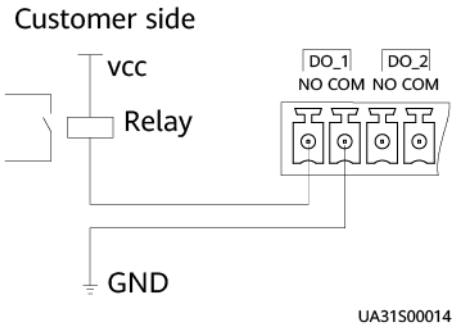


Figure 2-24 COM1 pins

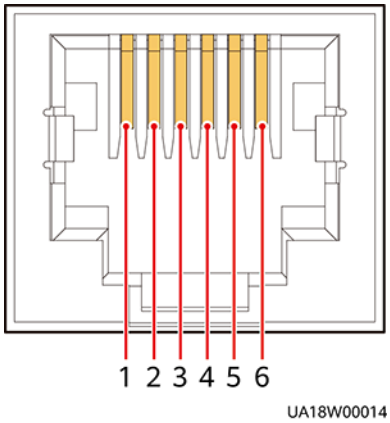


Table 2-8 COM1 pin definition

Pin	Description
1	GND

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

Figure 2-25 COM2 pins

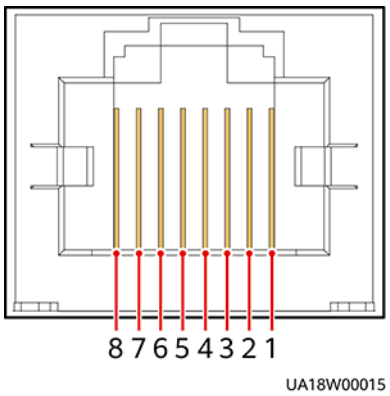


Table 2-9 COM2 pin definition

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

Figure 2-26 RS485 pins

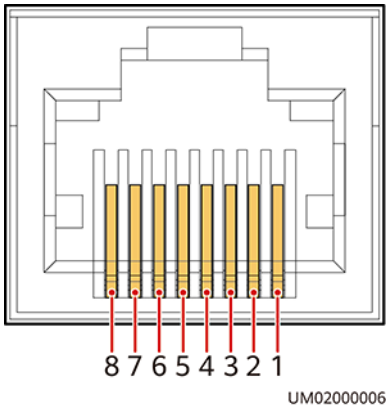


Table 2-10 RS485 pin definition

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

NOTE

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

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

2.3.5 MDU

There are two types of MDUs.

Appearance

Figure 2-27 MDU (flat LCD)

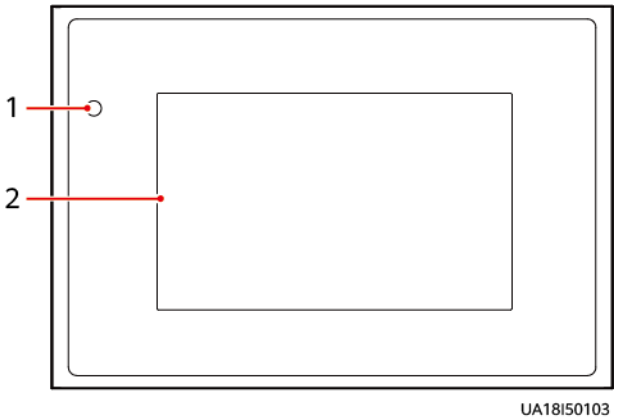
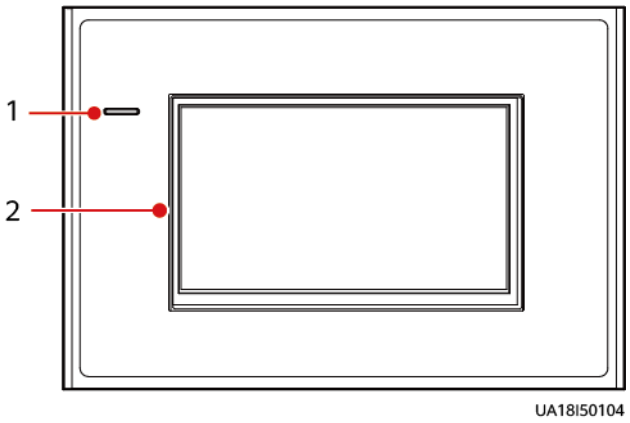


Figure 2-28 Old MDU (indented LCD)



(1) Status indicator (2) LCD touchscreen

Table 2-11 Indicator status

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

NOTE

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

Figure 2-29 MDU ports

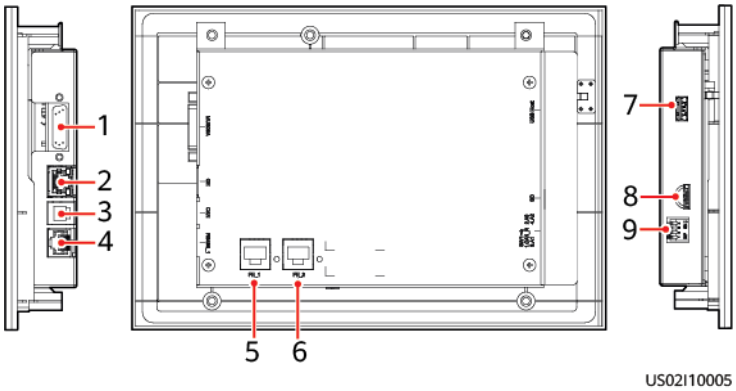


Table 2-12 MDU port description

No.	Port Name	Description
1	MUS05A (DB26)	Connects to the MDU and monitoring interface card
2	GE	Network port
3	CAN	Reserved
4	RS485_1	Reserved
5	FE_1	Reserved
6	FE_2	Reserved
7	USB Host	Insert the USB flash drive, import and export the configuration file, export run logs, and upgrade software. **NOTE** The USB port is protected by a security mechanism. Users can export and import data and upgrade software only after being authenticated.
8	SD	Reserved
9	DIP switch	Implements specific functions by using the DIP switch and specific buttons; controls the CAN communication build-out resistor in a parallel system

Figure 2-30 Ports on the old MDU

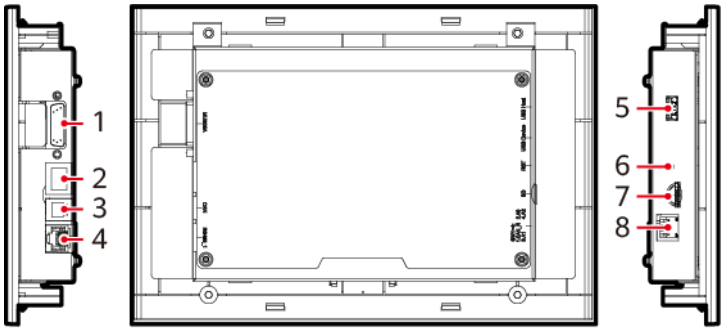


Table 2-13 Port description for the old MDU

No.	Port Name	Description
1	MUS05A (DB26)	Connects to the MDU and monitoring interface card
2	FE	Network port
3	CAN	Reserved
4	RS485_1	Reserved
5	USB Host	Insert the USB flash drive, import and export the configuration file, export run logs, and upgrade software. **NOTE** The USB port is protected by a security mechanism. Users can export and import data and upgrade software only after being authenticated.
6	RST	Restart switch for the MDU
7	SD	Reserved
8	DIP switch	Implements specific functions by using the DIP switch and specific buttons; controls the CAN communication resistor in a parallel system.

Functions

The MDU allows you to control UPS operations, view the running status and alarms, and set parameters.

Specifications

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

2.4 Typical Configurations

Table 2-14 Typical UPS configurations

Configuration	Application Scenario
Single UPS	Supplies power to common loads.
Parallel system	Supplies power to important loads in small- and medium-sized data centers. It features high availability and strong transient overload capability.
Dual-bus system	The dual-bus system is suitable for scenarios where high availability requirements are posed for power supply. The dual-bus system supplies power to important loads in large- and medium-sized equipment rooms and data centers. In addition to common parallel system advantages, the dual-bus system also provides outstanding availability and eliminates bottleneck failures. However, configuration of the dual-bus system is complex.

NOTE

A 1+1 parallel system is a typical configuration. You can set the number of requisite UPSs and redundant ones on the LCD or WebUI.

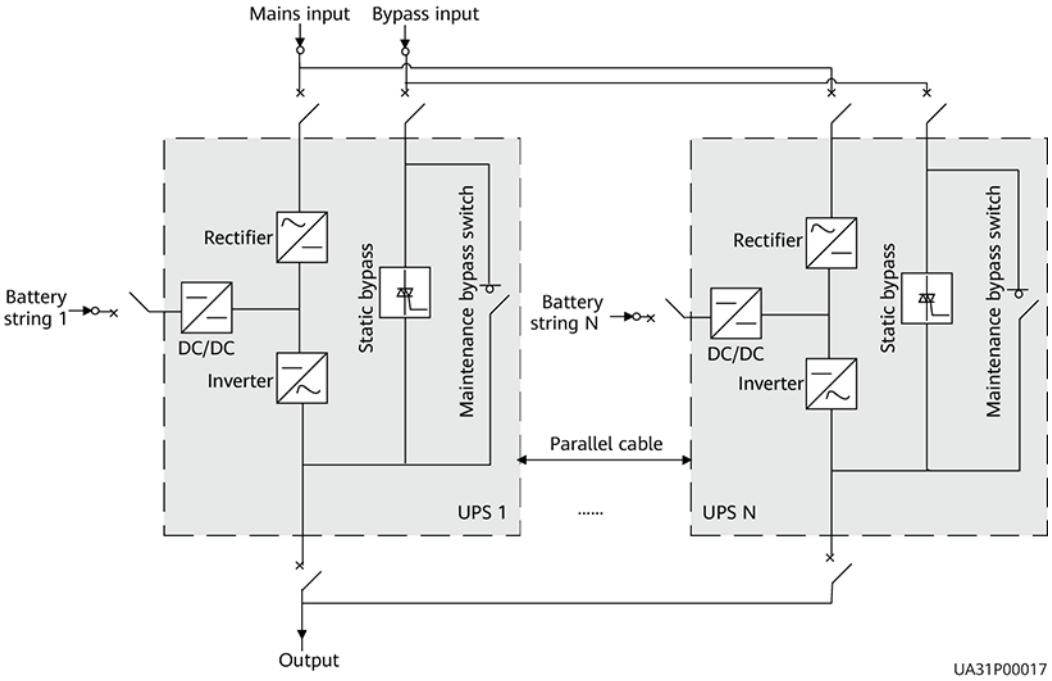
2.4.1 Single UPS

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

2.4.2 Parallel System

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

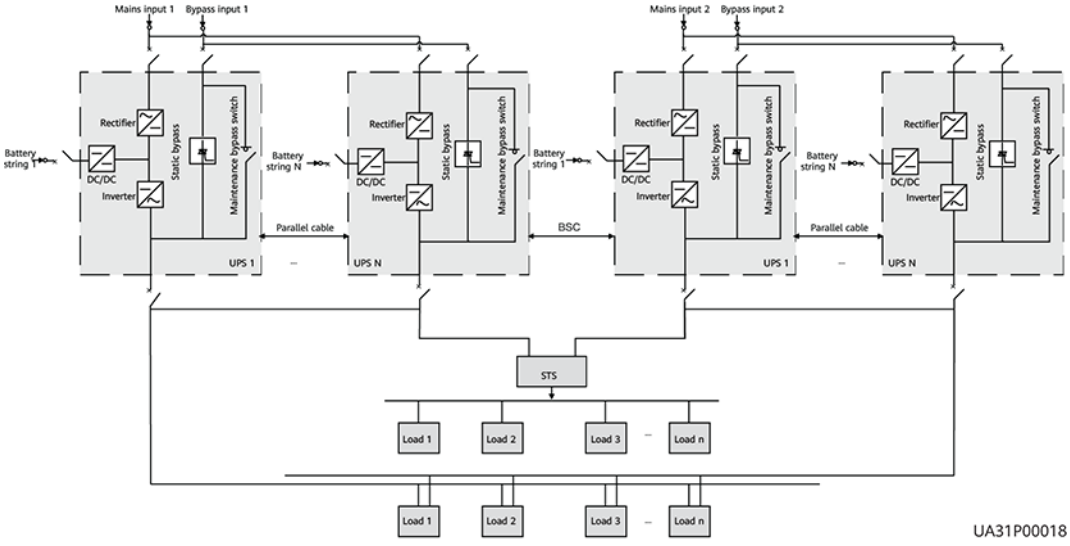
Figure 2-31 Conceptual diagram of an N+X parallel system



2.4.3 Dual-Bus System

A dual-bus system consists of two independent UPS systems. Each of these UPS systems in turn consists of one or more UPSs connected in parallel. Of the two UPS systems, one is a master system, and the other is a slave system. This design makes the dual-bus system highly reliable and suitable for loads with multiple input terminals. An optional static transfer switch (STS) can be installed to start the bus synchronization controller (BSC). The UPS systems work in normal mode or bypass mode.

Figure 2-32 Conceptual diagram of a dual-bus system



2.5 Optional Components

Component	Model	Function
BCB-BOX	• PDC-0250DC0384BXA • PDC-0400DC0384BXA • PDC-0630DC0384BXA • PDU8000-0125DCV8-BXA001 • PDU8000-0250DCV8-BXA001 • PDU8000-0400DCV8-BXA001 • PDU8000-0630DCV8-BXA001 • PDU8000-0800DCV8-BXA001	Controls the connection between battery strings and the UPS, and supports overload protection, short-circuit protection, and remote trip control.
BBB-BOX	• PDU8000-0630DCV8-BGA001 • PDU8000-1250DCV8-BGA001 • PDU8000-2000DCV8-BGA001	Converges the energy from multiple battery strings.
Surge protection box	-	Improves the UPS surge protection capability. For details, see the *UPS Surge Protection Box Quick Installation Guide (02311DJH)*.
Surge protection box subrack	-	Configured only when the surge protection box is used. The position for installing the surge protection box subrack and ECM expansion subrack is the same, and therefore the two types of subracks cannot be used simultaneously.

Component	Model	Function
ECM extended subrack	-	Install this subrack when the UPS is equipped with a backfeed protection card and dry contact extended card. The position for installing the surge protection box subrack and ECM expansion subrack is the same, and therefore the two types of subracks cannot be used simultaneously.
Antiseismic kit	-	Reinforces the cabinet so that the cabinet can resist intensity 9 earthquakes.
IP21 component	-	Prevents water from dropping into the cabinet, protecting the cabinet to IP21.
Dry contact extended card	-	Provides extended monitoring ports: five relay output ports and five input ports.
Backfeed protection card	-	Detects mains and bypass backfeed and provides protection.
Battery grounding failure detector	-	Detects current leakage and generates alarms. When equipped with a remote trip switch, the detector protects devices and prevents fire outbreak. Detects battery grounding failures and generates alarms when the ground leakage current exceeds the specified value.
T/H sensor	EIM03C1	Monitors the ambient temperature and humidity, and can be applied to batteries.
4G module	• iIOT-WAC0411 • iIOT-WAC0412	Exchanges data with related equipment through wireless communication.
Parallel cable	5 m/10 m/15 m	Connects UPSs in parallel.
BSC cable	10 m/15 m/60 m	Transmits bus synchronization signals in a dual-bus system.
Top air-flow cabinet	-	Exhausts air from the top.

Component	Model	Function
Cable entry cabinet	-	If a cable entry cabinet is installed, cables can be routed in and out from the bottom of the cabinet.

NOTE

- The ECM expansion subrack does not support onsite installation. If you require this optional component, specify it when you purchase the device and the component will be preinstalled.
- The IP21 component cannot be configured for the UPS5000-E-300K-SMT and UPS5000-E-200K-FM. If cables are routed in and out from the top for the UPS5000-E-200K-SM, the IP21 component cannot be configured.

3 Installation

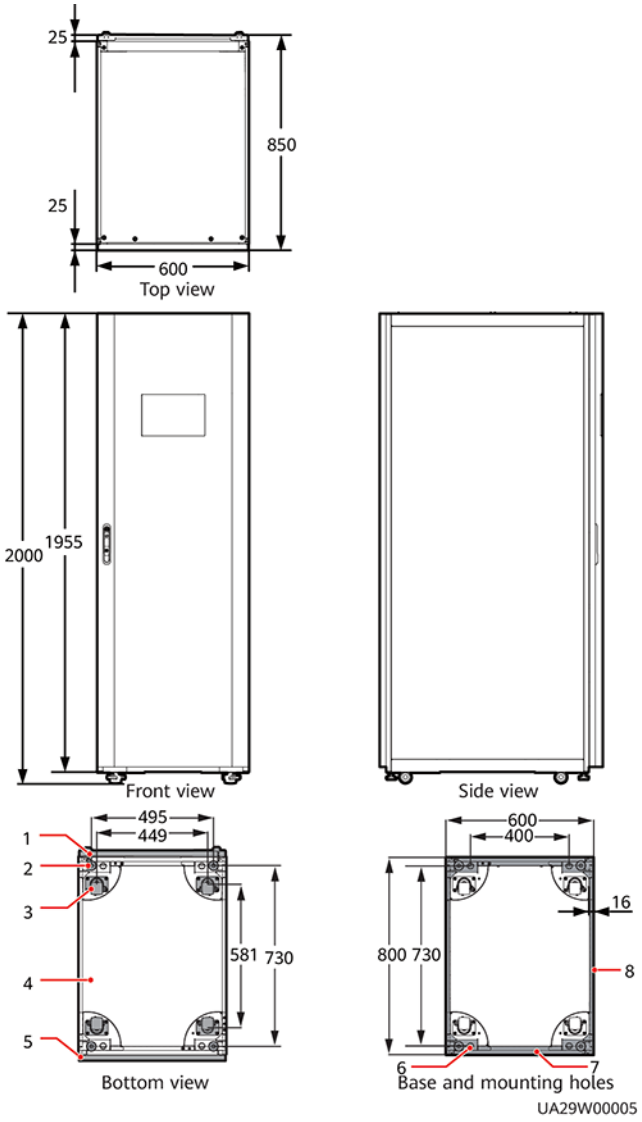
3.1 Installation Preparations

3.1.1 Site Planning

3.1.1.1 Dimensions

Ensure that the floor or installation support can bear the weight of the UPS5000, batteries, and battery racks. The weight of batteries and battery racks depends on the UPS configuration for the site.

Figure 3-1 UPS dimensions (unit: mm)



(1) Front door	(2) Foot	(3) Caster	(4) Base
(5) Rear panel	(6) Base installation hole	(7) Beam	(8) Side beam

3.1.1.2 Installation Environment

- Do not install the UPS in an environment where the operating temperature and relative humidity are beyond the ranges stipulated in the technical specifications.
- Install the UPS away from water sources, heat sources, and flammable or explosive materials. Keep the UPS away from direct sunlight, dust, volatile gases, corrosive materials, and air dense with salt particles.
- Do not install the UPS in environments with conductive metal scraps in the air.
- The optimal operating temperatures for valve-regulated lead-acid batteries (VRLA batteries) are 20–30°C. Operating temperatures higher than 30°C

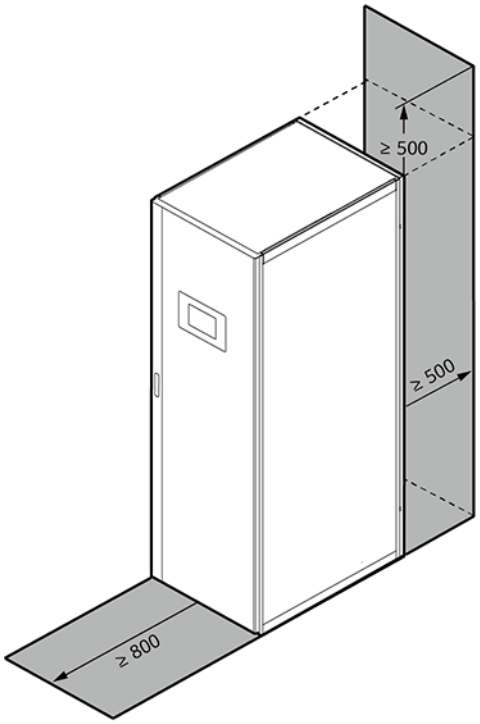
shorten the battery lifespan and operating temperatures lower than 20°C reduce the battery backup time.

3.1.1.3 Installation Clearances

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

- Reserve at least 800 mm from the front and rear of the cabinet.
- Reserve at least 500 mm from the top of the cabinet.
- If a top air-flow cabinet is deployed, the UPS can be installed against a wall and no space needs to be reserved at the rear. If no top air-flow cabinet is deployed, at least 500 mm space should be reserved at the rear for ventilation. If the UPS will be operated from the rear, at least 800 mm space should be reserved for operations.

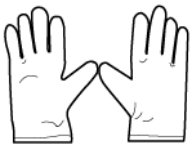
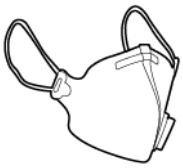
Figure 3-2 Reserved clearances (unit: mm)



3.1.2 Tools

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

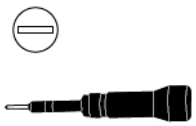
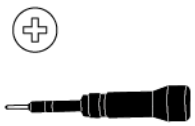
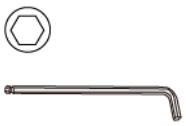
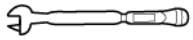
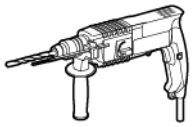
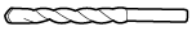
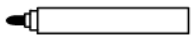
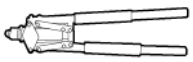
Personal protective equipment

 Safety helmet	 Goggles	 Protective shoes	 Reflective vest
 ESD gloves	 Insulated gloves	 Protective gloves	 Safety harness
 Dust mask	 Insulated shoes	-	-

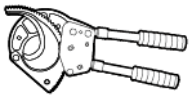
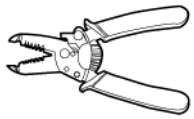
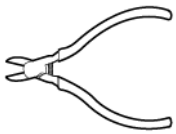
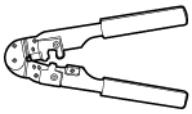
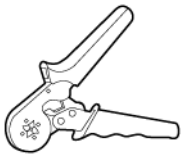
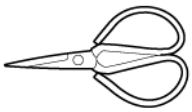
Transportation tools

 Electric forklift	 Manual pallet truck	 Lifting trolley	-

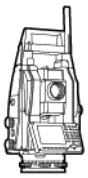
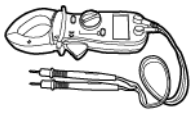
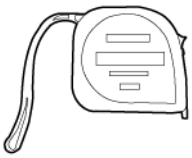
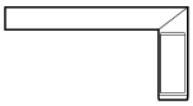
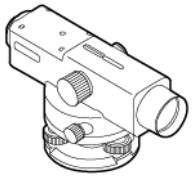
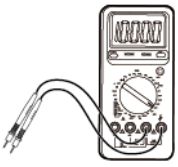
Hardware installation tools

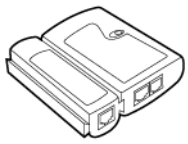
 Flat-head insulated torque screwdriver (M2.5)	 Phillips insulated torque screwdriver (M4/M5/M6)	 Insulated torque socket wrench Including extended sockets (M8/M10/M12/M16)	 Hex key
 Adjustable torque wrench	 Hammer drill	 Hammer drill bit (Φ16 mm)	 Claw hammer
 Electric screwdriver	 Step ladder	 Pliers	 Rubber mallet
 Utility knife	 Marker	 Rivet gun	 Insulated ladder

Cable installation tools

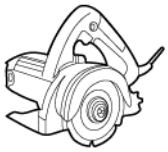
 Cable cutter	 Wire stripper	 Diagonal pliers	 RJ45 crimping tool
 Electro-hydraulic pliers	 Cord end terminal crimping tool	 Heat gun	 Scissors

Measurement instruments

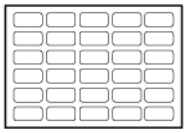
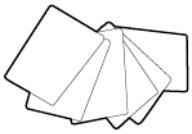
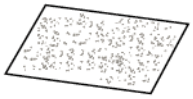
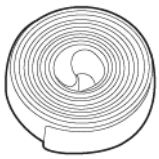
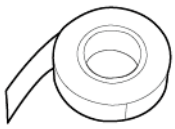
 Height gauge	 Laser locator	 Electroprobe	 Thermometer
 Clamp meter	 Soft measuring tape	 Steel measuring tape	 Square
 Level	 Laptop	 Level gauge	 Multimeter

 Network tester	 Phase sequence meter	 Dielectric strength tester	 Megohmmeter

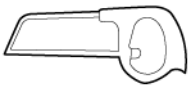
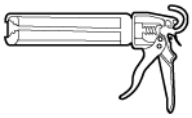
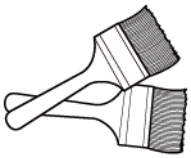
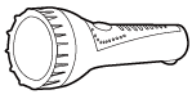
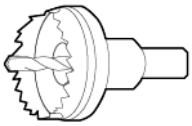
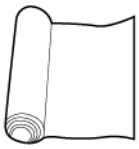
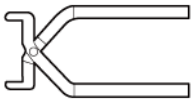
Machinery

 Small cutter	 Cable reel	-	-

Engineering auxiliary materials

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

Other tools

 Electrician's knife	 Hacksaw	 Powder marker	 Glue gun
 Brush	 Paint brush	 Vacuum cleaner	 Flashlight
 Hole saw	 Insulation pad	 SPD extracting tool	-

3.1.3 Power Cables

NOTICE

- The UPS can generate large leakage currents. A circuit breaker that provides leakage current protection is not recommended.
- If multiple UPSs are to be connected in parallel, input and output power cables for each UPS should have the same length and specifications.
- The TN-C system is supported when the input N and PE are connected.

Table 3-1 lists the recommended cross-sectional areas for power cables. Note that the currents listed are measured at a rated voltage of 380 V (line voltage).

Table 3-1 Recommended cross-sectional areas for power cables

Item			UPS5000-E-200K-SM/FM, UPS5000-E-300K-SM/SMT				UPS5000-E-300K-SM/SMT	
			50 kVA	100 kVA	150 kVA	200 kVA	250 kVA	300 kVA
Mains input	Mains input current (A)		89	178	267	355	444	533
	Recommended cross-sectional area (mm^2)	L1	4 x 25	4 x 70	2 x (4 x 70)	2 x (4 x 95)	2 x (4 x 120)	2 x (4 x 150)
		L2						
		L3						
		N						
		PE	25	35	70	95	120	150
Bypass input	Bypass input current (A)		76	152	228	304	380	456
	Recommended cross-sectional area (mm^2)	L1	4 x 25	4 x 70	2 x (4 x 70)	2 x (4 x 95)	2 x (4 x 120)	2 x (4 x 150)
		L2						
		L3						
		N						
		PE	25	35	70	95	120	150
Output	Output current (A)		76	152	228	304	380	456
	Recommended cross-sectional area (mm^2)	U	4 x 25	4 x 70	2 x (4 x 70)	2 x (4 x 95)	2 x (4 x 120)	2 x (4 x 150)
		V						
		W						
		N						
		PE	25	35	70	95	120	150
Battery input (VRLA battery)	Battery nominal discharge current (A)		110	219	329	439	548	658
	Battery maximum discharge current (A)		131	263	394	525	657	788
	Recommended cross-sectional	+	3 x 35	3 x 95	2 x (3 x 95)	2 x (3 x 120)	2 x (3 x 150)	2 x (3 x 185)
		N						
		-						

Item			UPS5000-E-200K-SM/FM, UPS5000-E-300K-SM/SMT				UPS5000-E-300K-SM/SMT	
			50 kVA	100 kVA	150 kVA	200 kVA	250 kVA	300 kVA
	area (mm^2)	PE	35	50	95	120	150	185
Battery input (SmartLi)	Nominal battery discharge current (A)		103	206	308	411	514	617
	Maximum battery discharge current (A)		129	258	387	516	645	774
	Recommended cross-sectional area		For details, see IEC-60364-5-52 and SmartLi User Manual.					

NOTE

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

- When selecting, connecting, and routing power cables, follow local safety regulations and rules.
- When the external conditions change, for example, the cable layout or ambient temperatures, perform verification in accordance with the IEC-60364-5-52 or the local regulations.
- If the rated voltage is 400 V, multiply the currents by 0.95. If the rated voltage is 415 V, multiply the currents by 0.92.
- When the primary loads are non-linear loads, increase the cross-sectional areas of the neutral wires 1.5–1.7 times.
- The nominal battery discharge current refers to the current of forty 12 V batteries at 480 V in standard configuration.
- The maximum battery discharge current refers to the current when forty 12 V batteries in standard configuration, that is, two hundred and forty 2 V battery cells (1.67 V/cell), stop discharging.
- The battery cable specifications are selected based on 40 batteries by default and compatible with application scenarios with 30–44 batteries.
- When the mains input and bypass input share a power source, configure input power cables as mains input power cables. In addition, cables listed in **Table 3-1** apply only to the following conditions:
  - 200 kVA: The cables are installed along the wall or on the floor (IEC-60364-5-52 C standards). 300 kVA: The cables are routed over a ladder or bracket in a single layer (IEC60364-5-52 F standards). The distances between cables must be greater than twice the cable diameter.
  - The ambient temperature is 30°C.

- The AC voltage loss is less than 3%, and the DC voltage loss is less than 1%.
- 200 kVA: single- or multi-core 90°C soft power cable with a copper conductor; 300 kVA: single-core 90°C soft power cable with a copper conductor.
- It is recommended that the 200 kVA AC power cable should not be longer than 30 meters and the DC power cable should not be longer than 40 meters. The 300 kVA AC power cable should not be longer than 30 meters and the DC power cable should not be longer than 50 meters.

Table 3-2 and **Table 3-3** list the requirements for power cable terminals of the UPS5000-E-200K-SM/FM.

Table 3-2 Power cable terminal requirements for the UPS5000-E-200K-SM

Port Description	Connection Method	Bolt Specifications	Bolt Hole Diameter	Bolt Length	Torque
Mains input	Crimped OT terminals	M10	10.5 mm	30 mm	26 N·m
Bypass input	Crimped OT terminals	M10	10.5 mm	30 mm	26 N·m
Battery input	Crimped OT terminals	M12	13.5 mm	45 mm	46 N·m
Output	Crimped OT terminals	M10	10.5 mm	30 mm	26 N·m
PE	Crimped OT terminals	M10	10.5 mm	30 mm	26 N·m

Table 3-3 Power cable terminal requirements for the UPS5000-E-200K-FM

Port Description	Connection Method	Bolt Specifications	Bolt Hole Diameter	Bolt Length	Torque
Mains input	Crimped OT terminals	M10	10.5 mm	40 mm	26 N·m
Bypass input	Crimped OT terminals	M10	10.5 mm	40 mm	26 N·m
Battery input	Crimped OT terminals	M12	13.5 mm	60 mm	46 N·m
Output	Crimped OT terminals	M10	10.5 mm	40 mm	26 N·m

Port Description	Connection Method	Bolt Specifications	Bolt Hole Diameter	Bolt Length	Torque
PE	Crimped OT terminals	M10	10.5 mm	30 mm	26 N·m

Table 3-4 lists the requirements for power cable terminals of the UPS5000-E-300K-SM/SMT.

Table 3-4 Power cable terminal requirements for the 300 kVA cabinet

Port Description	Recommended Connection Method	Bolt Specifications	Bolt Hole Diameter	Bolt Length	Torque
Mains input	Crimped OT terminals	M12	13.5 mm	45 mm	46 N·m
Bypass input	Crimped OT terminals	M12	13.5 mm	45 mm	46 N·m
Battery input	Crimped OT terminals	M12	13.5 mm	45 mm	46 N·m
Output	Crimped OT terminals	M12	13.5 mm	45 mm	46 N·m
PE	Crimped OT terminals	M12	13.5 mm	30 mm	46 N·m

Table 3-5 Recommended upstream input and downstream output circuit breakers

Model	UPS Capacity	Component	Specifications[a]
UPS5000-E-200K-SM/FM, UPS5000-E-300K-SM/SMT	50 kVA	Mains input circuit breaker	160 A/3P
		Bypass input circuit breaker	100 A/3P
		Downstream output circuit breaker	100 A/3P
	100 kVA	Mains input circuit breaker	250 A/3P
		Bypass input circuit breaker	160 A/3P
		Downstream output circuit breaker	160 A/3P

Model	UPS Capacity	Component	Specifications[a]
	150 kVA	Mains input circuit breaker	320 A/3P
		Bypass input circuit breaker	250 A/3P
		Downstream output circuit breaker	250 A/3P
	200 kVA	Mains input circuit breaker	400 A/3P
		Bypass input circuit breaker	400 A/3P
		Downstream output circuit breaker	400 A/3P
UPS5000-E-300K-SM/SMT	250 kVA	Mains input circuit breaker	630 A/3P
		Bypass input circuit breaker	400 A/3P
		Downstream output circuit breaker	400 A/3P
	300 kVA	Mains input circuit breaker	630 A/3P
		Bypass input circuit breaker	630 A/3P
		Downstream output circuit breaker	630 A/3P
a: recommended when the short-circuit current where the switch is located is less than 36 kA			

NOTE

- The input upstream circuit breakers recommended in **Table 3-5** are for reference only.
- If multiple loads are connected, specifications for branch circuit breakers must not exceed the recommended specifications.
- The circuit breaker selection principle is to protect loads and cables, and the cascading principle is to realize specific protection.

3.1.4 SPD

NOTE

- When installing the UPS, install a class C SPD for the UPS input to meet the requirements of OVC II.
- Only the UPS5000-E-300K-SM/SMT needs to be installed with an SPD.

- Recommended SPD specifications: VDE/TUV certification, voltage protection level Up ≤ 2500 V

  For a model with the 380 V/400 V/415 V voltage system, the operating voltage Uc should be greater than or equal to 280 V AC (phase voltage).
- Determine the maximum continuous operating voltage (Uc) based on the highest line voltage of the local power grid. It is recommended that the phase-to-N voltage be 1.1 times the phase voltage and the N-to-PE voltage be the same as the phase voltage.
- If SPD status detection is required, connect the SPD status detection cable to the SPD port on the dry contact card. The SPD dry contact must meet the SELV circuit requirements.

3.1.5 Transportation, Unpacking, and Checking

NOTICE

- Only trained personnel are allowed to move the cabinet. Use a forklift truck to remove the packed cabinet from the pallet.
- To prevent the equipment from falling over, secure it to a pallet truck using ropes before moving it. Move the equipment with caution to avoid bumping or falling, which may damage the equipment.
- After placing the equipment in the installation position, unpack it and take care to prevent scratches. Keep the equipment stable during unpacking.
- After unpacking, check whether the fastening components and removable components are loose. If they are loose, notify the carrier and manufacturer immediately.
- If the installation environment is poor, take dustproof and anti-condensation measures (for example, use a dust cover) after unpacking the equipment to prevent condensation and dust buildup, which may corrode the equipment. Do not remove the dust cover before powering on or during construction. Remove the dust cover only when the equipment is ready for operation.

Step 1 Use a forklift truck to transport the cabinet to the installation position.

Step 2 Remove the packing materials and set the accessories aside.

Step 3 Check that the cabinet is intact.

1. Visually inspect the cabinet appearance for damage caused during transportation. If any damage is found, report the photos to the carrier immediately.

2. Check whether the cabinet accessories are complete and correct according to the packing list. If there is any discrepancy, keep a record and contact the supplier immediately.

Step 4 After confirming that the cabinet is intact, remove the L-shaped bracket that secures the cabinet and pallet, and secure the sliding plate to the pallet using the two M12 screws that you have removed.

Figure 3-3 Removing L-shaped brackets

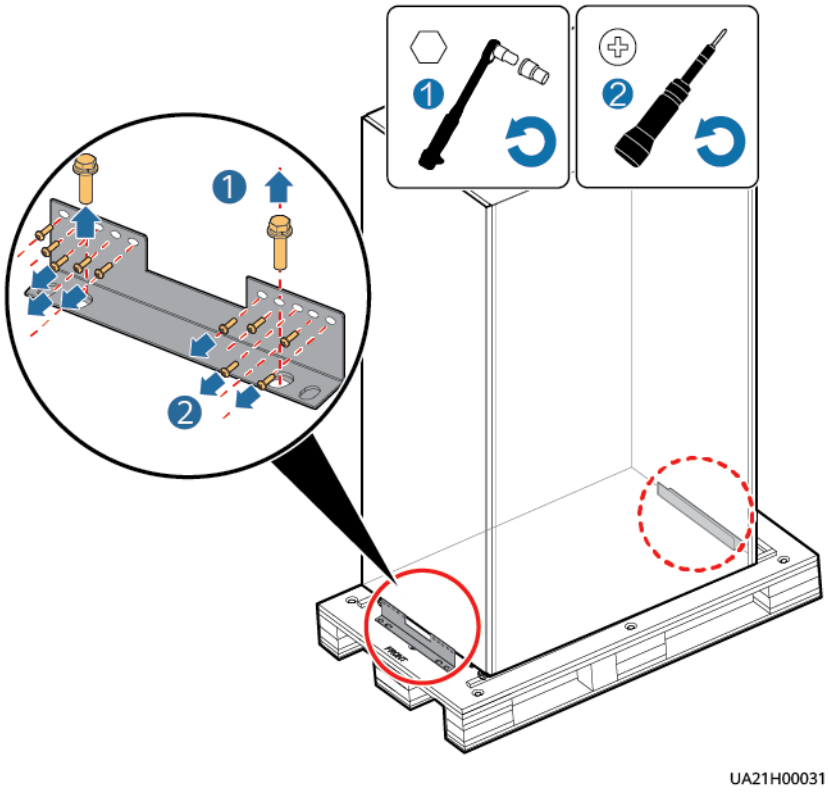
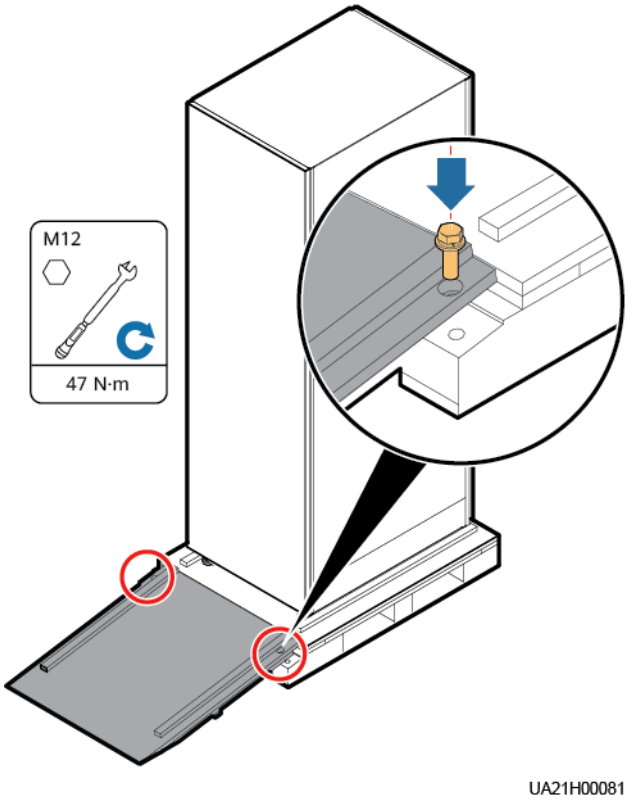


Figure 3-4 Securing the sliding plate to the pallet



NOTE

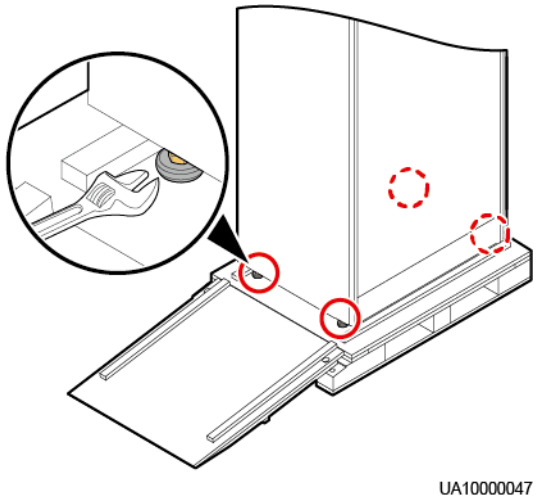
Ensure that the two screws on the sliding plate are tightened. Otherwise, the sliding plate may move when you remove the UPS.

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

NOTICE

When raising the leveling feet, at least one person is required to hold the cabinet to prevent it from sliding.

Figure 3-5 Raising the anchor bolts to the highest position



Step 6 Slowly move the cabinet over its castors to the installation position.

----End

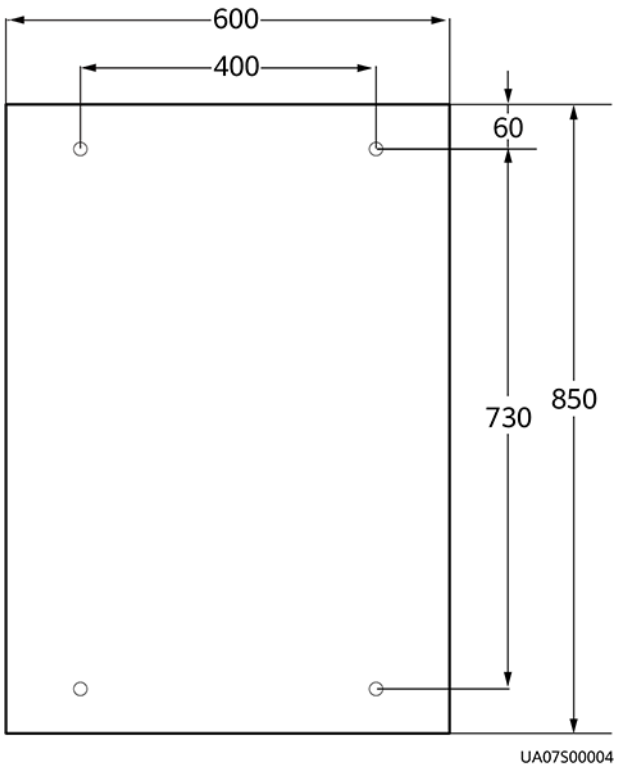
3.2 Installing a Single UPS

3.2.1 Installing a UPS Cabinet

Secured Installation

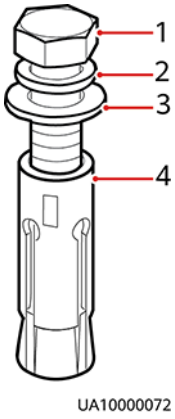
Step 1 Determine the cabinet installation position. Draw mounting holes in the installation position according to the drawing.

Figure 3-6 UPS mounting hole positions (unit: mm)



Step 2 Use a hammer drill to drill four holes for installing expansion bolts and then install four expansion bolts in the holes. **Figure 3-7** shows the composition of an expansion bolt, and **Figure 3-8** shows how to install an expansion bolt.

Figure 3-7 Expansion bolt composition

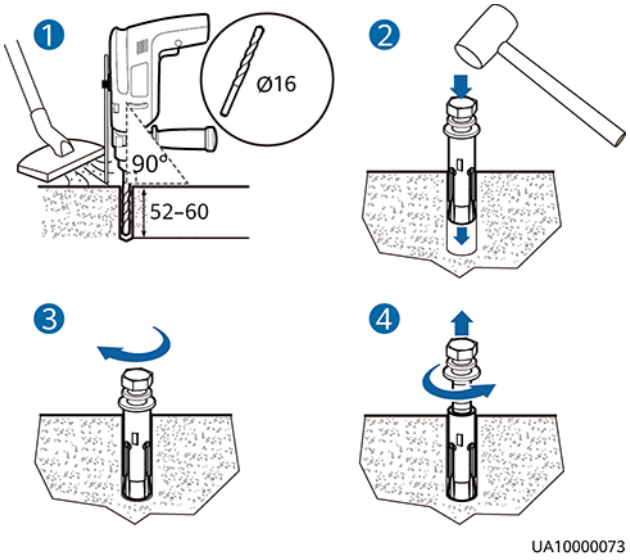


(1) M12 bolt (2) Spring washer (3) Flat washer (4) Expansion sleeve

NOTICE

Knock the expansion bolt into the hole until the expansion sleeve completely fits into the hole. The expansion sleeve must be completely buried under the ground to facilitate subsequent installation.

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



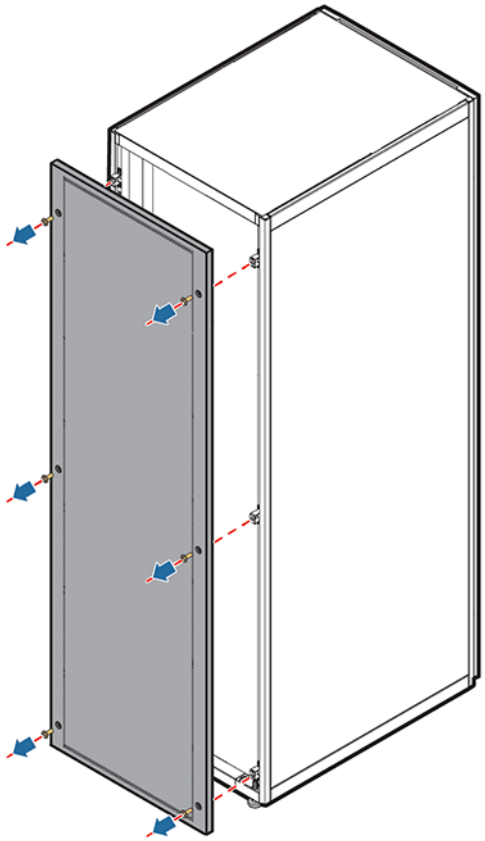
1. Drill holes in the ground by using a hammer drill. The hole depth is 52 mm to 60 mm.
2. Partially tighten the expansion bolt and vertically insert it into the hole. Hit the expansion bolt using a rubber mallet until the expansion sleeve is fully inserted into the hole.
3. Partially tighten the expansion bolt.
4. Remove the bolt, spring washer, and flat washer.

Step 3 Move the cabinet over its castors to the installation position.

Step 4 (Optional) If the castors of the UPS need to be lifted from the ground, perform steps **Step 1** to **Step 2** in **Unsecured Installation**.

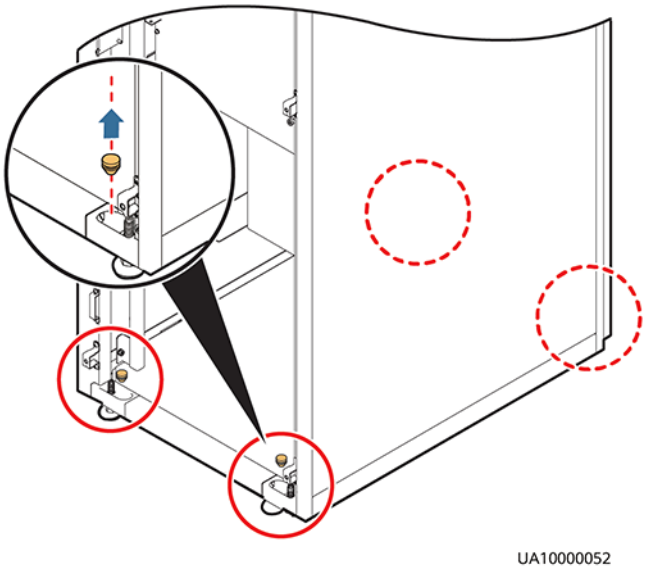
Step 5 Remove the rear panel of the cabinet, and then open the front door.

Figure 3-9 Removing the rear panel



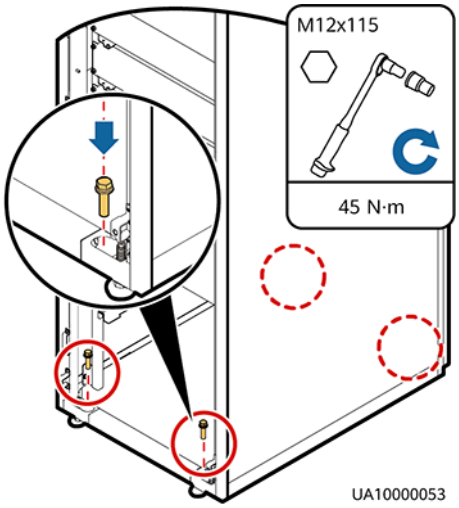
Step 6 Remove the four plugs from the bottom of the cabinet (two at the front and two at the rear).

Figure 3-10 Removing plugs



Step 7 Insert four M12x115 expansion bolts into the expansion bolt holes in the floor, and tighten the expansion bolts in the direction.

Figure 3-11 Tightening expansion bolts

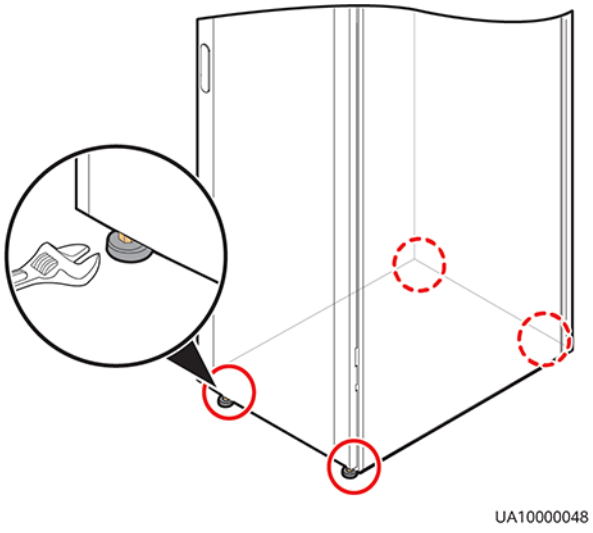


----End

Unsecured Installation

Step 1 Adjust the four anchor bolts at the bottom of the UPS cabinet until all the four castors at the bottom hang in the air and the anchor bolts bear all of the cabinet weight, as shown in **Figure 3-12**.

Figure 3-12 Castors adjustment



Step 2 Check the cabinet levelness using a level. If the cabinet is not level, wrench the anchor bolts.

----End

3.2.2 Installing Batteries

Context

DANGER

- Before installing batteries, read through the battery safety precautions, obtain the delivered battery installation guide, and install batteries as instructed.
- Wear insulated gloves and use insulated tools to prevent electric shocks or short circuits.
- Place the batteries in a correct way to prevent vibrations and shocks.
- Install the batteries from the lower layer to the upper layer to prevent falling over due to imbalance.

Procedure

Step 1 Install a battery rack and batteries.

For details, see the battery installation guide delivered along with batteries.

----End

3.2.3 Installing Optional Components

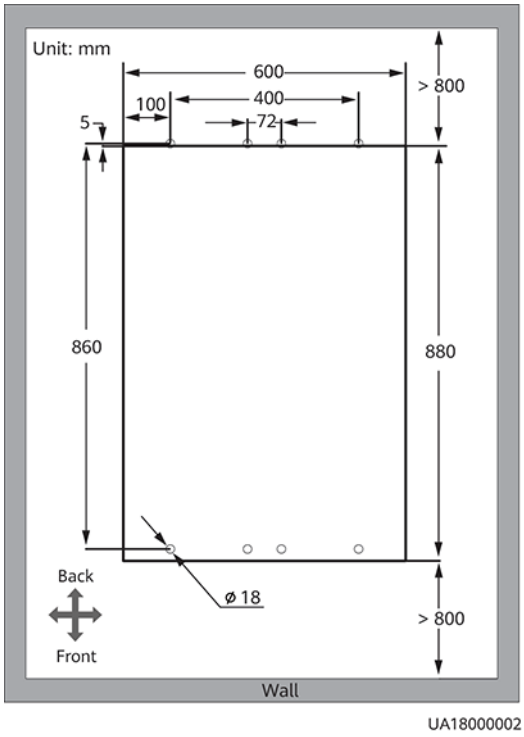
3.2.3.1 Installing Antiseismic Kits

Procedure

Step 1 Determine the positions for installing the antiseismic kits.

- (With a marking-off template) Determine the installation positions for the antiseismic kits based on the delivered marking-off template, and mark mounting holes.
- (Without a marking-off template) Mark mounting holes based on the following figure.

Figure 3-13 Antiseismic kit mounting hole positions (unit: mm)

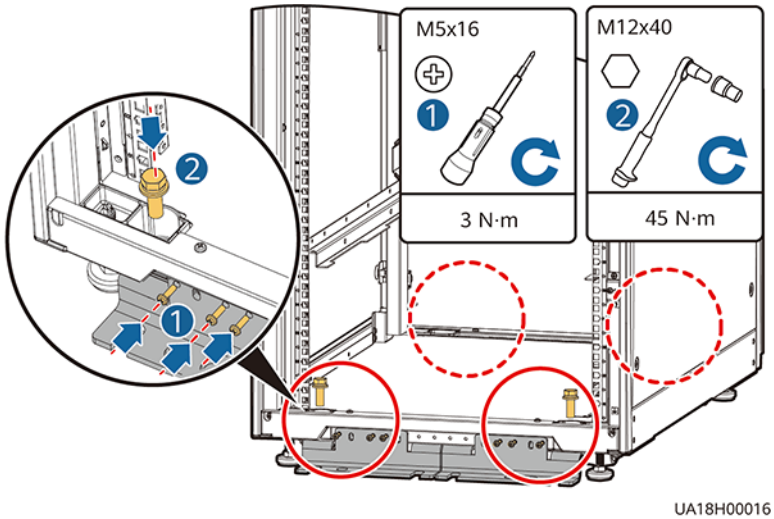


Step 2 Drill holes for installing expansion bolts, and install expansion bolts.

Step 3 Secure two antiseismic kits to the front and rear of the cabinet:

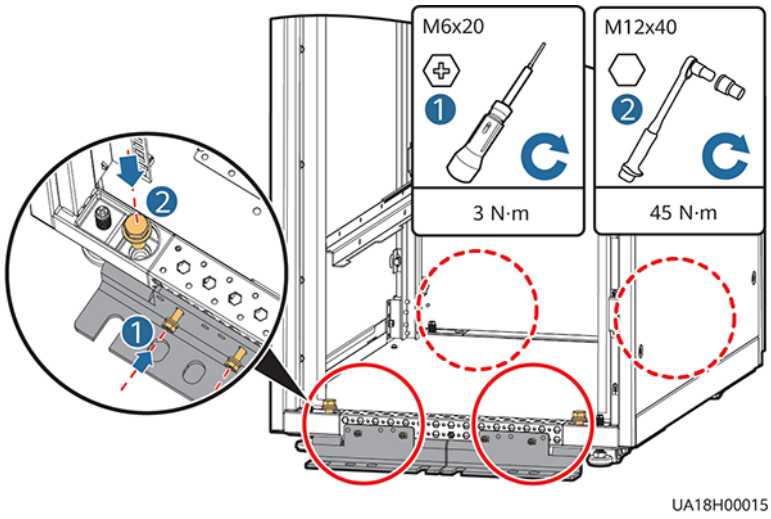
- (With a marking-off template) Use twelve M5x16 and four M12 screws.

  Figure 3-14 Securing the antiseismic kits to the cabinet (with a marking-off template)

- (Without a marking-off template) Use eight M6x20 and four M12 screws.

Figure 3-15 Securing the antiseismic kits to the cabinet (without a marking-off template)

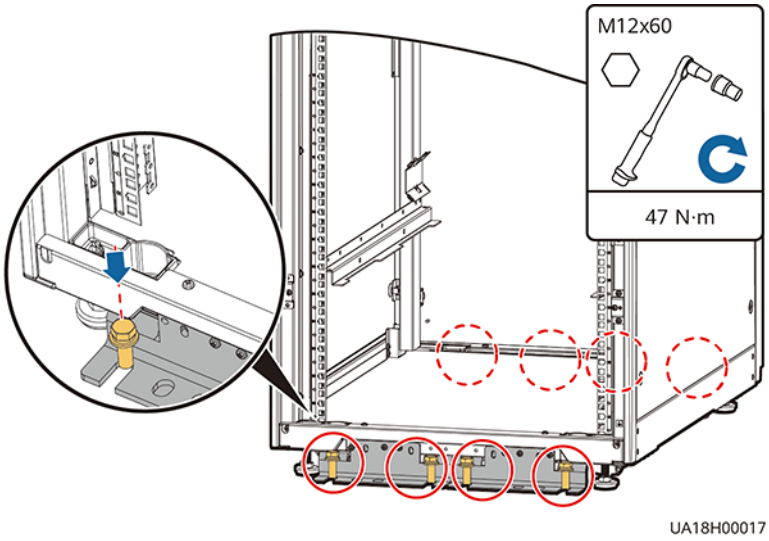


Step 4 Reinstall the rear panel.

Step 5 Adjust the cabinet position so that the expansion bolt holes are aligned with the eight holes at the bottom of the cabinet.

Step 6 Secure antiseismic kits to the floor at both the front and rear of the cabinet by using eight M12 expansion bolts. The positioning is shown in **Figure 3-16**.

Figure 3-16 Securing the antiseismic kits to the floor



----End

3.2.3.2 Installing an IP21 Component

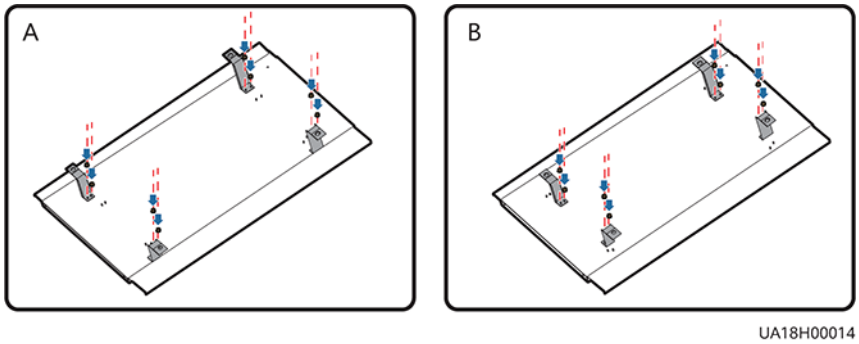
Procedure

Step 1 Install leveling feet at the bottom of the IP21 component, with two long feet on the front and two short feet at the rear.

NOTE

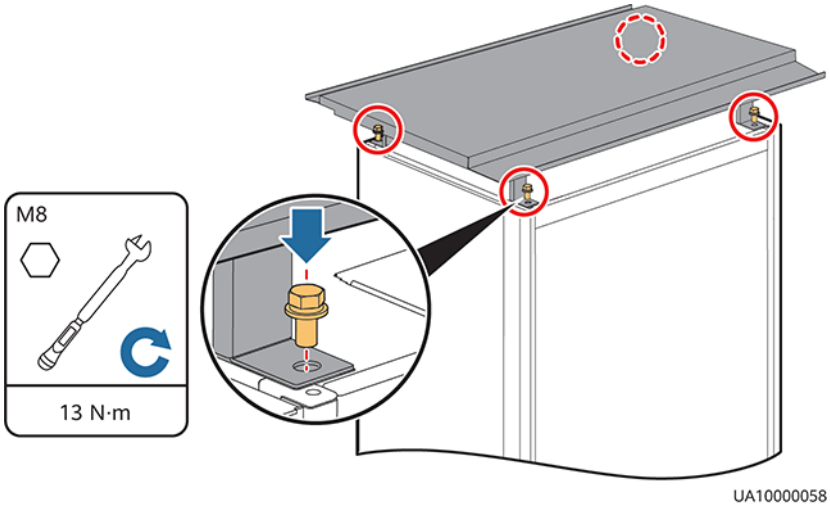
- Refer to the "front" and "back" silk screens on the surface of the IP21 component.
- Select the mounting holes for leveling feet based on the cabinet width onsite.

Figure 3-17 Installing leveling feet



Step 2 Secure the IP21 component to the top of each cabinet.

Figure 3-18 Installing the IP21 component



----End

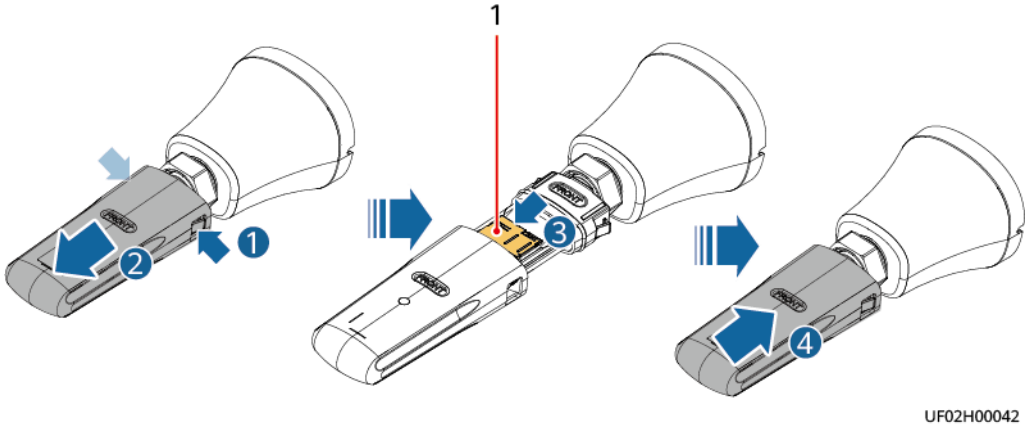
3.2.3.3 Installing a 4G Module or Network Cable

If the iManager-M service is chosen, use either of the following methods to complete the installation.

4G Module Access Scenario

Step 1 If the 4G module does not have a built-in SIM card, remove the 4G module enclosure, install a SIM card, and reinstall the enclosure.

Figure 3-19 Installing a SIM card



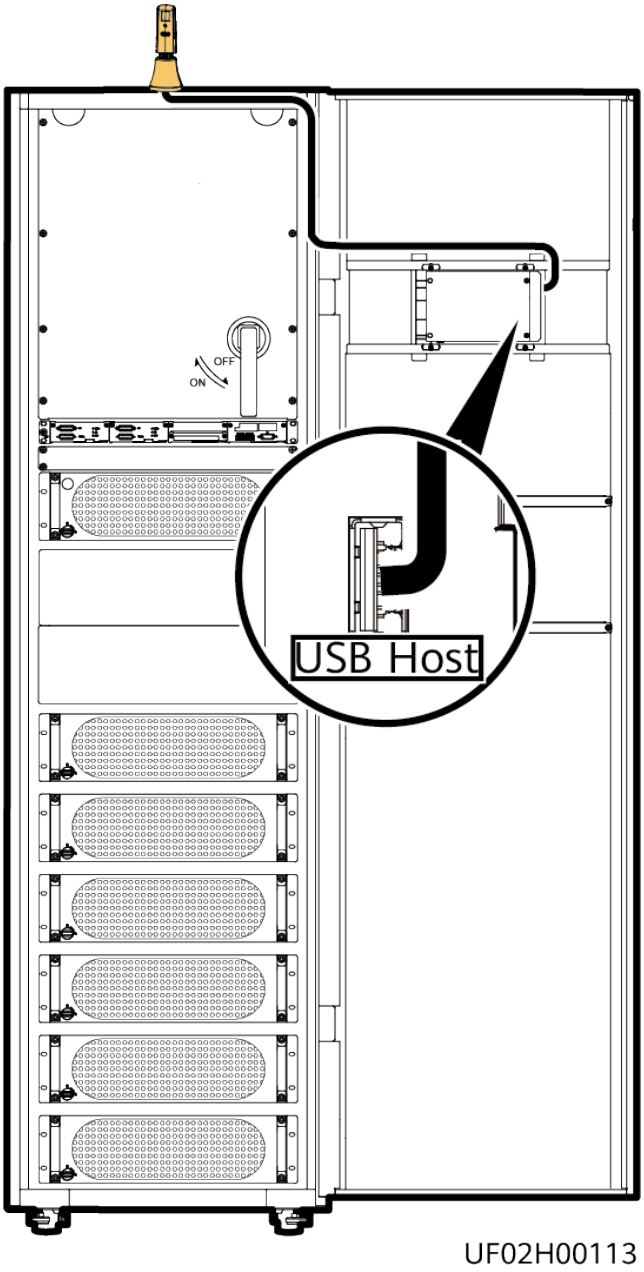
(1) SIM card installation position

Step 2 Attach the 4G module to the top of the cabinet by the magnet, and connect the 4G module to the USB Host port on the MDU using a USB extension cable.

NOTICE

- Do not install the 4G module in an enclosed environment or a position subject to severe signal interference. Otherwise, the 4G module may be disconnected from the network for a short period of time.
- The figure uses top cable routing as an example. The installation positions are the same for bottom cable routing and top air-flow configuration.

Figure 3-20 Installing a 4G module



----End

FE Access Scenario

Step 1 Connect the network port on a LAN switch or router to the FE port on the monitoring interface card.

Figure 3-21 Cable routing

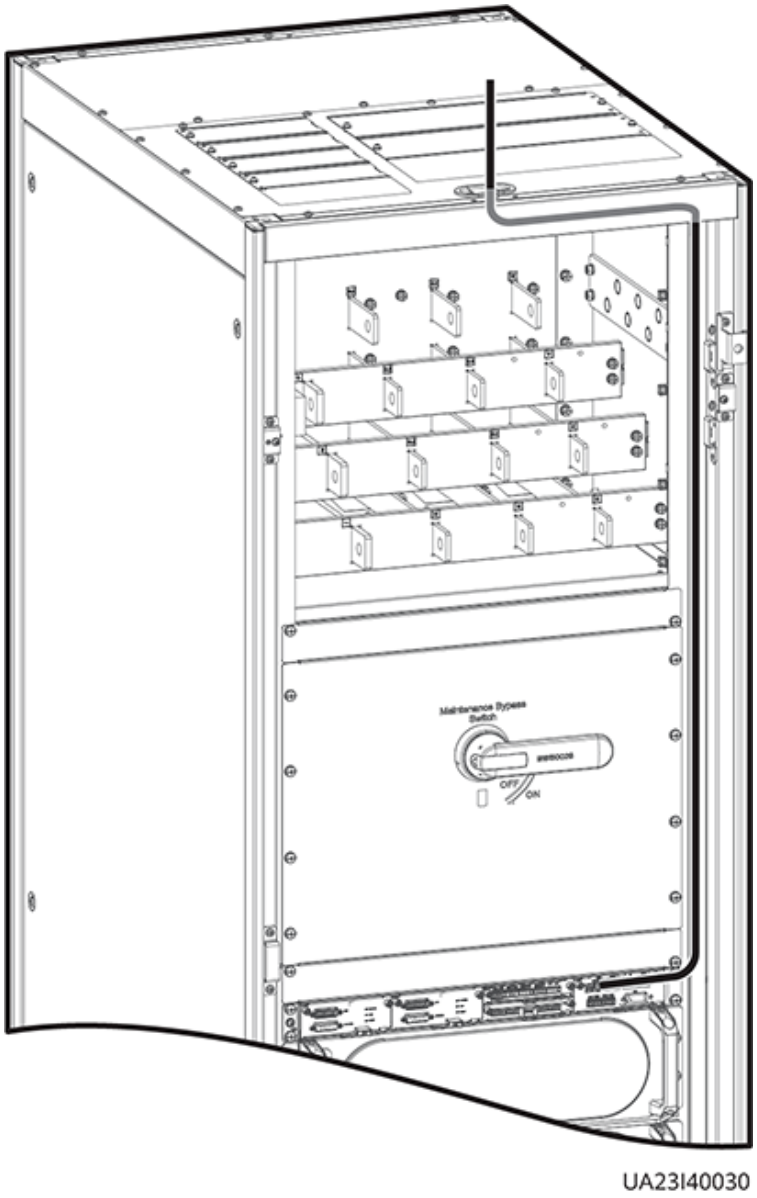
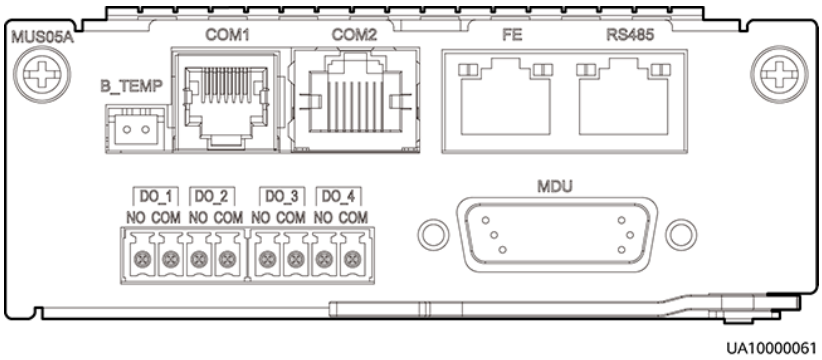


Figure 3-22 Monitoring interface card



----End

3.2.3.4 Installing T/H Sensors and Cables

Procedure

Step 1 Secure the fastener of the T/H sensor to the wall or ceiling near the UPS.

Step 2 Install the T/H sensor on the fastener.

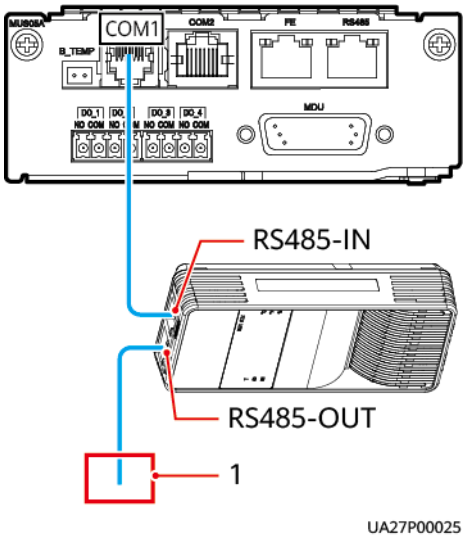
Step 3 Connect the T/H sensor cables.

1. Connect the RS485-IN port on the T/H sensor to the COM1 port on the MUS05A monitoring interface card.
2. Connect the RS485-OUT port on the T/H sensor to the RS485-IN port on another T/H sensor.

NOTICE

COM1 is a 6-pin port. Use a communications cable with a connector of 6–8 pins.

Figure 3-23 Connecting cables



(1) Cascaded with other T/H sensors

----End

3.2.3.5 Connecting the BCB Box

Open the cover of the BCB box, and connect the BCB port on the dry contact card to the control signal port on the BCB box. For details, see the *PDC-(0250,0400,0630)DC0384BXA BCB Box User Manual* or *PDU8000-(0125,0250,0400,0630,0800) DCV8-BXA001 BCB Box User Manual*.

3.2.3.6 Connecting the BBB Box

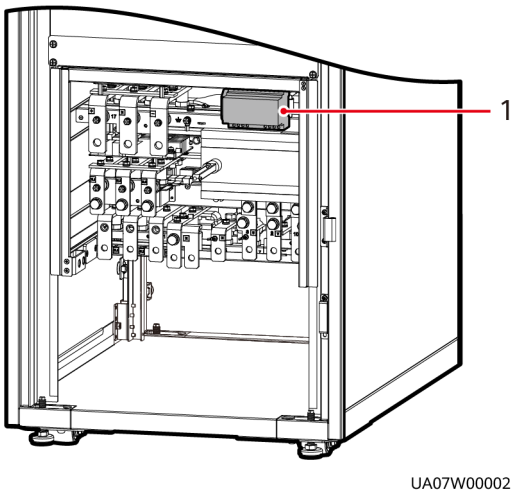
Connect the BBB box. For details, see the *PDU8000-(0630, 1250, 2000) DCV8-BGA001 BBB Box User Manual*.

3.2.3.7 Installing a Battery Grounding Failure Detector

Procedure

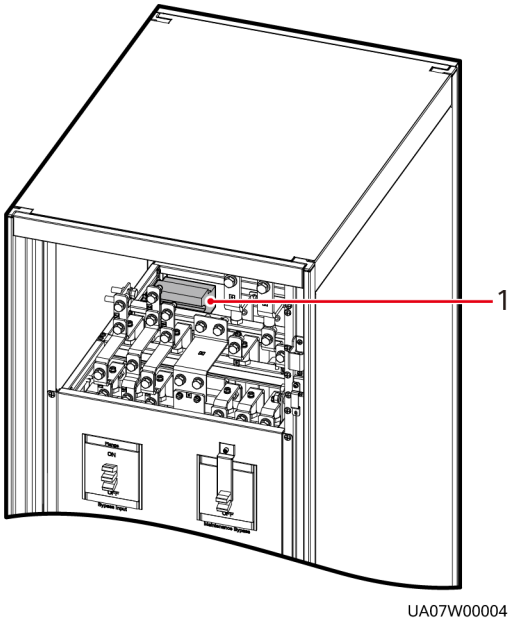
Step 1 Install a battery grounding failure detector. For the installation method, see *UPS5000 Battery Grounding Failure Detector User Manual*.

Figure 3-24 Position of a battery grounding failure detector in a UPS5000-E-200K-SM



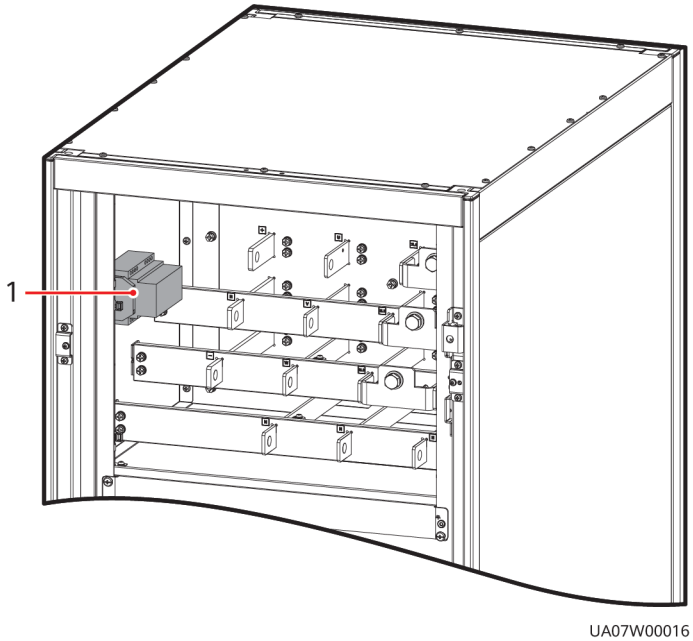
(1) Battery grounding failure detector

Figure 3-25 Position of a battery grounding failure detector in a UPS5000-E-200K-FM



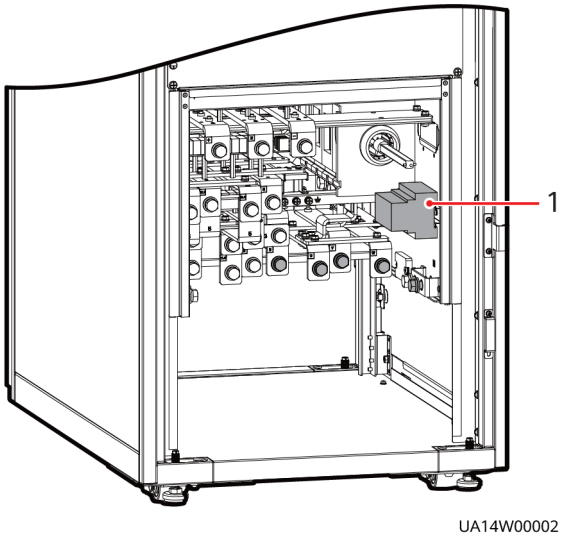
(1) Battery grounding failure detector

Figure 3-26 Position of a battery grounding failure detector in a UPS5000-E-200K-FM (isolation protection)



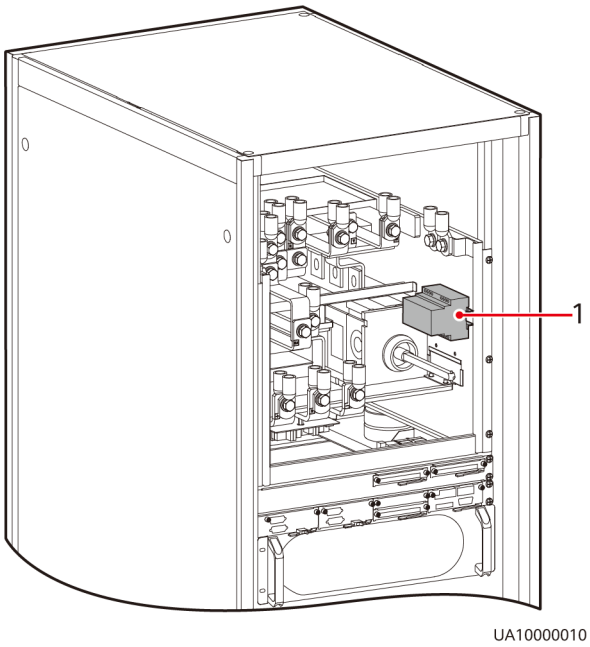
(1) Battery grounding failure detector

Figure 3-27 Position of a battery grounding failure detector in a UPS5000-E-300K-SM



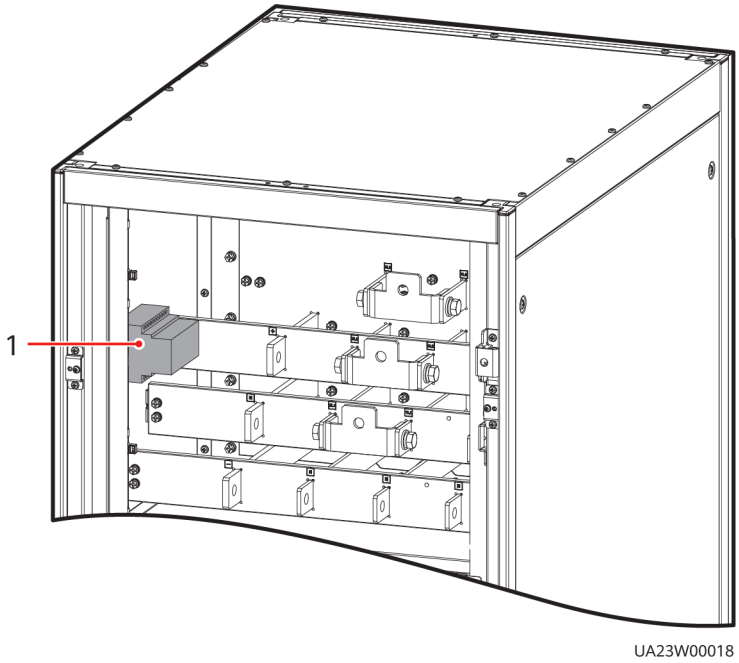
(1) Battery grounding failure detector

Figure 3-28 Position of a battery grounding failure detector in a UPS5000-E-300K-SMT



(1) Battery grounding failure detector

Figure 3-29 Position of a battery grounding failure detector in a UPS5000-E-300K-SMT (isolation protection)



(1) Battery grounding failure detector

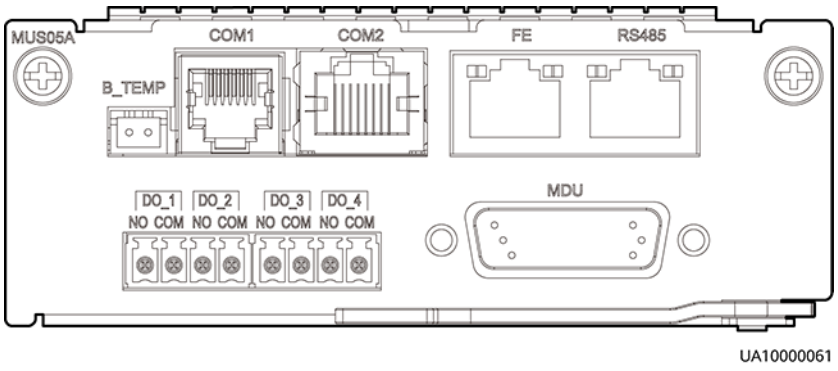
----End

3.2.3.8 Connecting the iBAT

Procedure

Step 1 Connect the COM_OUT port on the CIM of the iBAT to the COM2 port on the monitoring interface card.

Figure 3-30 COM2 port



----End

3.2.4 Cable Routing Requirements

Context

WARNING

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

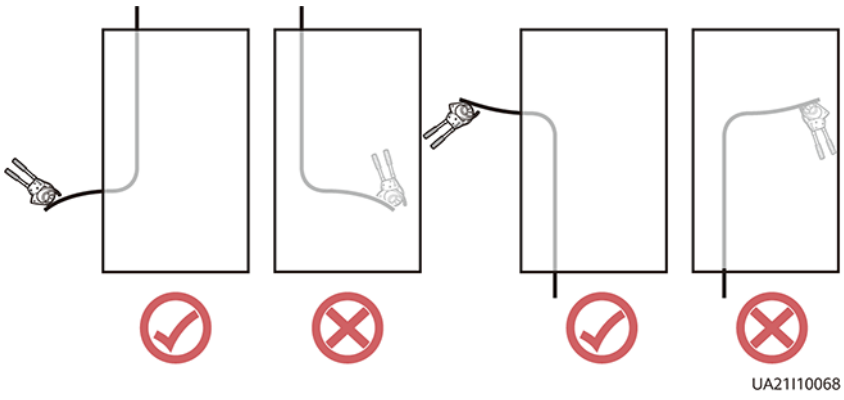
Procedure

Step 1 Route a cable into the cabinet and bind it to a nearby beam.

Step 2 Pull the cable to the copper bar to which the cable is to be connected, determine the cable length, and mark the cable at the position where the cable is to be cut.

Step 3 Pull the marked cable out of the cabinet, cut the cable from the marked position, strip the cable, and crimp a terminal.

Figure 3-31 Preparing a cable terminal outside the cabinet



NOTE

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

Step 4 Connect the cable with a crimped terminal to the corresponding copper bar.

Step 5 Clean foreign matter inside the cabinet.

----End

3.2.5 Routing Cables (UPS5000-E-200K-SM)

3.2.5.1 Routing Cables from the Top

Context

NOTICE

- Route cables for the UPS from inside out and from bottom up.

Procedure

Step 1 Ensure the maintenance bypass switch is OFF. Open the front door, and remove the cover from the power distribution subrack, as shown in **Figure 3-32**. The positioning of the copper bars is shown in **Figure 3-33**

Figure 3-32 Removing the cover

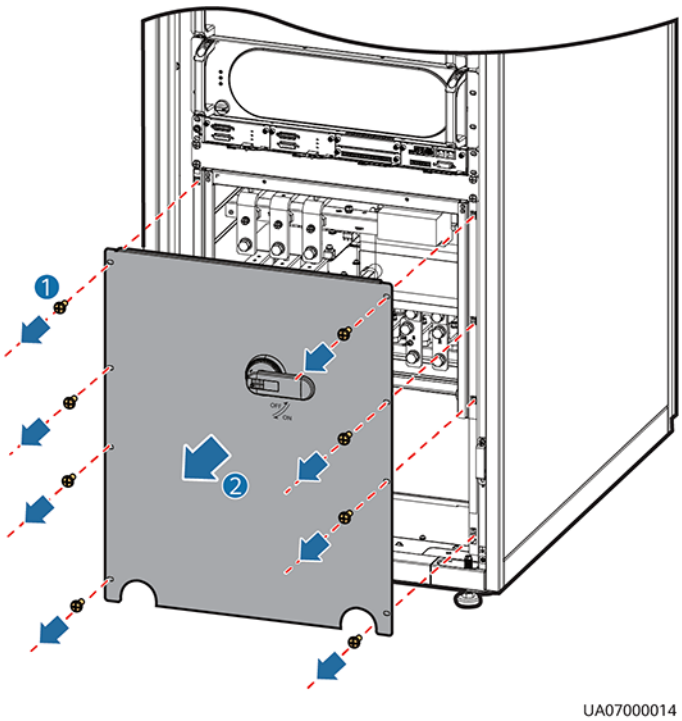
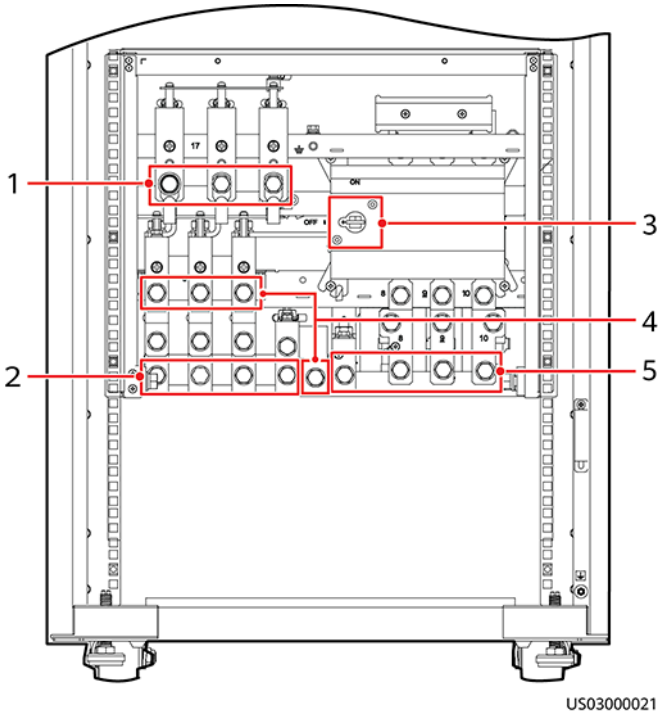


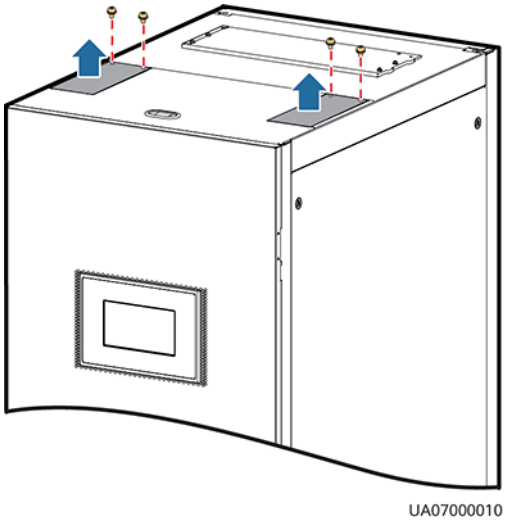
Figure 3-33 Copper bar positions



(1) Battery input terminals (+, N, –)
(2) Mains input terminals (1L1–1L3, N)
(3) Maintenance bypass switch
(4) Bypass input terminals (2L1–2L3, N)
(5) Output terminals (U, V, W, and N)

Step 2 Remove the cable covers from the top of the cabinet.

Figure 3-34 Removing the cable covers from the top of the cabinet

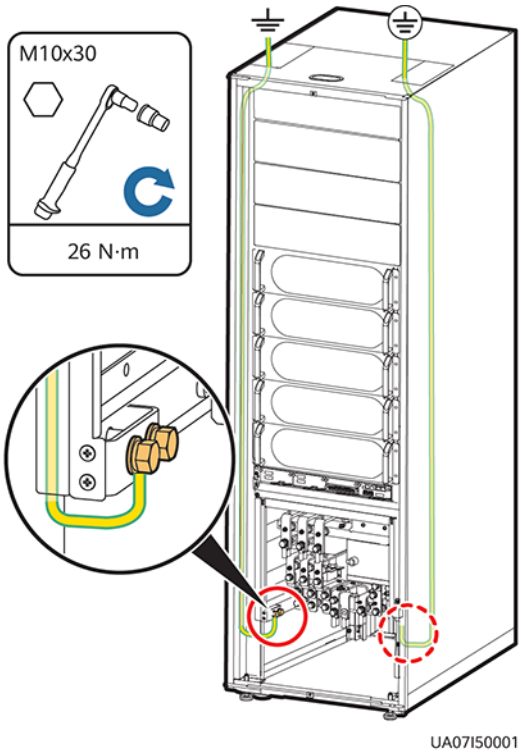


Step 3 Connect ground cables, as shown in **Figure 3-35**.

NOTICE

- Ensure that all UPS upstream input switches are turned off before connecting cables.
- Determine the actual number of ground cables based on **Table 3-1** and the site requirements. The following figure is for reference only.
- Prepare the OT terminals onsite to ensure that the length of the copper wire is the same as that of the part of the OT terminal that covers the conductor.

Figure 3-35 Ground cable



NOTE

- : Internal equipotential connection
- : Protective ground

Step 4 Route power cables.

- Two power sources

  Remove the copper bars between mains and bypass input terminals, as shown in **Figure 3-36**.

Figure 3-36 Removing copper bars

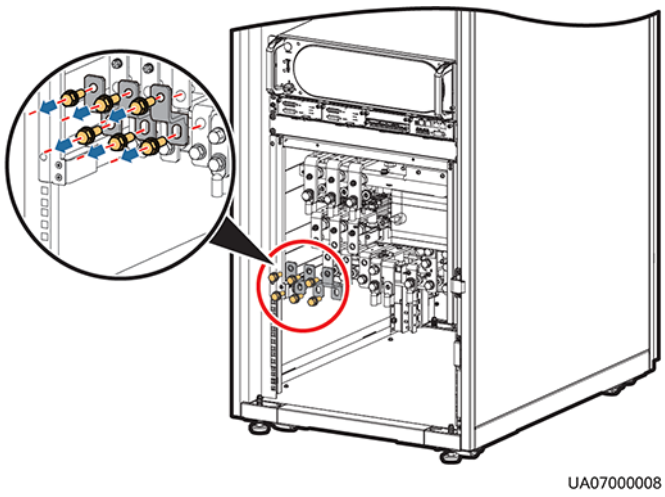
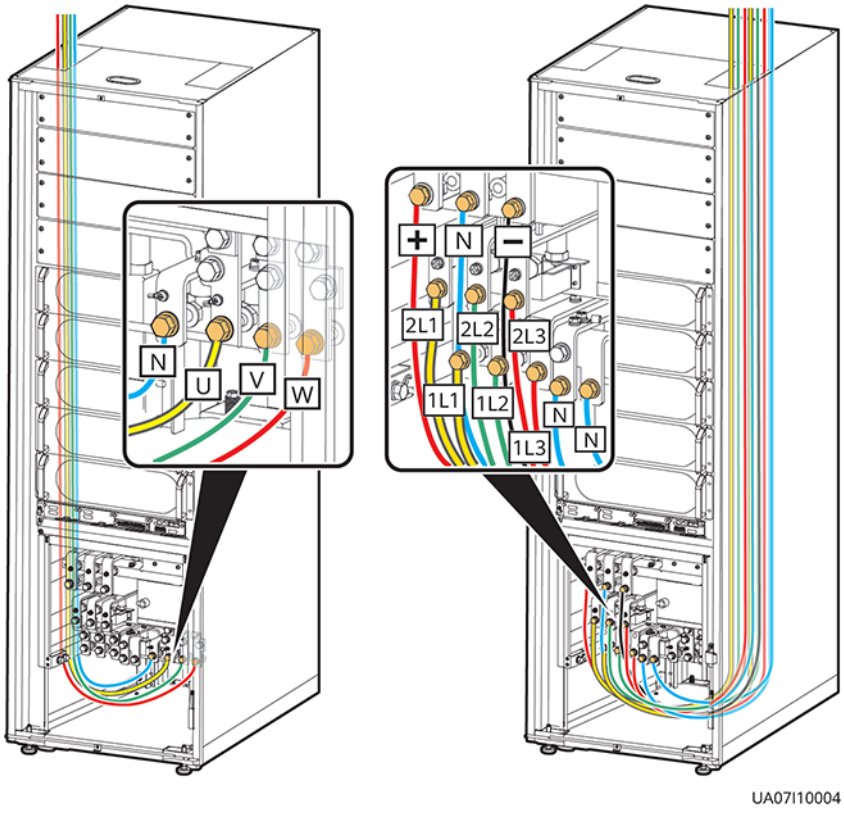


Figure 3-37 shows cables routed from the top by removing small covers, as an example.

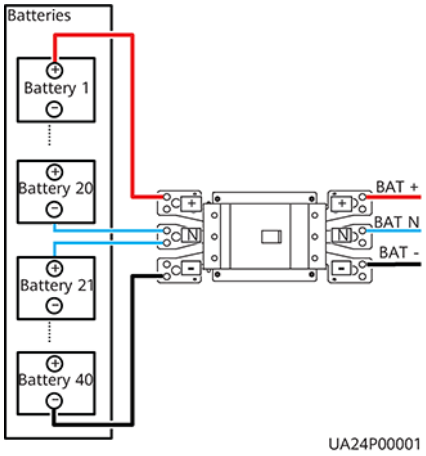
Figure 3-37 Top cabling



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

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

Figure 3-38 Neutral wire

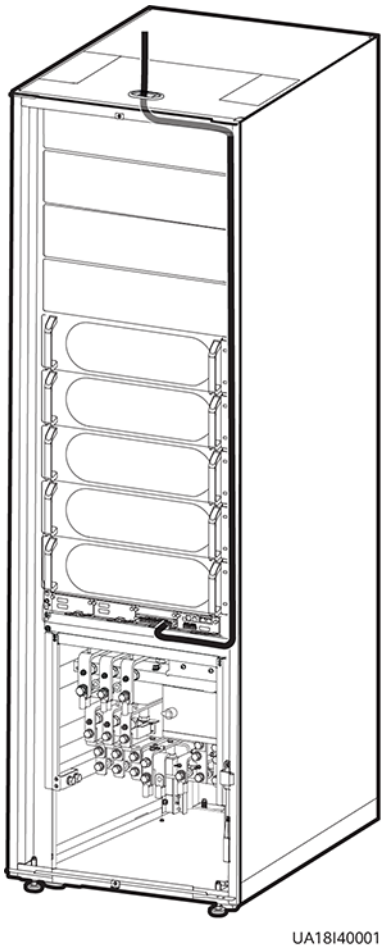


- One power source

  If the mains input and bypass input share a power source, you do not need to remove the copper bar between the mains and bypass input terminals or connect the bypass input power cable.

Step 5 Route the signal cables on the left side of subracks along the left side of the cabinet and the cables on the right side of subracks along the right side of the cabinet, and then bind the cables to the cabinet, as shown in **Figure 3-39**.

Figure 3-39 Connecting signal cables



NOTE

The number and colors of signal cables in **Figure 3-39** are for reference only.

----End

3.2.5.2 Routing Cables from the Bottom

Context

NOTICE

- Route cables for the UPS from inside out and from bottom up.

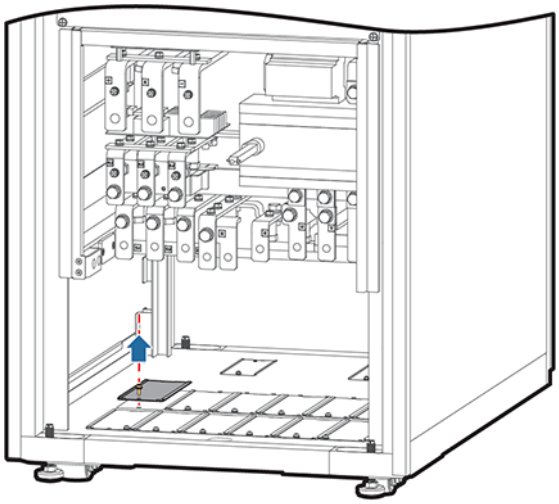
Procedure

Step 1 Open the front door and remove the cover from the power distribution subrack.

Step 2 Determine the cabling mode.

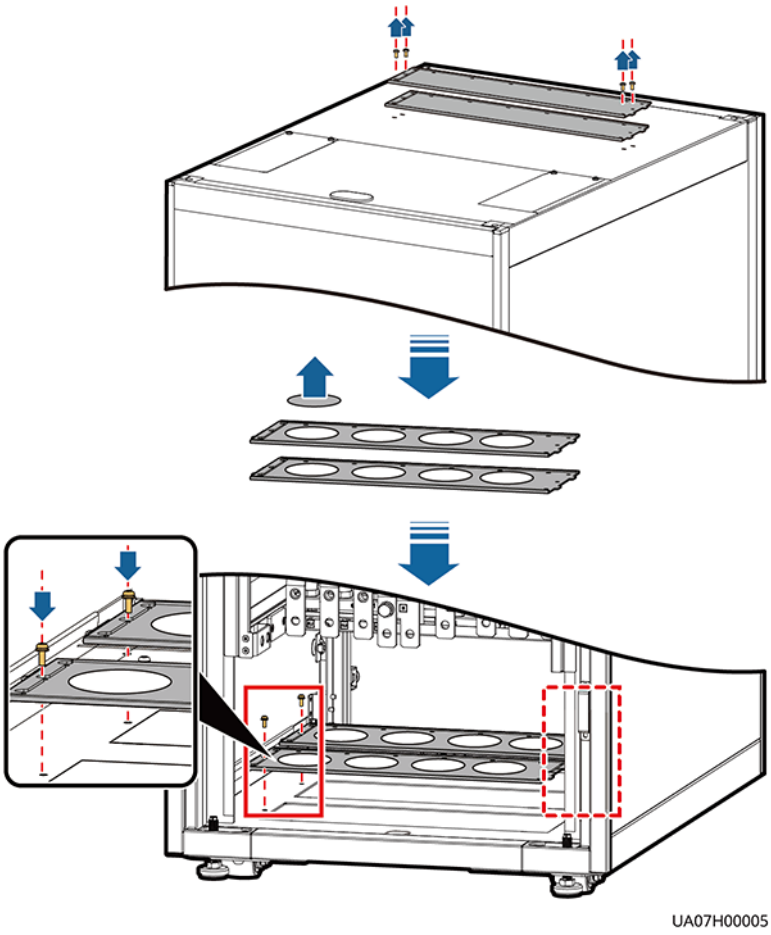
- Remove small covers for routing cables.

Figure 3-40 Removing small covers from the bottom of the cabinet



- Drill holes into the large cover for routing cables.
  a. Remove all the cable cover for signal cables and small covers from the bottom.
  b. Remove the two large covers from the top of the cabinet, drill holes into them, and install them to the positions where the small covers were originally.

Figure 3-41 Hole positions

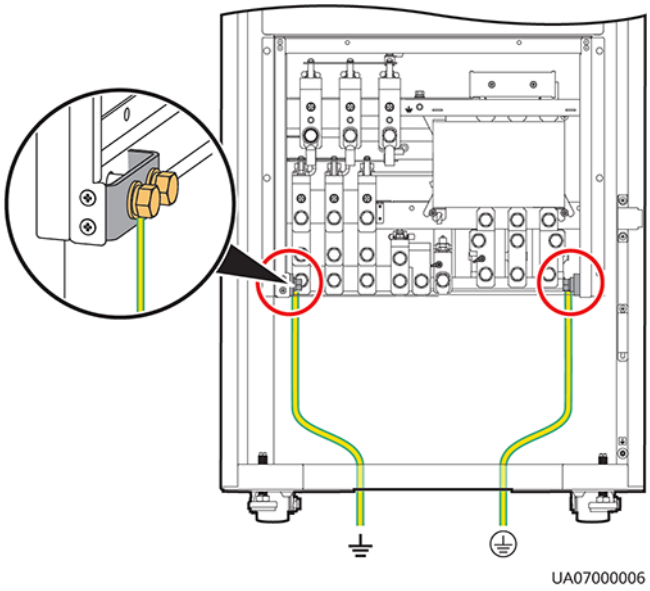


NOTE

- The quantity of holes in the above figure is for reference only.
- If holes are drilled for routing cables, attach grommet strips on the hole edges to protect cables.

Step 3 Connect ground cables.

Figure 3-42 Ground cable connection



NOTE

- : Internal equipotential connection
- : Protective ground

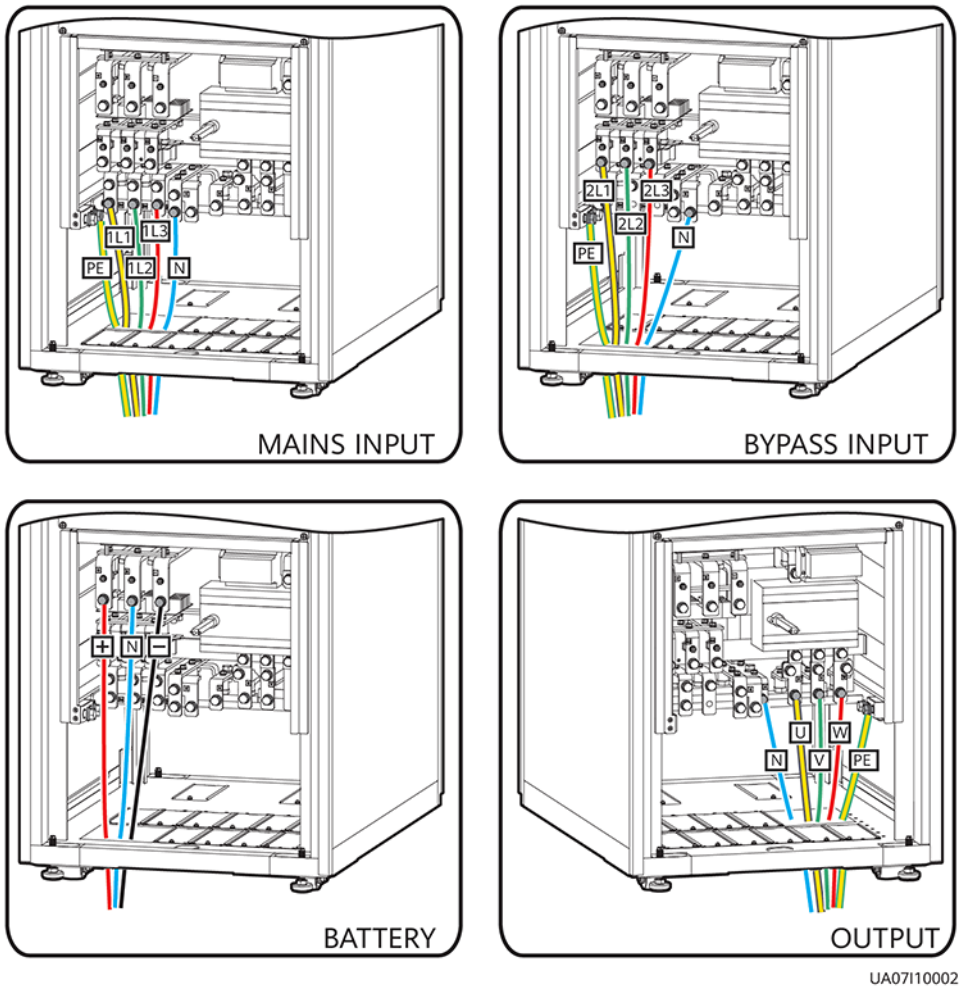
Step 4 Route power cables.

- Two power sources

  Remove the copper bars between mains and bypass input terminals.

  Figure 3-43 shows power cables routed from the bottom by removing small covers, as an example.

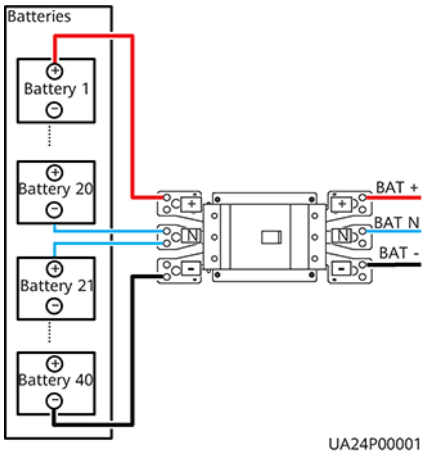
Figure 3-43 Bottom cabling



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

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

Figure 3-44 Neutral wire

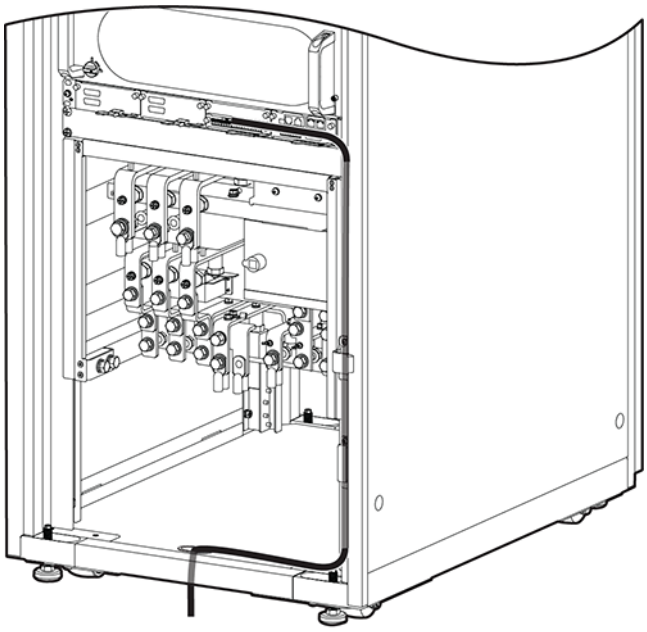


- One power source

  If the mains input and bypass input share a power source, you do not need to remove the copper bar between the mains and bypass input terminals or connect the bypass input power cable.

Step 5 Route the signal cables on the left side of subracks along the left side of the cabinet and the cables on the right side of subracks along the right side of the cabinet, and then bind the cables to the cabinet, as shown in **Figure 3-45**.

Figure 3-45 Connecting signal cables



NOTE

The number and colors of signal cables in **Figure 3-45** are for reference only.

----End

3.2.6 Routing Cables (UPS5000-E-200K-FM)

3.2.6.1 Routing Cables from the Top

Context

NOTICE

Route cables for the UPS from inside out.

Procedure

Step 1 Open the front door and remove the cover from the power distribution subrack.

Figure 3-46 Removing the cover

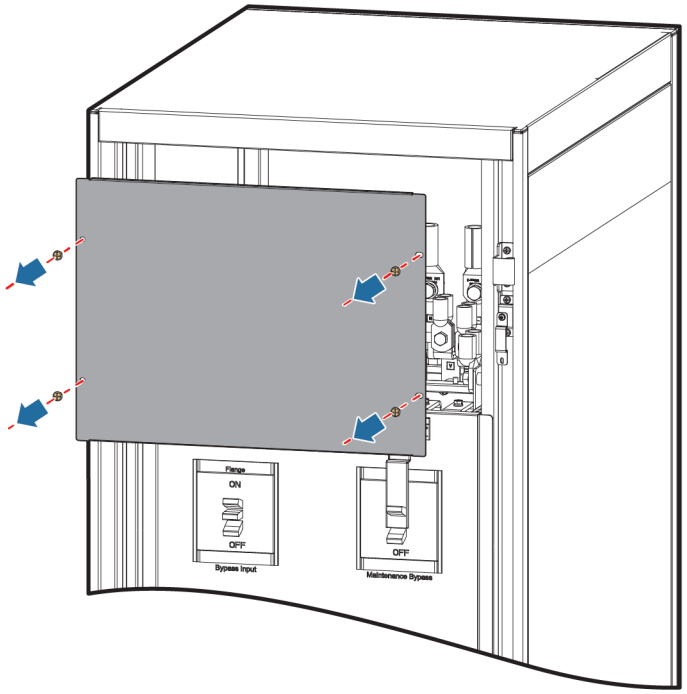
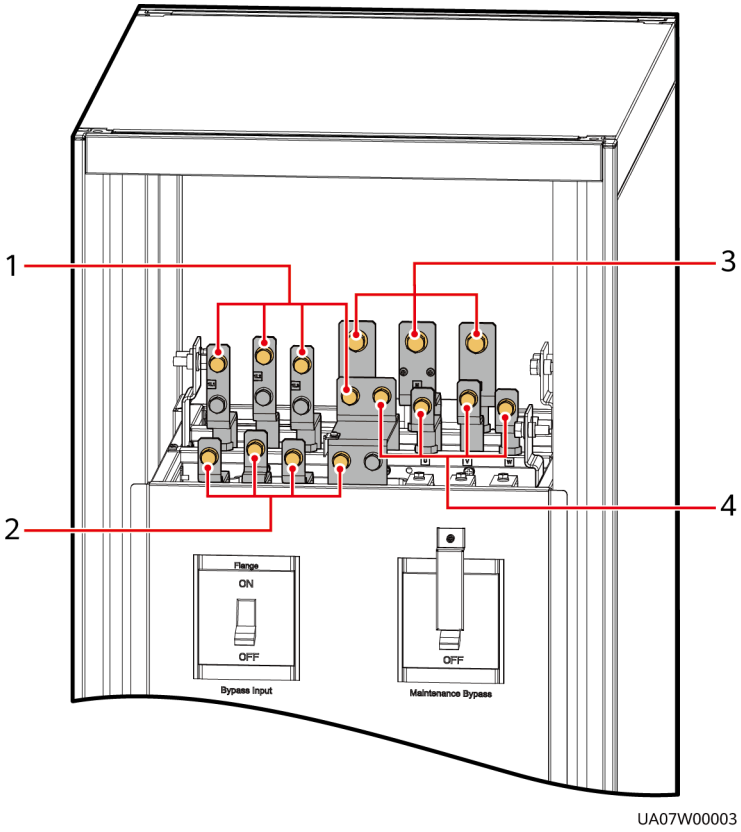


Figure 3-47 Copper bar positions

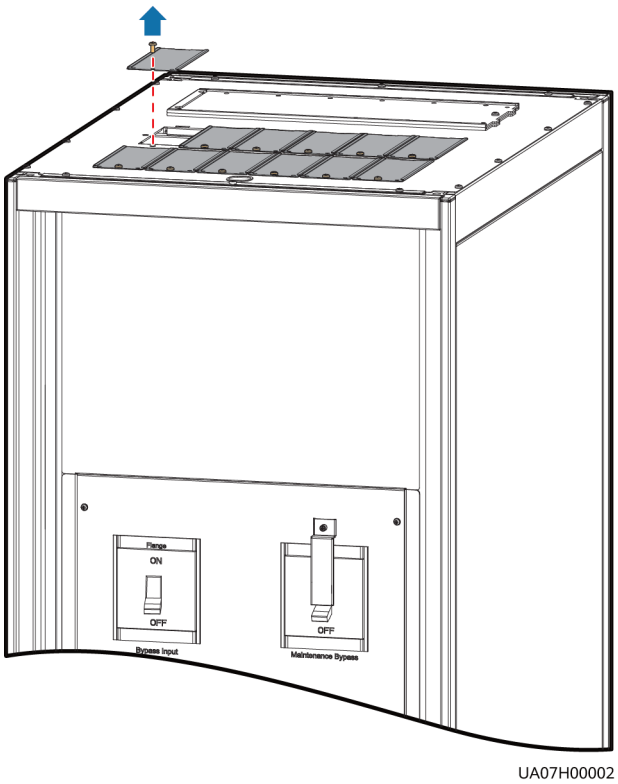


(1) Mains input terminals (1L1–1L3, N)
(2) Bypass input terminals (2L1–2L3, N)
(3) Battery input terminals (+, N, –)
(4) Output terminals (U, V, W, and N)

Step 2 Determine the cabling mode.

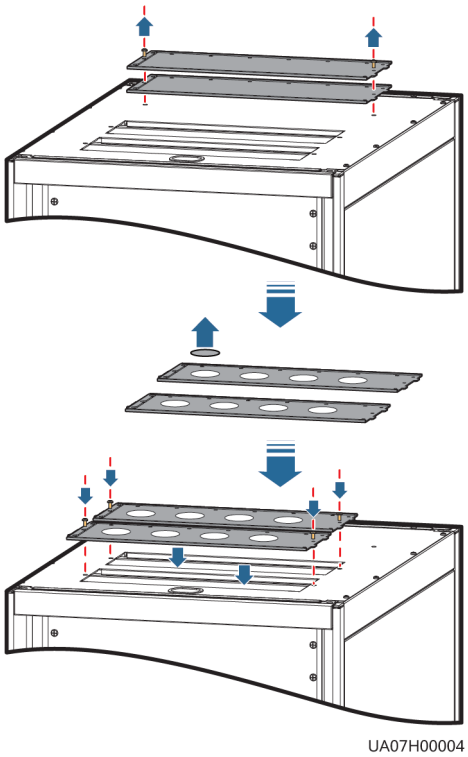
- Remove small covers for routing cables.

Figure 3-48 Removing small covers from the top of the cabinet



- Drill holes into the large cover for routing cables.
  a. Remove the cable cover for signal cables and small covers from the top.
  b. Remove the two large covers from the rear top of the cabinet, drill holes into them, and install them to the positions where the small covers were placed.

Figure 3-49 Hole positions



NOTE

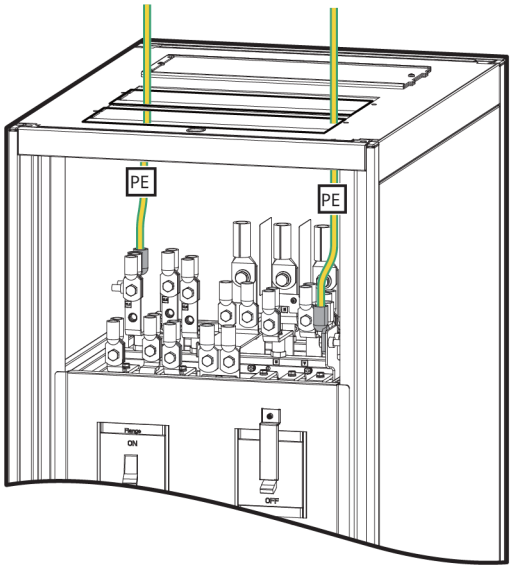
- The quantity of holes in the above figure is for reference only.
- If holes are drilled for routing cables, attach grommet strips to the hole edges to protect cables.

Step 3 Connect ground cables.

NOTICE

- Ensure that all UPS upstream input switches are turned off before connecting cables.
- Determine the actual number of ground cables based on "Preparing Power Cables" and the site requirements. The following figure is for reference only.
- Prepare the OT terminals onsite to ensure that the length of the copper wire is the same as that of the part of the OT terminal that covers the conductor.

Figure 3-50 Ground cable connection



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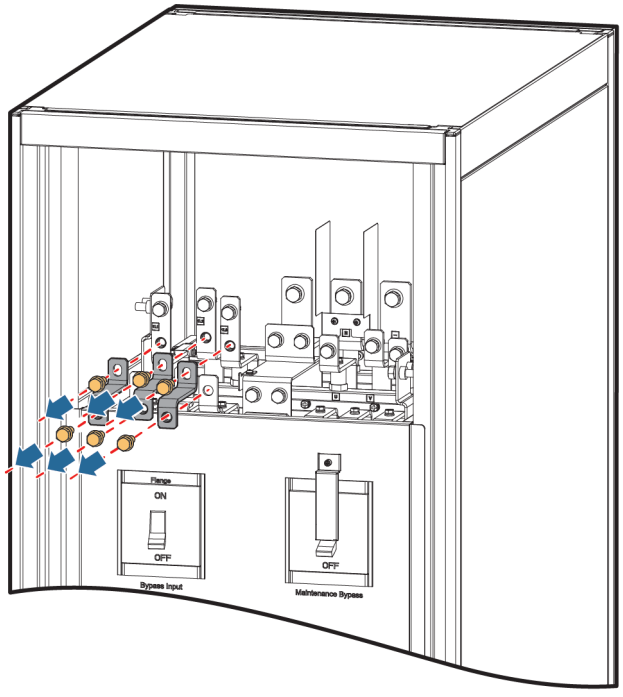
Step 4 Route power cables.

- Two power sources

  Remove the copper bars between mains and bypass input terminals.

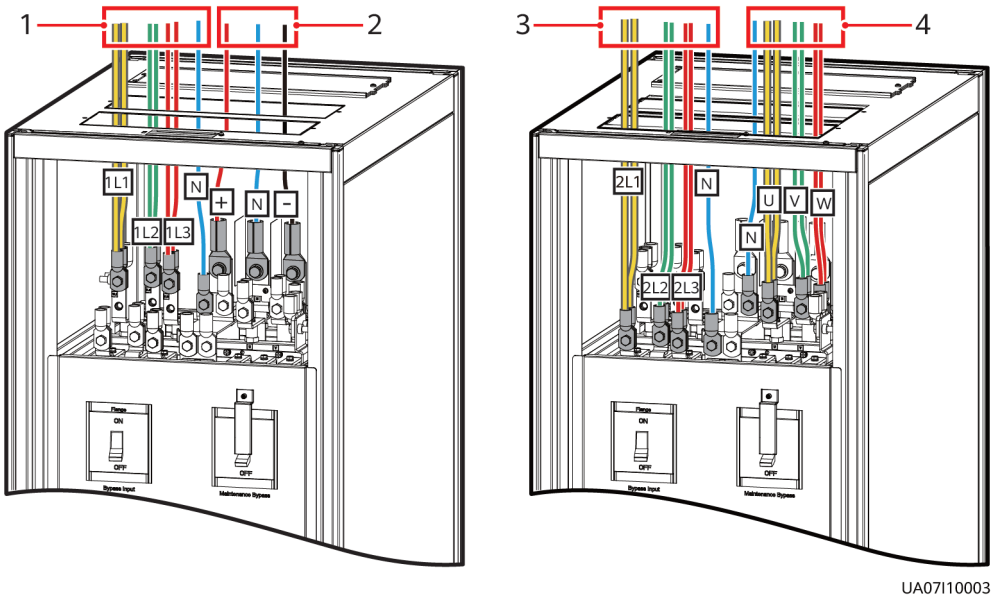
  Figure 3-51 Removing copper bars



UA07H00003

  Figure 3-52 shows the cables routed from the top of the cabinet.

Figure 3-52 Top cabling



(1) Mains input terminals (1L1–1L3, N)

(2) Battery input terminals (+, N, –)

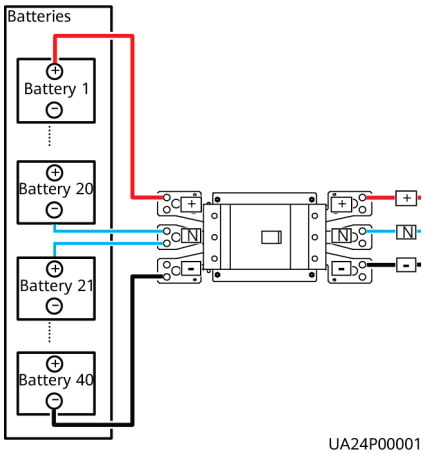
(3) Bypass input terminals (2L1–2L3, N)

(4) Output terminals (U, V, W, N)

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

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

Figure 3-53 Neutral wire

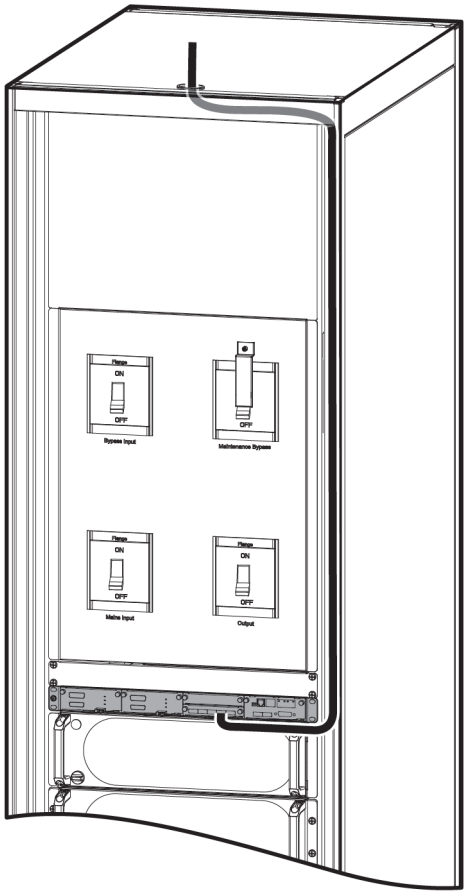


- One power source

  If the mains input and bypass input share a power source, you do not need to remove the copper bar between the mains and bypass input terminals or connect the bypass input power cable.

Step 5 Route the signal cables on the left side of subracks along the left side of the cabinet and the cables on the right side of subracks along the right side of the cabinet, and then bind the cables to the cabinet, as shown in **Figure 3-54**.

Figure 3-54 Connecting signal cables



NOTE

The number and colors of signal cables in **Figure 3-54** are for reference only.

----End

3.2.6.2 Routing Cables from the Bottom

Prerequisites

A cable entry cabinet is installed.

Context

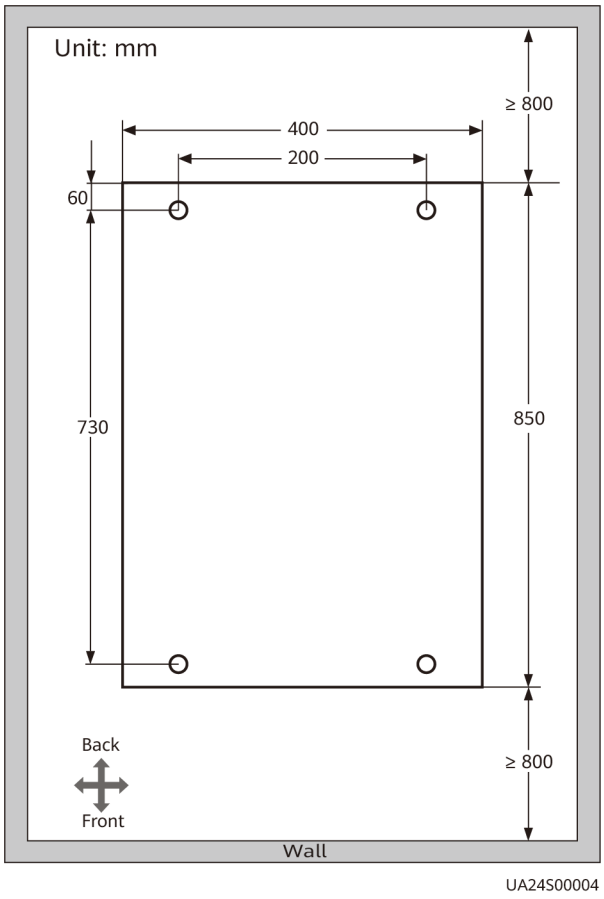
NOTICE

Route cables for the UPS from inside out.

Procedure

Step 1 (Optional) Determine the installation position for the cable entry cabinet, and draw mounting holes in the installation position based on drawings.

Figure 3-55 Mounting holes for the cable entry cabinet (unit: mm)



NOTE

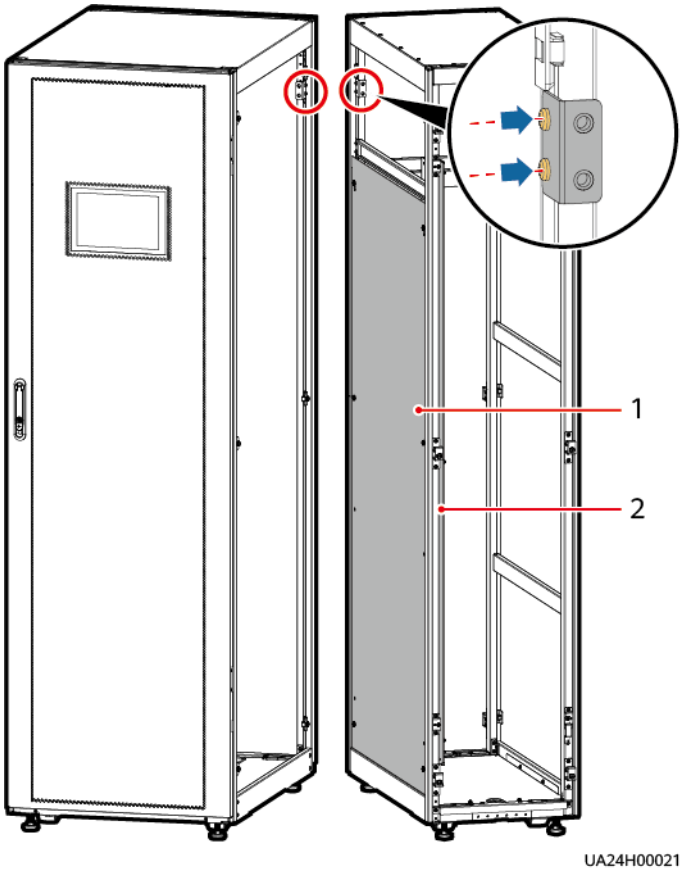
This section describes how to install the cable entry cabinet on the right side of the UPS. If the cable entry cabinet needs to be installed on the left side of the UPS, remove the side panel of the cable entry cabinet and the cable trough, and install them on the right side of the cable entry cabinet. **Figure 3-56** shows the positions of the side panel of the cable entry cabinet and the cable trough.

Step 2 Remove the right and rear covers from the UPS cabinet, and remove the front and rear covers from the cable entry cabinet. Put away the removed screws and covers.

Step 3 Adjust the anchor bolts of the cable entry cabinet to make it flush with the UPS cabinet.

Step 4 Install equipotential plate mounting kits on the same horizontal plane of the UPS cabinet and cable entry cabinet.

Figure 3-56 Installing equipotential plate mounting kits

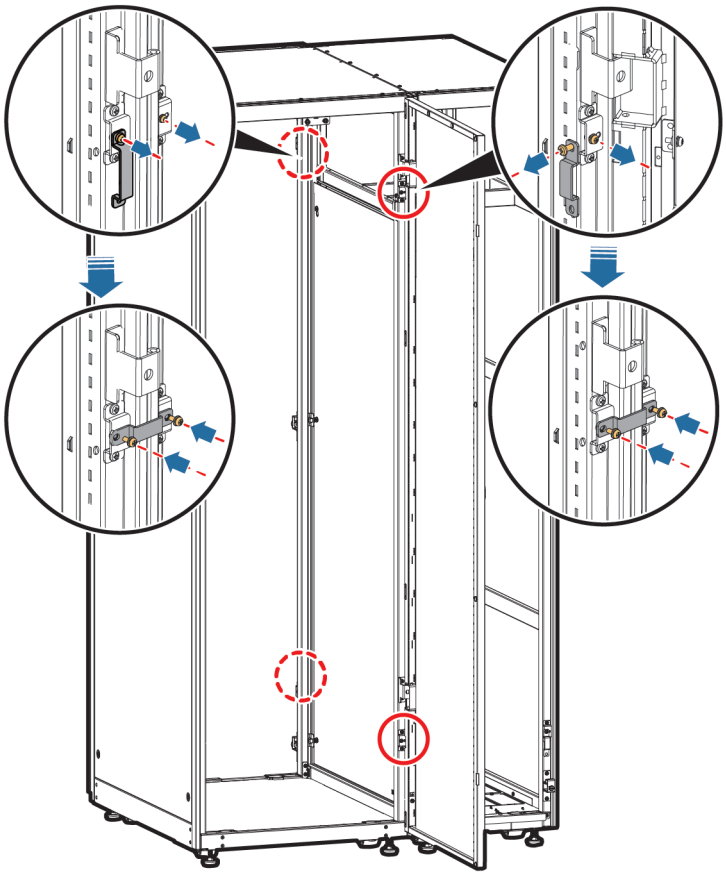


(1) Side panel (2) Cable trough

Step 5 Place the cable entry cabinet on the right of the UPS cabinet.

Step 6 Install the front and rear connecting kits.

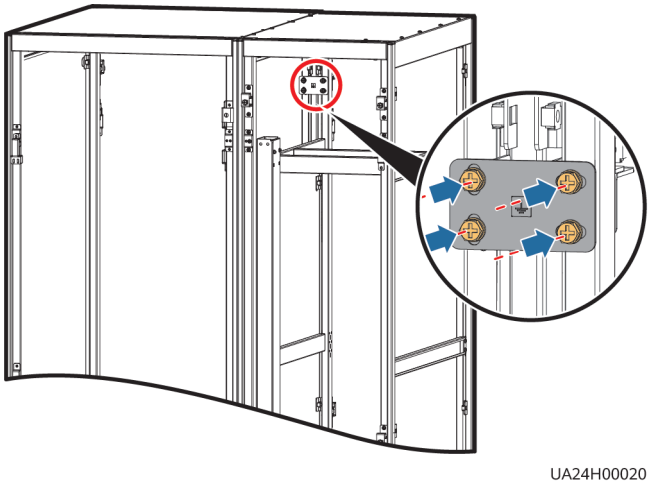
Figure 3-57 Installing connecting kits



Step 7 (Optional) Secure the cable entry cabinet to the ground.

Step 8 Install an equipotential plate.

Figure 3-58 Equipotential plate

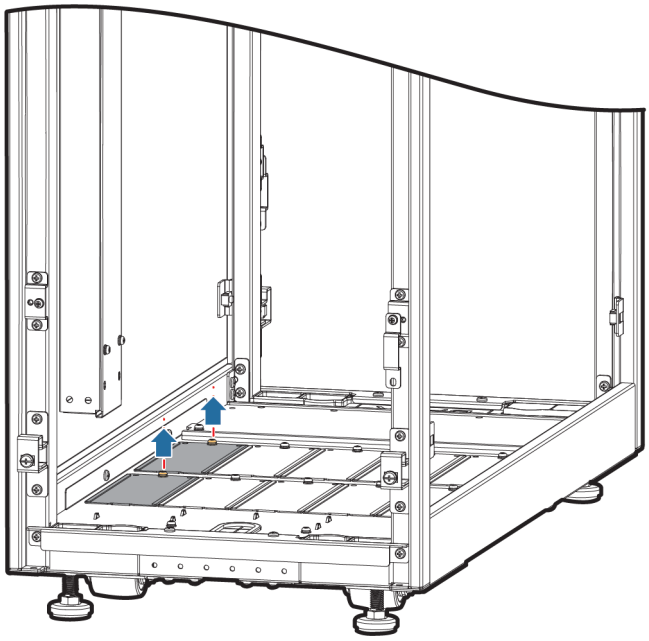


Step 9 Determine the cabling mode.

- Remove small covers for routing cables.

  Remove a certain number of small covers from the bottom of the cable entry cabinet based on the actual cable conditions.

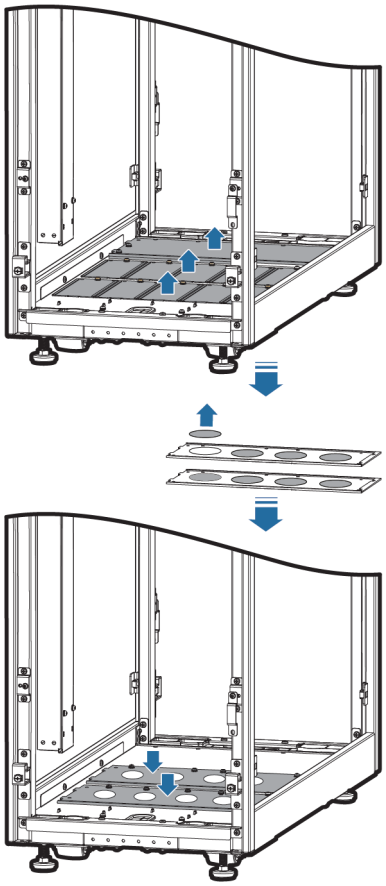
Figure 3-59 Removing small covers



UA24H00024

- Drill holes in the large cover for routing cables.
  a. Remove all small covers from the bottom of the cable entry cabinet.
  b. Remove the two large covers from the bottom of the cable entry cabinet, drill holes in them based on site requirements, and install them on the positions where the small covers were placed.

Figure 3-60 Removing large covers

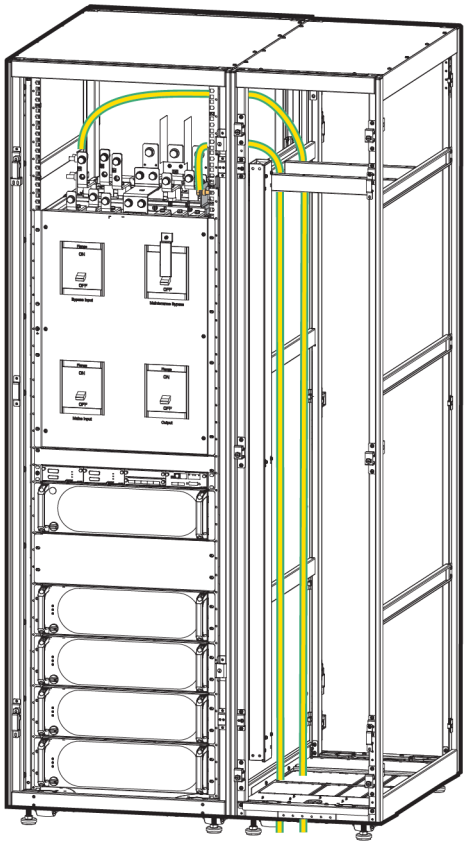


NOTE

- The quantity of holes in the above figure is for reference only.
- If holes are drilled for routing cables, attach grommet strips on the hole edges to protect cables.

Step 10 Connect the ground cables.

Figure 3-61 Connecting the ground cables



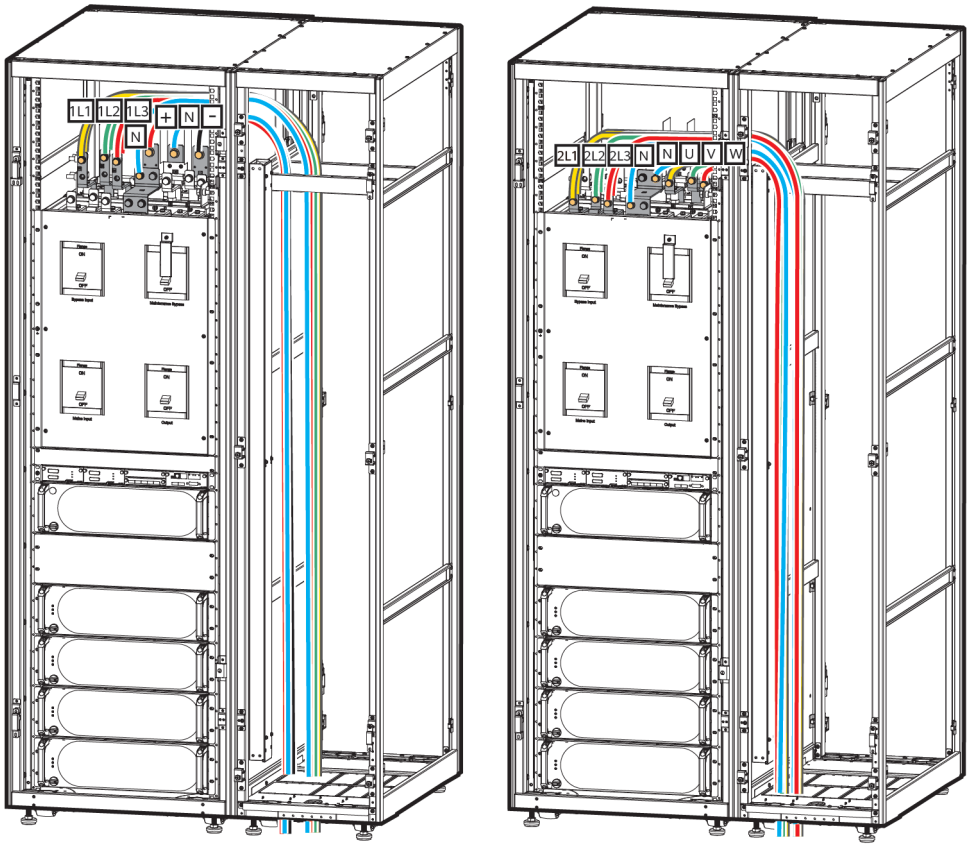
Step 11 Connect power cables.

- Two power sources

  Remove the copper bars between mains and bypass input terminals, as shown in **Figure 3-51**.

  Figure 3-62 shows power cables routed from the bottom by removing small covers, as an example.

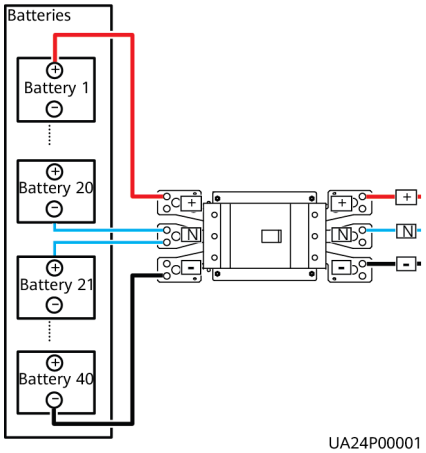
Figure 3-62 Connecting power cables



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

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

Figure 3-63 Neutral wire



- One power source

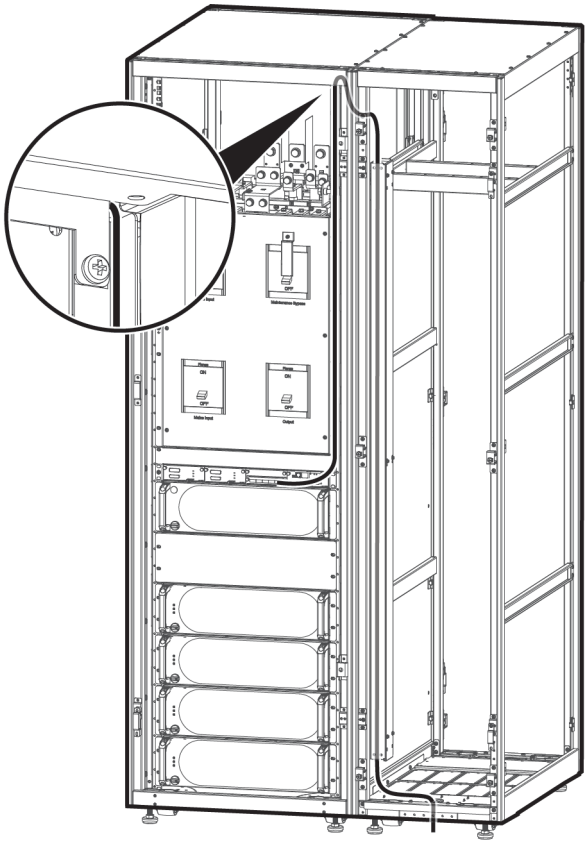
If the mains input and bypass input share a power source, you do not need to remove the copper bar between the mains and bypass input terminals or connect the bypass input power cable.

Step 12 Remove the signal cable trough cover from the cable entry cabinet.

Figure 3-64 Removing the cable trough cover

Step 13 Connect the signal cable.

Figure 3-65 Signal cable



Step 14 Install the right cover of the UPS cabinet on the right of the cable entry cabinet, and install other covers in the original positions.

----End

3.2.7 Routing Cables (200 kVA, Full Isolation Protection)

3.2.7.1 Routing Cables from the Top

Context

NOTICE

- Before connecting cables, ensure that the switches inside the UPS, the upstream input switch and battery string switch are OFF to prevent operations with power on.
- Route cables for the UPS from inside out and from bottom up.

Procedure

Step 1 Ensure the maintenance bypass switch is OFF. Open the front door, remove the front cover, and remove covers from the top of the cabinet based on the site requirements.

Figure 3-66 Removing the cover

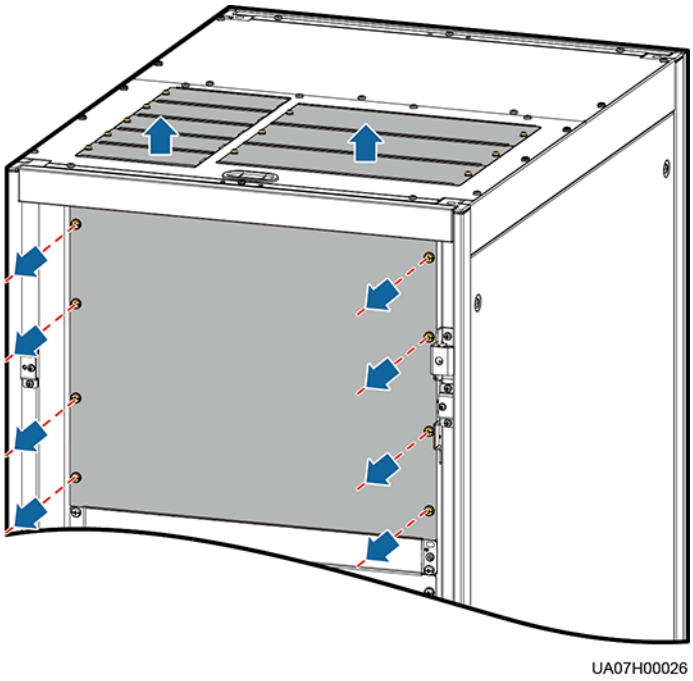
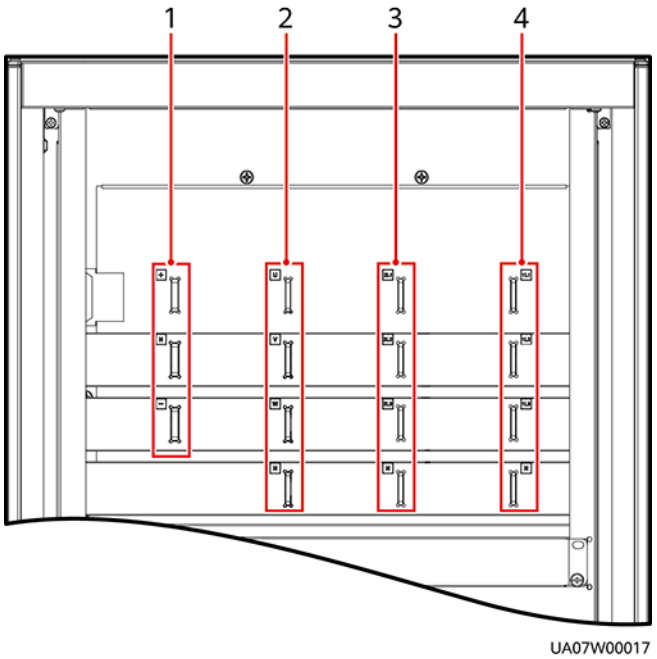


Figure 3-67 Copper bar positions

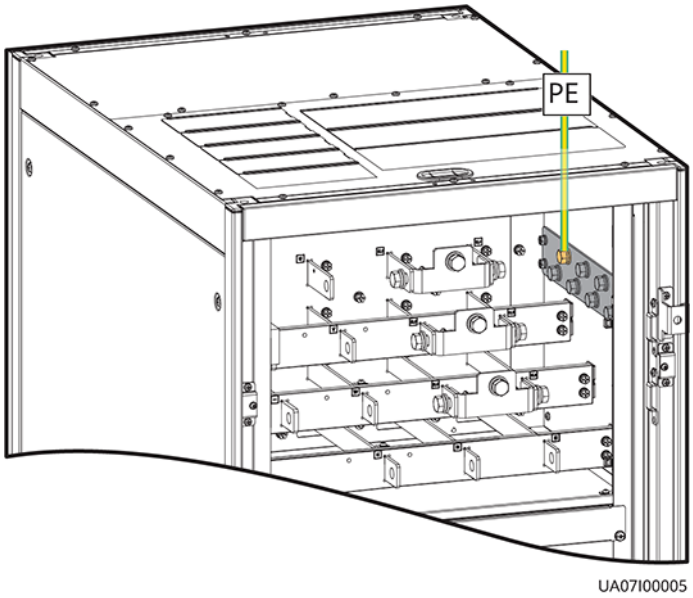


(1) Battery input terminals (+, N, –) (2) Output terminals (U, V, W, N)

(3) Bypass input terminals (2L1–2L3, N) (4) Mains input terminals (1L1–1L3, N)

Step 2 Connect the ground cable.

Figure 3-68 Grounding



Step 3 Route power cables.

- Two power sources

  Remove the copper bar between mains and bypass input terminals.

Figure 3-69 Removing copper bars

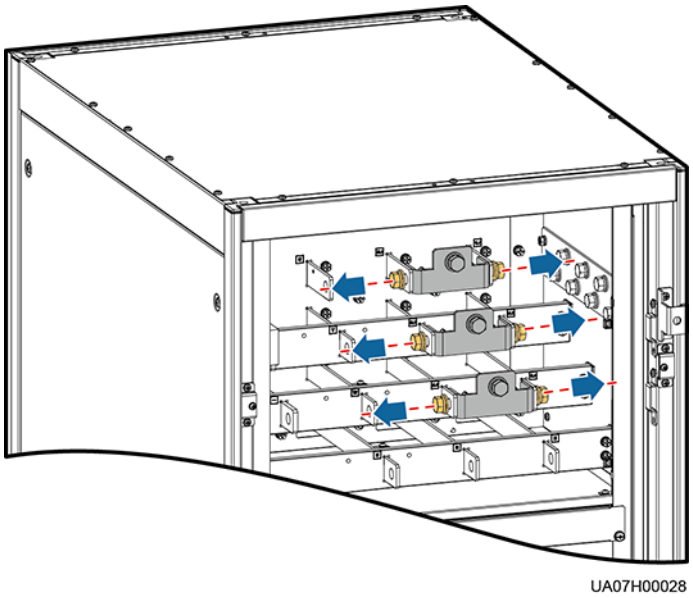
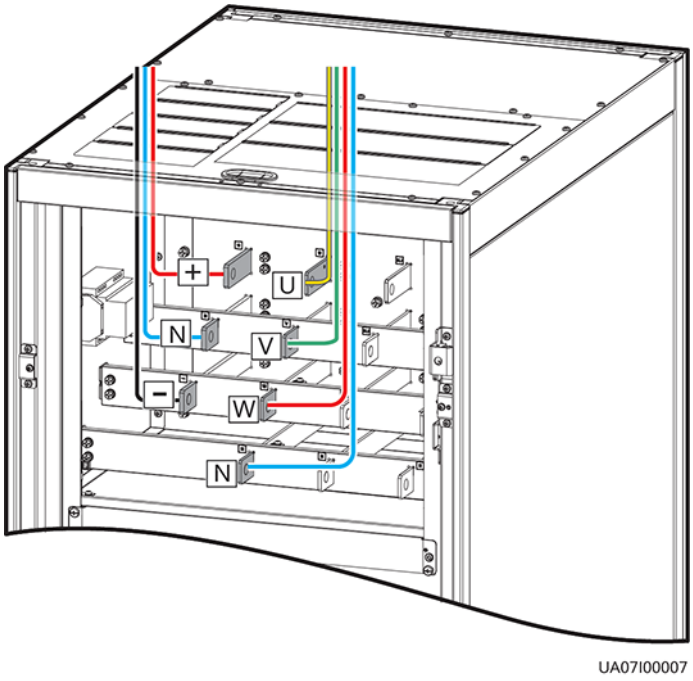


Figure 3-70 Connecting power cables 1



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

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

Figure 3-71 Neutral wire

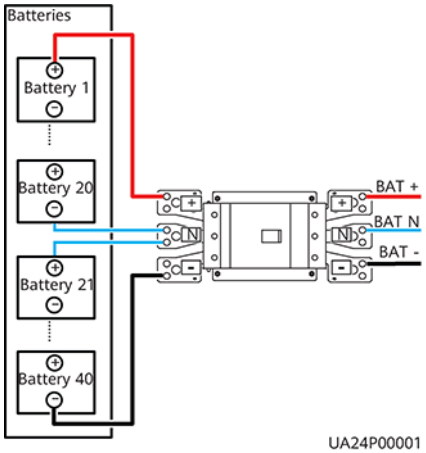
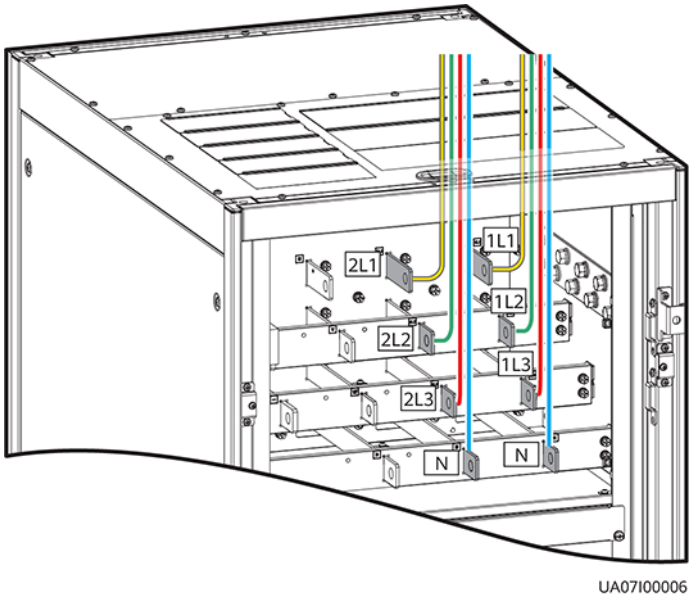


Figure 3-72 Connecting power cables 2

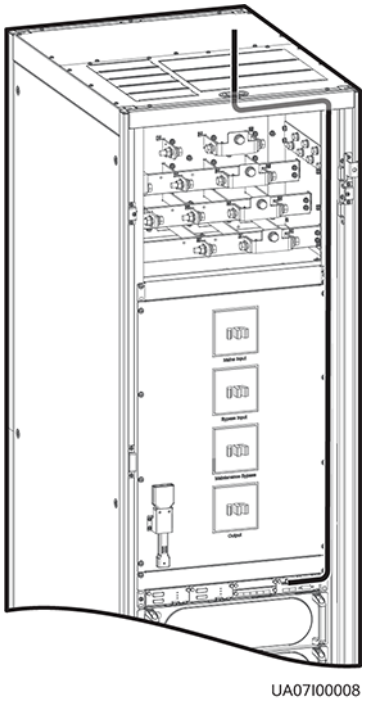


- One power source

  If the mains input and bypass input share a power source, you do not need to remove the copper bar between the mains and bypass input terminals or connect the bypass input power cable.

Step 4 Route signal cables. Bind cables to the cabinet.

Figure 3-73 Connecting signal cables



NOTE

The number and colors of signal cables are for reference only.

----End

3.2.7.2 Routing Cables from the Bottom

Prerequisites

A cable entry cabinet is configured.

Context

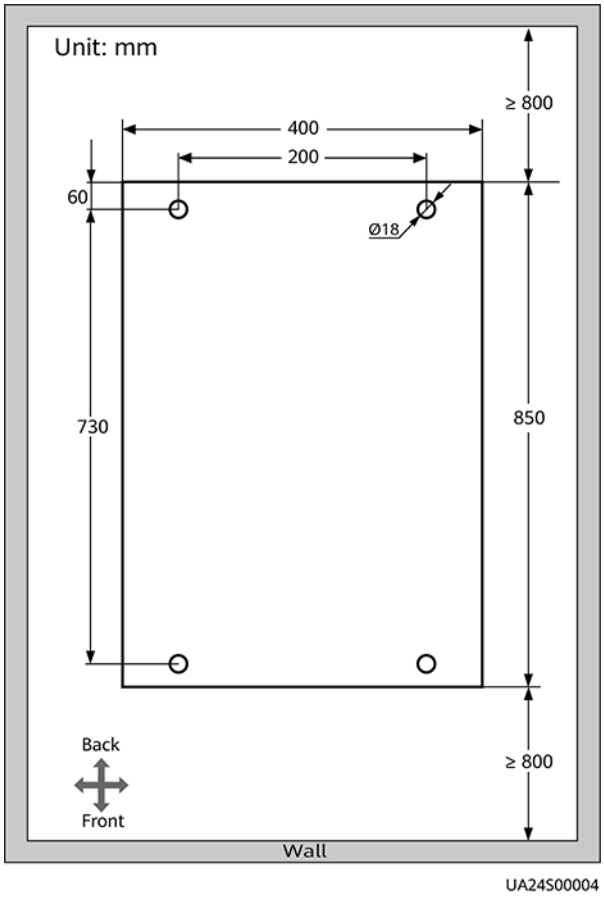
NOTICE

- Before connecting cables, ensure that the switches inside the UPS, the upstream input switch and battery string switch are OFF to prevent operations with power on.
- Route cables for the UPS from inside out and from bottom up.

Procedure

Step 1 (Optional) Determine the installation position for the cable entry cabinet, and mark mounting holes at the installation position based on drawings.

Figure 3-74 Mounting holes for a cable entry cabinet (unit: mm)



NOTE

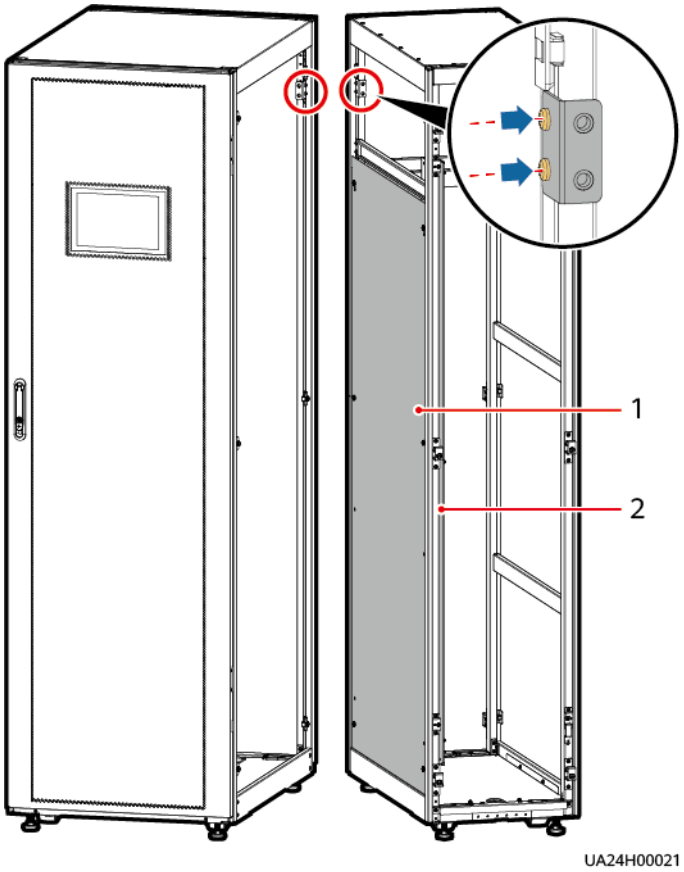
This section describes how to install the cable entry cabinet on the right side of the UPS. If the cable entry cabinet needs to be installed on the left side of the UPS, remove the side panel of the cable entry cabinet and the cable trough, and install them on the right side of the cable entry cabinet. **Figure 3-75** shows the positions of the side panel of the cable entry cabinet and the cable trough.

Step 2 Remove the right and rear covers from the UPS cabinet, and remove the front and rear covers from the cable entry cabinet. Put away the removed screws and covers.

Step 3 Adjust the anchor bolts of the cable entry cabinet to make it flush with the UPS cabinet.

Step 4 Install the equipotential plate mounting kits on the same horizontal plane of the UPS cabinet and cable entry cabinet.

Figure 3-75 Installing equipotential plate mounting kits

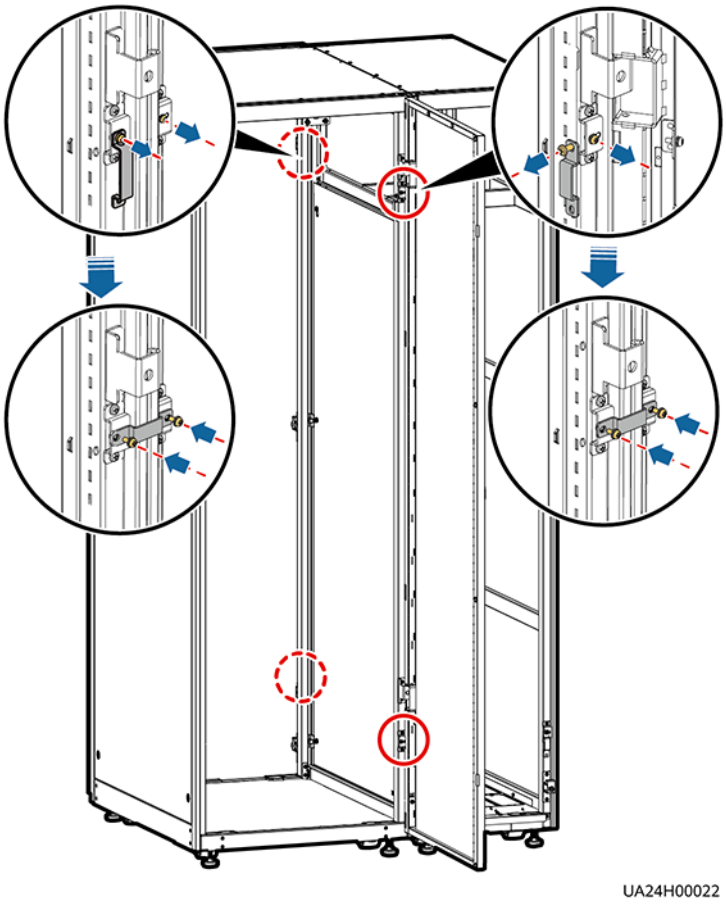


(1) Side cover (2) Cable trough

Step 5 Place the cable entry cabinet on the right of the UPS cabinet.

Step 6 Install the front and rear connecting kits.

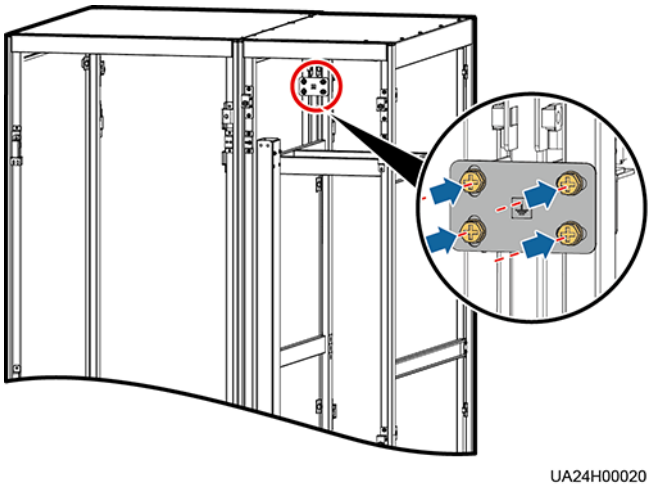
Figure 3-76 Installing connecting kits



Step 7 (Optional) Secure the cable entry cabinet to the ground.

Step 8 Install an equipotential plate.

Figure 3-77 Equipotential plate



Step 9 Open the front door of the UPS, remove the front cover, and remove the top cover if needed.

Figure 3-78 Removing the covers

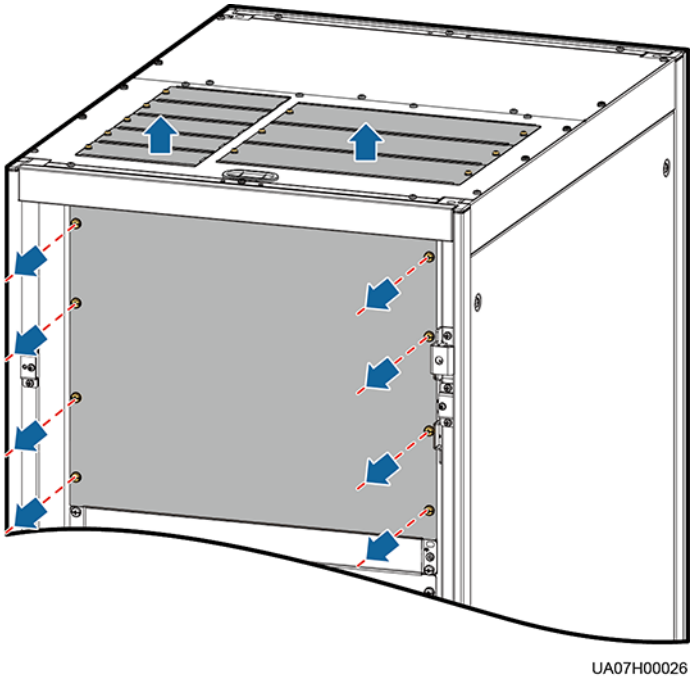
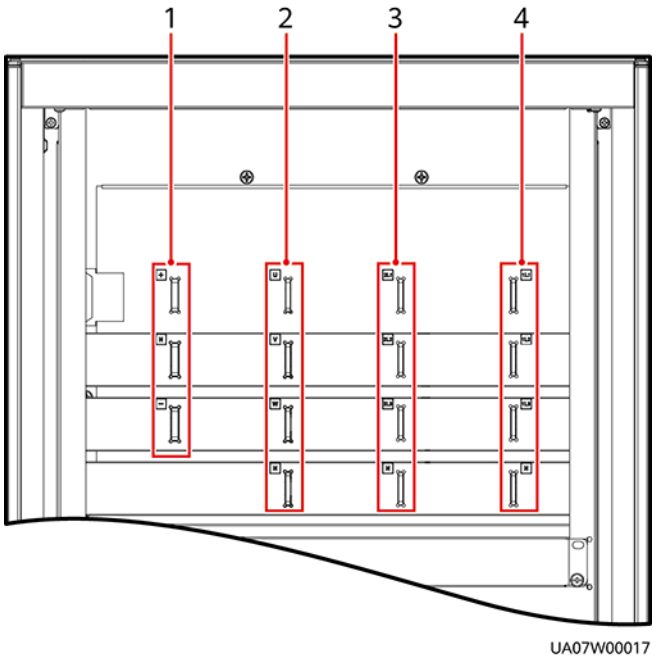


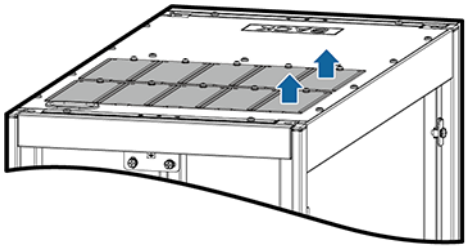
Figure 3-79 Copper bar positions



(1) Battery input terminals (+, N, –)
(2) Output terminals (U, V, W, N)
(3) Bypass input terminals (2L1–2L3, N)
(4) Mains input terminals (1L1–1L3, N)

Step 10 Remove covers from the top of the cable entry cabinet based on the site requirements.

Figure 3-80 Drilling holes into the top cover of the cable entry cabinet

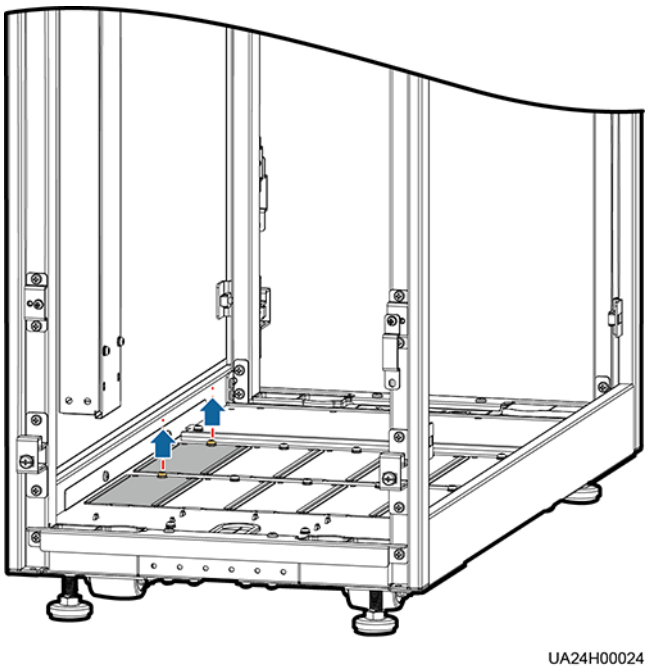


Step 11 Determine the cabling mode.

- Remove small covers for routing cables

  Remove a certain number of small covers from the bottom of the cable entry cabinet based on the actual cable conditions.

  Figure 3-81 Removing small covers

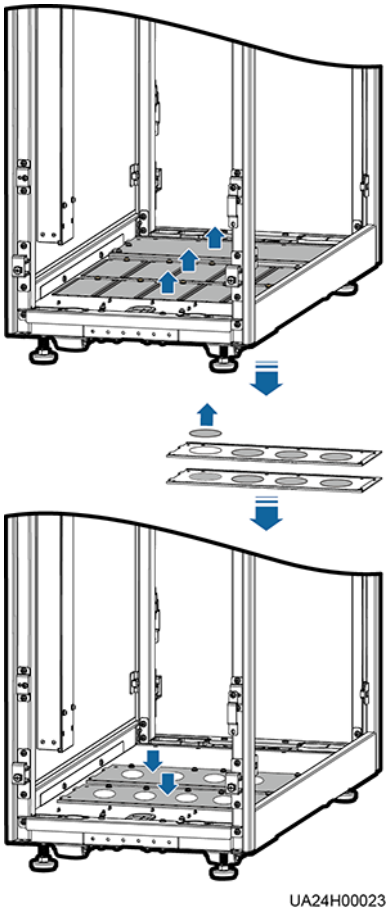
  

- Drilling holes into the large covers for routing cables

  a. Remove all small covers from the bottom of the cable entry cabinet.

  b. Remove the two large covers from the bottom of the cable entry cabinet, drill holes into them based on site requirements, and install them on the positions where the small covers were placed.

Figure 3-82 Removing large covers



NOTE

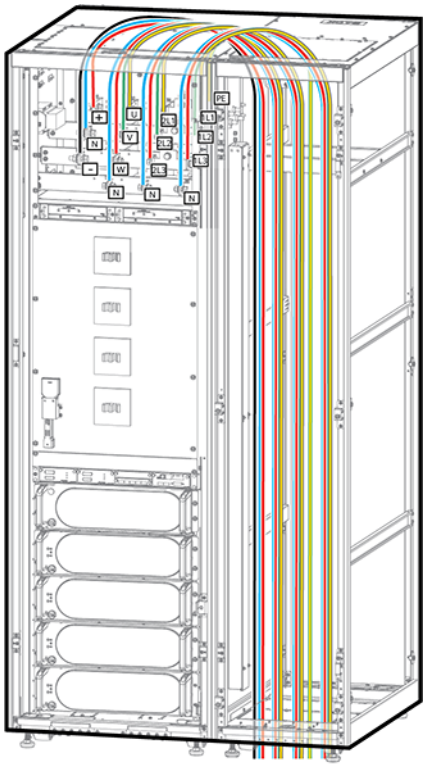
- The number of holes to be drilled is for reference only.
- If holes are drilled for routing cables, attach grommet strips on the hole edges to protect cables.

Step 12 Connect ground cables and power cables.

NOTE

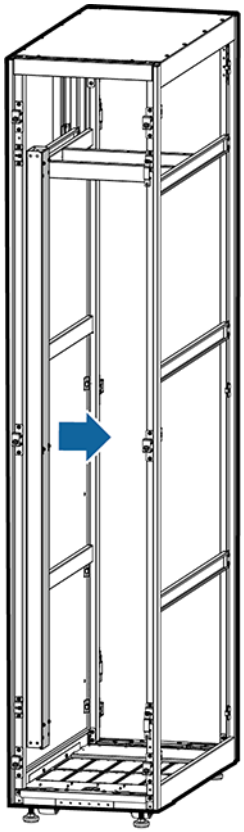
For the screw specifications and torque used for connecting cables in a bottom cable routing scenario, refer to the top cable routing scenario. This section only shows the cable routes in the bottom cable routing scenario.

Figure 3-83 Connecting cables



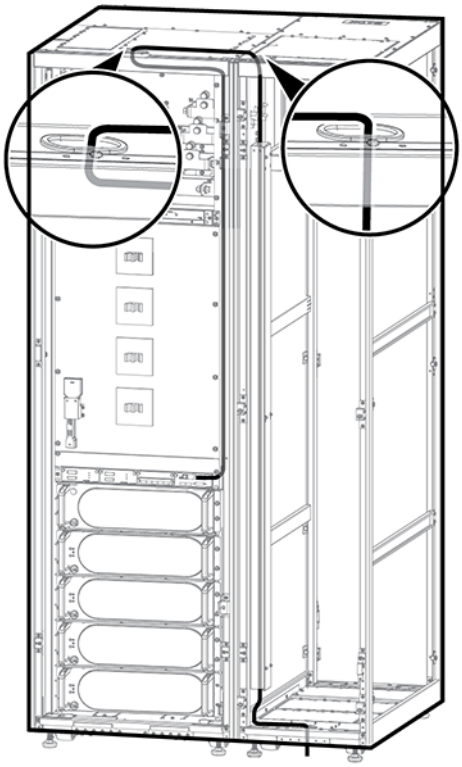
Step 13 Remove the signal cable trough cover from the cable entry cabinet.

Figure 3-84 Removing the cable trough cover



Step 14 Connect the signal cable. Route the control cable out of the UPS cabinet through the cable hole on the top, and then into the cable entry cabinet through the cable hole on the top of that cabinet.)

Figure 3-85 Control cable



NOTE

The number and colors of signal cables are for reference only.

Step 15 Install the right cover of the UPS cabinet on the right of the cable entry cabinet, and install other covers in the original positions.

----End

3.2.8 Routing Cables (UPS5000-E-300K-SM)

Context

NOTICE

- Route cables for the UPS from inside out and from bottom up.

Procedure

Step 1 Open the front door, and remove the cover from the power distribution subrack, as shown in **Figure 3-86**. **Figure 3-87** shows the positions of copper bars.

Figure 3-86 Removing the cover

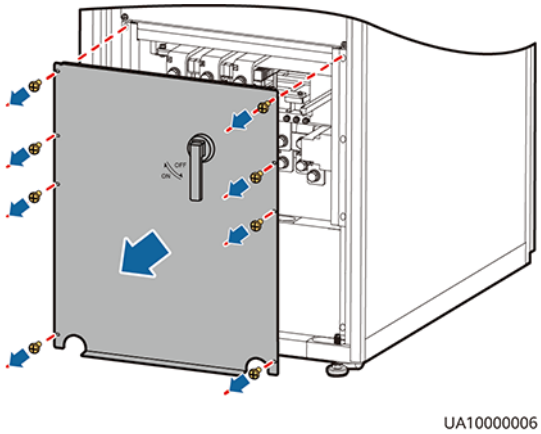
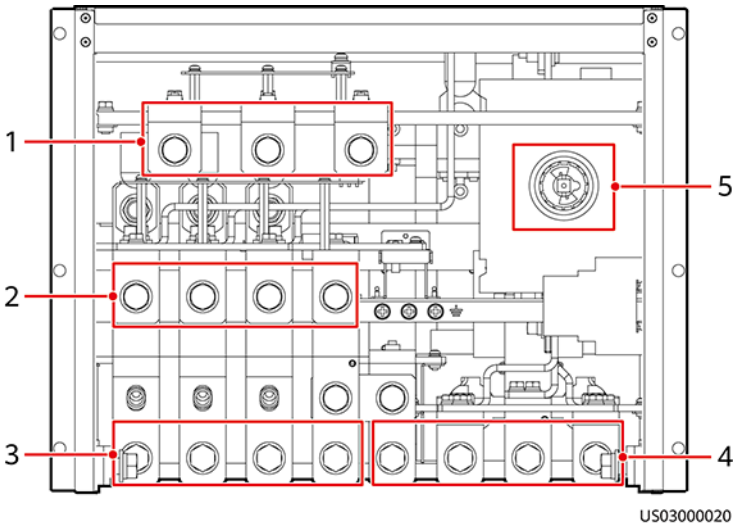


Figure 3-87 Copper bar positions



(1) Battery input terminals (+, N, –)

(2) Bypass input terminals (2L1–2L3, N)

(3) Mains input terminals (1L1–1L3, N)

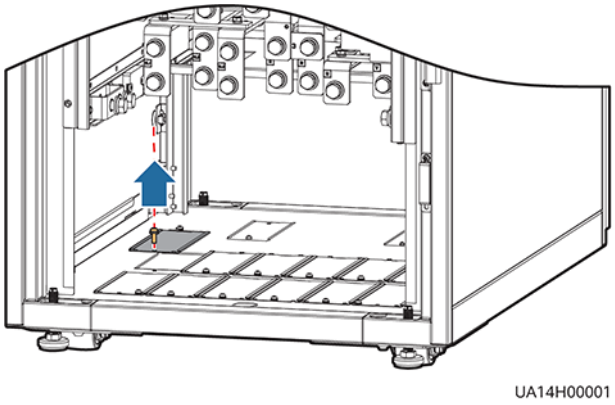
(4) Output terminals (U, V, W, and N)

(5) Maintenance bypass switch

Step 2 Determine the cabling mode.

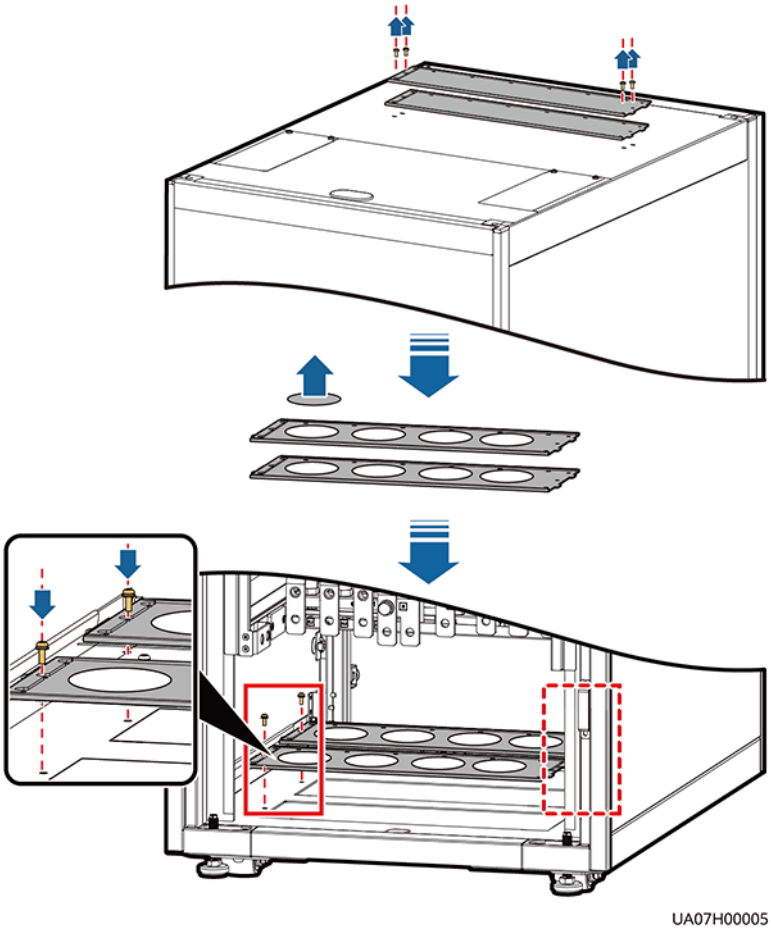
- Remove small covers for routing cables.

Figure 3-88 Removing small covers from the bottom of the cabinet



- Drill holes into the large cover for routing cables.
  a. Remove all small covers from the bottom of the cabinet.
  b. Remove the two large covers from the top of the cabinet, drill holes into them, and install them to the positions where the small covers were originally.

Figure 3-89 Hole positions

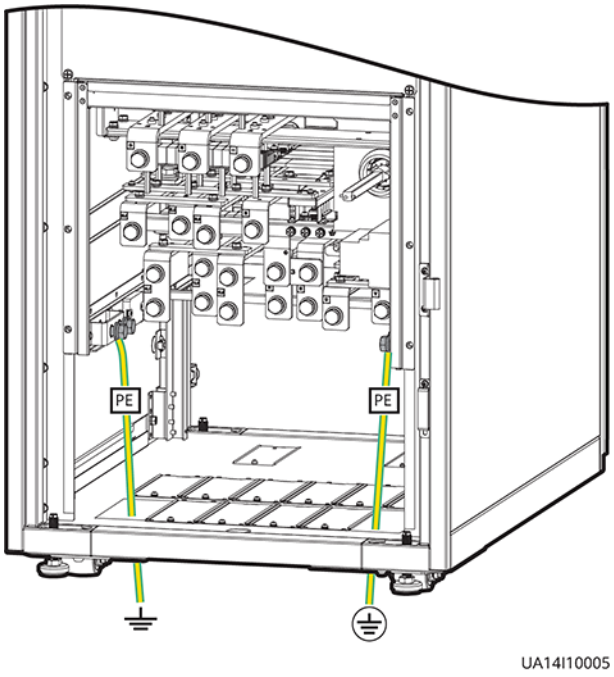


NOTE

- The quantity of holes in the above figure is for reference only.
- If holes are drilled for routing cables, attach grommet strips to the hole edges to protect cables.

Step 3 Connect ground cables, as shown in **Figure 3-90**.

Figure 3-90 Grounding



NOTE

- : Internal equipotential connection
- : Protection ground

Step 4 Route power cables.

- Two power sources

  Remove the copper bars between the mains and bypass input terminals, as shown in **Figure 3-91**.

Figure 3-91 Removing copper bars

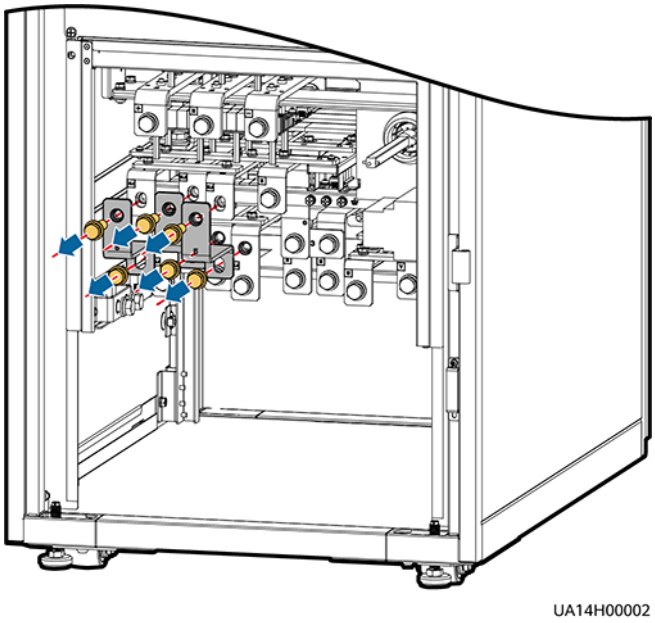
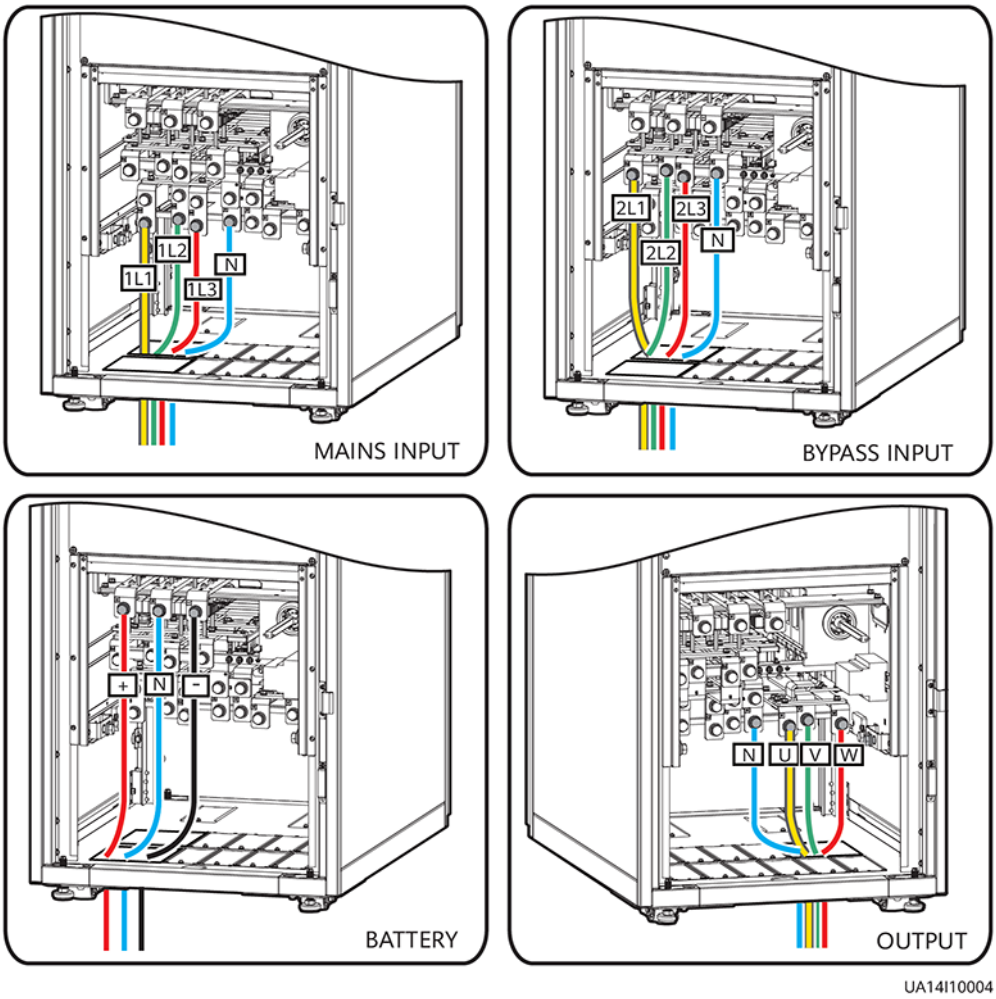


Figure 3-92 shows the power cables routed from the bottom of the cabinet.

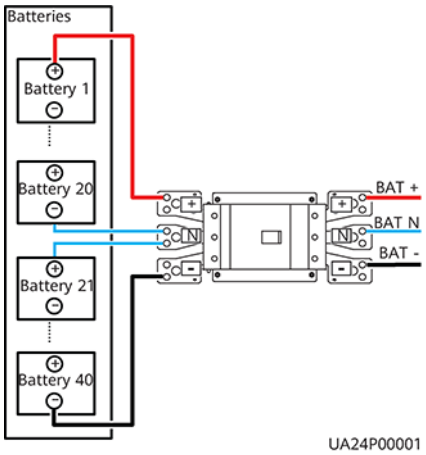
Figure 3-92 Connecting power cables



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

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

Figure 3-93 Neutral wire

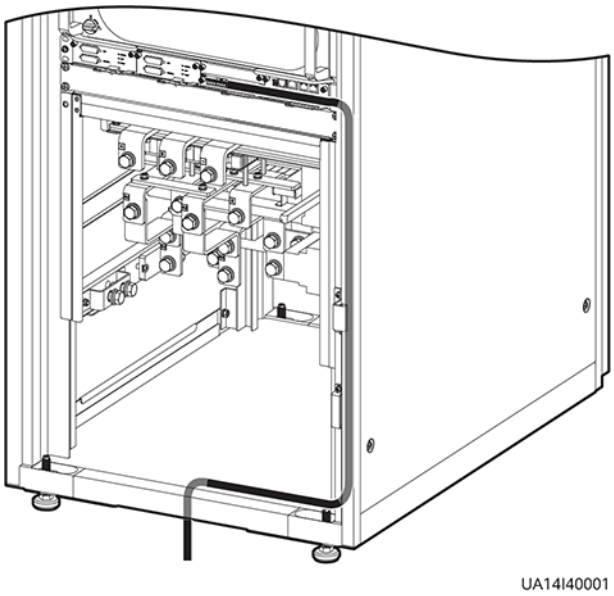


- One power source

  If the mains input and bypass input share a power source, you do not need to remove the copper bar between the mains and bypass input terminals or connect the bypass input power cable.

Step 5 Route the signal cables on the left side of subracks along the left side of the cabinet and the cables on the right side of subracks along the right side of the cabinet, and then bind the cables to the cabinet, as shown in **Figure 3-94**.

Figure 3-94 Connecting signal cables



NOTE

The number and colors of signal cables in **Figure 3-94** are for reference only.

----End

3.2.9 Routing Cables (UPS5000-E-300K-SMT)

Context

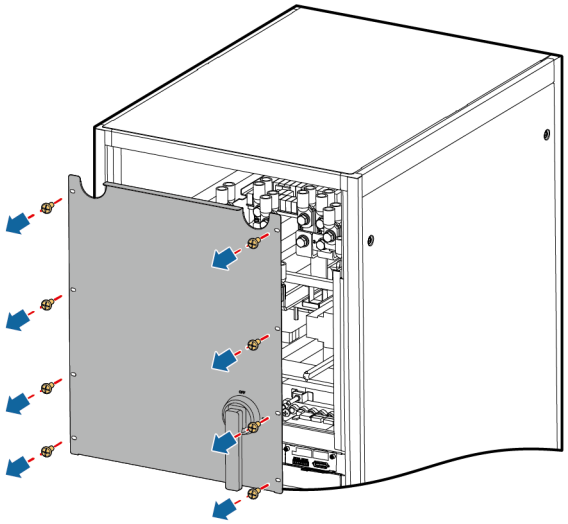
NOTICE

Route cables for the UPS from inside out.

Procedure

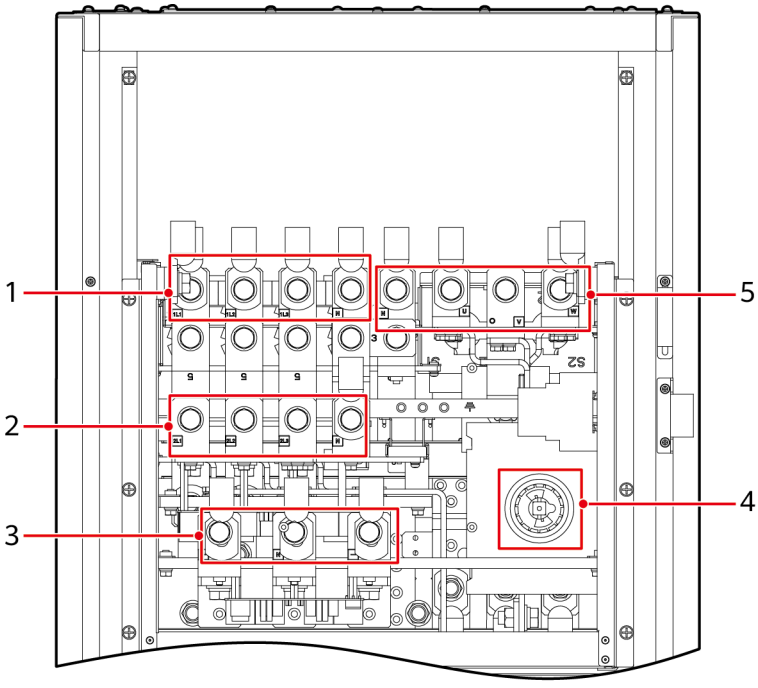
Step 1 Ensure the maintenance bypass switch is OFF. Open the front door and remove the cover from the power distribution subrack, as shown in **Figure 3-95**.

Figure 3-95 Removing the cover



UA10000011

Figure 3-96 Copper bar positions



US03000019

(1) Mains input terminals (1L1–1L3, N)

(2) Bypass input terminals (2L1–2L3, N)

(3) Battery input terminals (+, N, –)

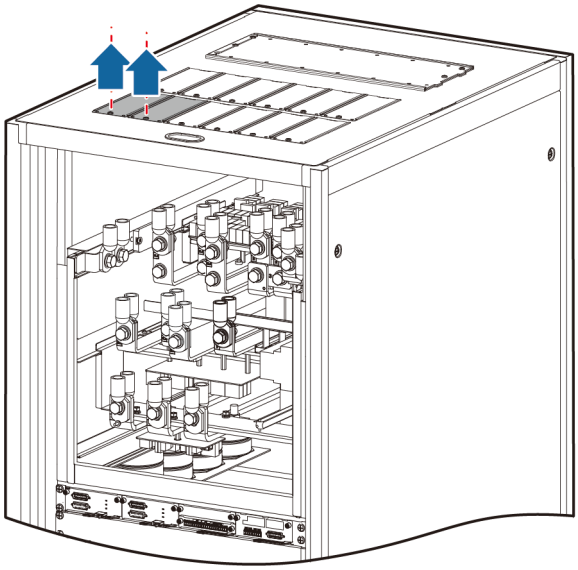
(4) Maintenance bypass switch

(5) Output terminals (U, V, W, N)

Step 2 Determine the cabling mode.

- Remove small covers for routing cables.

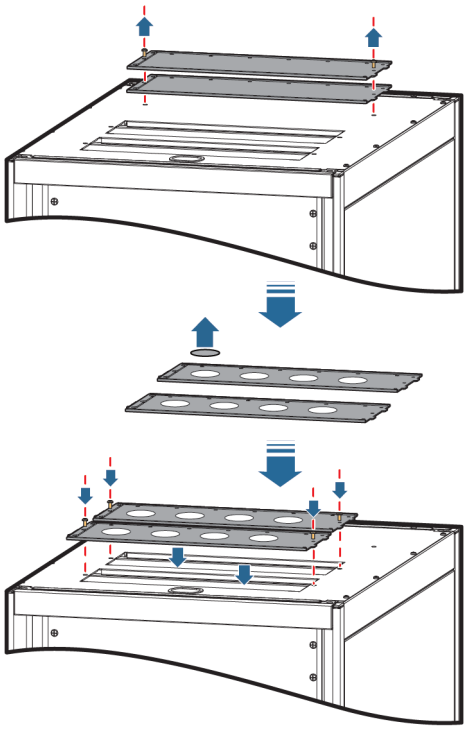
Figure 3-97 Removing small covers from the top of the cabinet



UA07H00018

- Drill holes into the large cover for routing cables.
  a. Remove small covers from the top.
  b. Remove the two large covers from the rear top of the cabinet, drill holes into them, and install them to the positions where the small covers were placed.

Figure 3-98 Hole positions



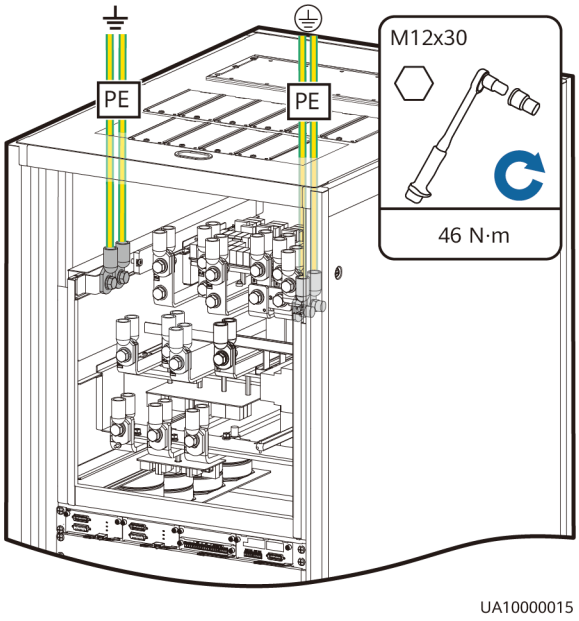
UA07H00004

NOTE

- The quantity of holes in the above figure is for reference only.
- If holes are drilled for routing cables, attach grommet strips to the hole edges to protect cables.

Step 3 Connect ground cables, as shown in **Figure 3-99**.

Figure 3-99 Grounding



NOTE

- : Internal equipotential connection
- : Protection ground

Step 4 Route power cables.

- Two power sources

  Remove the copper bar between mains and bypass input terminals, as shown in **Figure 3-100**.

Figure 3-100 Removing copper bars

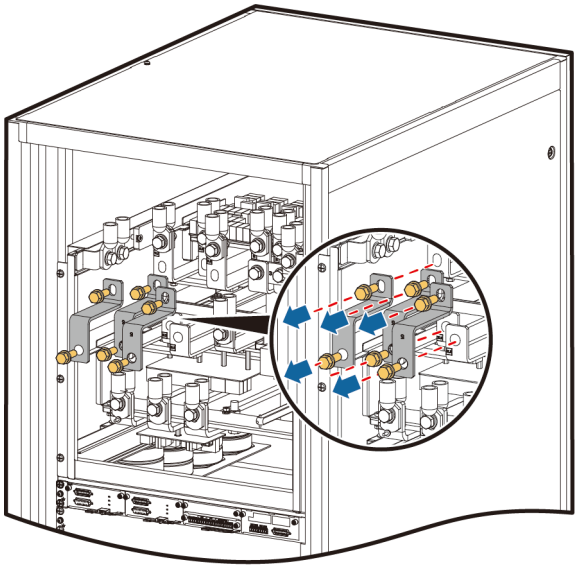
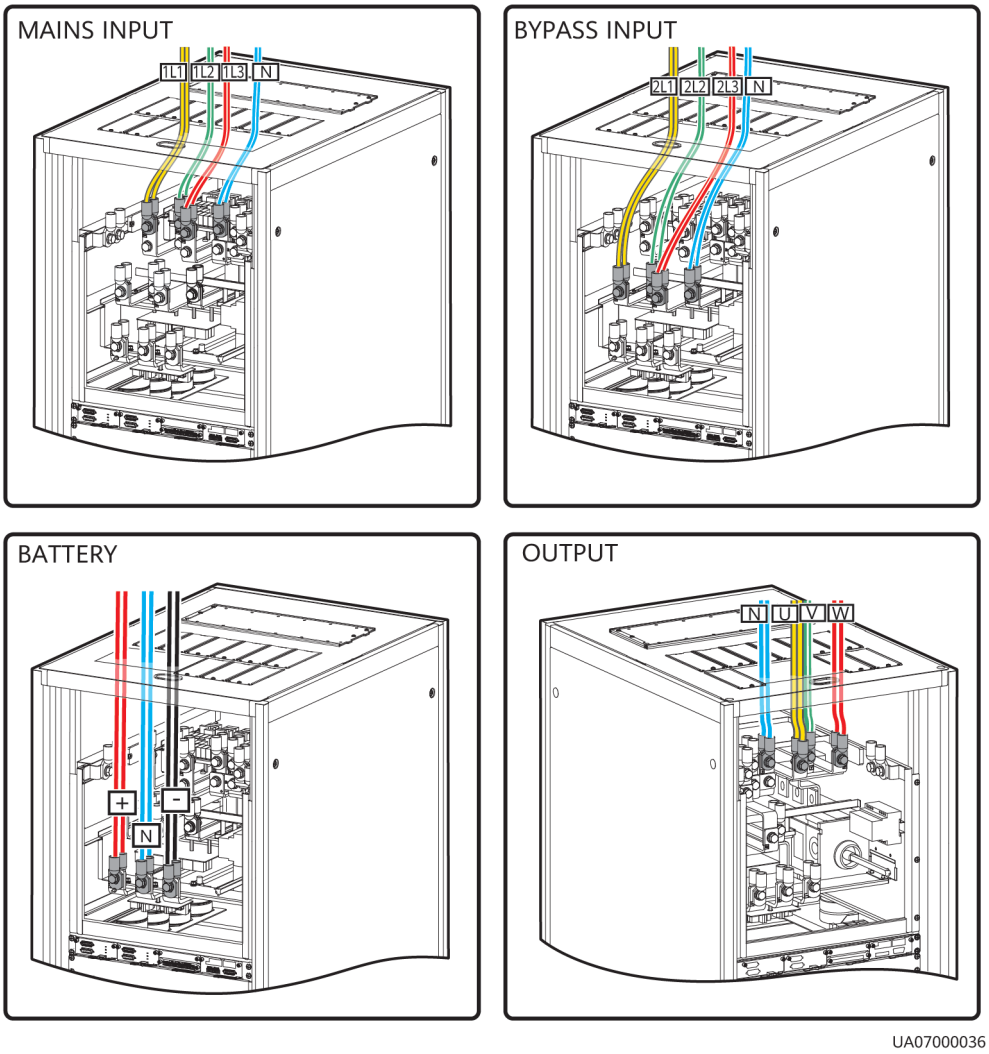


Figure 3-101 shows the cables routed from the top of the cabinet.

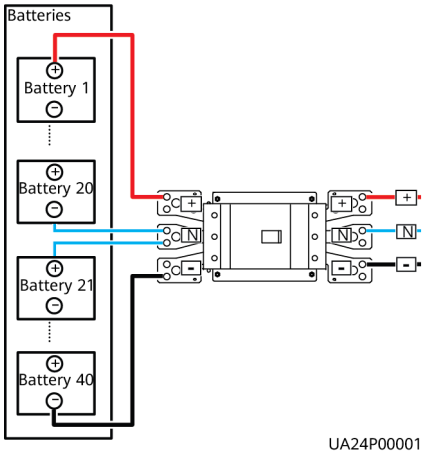
Figure 3-101 Top cabling



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

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

Figure 3-102 Neutral wire

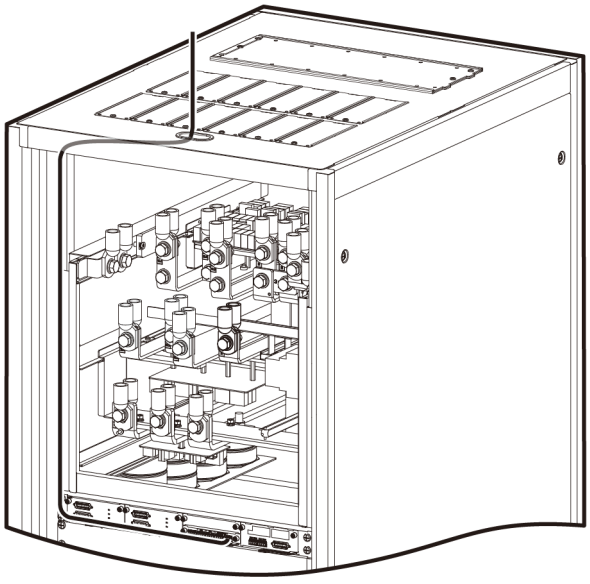


- One power source

  If the mains input and bypass input share a power source, you do not need to remove the copper bar between the mains and bypass input terminals or connect the bypass input power cable.

Step 5 Route signal cables. Bind cables to the cabinet.

Figure 3-103 Connecting signal cables



NOTE

The number and colors of signal cables in **Figure 3-103** are for reference only.

----End

3.2.10 Routing Cables (UPS5000-E-300K-SMT, Isolation Protection)

Context

NOTICE

- Route cables for the UPS from inside out and from bottom up.

Procedure

Step 1 Ensure the maintenance bypass switch is OFF. Open the front door, remove the front cover, and remove covers from the top of the cabinet based on the site requirements.

Figure 3-104 Removing the cover

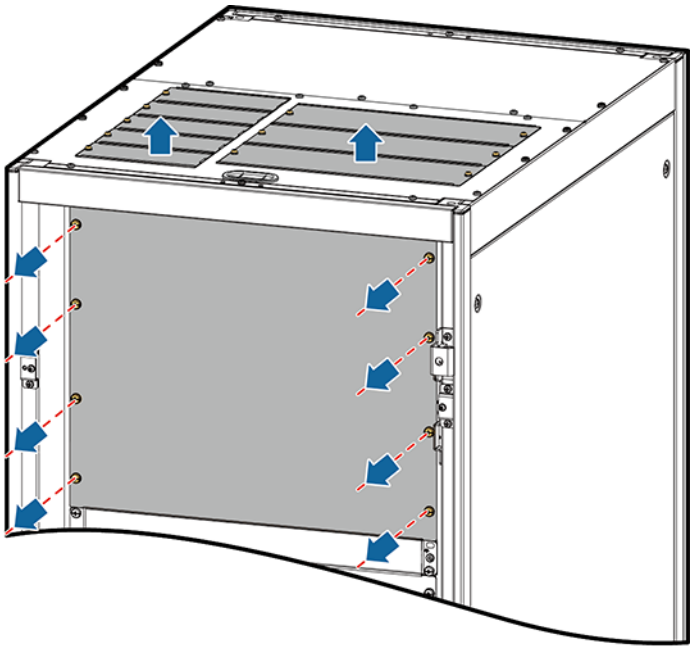
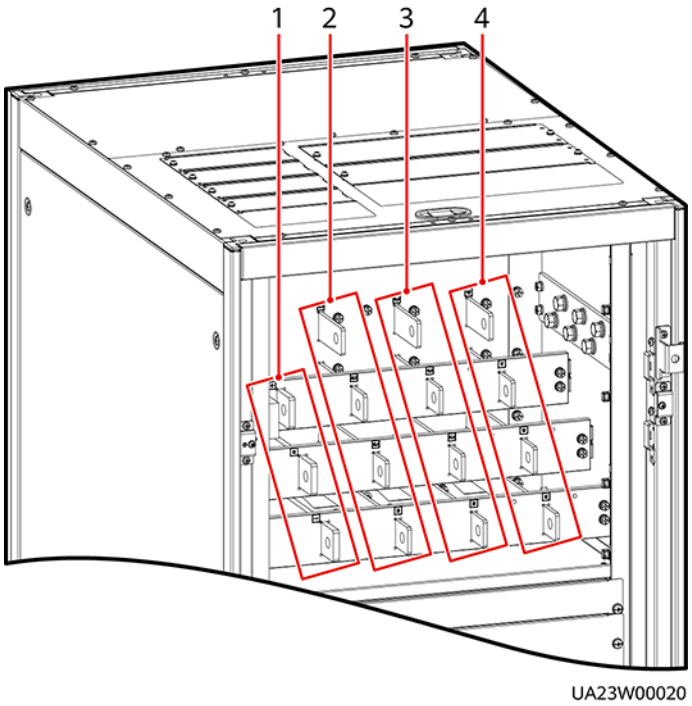


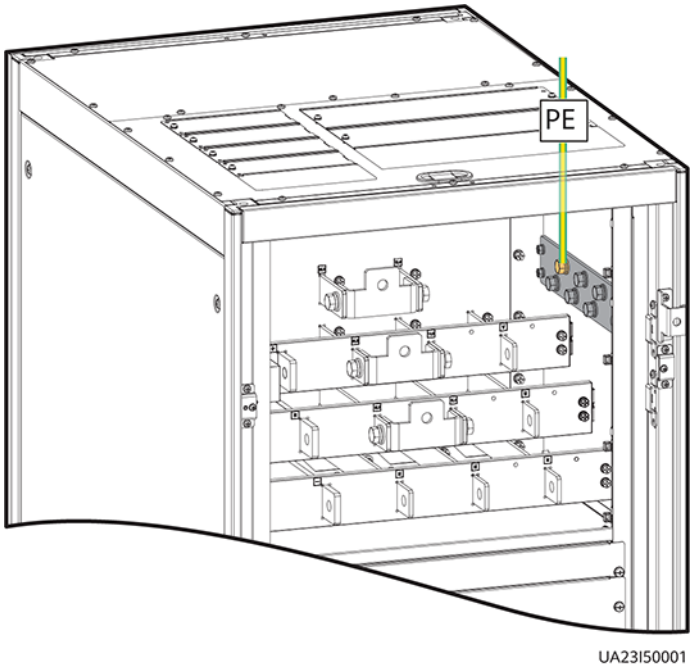
Figure 3-105 Copper bar positions



(1) Battery input terminals (+, N, –)
(2) Bypass input terminals (2L1–2L3, N)
(3) Mains input terminals (1L1–1L3, N)
(4) Output terminals (U, V, W, N)

Step 2 Connect ground cables.

Figure 3-106 Grounding



Step 3 Route power cables.

- Two power sources

Remove the copper bar between mains and bypass input terminals.

Figure 3-107 Removing copper bars

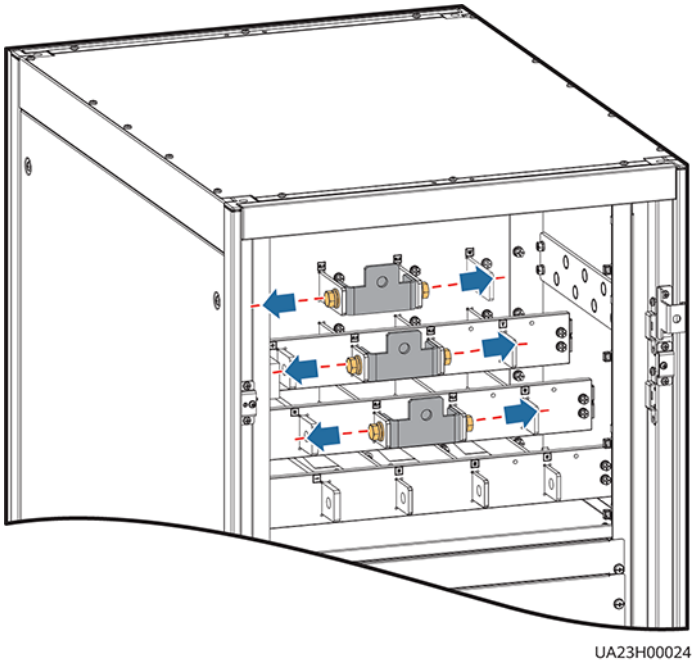
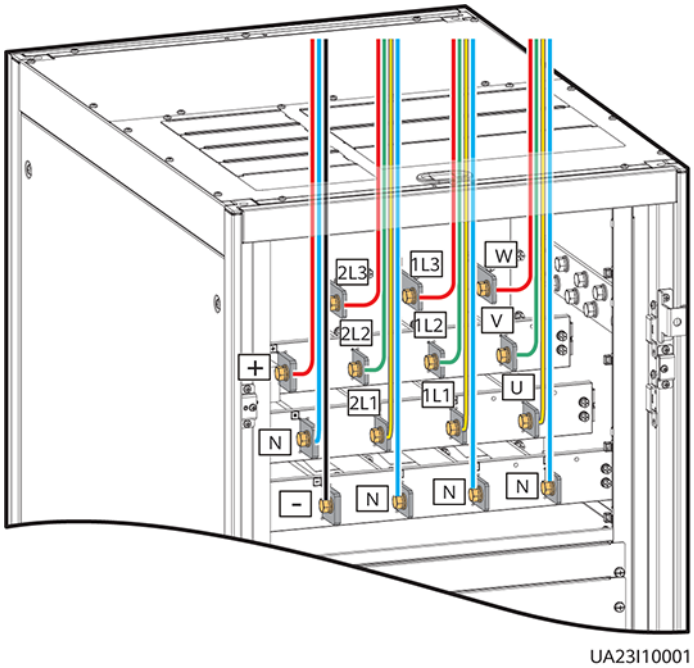


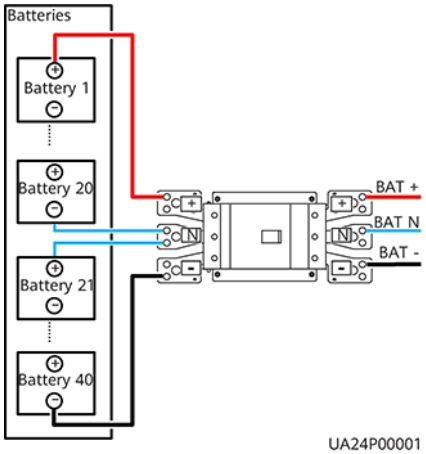
Figure 3-108 Connecting power cables



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

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

Figure 3-109 Neutral wire

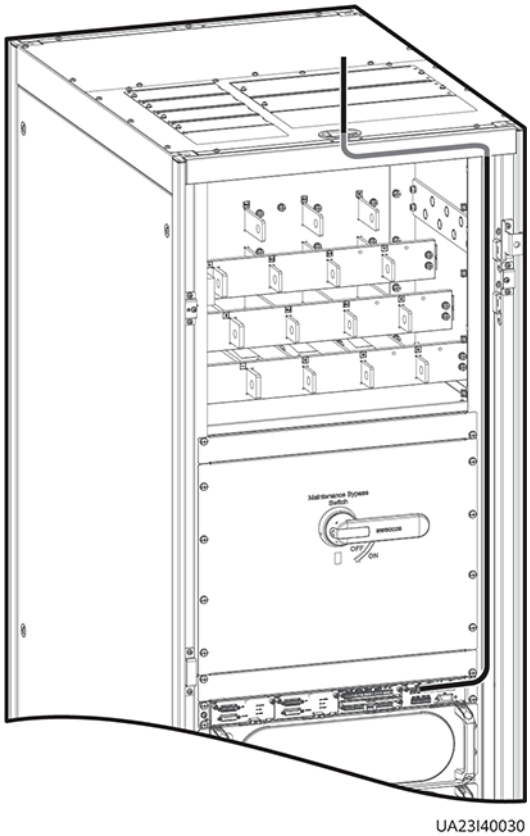


- One power source

  If the mains input and bypass input share a power source, you do not need to remove the copper bar between the mains and bypass input terminals or connect the bypass input power cable.

Step 4 Route signal cables. Bind cables to the cabinet.

Figure 3-110 Connecting signal cables



NOTE

The number and colors of signal cables are for reference only.

----End

3.2.11 Connecting a Remote EPO Switch

NOTICE

- The Company does not provide the EPO switch or cable. Prepare them by yourself. The recommended cable size is 22 AWG.
- Equip the EPO switch with a protective cover to prevent misoperations, and cover the cable with protective tubing.
- Triggering EPO will shut down the rectifier, inverter, charger, and static bypass, but does not disconnect the UPS mains input. To power off the UPS completely, open the front-end input switch when triggering EPO.
- Set remote EPO for the SmartLi system separately. The SmartLi system shall not share switch contacts with other devices such as the UPS.

Connect the requisite EPO switch to UPS dry contacts.

- **Figure 3-111** shows the cable connections for an NC EPO switch.
- **Figure 3-112** shows the cable connections for an NO EPO switch.

Figure 3-111 Cable connection for an NC EPO switch

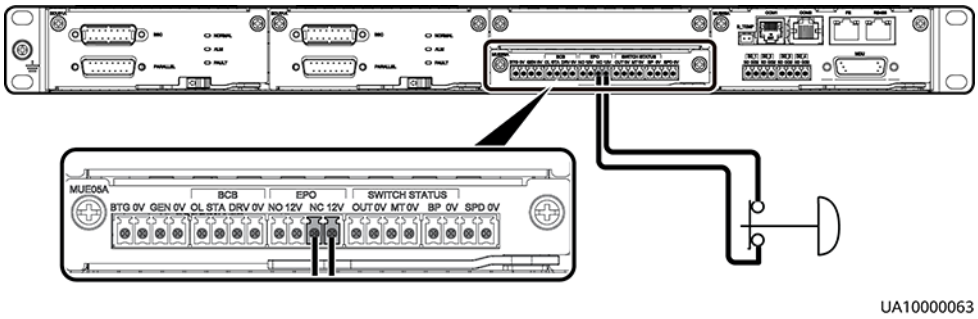
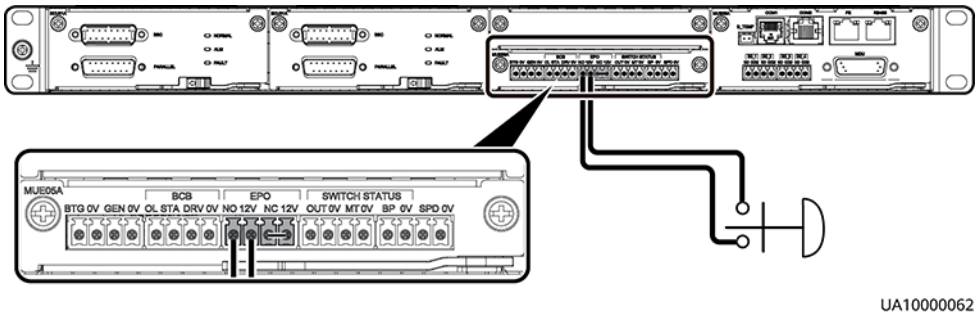


Figure 3-112 Cable connection for an NO EPO switch



NOTE

- When you use the NC status, remove the jumper between EPO_NC and EPO_12V first. When you turn off the EPO switch, EPO is triggered.
- When you use the NO status, ensure that the jumper is connected between EPO_NC and EPO_12V. When you turn on the EPO switch, EPO is triggered.

3.2.12 Connecting Communications Cables

Procedure

Step 1 Connect the external network management device to the RS485 port of the monitoring interface card.

Step 2 Connect the network port on a PC to the FE port of the monitoring interface card.

----End

3.3 Installing a Parallel System

3.3.1 Installing the UPSs

Context

NOTICE

When installing multiple cabinets, install connecting kits to combine and secure the cabinets.

Procedure

Step 1 Install the UPSs in the parallel system in the same way as installing a single UPS. For details, see the instructions for installing a single UPS.

Step 2 Unscrew the connecting kits at the front and rear of the cabinet, align them with the reserved holes that can connect the two UPSs and then use screws to tighten the connecting kits to the cabinet according to the following figures:

- **Figure 3-113** shows the connection point for the UPS5000-E-200K-SM and UPS5000-E-300K-SM/SMT.
- **Figure 3-114** shows the connection point for the UPS5000-E-200K-FM.

Figure 3-113 Installing connecting kits (UPS5000-E-200K-SM and UPS5000-E-300K-SM/SMT)

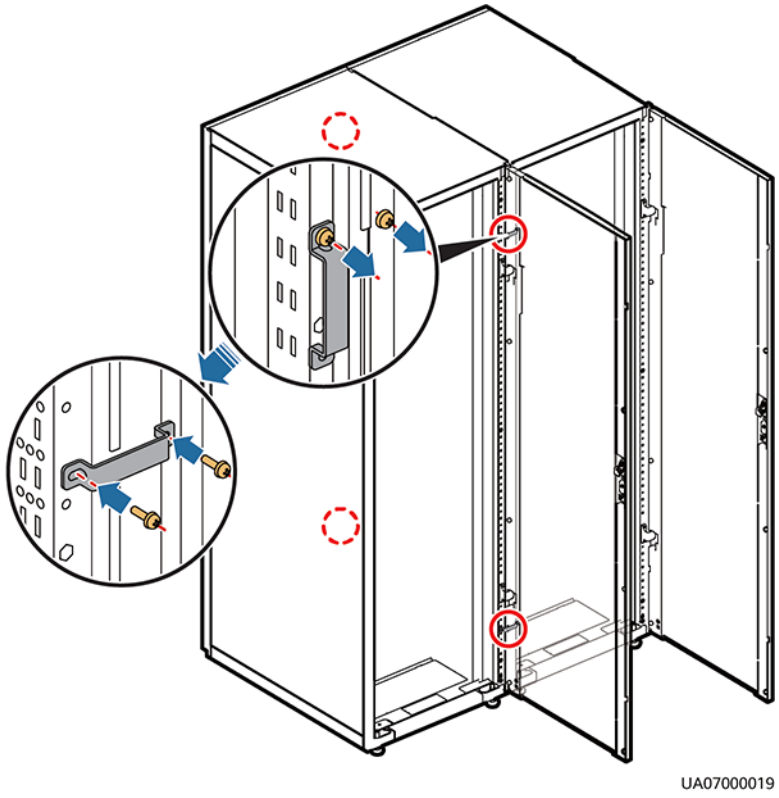
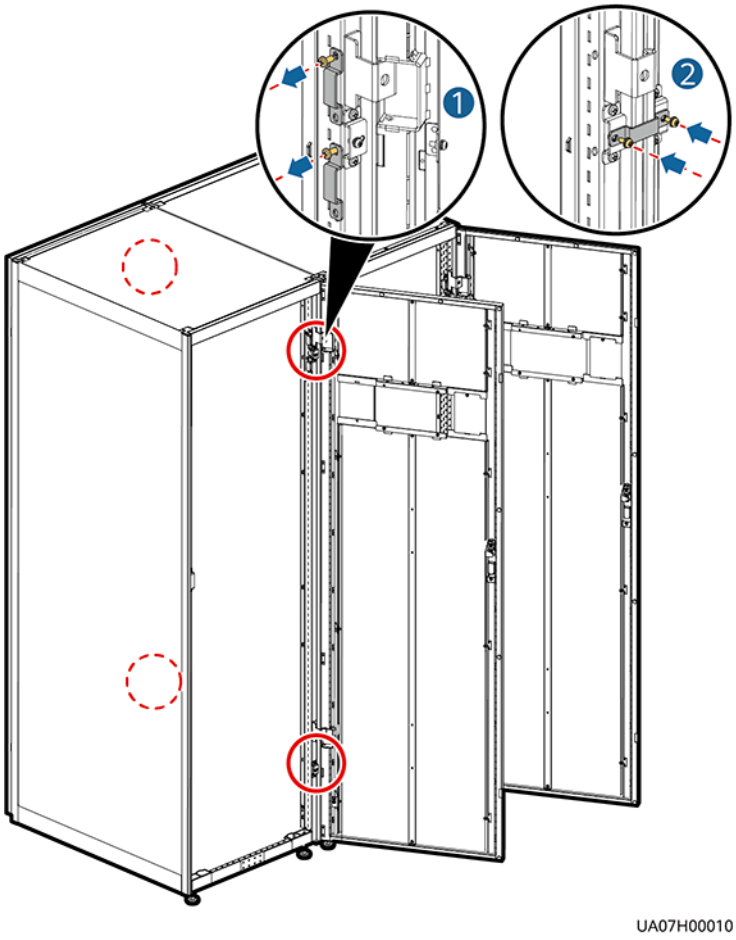


Figure 3-114 Installing connecting kits (UPS5000-E-200K-FM)



----End

3.3.2 Connecting Power Cables

Context

Cable connection for the UPS5000-E-200K-SM is used as an example. The parallel power cables for different UPS models can be connected in a similar way.

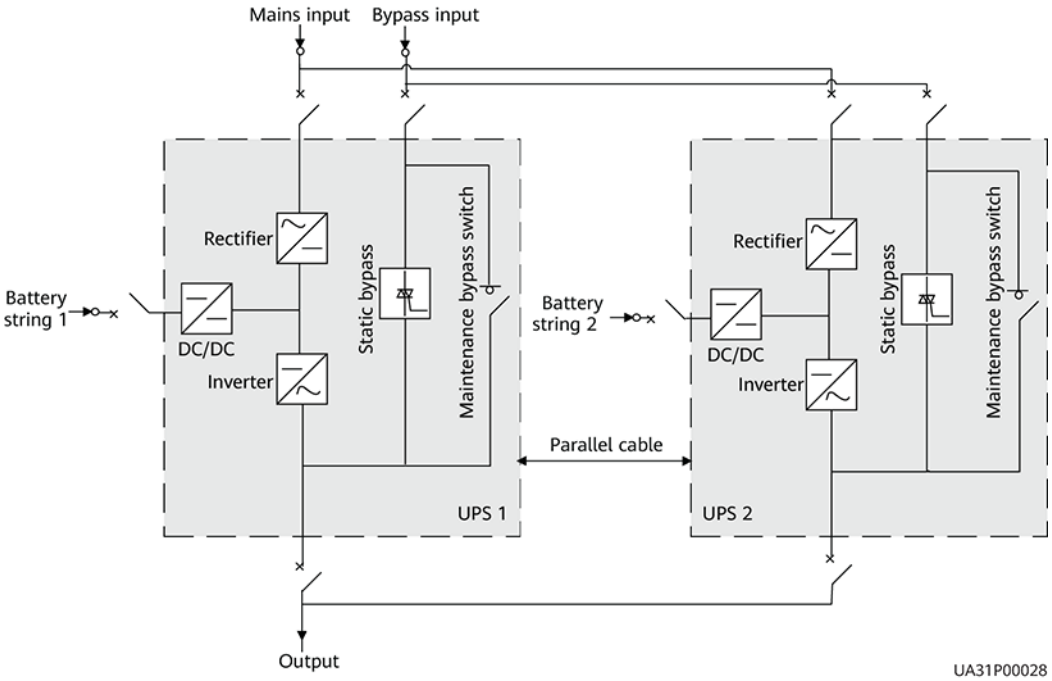
Procedure

Step 1 Ground each UPS in a parallel system separately, and connect power cables and battery cables according to **3.2 Installing a Single UPS**.

Step 2 Based on the site configurations, select a parallel connection method to connect cables for the parallel system.

Figure 3-115 shows a typical conceptual diagram for a 1+1 parallel system, and **Figure 3-116** shows the cable connections for this system.

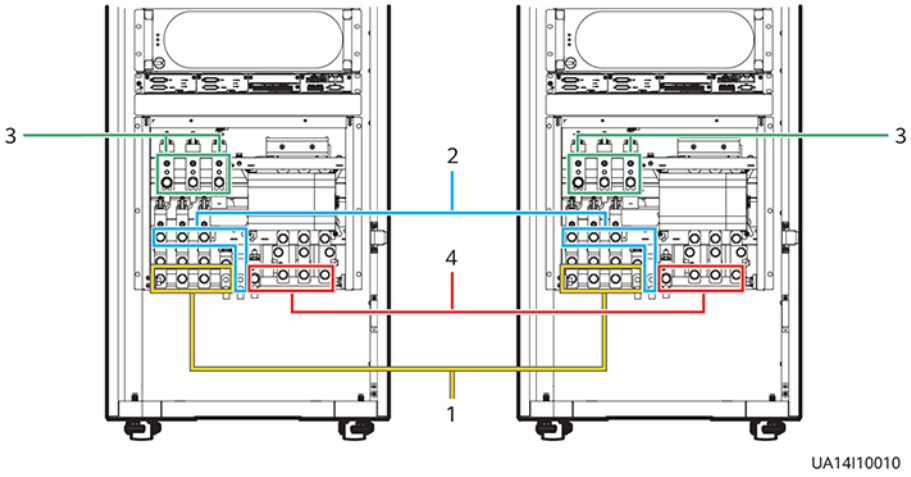
Figure 3-115 Conceptual diagram of a 1+1 parallel system



NOTICE

Connect power cables according to port silk screen.

Figure 3-116 Cable connections for a 1+1 parallel system



(1) Mains input power cables (2) Bypass input power cables (3) Battery cables (4) Output power cables

Figure 3-117 shows a typical conceptual diagram for a dual-bus system consisting of two UPS systems, and Figure 3-118 show the cable connections for this system.

Figure 3-117 Conceptual diagram of a dual-bus system

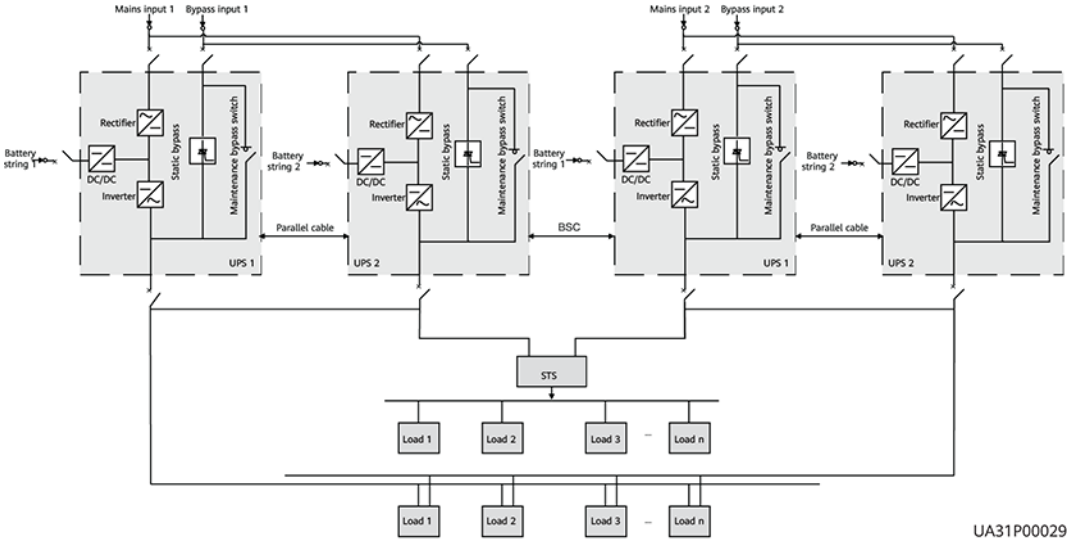
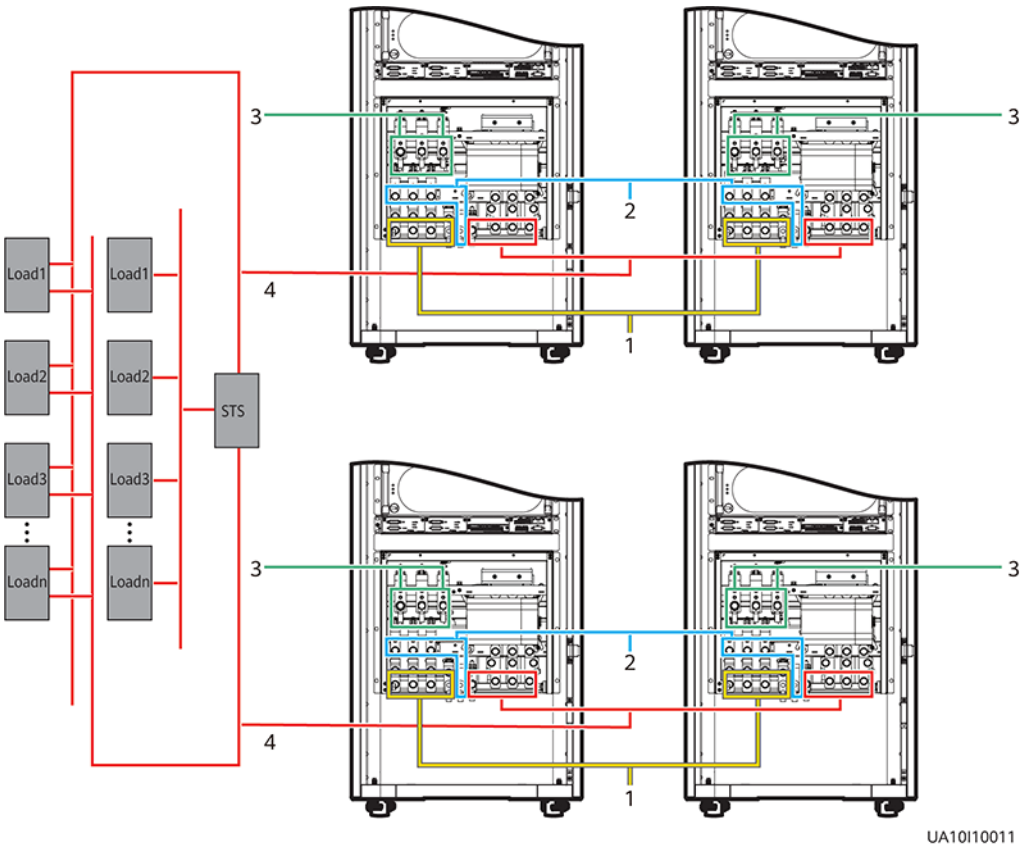


Figure 3-118 Cable connections for a dual-bus system



(1) Mains input power cables (2) Bypass input power cables (3) Battery cables (4) Output power cables

----End

3.3.3 Connecting Signal Cables

Context

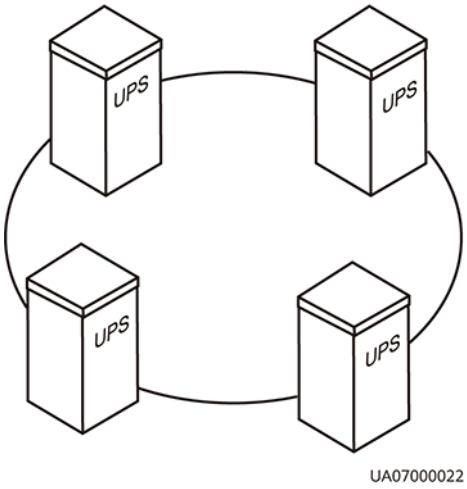
The following describes how to connect signal cables as a loop for four UPSs in a parallel system.

Procedure

Step 1 Connect the parallel ports on the UPSs using parallel cables.

- Figure 3-119 shows the topology diagram for the N+X parallel system and Figure 3-120 shows the cable connections for this system.

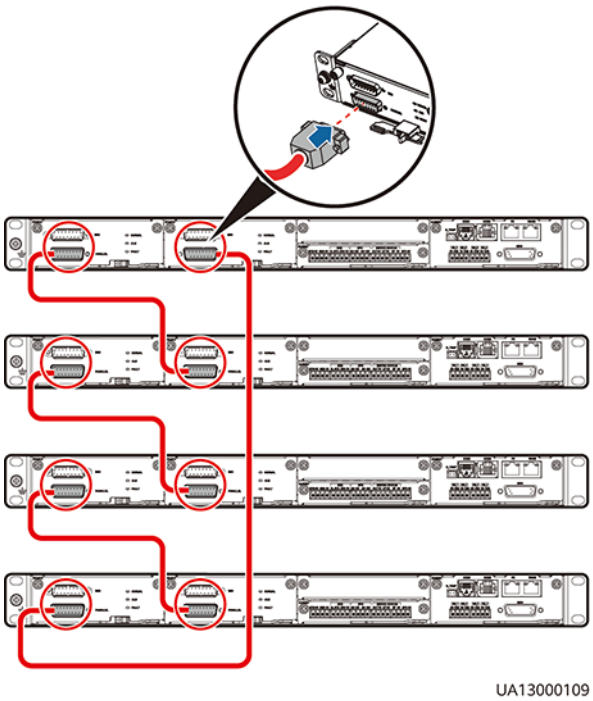
Figure 3-119 Topology diagram of an N+X parallel system



NOTICE

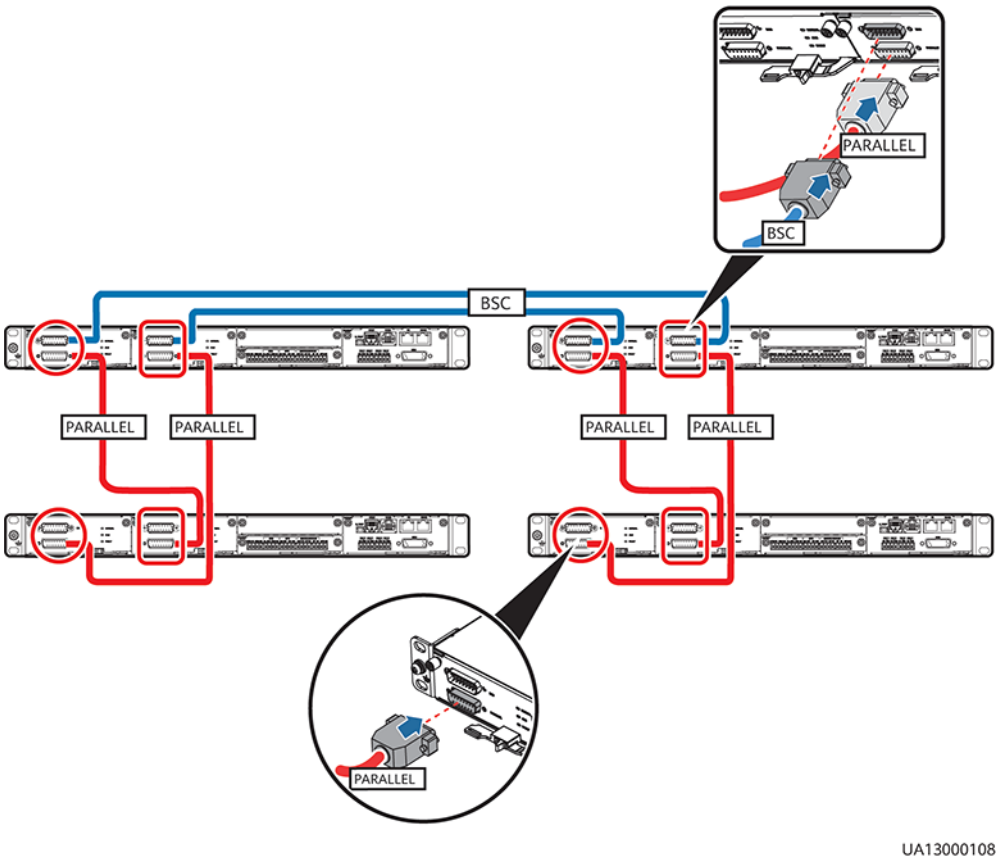
Figure 3-120 shows only control modules. Each control module represents a single UPS.

Figure 3-120 Connecting signal cables in a parallel system consisting of four UPSs



- In a dual-bus system, you need to connect cables to BSC ports on the UPSs. **Figure 3-121** shows the cable connections for a dual-bus system containing two master systems.

Figure 3-121 Connecting signal cables in a dual-bus system



Step 2 Connect signal cables to each UPS in the parallel system.

----End

3.4 Verifying the Installation

Table 3-6 lists check items.

NOTICE

You need to carefully check items 08 to 12 listed in Table 3-6. Otherwise, the UPS may be damaged.

Table 3-6 Check items and acceptance criteria

No.	Item	Acceptance Criteria
01	UPS installation	The UPS is securely installed and does not tilt due to vibration.

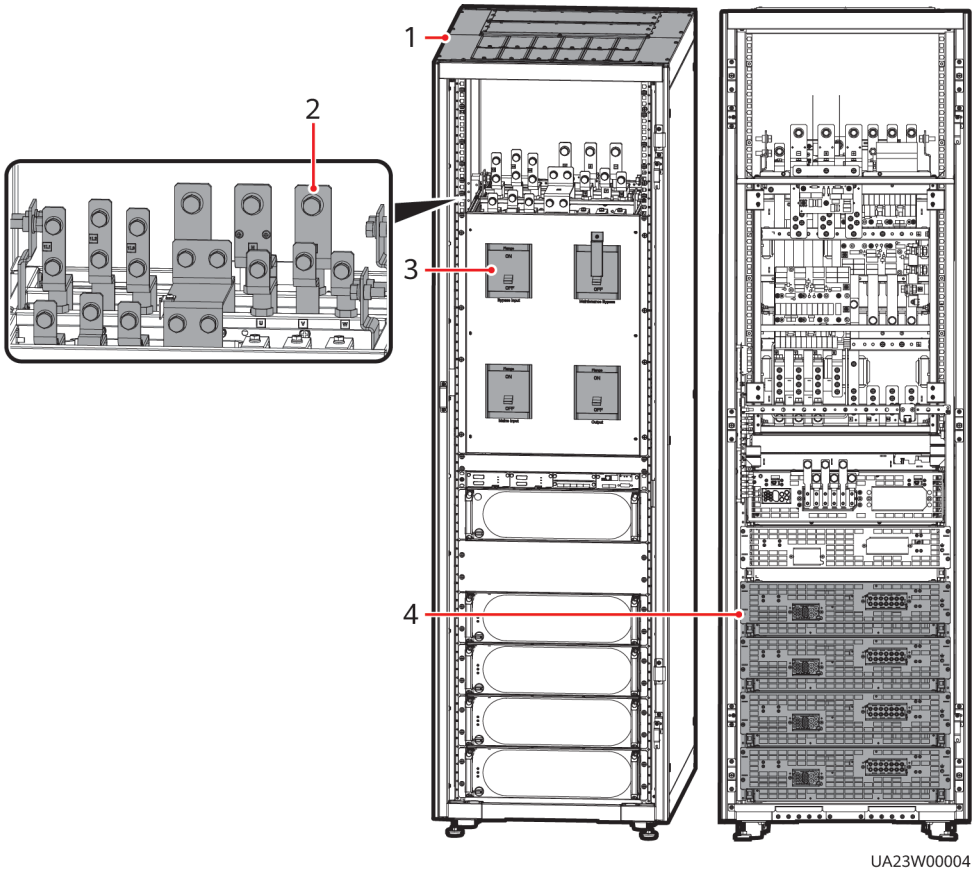
No.	Item	Acceptance Criteria
02	Neat arrangement	The UPS and its adjacent cabinets are neatly arranged and secured with connecting plates.
03	Cable layout	Cables are routed properly and cable routing meets customer requirements.
04	Cable labels	Both ends of a cable are labeled. Labels are concise and easy to understand.
05	Cable ties	Cable ties are secured evenly and no burr exists.
06	Cable connections	The input, output, and battery cables are securely connected. For the cables secured by screws, the spring washers are flattened.
07	Grounding	The resistance between the UPS ground bar and the equipment room ground bar is less than 0.1 ohm.
08	AC phase sequence	For a single UPS, the mains input, bypass input, and output phase sequences are correct. For a parallel system, the phase sequences of each UPS must be consistent.
09	Battery cable connections	The battery strings are correctly connected to the UPS.
10	Foreign matter cleaning inside the cabinet	The inside and outside of the cabinet, and other operating components, are free from conductive dust. 1. There is no foreign matter (such as copper wires and screws) on the top of the cabinet. 2. There is no foreign matter on the copper bar terminals. 3. There is no foreign matter around switch terminals. 4. There is no foreign matter on the bottom plate of the cabinet. 5. There is no foreign matter on the rear module subrack.

No.	Item	Acceptance Criteria
11	Air filters on the front doors of cabinets	The air filters on the front doors of the cabinets are intact. Any damaged air filter should be replaced promptly. Removing an air filter will compromise the equipment performance, which may result in equipment damage.
12	Dust covers on the cabinets	The dust covers on the cabinet are intact. Any damaged air filter should be replaced promptly. Do not remove the dust covers during construction or before power-on. Otherwise, the equipment may be damaged.

NOTE

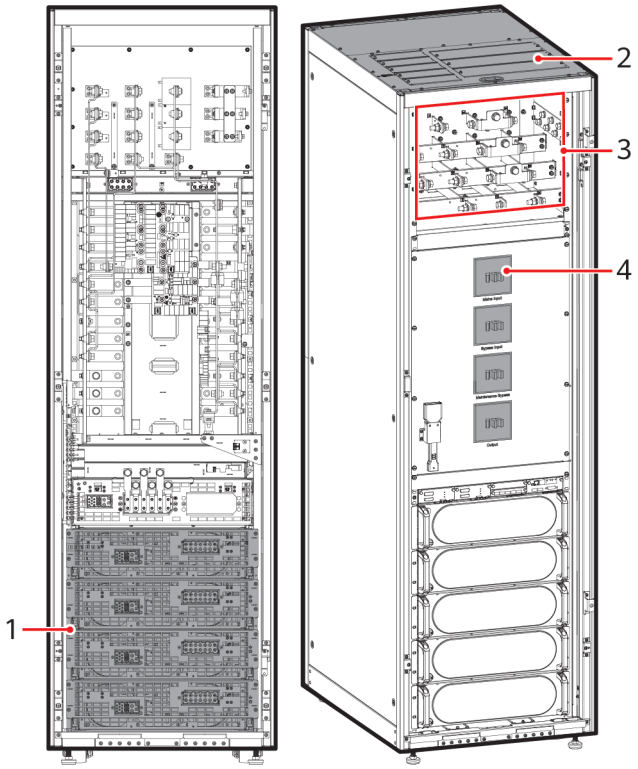
1. In the scenarios where holes are drilled for routing cables or covers are removed for routing cables, after routing cables and checking cable connections, use sealing putty to fill in the gap between the cables and the cabinet.
2. After verifying the installation, reinstall all the covers.
3. Do not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

Figure 3-122 Positions for checking foreign matter (UPS5000-E-200K-FM)



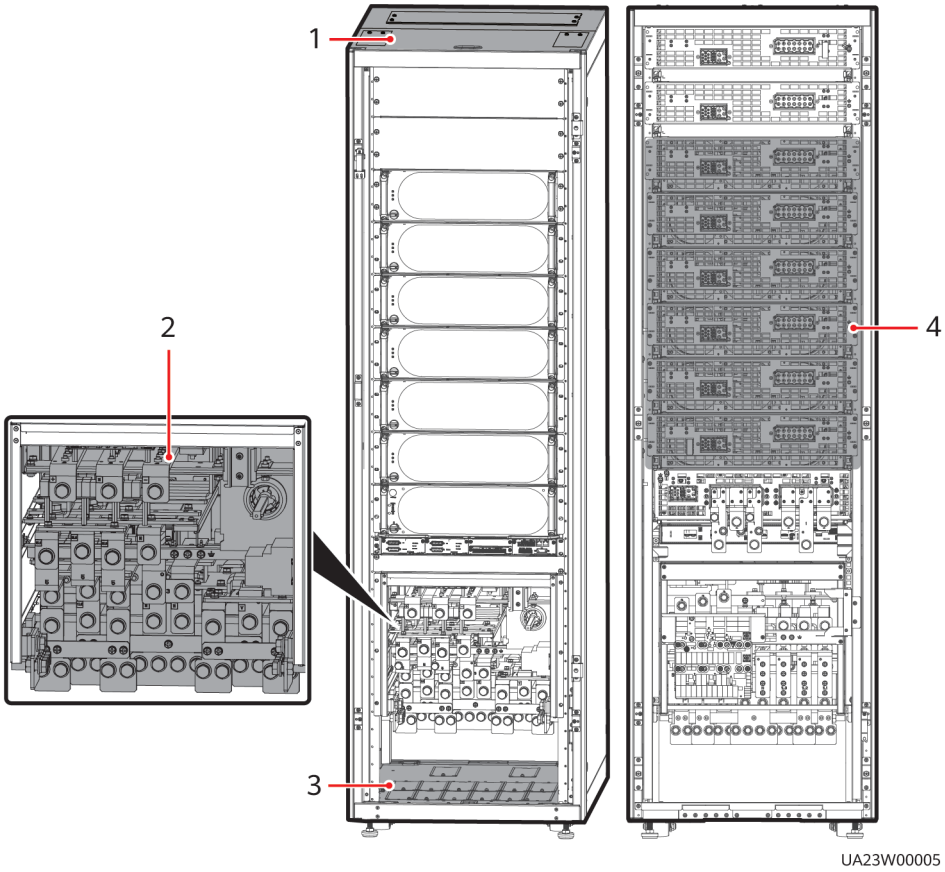
(1) Cabinet top (2) Wiring terminal blocks (3) Switches (4) Rear of modules

Figure 3-123 Positions for checking foreign matter (UPS5000-E-200K-FM, isolation protection)



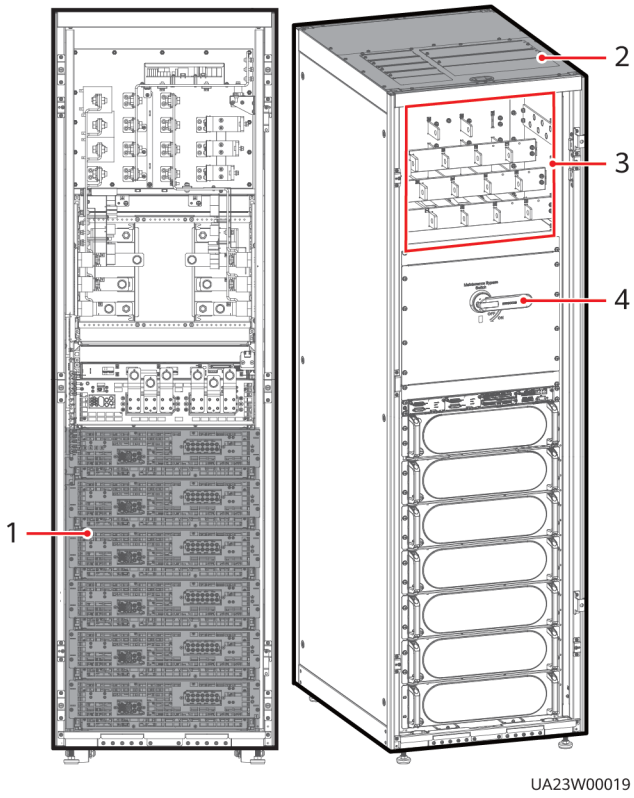
(1) Rear of modules (2) Cabinet top (3) Wiring terminal blocks (4) Switches

Figure 3-124 Positions for checking foreign matter (UPS5000-E-300K-SM)



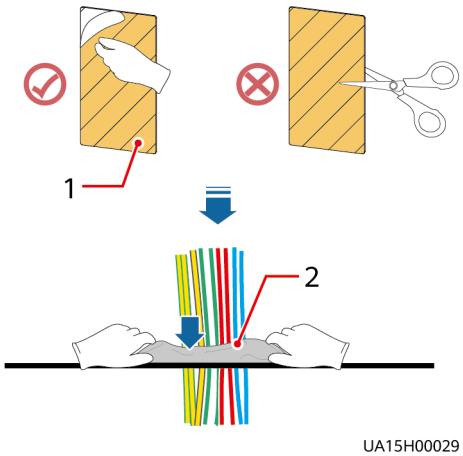
(1) Cabinet top (2) Wiring terminal blocks and switch (3) Cabinet bottom (4) Rear of modules

Figure 3-125 Positions for checking foreign matter (UPS5000-E-300K-SMT, isolation protection)



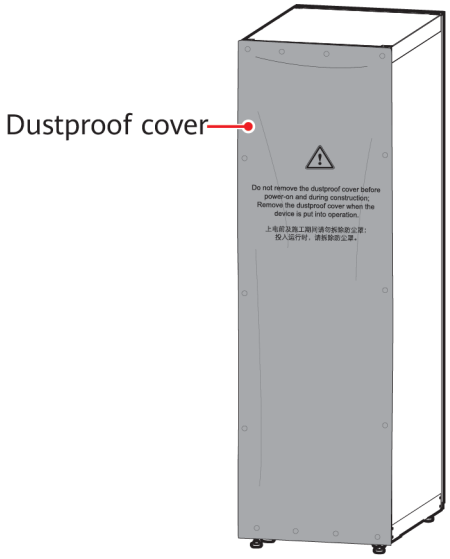
(1) Rear of modules (2) Cabinet top (3) Wiring terminal blocks (4) Switches

Figure 3-126 Fill the holes with sealing putty



(1) Paper protective film (2) Sealing putty

Figure 3-127 Dustproof cover



3.5 Sealing Cabinets

CAUTION

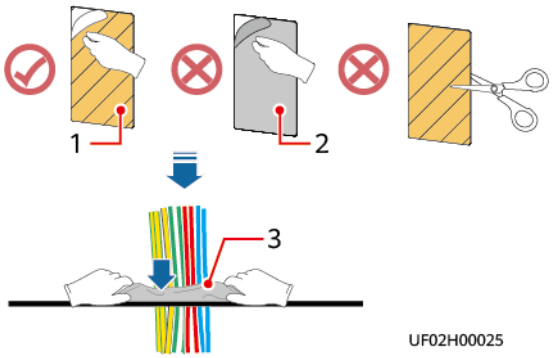
- If the equipment will not be powered on after installation, take dustproof and anti-condensation measures (for example, use a dust cover) to prevent condensation and dust buildup, which may corrode the equipment. Remove the dust cover only when the equipment is ready for operation.
- Use the sealing putty delivered with the equipment to seal the cabinet.
- Do not remove the transparent film.
- Do not cut the sealing putty.

Step 1 Ensure that all items have been checked after the installation.

Step 2 Fill in gaps between the cables and the cabinets with sealing putty.

1. Remove the paper protective film from the sealing putty and keep the transparent film.
2. Fill the gaps between the cables and the cabinets with the sealing putty. Ensure that the transparent film faces upward.

Figure 3-128 Filling a gap with sealing putty



(1) Paper protective film (2) Transparent film (3) Sealing putty (with the transparent film facing upward)

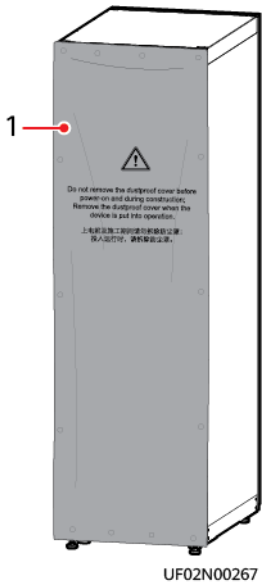
Step 3 Reinstall all covers.

Step 4 Close the cabinet doors.

NOTICE

Do not remove the dust cover during construction or before the device is powered on. Remove the cover only when the device is ready for operation. Otherwise, device faults may occur.

Figure 3-129 Dust cover



(1) Dust cover

----End

4 Single UPS Commissioning

DANGER

Wear dedicated protective gears and use insulated tools to avoid electric shocks or short circuits.

4.1 Powering On and Starting the UPS

Prerequisites

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

4.1.1 Power-On

Context

- Before power-on, ensure that the devices have passed all check items in the section "Verifying the Installation."
- Before power-on, ensure that all the UPS switches and upstream switches are OFF.

Procedure

Step 1 If desiccant is available inside the cabinet, remove the desiccant.

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

Step 3 (Full configuration model) Turn on the UPS bypass input switch, mains input switch, and output switch.

NOTE

After the UPS is powered on, initialization begins. The MDU displays the initialization progress bar.

----End

4.1.2 Initial Startup

NOTICE

If the equipment is started for the first time, obtain authorization for the equipment and set related parameters on the **Settings Wizard** screen. If the equipment is not started for the first time, skip this section.

Procedure

Step 1 Enter the startup password obtained through the app on the service authorization page to complete device authorization.

NOTICE

Technical support engineers can obtain the service authorization code through the app. For details, see the *Data Center Facility Deployment Guide*.

Step 2 If the software version is incompatible, activate the software version as instructed on the LCD.

NOTE

If you do not activate the software version as instructed, perform the following operations to activate it:

- On the LCD, choose **Maintenance** > **USB Operations** > **Upgrade Software** > **Details** > **Activate** to activate the software version.
- On the WebUI, choose **Maintenance** > **System Upgrade** > **Activate All** to activate the software version.

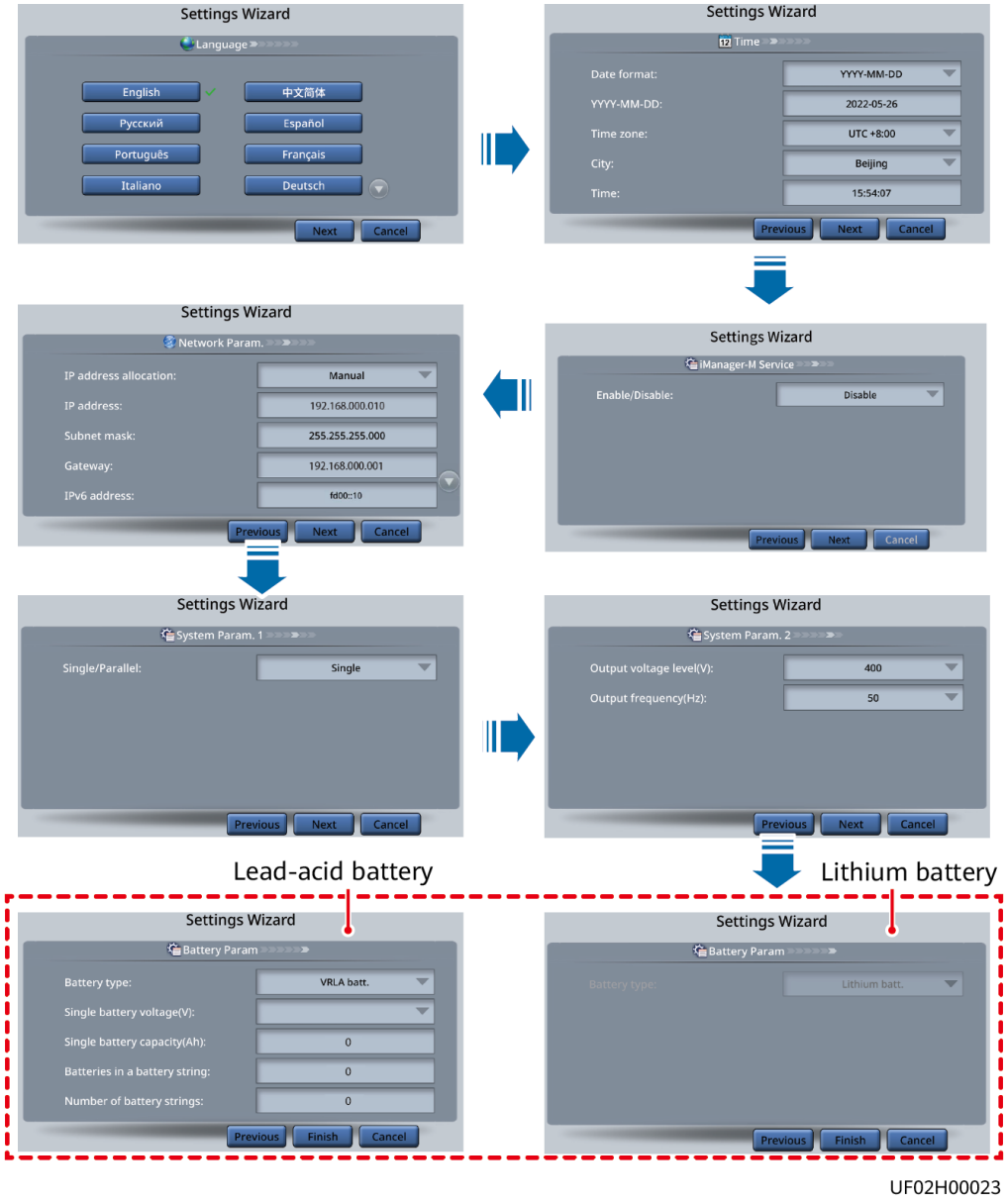
Step 3 Set the language, time and date, iManager-M service, network parameters, system parameters, and battery parameters on the **Settings Wizard** screen.

NOTICE

Set system parameters with caution. Incorrect setting may affect the normal UPS operation.

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

Figure 4-1 Settings Wizard



UF02H00023

NOTE

- Set the time and date correctly. Incorrect time and date will cause false fault analysis during maintenance or repair, affecting the normal operation.
- If you need to use the iManager-M function, perform operations by referring to **4.1.3.1 (Optional) iManager-M Service Access**. Otherwise, retain the default setting of iManager-M.
- After you set network parameters, connect the UPS to the network over a network cable, which enables you to remotely manage the UPS. If you do not need remote management, retain the default network parameter settings.

Step 4 After you set parameters on the **Settings Wizard** screen, the system displays the **Bypass mode** and **No battery** alarms, which do not need to be handled. Other alarms need to be handled.

NOTE

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

Step 5 If the system has connected to the remote EPO switch, you need to choose **Monitoring** > **UPS System** > **Running Parameter** > **System Settings** on the WebUI and set **EPO detection** to **Enable**.

Step 6 View the system running status diagram on the LCD to check that the UPS is working in bypass mode.

----End

4.1.3 Setting Parameters for Optional Components

4.1.3.1 (Optional) iManager-M Service Access

NOTICE

- If the 4G module has been installed, use the method described in the 4G module access scenario (LCD or WebUI) to complete iManager-M service access.
- If the device has been connected to the LAN switch or router, use the method described in the FE access scenario (LCD or WebUI) to complete iManager-M service access.

4G Module Access Scenario (LCD)

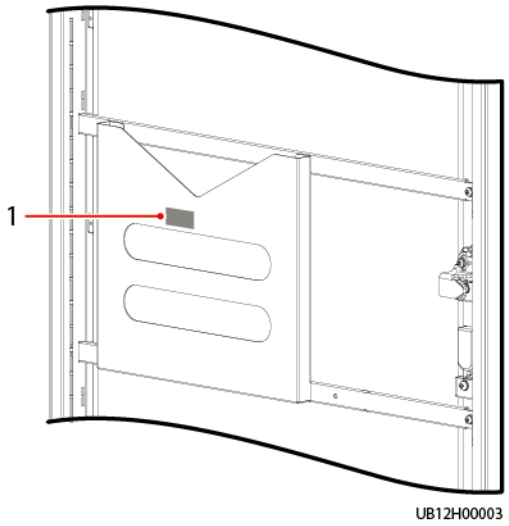
Step 1 Set **iManager-M Service** parameters.

On the LCD, choose **System Status** > **Settings** > **Settings Wizard**. On the **iManager-M Service** screen, set **Enable/Disable** to **Enable** and **Access channel** to **4G**.

NOTE

If **Access authentication code** on the **iManager-M Service** screen is empty, obtain the authentication code from the position shown in the following figure and enter it in **Access authentication code**.

Figure 4-2 Documentation QR code on the cabinet



(1) Documentation QR code

Figure 4-3 About

(1) Authentication code

Step 2 Choose **System Status** > **Runn. Info.** > **Wireless Module** on the LCD. Confirm that the 4G module dial-up is successful and check the signal strength.

Step 3 Connect the device on the NetEco app.

----End

4G Module Access Scenario (WebUI)

Step 1 Set wireless module parameters.

Choose **Monitoring** > **Wireless Module** > **Running Parameter** on the WebUI. Set **Mobile data** to **Enable** and set operator parameters based on site requirements.

Step 2 Check the running status of the wireless module.

Choose **Monitoring** > **Wireless Module** > **Running Information** on the WebUI. Check the 4G module running status, confirm that the 4G module dial-up is successful, and check the signal strength.

NOTICE

If the dial-up connection fails, the possible causes are as follows:

- The SIM card is invalid. (The account is deregistered because it has been in arrears for a long time.)
- Network signals are weak.

Step 3 Set and test domain name parameters.

1. Choose **System Settings** > **NMS Application** > **BIN** > **Communication Parameters** on the WebUI. Set parameters as follows:
   - **Address type**: **Domain name**
   - **Server domain name** and **Port number**: Retain the default values.
   - **Connection test link setup port**: **4G**
2. Click **Test Connect**. After the test is successful, click **Submit**.

Step 4 Connect the device on the NetEco app.

----End

FE Access Scenario (LCD)

Step 1 Set **iManager-M Service** parameters and the IP addresses for the DNS server.

Choose **System Status** > **Settings** > **Settings Wizard** on the LCD. On the **iManager-M Service** screen:

- Set **Enable/Disable** to **Enable** and **Access channel** to **FE**
- Set IP addresses for the DNS server based on site requirements.

Step 2 Set the IP address of the device.

Choose **System Status** > **Settings** > **Settings Wizard** on the LCD. On the **Network Param.** page, set the IP address, subnet mask, and gateway based on site requirements.

Step 3 Connect the device on the NetEco app.

----End

FE Access Scenario (WebUI)

Step 1 Set the IP address of the device.

Choose **System Settings** > **Comm. Settings** > **IP Settings** on the WebUI. Set **IP address type** to **IPv4**, and set the IP address, subnet mask, and default gateway based on site requirements.

Step 2 Set IP addresses for the DNS server.

Choose **System Settings** > **Comm. Settings** > **DNS Server Address** on the WebUI. Set IP addresses for the DNS server based on site requirements.

Step 3 Set and test domain name parameters.

1. Choose **System Settings** > **NMS Application** > **BIN** > **Communication Parameters** on the WebUI. Set parameters as follows:
   - **Address type**: **Domain name**
   - **Server domain name** and **Port number**: Retain the default values.
   - **Connection test link setup port**: **FE**
2. Click **Test Connect**. After the test is successful, click **Submit**.

Step 4 Connect the device on the NetEco app.

----End

4.1.3.2 Setting BCB Parameters

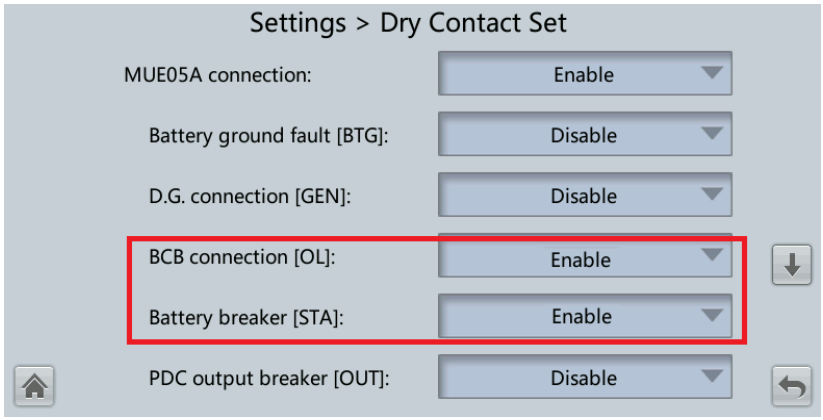
Prerequisites

A BCB box is installed.

Procedure

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

Figure 4-4 BCB connection settings



----End

4.1.3.3 Setting the T/H Sensor

Context

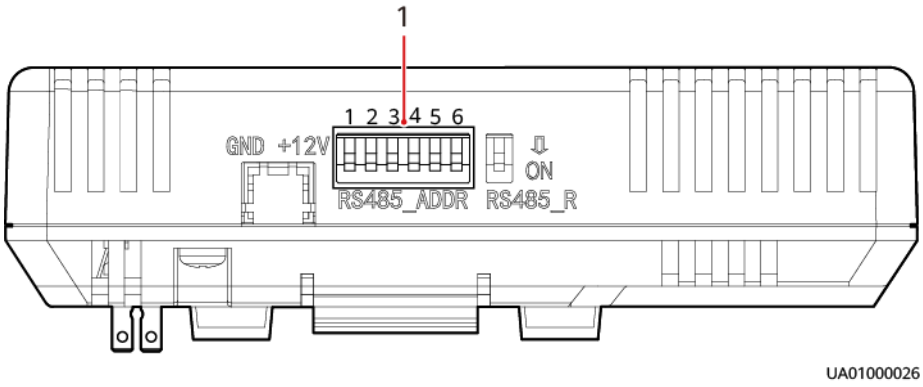
The ambient T/H sensor has been installed by referring to the installation section.

The ambient T/H sensor can also be used as a battery temperature sensor. The monitoring module distinguishes these two types of sensors through their DIP switch settings.

Procedure

Step 1 Set the DIP switch.

Figure 4-5 DIP switch



(1) DIP switch

NOTE

The RS485_R DIP switch is used to enable a build-out resistor so that the ambient T/H sensor can communicate with the controller. If there are no more than four ambient T/H sensors on the bus, the RS485_R DIP switch does not need to be set. If there are more than four, flip the RS485_R DIP switch of the ambient T/H sensor furthest from the UPS to ON.

- DIP switch settings on ambient T/H sensors

Each ambient T/H sensor has a unique DIP switch address, ranging from 32 to 44. A DIP switch has six binary toggle switches. The bit on the leftmost is the most significant bit, and the bit on the rightmost is the least significant bit. Bit 1 indicates ON, and bit 0 indicates OFF.

Table 4-1 DIP switch address mapping

No.	RS485 Address												
	32	33	34	35	36	37	38	39	40	41	42	43	44
6	1	1	1	1	1	1	1	1	1	1	1	1	1
5	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	1	1	1	1	1
3	0	0	0	0	1	1	1	1	0	0	0	0	1
2	0	0	1	1	0	0	1	1	0	0	1	1	0
1	0	1	0	1	0	1	0	1	0	1	0	1	0

- DIP switch settings on battery temperature sensors

When an ambient T/H sensor is used as a battery temperature sensor, set the DIP switch to a value in the range of 16 to 28 to monitor the battery temperature.

Table 4-2 DIP switch address mapping (battery temperature sensor)

No.	RS485 Address												
	16	17	18	19	20	21	22	23	24	25	26	27	28
6	0	0	0	0	0	0	0	0	0	0	0	0	0
5	1	1	1	1	1	1	1	1	1	1	1	1	1
4	0	0	0	0	0	0	0	0	1	1	1	1	1
3	0	0	0	0	1	1	1	1	0	0	0	0	1
2	0	0	1	1	0	0	1	1	0	0	1	1	0
1	0	1	0	1	0	1	0	1	0	1	0	1	0

Step 2 Set UI parameters.

NOTICE

The address set on the software must be the same as the address set on the DIP switch. Otherwise, the communication fails.

- The DIP switch address of an ambient T/H sensor ranges from 32 to 44.

  LCD: Choose **System Info** > **Settings** > **Comm. Settings** > **Amb. T/H Sensor**, and set **Start address** and **Quantity**.

  WebUI: Choose **System Settings** > **Comm. Settings** > **Amb. T/H Sensor**, and set **Start address** and **Quantity**.
- When an ambient T/H sensor is used as a battery temperature sensor, the DIP switch address ranges from 16 to 28.

  LCD: Choose **System Info** > **Settings** > **Comm. Settings** > **Batt Temp Sensor**, and set **Start address** and **Quantity**.

  WebUI: Choose **System Settings** > **Comm. Settings** > **Batt Temp Sensor**, and set **Start address** and **Quantity**.

----End

4.1.3.4 Setting Parameters for the Backfeed Protection Card

Prerequisites

A backfeed protection card is installed.

Procedure

Step 1 On the LCD, choose **System Info** > **Settings** > **Dry Contact Set** and set **MUE06A connection** to **Enable**.

NOTE

If **MUE06A connection** is set to **Enable** and the backfeed protection card fails to communicate with the UPS, the system reports a **Dry contact board fault** alarm.

----End

4.1.3.5 (Optional) Setting Parameters for the BCB Box

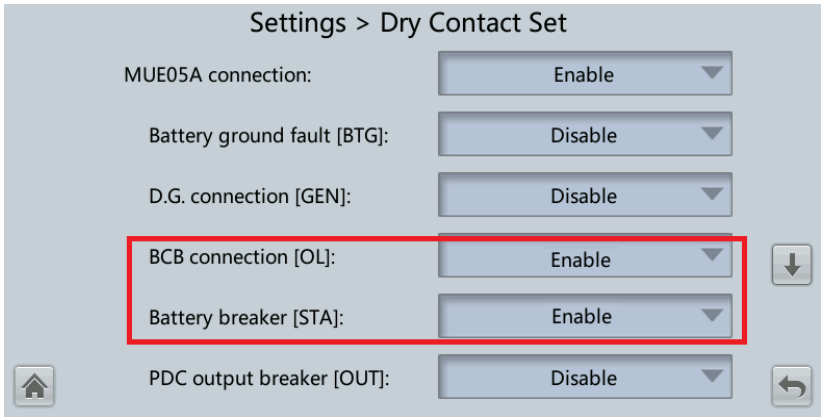
Prerequisites

A BCB box is installed.

Procedure

Step 1 On the **System Info > Settings** > **Dry Contact Set** screen, set **MUE05A connection** to **Enable**, and set **BCB connection [OL]** and **Battery breaker [STA]** to **Enable**.

Figure 4-6 BCB connection setting



----End

4.1.4 Setting Working Modes

4.1.4.1 Setting the ECO Mode

Prerequisites

The UPS is working in inverter mode.

Context

- The UPS is set to non-ECO mode by default. Set the UPS to ECO mode when it is required.
- In ECO mode, the bypass takes priority over the inverter in supplying power. If the bypass fails, the UPS transfers to inverter mode.

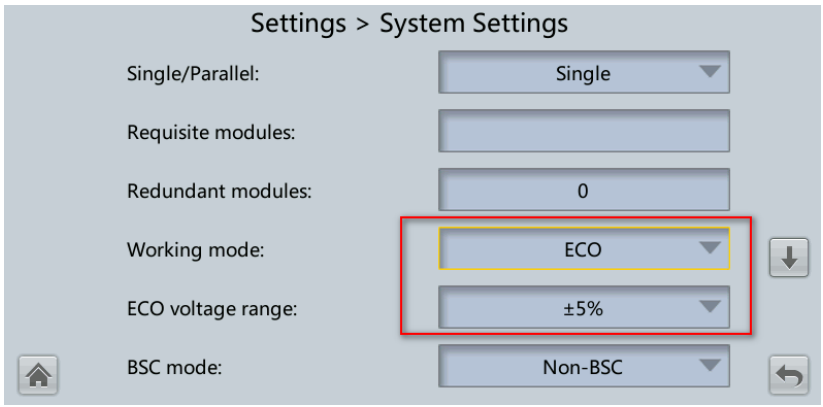
- Both a single UPS and a parallel system support ECO mode which ensures a higher efficiency.
- To avoid frequent transfers between ECO mode and normal mode, do not set ECO mode when the bypass input is unstable or is sensitive to load changes.
- ECO mode is not recommended when the load is less than 10%.
- Before setting ECO mode, ensure that the bypass is working properly.

Procedure

Step 1 On the LCD, choose **System Info** > **Settings** > **System Settings** and set **Working mode** to **ECO**. The information indicating that the UPS works in ECO mode is displayed on the LCD.

Step 2 Set the ECO voltage range.

Figure 4-7 ECO specifications



NOTE

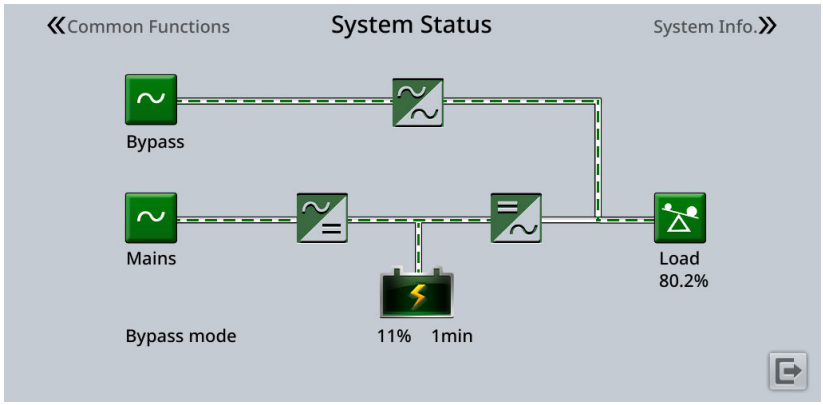
If the ECO mode is set when the UPS works in inverter mode, the UPS transfers to the ECO mode 4 minutes after the setting is complete and the conditions are met.

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

NOTICE

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

Figure 4-8 System status in ECO mode



----End

4.1.4.2 Setting Hibernation Mode

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

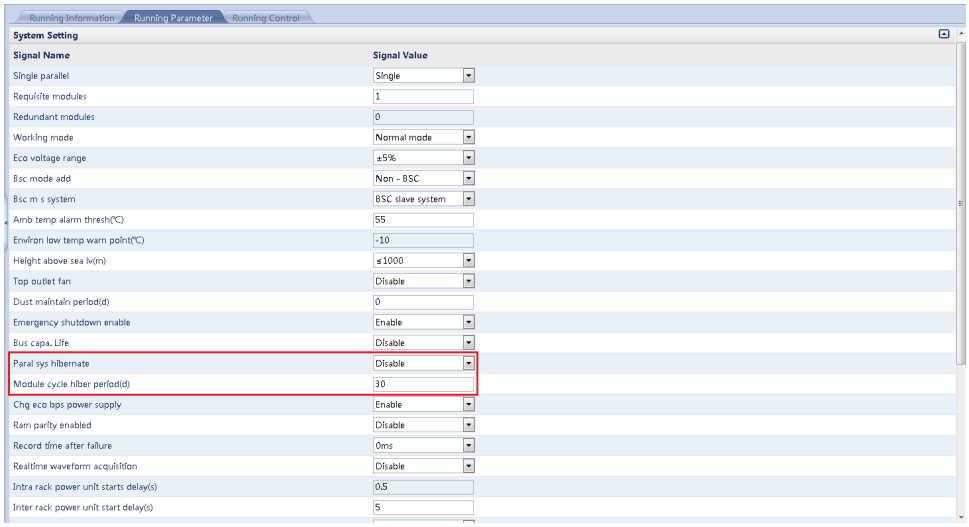
NOTICE

- Ensure that the load power is stable. If the system load power fluctuation is greater than the rated capacity of half a module (for example, the single-phase load power fluctuation is greater than 8.33 kVA for a 50 kVA module), the UPS may enter and exit from hibernation mode repeatedly.
- Check that the number of redundant power modules and racks are appropriate. If the number is insufficient, the UPS may not enter hibernation mode.

Web

1. On the WebUI, choose **Monitoring** > **UPS System** > **Running Parameter** > **System Settings** and set **Paral sys hibernate** to **Enable**.
2. Set the module cycle hibernation period to an integer ranging from 1 to 100. The default value is 30.

Figure 4-9 Running Parameter



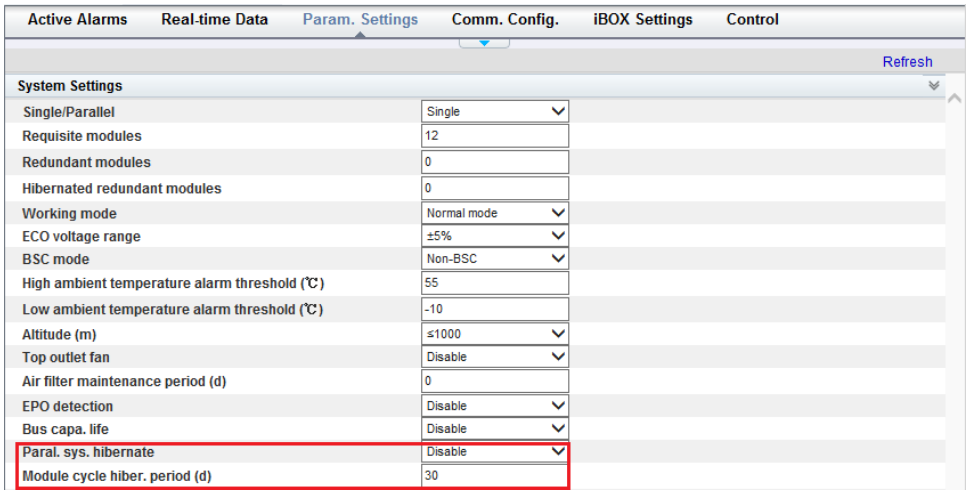
NOTE

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

Old Web

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

Figure 4-10 Running Parameter



NOTE

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

4.1.5 Starting the Inverter

UPS System User List

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

NOTE

Change the password after your first login to prevent unauthorized access. You can choose **System Info** > **Settings** > **User Settings** and change **Password**.

Starting the Inverter on the LCD

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

NOTE

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

Step 2 On the displayed login screen, select a user name and enter the password.

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

----End

Starting the Inverter on the WebUI

Step 1 Set the LAN.

1. (Optional) Open the Chrome browser, go to the **Settings** page, choose **System**, click **Open your computer's proxy settings**, and deselect **Use a proxy server**.
2. (Optional) Under **Proxy server**, deselect **Use a proxy server for your LAN**.
3. Click **Save**.

Step 2 In the address box of the browser, enter https://*UPS IP address*.

Step 3 Enter the correct user name and password and click **Login**.

Step 4 On the WebUI, choose **Monitoring** > **UPS System** > **Running Control**, and click **Inv. ON**, and confirm the operation to start the inverter.

NOTE

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

----End

4.1.6 Powering On Loads

Context

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

Procedure

Step 1 After confirming that the battery string is properly connected, turn on the battery string input switch. If there are multiple battery strings, turn on the switch for each battery string and then the general switch between the battery strings and the UPS. The **No battery** alarm on the MDU disappears.

Step 2 Turn on the downstream output switch to supply power to loads.

----End

4.2 Shutting Down and Powering Off the UPS

Context

NOTICE

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

Procedure

Step 1 Shut down the inverter.

- Shutting down the inverter on the LCD

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

  NOTE

  You can also tap **System Info** > **Maintenance** to shut down the inverter on the **Maintenance** screen.

- Shutting down the inverter on the WebUI

  Choose **Monitoring** > **UPS System** > **Running Control**, and click **Inv. OFF**.

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

Figure 4-11 Normal bypass

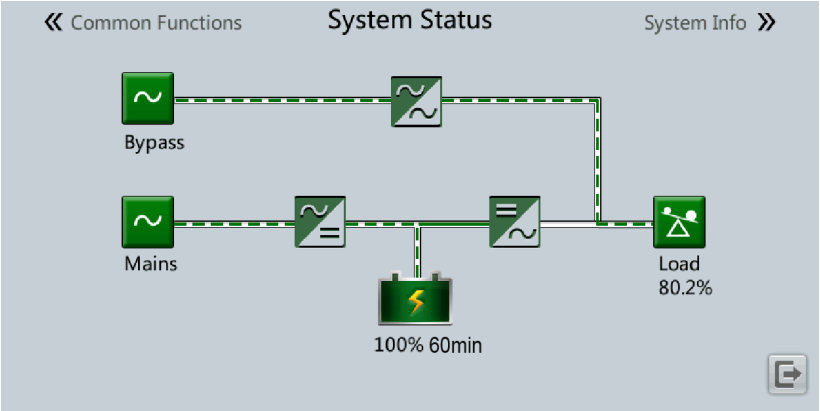
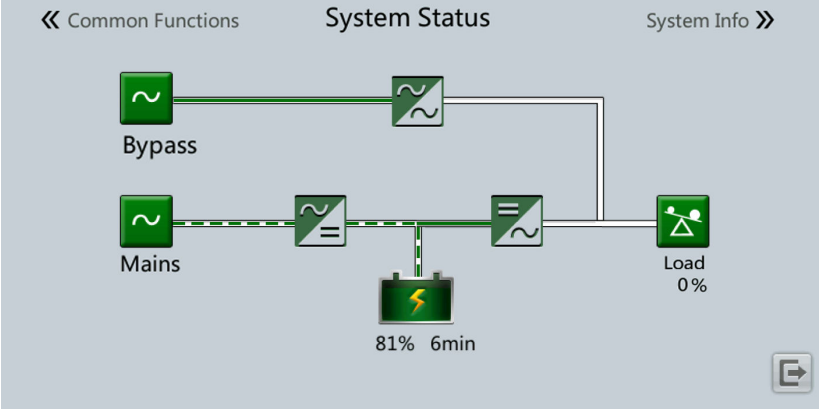


Figure 4-12 Abnormal bypass



NOTE

If you need to shut down the inverter and transfer the UPS to bypass mode, check that the UPS has not generated any alarm and perform step 1.

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

Step 3 Switch off the battery string circuit breaker. If there are multiple battery strings, switch off the general circuit breaker between battery strings and the UPS and then switch off the circuit breaker for each battery string.

Step 4 For a UPS in full configuration:

1. Turn off the mains input switch, bypass input switch, and output switch of the UPS.
2. Turn off the upstream mains input and bypass input switches.

Step 5 For a UPS in standard configuration, turn off the upstream mains input and bypass input switches.

----End

5 Parallel System Commissioning

DANGER

Wear personal protective equipment and use dedicated insulated tools to avoid electric shocks or short circuits.

5.1 Configuring ECM Communication Jumpers

Prerequisites

An ESD wrist strap and ESD gloves are available.

Procedure

Step 1 Check the number of UPSs connected in parallel.

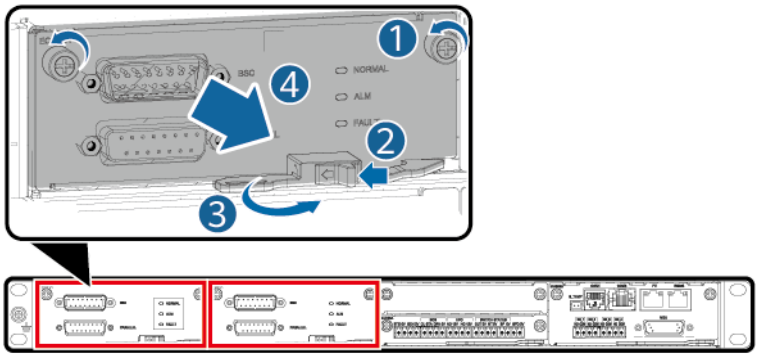
- If more than four UPSs are connected in parallel, perform the following steps to remove jumper caps from the ECMs on all the UPSs.
- If four or fewer UPSs are connected in parallel, skip the following steps.

Step 2 Connect the ground cable of the ESD wrist strap, and wear the ESD wrist strap and ESD gloves.

Step 3 Remove the two ECMs from the upper part of the UPS cabinet control module.

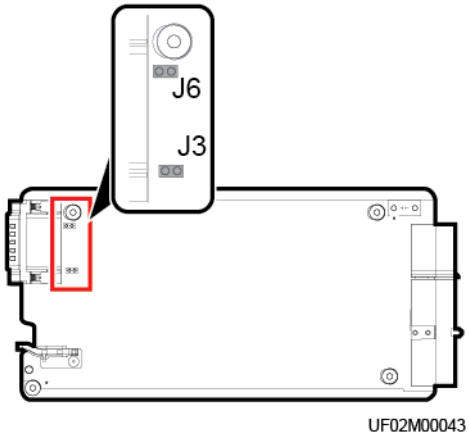
1. Loosen the captive screws on an ECM.
2. Push the micro switch on the ejector lever.
3. Pull the ejector lever outwards to remove the ECM from the subrack.
4. Remove the ECM.

Figure 5-1 Removing the ECMs



Step 4 Remove the J3 and J6 jumper caps from the ECMs.

Figure 5-2 Removing the jumper caps



Step 5 Reinstall the ECMs.

Step 6 Remove the jumper caps from other UPSs in the same way.

Step 7 Disconnect the ground cable of the ESD wrist strap, and remove the ESD wrist strap and ESD gloves.

----End

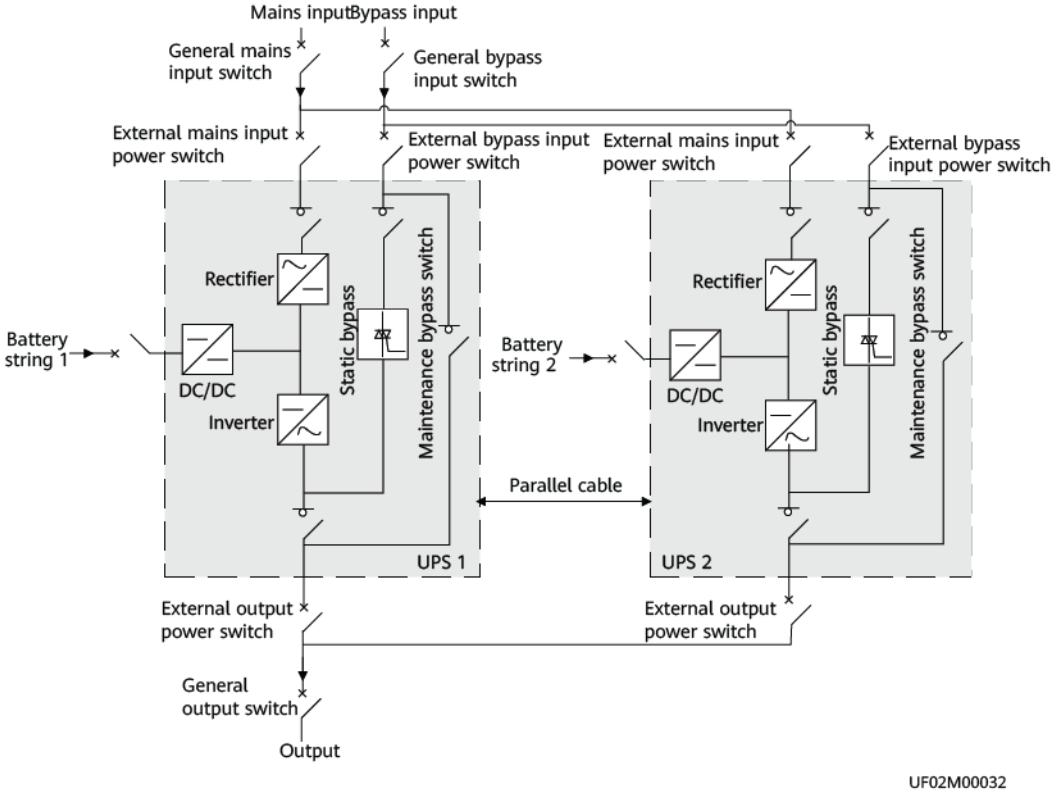
5.2 Starting a Parallel System

Prerequisites

CAUTION

- Before starting a parallel system, ensure that each UPS has been commissioned (see **4.1 Powering On and Starting the UPS**).
- Choose **Monitoring** > **UPS System** > **Running Parameter** > **System Settings** on the WebUI of each UPS and set **EPO detection** to **Enable**.
- If you commission the parallel system where UPSs are not powered off after they are commissioned individually, skip step 4. In addition, ensure that step 1 is performed before commissioning a single UPS.
- Ensure that all load circuit breakers in the system are OFF. Do not start loads before the parallel system is started.
- Before connecting parallel cables, if you turn on the external output power switch of the rack by mistake, the system may report alarm **0570-002 BPM unit abnormal**. In this case, you need to power off the rack to clear the alarm.

Figure 5-3 Schematic diagram



Procedure

Step 1 Check before power-on: Ensure that the mains input, bypass input, and AC output cables of each UPS in the parallel system are connected in the same phase sequence.

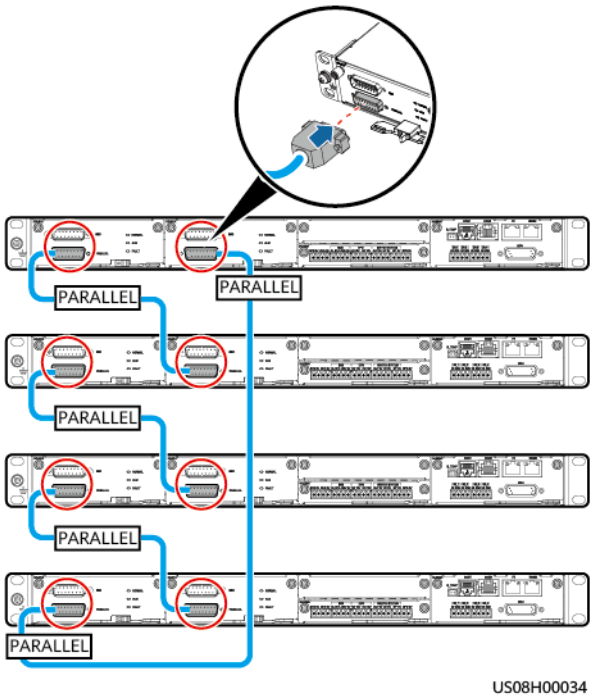
1. Check that the general mains input, bypass input, and output circuit breakers are OFF.
2. Check that the power cables of UPSs are connected in parallel (the external mains input, external bypass input, and external output power switches for each UPS are ON).
3. Use a multimeter to measure the impedance between phases A, B, and C of the mains/bypass input and AC output of any UPS. If the measured result is low conducted resistance, check whether the cables to each UPS are short-circuited.
4. Use a multimeter to measure the impedance between phases A, B, and C of the mains/bypass input and AC output of any two UPSs. If the measured result is low conducted resistance, check whether the mains/bypass input and AC output phase sequences of the two UPSs are correct.

Step 2 Trigger EPO on each UPS.

1. Press the EPO switches connected to the dry contact cards of all UPSs one by one, or remove the 4-pin terminals from the EPO ports on the dry contact cards of all UPSs, or remove the general EPO switch.
2. If a single UPS is not powered off after commissioning, verify on the monitoring screen that EPO has been activated successfully.

Step 3 Install parallel cables between parallel cabinets.

Figure 5-4 Control cable connections in a parallel system of four UPSs



Step 4 Power on the parallel system.

1. Turn off the external output power switch for each UPS to ensure that the UPS outputs are independent of each other.
2. Turn on the general bypass and mains input switches.
3. Turn on the internal bypass input switch of each UPS.
4. Turn on the internal output switch of each UPS.
5. Turn on the internal mains input switch of each UPS.

If the input power is normal, the rectifier starts automatically. The MDU starts and displays the progress bar. Wait until the MDU starts properly.

NOTE

If you turn on the internal input switch prior to the internal output switch, an alarm indicating neutral wire missing may be generated. This alarm is normal and does not need to be handled before the mains input switch is turned on.

Step 5 Check that the software versions of all UPSs are consistent.

On the LCD of each UPS, choose **System Info** > **About** > **Version Info** and check whether all software versions are consistent. If not, update all software versions to be consistent.

Step 6 Set parallel parameters for each UPS.

1. System Settings: On the LCD, choose **System Info** > **Settings** > **System Settings**. Alternatively, on the WebUI, choose **Monitoring** > **UPS System** > **Running Parameter** > **System Settings**.

Table 5-1 System Settings

Item	Setting	Description
Single/Parallel	Parallel	-
Parallel ID	Number UPSs in sequence (example: 1, 2, 3, 4).	-
Requisite UPSs	Sets it based on the actual number of UPSs.	– In a parallel system, the two parameters must be set to the same values for all UPSs. – The total number of UPSs in a parallel system is the sum of **Requisite UPSs** and **Redundant UPSs**.
Redundant UPSs	Sets it based on the actual number of UPSs.	

2. Battery Settings: On the LCD, choose **System Info** > **Settings** > **Battery Settings**. Alternatively, on the WebUI, choose **Monitoring** > **Battery System** > **Running Parameter** > **Battery Settings**.

Table 5-2 Battery Settings

Item	Setting	Description
Battery string sharing	Set this parameter as required.	If the parallel system shares one battery string, set this parameter to **Enable**. If each UPS uses an independent battery string, set this parameter to **Disable**.

Step 7 Synchronize parallel parameters.

1. If the **Inconsistent parallel param.** alarm is generated, choose **System Info** > **Settings** on the LCD and tap **Parameter Sync** to synchronize parameters between UPSs in the parallel system.
2. Check that no alarm is generated for any UPS and perform subsequent operations. If an alarm is generated, follow the troubleshooting suggestion to clear the alarm first.

Step 8 Measure the bypass input voltage of each UPS.

1. Check that no **Bypass abnormal** alarm is generated for any UPS in the system. Then, none of the UPSs supplies power.
2. Set the multimeter to the AC voltage position, connect the red probe to UPS 1 bypass input phase A, and connect the black probe to UPS 2 bypass input phase A to measure the bypass input voltage difference between UPSs. Perform the same operations on phases B and C. Complete the measurement between every two UPSs in the parallel system. If the phase sequence is correct and the voltage difference is less than 5 V, perform the subsequent operations. If the phase sequence is incorrect or the voltage difference for a phase between any two UPSs is greater than 5 V, power off the parallel system completely, and check whether the bypass input cables for the UPS parallel system are properly connected.

CAUTION

Exercise caution when performing operations with power on. There are many electrified parts in the UPS wiring area. It is recommended that the test be performed in the external power distribution area of the UPS.

Step 9 Clear the EPO state of each UPS. For details, see **8.5 Clearing the EPO State**.

Step 10 Measure the output voltage of each UPS.

1. Check that no **Bypass abnormal** alarm is generated for any UPS in the system. Then, all UPSs in the system supply power in bypass mode.
2. Set the multimeter to the AC voltage position, connect the red probe to UPS 1 output phase A, and connect the black probe to UPS 2 output phase A to measure the output voltage difference between UPSs. Perform the same operations on phases B and C. Complete the measurement between every two UPSs in the parallel system. If the phase sequence is correct and the

voltage difference is less than 5 V, perform the subsequent operations. If the phase sequence is incorrect or the voltage difference for a phase between any two UPSs is greater than 5 V, power off the parallel system completely, and check whether the output cables for the UPS parallel system are properly connected.

CAUTION

Exercise caution when performing operations with power on. There are many electrified parts in the UPS wiring area. It is recommended that the test be performed in the external power distribution area of the UPS.

Step 11 Turn on the external output power switch for each UPS.

Check that no alarm is generated for any UPS, and then turn on the external output power switch for each UPS.

Ensure that the output switch on each UPS is ON and the load switch is OFF.

Step 12 Tap **Paral. Inv. ON** on the LCD screen **Common Functions**. The system transfers to inverter mode.

Step 13 Connect batteries to the parallel system.

1. Check that no alarm except the **No battery** alarm is displayed on the LCD of each UPS.
2. Turn on the battery input switch for each UPS. (If there are multiple battery strings, turn on the switch of each battery string first, and then turn on the general switch between the battery strings and the UPS.)
3. Use a multimeter to measure the voltage where the battery switch is located (if there are multiple battery strings, use a multimeter to measure the voltage where each battery switch is located, and then measure the voltage where the general battery switch is located).
4. Ensure that batteries are properly connected (the **No battery** alarm in the active alarm list of all LCDs disappears within 2 minutes and no other alarms are generated).

Step 14 Turn on the general output switch (general load switch).

NOTE

- In a parallel system, it is recommended that all racks have the same capacity. When the system is unloaded, the load rate is displayed on the LCD of the UPS that starts first. The load rate is not displayed after all UPSs start.
- If you connect UPSs in parallel for the first time, perform all the preceding steps. If you need to restart the inverters after the parallel system powers off or if the parallel system needs to transfer from bypass mode to inverter mode, you only need to tap **Paral. Inv. ON** on the LCD screen **Common Functions**.

----End

5.3 Shutting Down and Powering Off a Parallel System

Procedure

Step 1 Choose **Common Functions** > **Paral. Inv. OFF** on the LCD. The system transfers to bypass mode.

Step 2 Turn off the general output switch (general load switch) and the external output power switch, battery switch, external mains input power switch, and then external bypass input power switch for each UPS.

Step 3 Turn off the internal bypass input switch, output switch, and then mains input switch of each UPS.

NOTE

- Perform only step 1 if you only need to shut down the UPS inverters to switch the system to bypass mode without powering off loads.
- If you need to power off the entire UPS system, perform all the preceding steps.

----End

5.4 Performing EPO

Procedure

Step 1 Press the EPO switches connected to the dry contact cards on all UPSs one by one or press the general EPO switch.

----End

5.5 Commissioning a Dual-Bus System

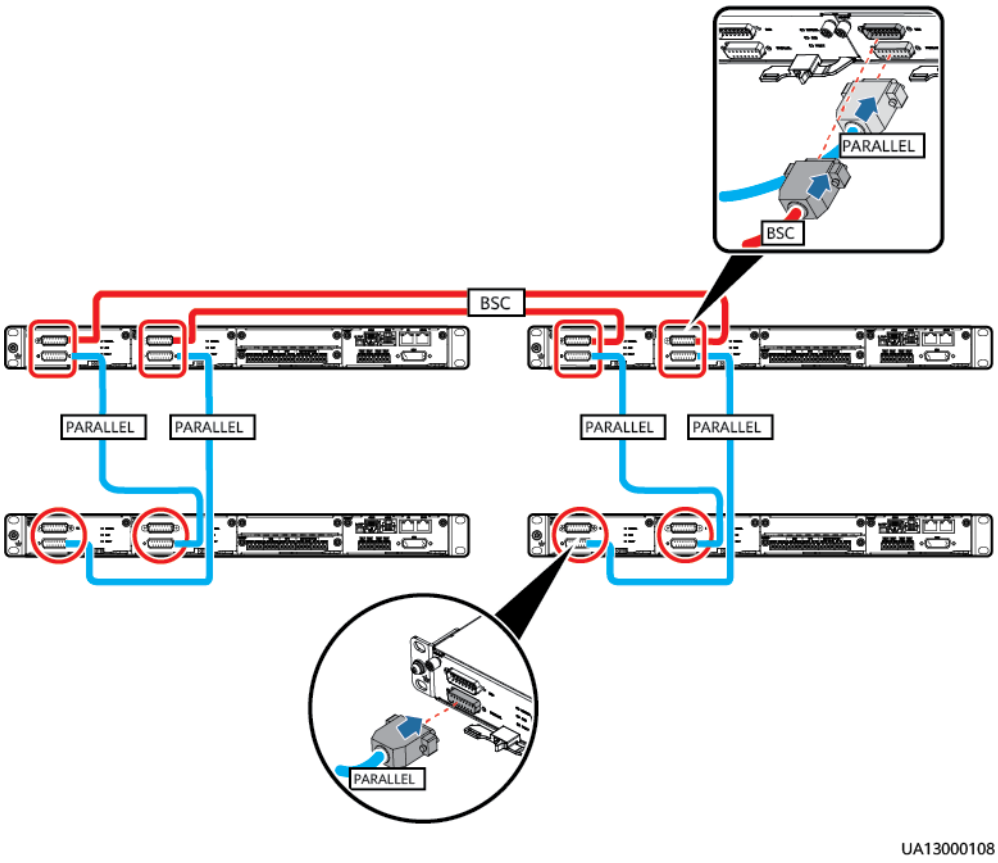
Context

The dual-bus system consists of one master BSC system and one slave BSC system. You can specify them (one UPS system cannot be set to both master and slave BSC systems) during startup, and change the settings under the guidance of maintenance engineers when needed. Set the master and slave BSC systems to master and slave modes respectively.

Procedure

Step 1 Connect BSC cables.

Figure 5-5 Connecting signal cables in a dual-bus system



Step 2 Commission the UPSs.

- If the dual-bus system consists of single UPS systems, commission each UPS. For details, see **4.1 Powering On and Starting the UPS**.
- If the dual-bus system consists of parallel systems, commission each independent parallel system. For details, see **5.2 Starting a Parallel System**.

Step 3 Set each UPS in the system that is defined as the master system to BSC master system.

1. On the LCD, choose **System Info** > **Settings** > **System Settings** and set **BSC mode** to **Standard BSC**.
2. On the LCD, choose **System Info** > **Settings** > **System Settings** and set **BSC master/slave mode** to **BSC master system**.

Step 4 Set each UPS in the system that is defined as the slave system to BSC slave system.

1. On the LCD, choose **System Info** > **Settings** > **System Settings** and set **BSC mode** to **Standard BSC**.
2. On the LCD, choose **System Info** > **Settings** > **System Settings** and set **BSC master/slave mode** to **BSC slave system**.

Step 5 Check that the RMS phase voltage difference between UPS systems is less than 5 V.

----End

6 Routine Maintenance

6.1 UPS Maintenance

Operating Environment Checklist

No.	Check Item	Acceptance Criteria	Check Method and Troubleshooting	Check Interval
1	Equipment room environment	• The fireproof door of the equipment room remains closed, and the air conditioner works normally without interruption. • The equipment room is airtight, and the equipment is not in a direct ventilation environment. • There is no dust or flammable sundries in the equipment room.	• Check method: visual inspection • Troubleshooting: Rectify the fault based on the acceptance criteria.	Monthly
2	Rodent-proof	Rodent-proof measures are taken in the equipment room, such as rat guard and rat trap.	• Check method: visual inspection • Troubleshooting: Rectify the fault based on the acceptance criteria.	Monthly

No.	Check Item	Acceptance Criteria	Check Method and Troubleshooting	Check Interval
3	Heat dissipation space	The distance between the equipment and surrounding objects meets the clearance requirements.	• Check method: Measure using a measuring tape. • Troubleshooting: Rectify the fault based on the acceptance criteria.	Monthly
4	Installation position	There is no air outlet or refrigerant copper pipe of the air conditioner placed above the equipment, and no other water leakage risks exist.	• Check method: visual inspection • Troubleshooting: Rectify the fault based on the acceptance criteria.	Monthly
5	Ambient temperature	Actual temperature: _____ °C (0–40°C)	• Check method: Measure using a hygrothermograph. • Troubleshooting: Check that the air conditioner runs properly.	Monthly
6	Ambient humidity	Actual humidity: _____% RH (0%–95% RH, non-condensing)	• Check method: Measure using a hygrothermograph. • Troubleshooting: Check that the air conditioner runs properly.	Monthly

Product Component Checklist

No.	Check Item	Acceptance Criteria	Check Method and Troubleshooting	Check Interval
1	Installation	The equipment is installed properly and arranged neatly, and screws are tightened.	• Check method: visual inspection • Troubleshooting: Rectify the fault based on the acceptance criteria.	Monthly

No.	Check Item	Acceptance Criteria	Check Method and Troubleshooting	Check Interval
2	Appearance	• Wipe the device surface using a white paper and the paper does not turn black. • The equipment is not rusty or deformed.	• Check method: visual inspection • Troubleshooting: Rectify the fault according to the acceptance criteria. Clean up the dust on the air filter or replace the air filter during dust removal.	Quarterly
3	Cabinet cable hole protection	The cable holes of the cabinet have been fully sealed using the standard sealing plates, and rodent-proof measures are taken.	• Check method: visual inspection • Troubleshooting: Rectify the fault based on the acceptance criteria.	Quarterly
4	Air outlet	The air outlet is not blocked.	• Check method: visual inspection • Troubleshooting: Rectify the fault based on the acceptance criteria.	Quarterly
5	Metal scraps in the cabinet	There is no copper scrap or other foreign matter in the cabinet.	• Check method: visual inspection • Troubleshooting: Rectify the fault based on the acceptance criteria.	Quarterly
6	Ground cable	The ground cable is reliably connected to the ground bar in the equipment room, and the screws are tightened.	• Check method: visual inspection • Troubleshooting: Tighten the screws.	Yearly
7	Through-current capacity	Switches and cables meet load requirements. The through-current capacity of cables is greater than the switch specifications.	• Check method: visual inspection • Troubleshooting: After the equipment is powered off, replace the switches or cables.	Yearly

No.	Check Item	Acceptance Criteria	Check Method and Troubleshooting	Check Interval
8	Surge protection	The surge protection module in the upstream power distribution cabinet for the UPS runs properly.	• Check method: visual inspection • Troubleshooting: Power off the equipment and replace the surge protection module.	Yearly
9	Power cable	• The cables and insulation layer are intact. • The screws at the cable connection points are tightened, and the tightening marks on the screws do not deviate. • The cable connections are free from black marks and noticeable sparks.	• Check method: visual inspection • Troubleshooting: After the equipment is powered off, replace the cables or tighten the screws.	Yearly
10	Signal cable	• The cables and insulation layer are intact. • Signal cable terminals are securely connected.	• Check method: visual inspection • Troubleshooting: Replace the cables.	Yearly

Running Status Checklist

No.	Check Item	Acceptance Criteria	Check Method	Check Interval
1	Power grid	• Input voltage: 380 V AC/400 V AC/415 V AC (line voltage) • Output voltage: 380 V AC/400 V AC/415 V AC (tolerance: ±1%, line voltage) • Input frequency: 40–70 Hz	• Check method: Visual inspection. View the running information on the LCD. • Troubleshooting: – If the input voltage is abnormal, check the power grid status or correct the input cable connection. – If the output voltage is abnormal, check the alarm information on the LCD and rectify the fault.	Monthly
2	Working status	The status icons on the LCD indicate that all units are operating properly, all operating parameters are within their normal ranges, and no fault or alarm information is displayed.	• Check method: Visual inspection. Check the system status on the LCD. • Troubleshooting: View the alarm information on the LCD and handle the alarm.	Monthly
3	Parameter settings	The configuration of the output voltage grade, frequency, number of batteries, and battery capacity meets requirements.	• Check method: visual inspection • Troubleshooting: Correct the parameter settings.	Quarterly
4	Status record	The three-phase load rate and output power factor are recorded.	• Check method: Visual inspection. Check the system status on the LCD. • Troubleshooting: Equalize the three-phase loads.	Quarterly

6.2 Lead-Acid Battery Maintenance

Operating Environment Checklist

No.	Check Item	Acceptance Criteria	Check Method and Troubleshooting	Check Interval
1	Equipment room environment	• The fireproof door of the equipment room remains closed, and the air conditioner works normally without interruption. • There is no dust or flammable sundries in the equipment room.	• Check method: visual inspection • Troubleshooting: Rectify the fault based on the acceptance criteria.	Monthly
2	Rodent-proof measures	Rodent-proof measures are taken in the equipment room, such as rat guard and mouse trap.	• Check method: visual inspection • Troubleshooting: Rectify the fault based on the acceptance criteria.	Monthly
3	Installation position	There is no air outlet or refrigerant copper pipe of the air conditioner placed above the equipment, and no other water leakage risks exist.	• Check method: visual inspection • Troubleshooting: Rectify the fault based on the acceptance criteria.	Monthly
4	Ambient temperature	Actual temperature: _____ °C (Allowed temperature: 20°C to 30°C; recommended temperature: 25°C)	• Check method: Measure using a hygrothermograph. • Troubleshooting: Check that the air conditioner runs properly.	Monthly
5	Ambient humidity	Actual humidity: _____% RH (5%–95% RH, non-condensing)	• Check method: Measure using a hygrothermograph. • Troubleshooting: Check that the air conditioner runs properly.	Monthly

Product Component Checklist

No.	Check Item	Acceptance Criteria	Check Method and Troubleshooting	Check Interval
1	Installation	The equipment is installed properly and arranged neatly, and screws are tightened.	• Check method: visual inspection • Troubleshooting: Rectify the fault based on the acceptance criteria.	Monthly
2	Appearance of the battery rack or cabinet	No dust, rust, or deformation exists.	• Check method: visual inspection • Troubleshooting: Rectify the fault based on the acceptance criteria.	Monthly
3	Battery appearance	• Batteries are clean and free from stains. • Battery wiring terminals are intact. • Batteries are intact and free of damage, deformation, bulges, and cracks. • Batteries have no acid or electrolyte leakage. (If electrolyte leakage occurs, there will be a pungent smell.)	• Check method: visual inspection • Troubleshooting: Contact technical support.	Monthly
4	Metal scrap	There is no copper scrap or other conductive foreign matter.	• Check method: visual inspection • Troubleshooting: Rectify the fault based on the acceptance criteria.	Monthly
5	Ground cable of the battery rack or cabinet	The ground cable is reliably connected to the ground bar in the equipment room, and the screws are tightened.	• Check method: visual inspection • Troubleshooting: Tighten the screws.	Yearly

No.	Check Item	Acceptance Criteria	Check Method and Troubleshooting	Check Interval
6	Battery cables	• The cables and insulation layer are intact. • The screws at the cable connection points are tightened, and the tightening marks on the screws do not deviate. • The cable connections are free from black marks and noticeable sparks.	• Check method: visual inspection • Troubleshooting: After the equipment is powered off, replace the cables or tighten the screws.	Quarterly
7	Battery connection reliability	• After the equipment is powered off, check the reliability of each connection point from positive terminals to negative terminals. All points are connected reliably. • In copper bar check, use a torque wrench to check the tightening torque for each battery screw. The torque meets the requirements of the battery manufacturer. After checking that the battery screws meet the requirements, mark the screws for later check.	• Inspection method: (1) Visual inspection. (2) Verify. After the device is powered off, use an insulated torque wrench to verify the torque of screws. • Troubleshooting: Rectify the fault based on the acceptance criteria.	Yearly

Running Status Checklist

No.	Check Item	Acceptance Criteria	Check Method	Check Interval
1	Working status	The UPS LCD shows that all batteries are running properly, battery running parameters are within their normal ranges, and no battery fault or alarm information is displayed.	• Check method: Visual inspection. Check the system status on the UPS LCD. • Troubleshooting: View the alarm information on the LCD and handle the alarm.	Monthly
2	Battery temperature sensor precision	The deviation between the detected temperature and the displayed temperature is less than 3°C.	• Check method: Visual inspection. using a hygrothermograph. • Troubleshooting: Correct the installation position of the battery temperature sensor, or replace the sensor.	Quarterly
3	Battery management parameters	• Battery management parameter settings and battery charge and discharge conditions meet the requirements of the battery manufacturer. • The battery operating temperature is lower than the ambient temperature plus 20°C.	• Check method: Visual inspection. Check the parameters displayed on the UPS LCD. • Troubleshooting: Correct the parameter settings or rectify battery operating temperature abnormality.	Quarterly

No.	Check Item	Acceptance Criteria	Check Method	Check Interval
4	Battery voltage	• Equalized charging voltage: 2.35 V/cell ±0.02 V/cell • Float charging voltage: 2.25 V/cell±0.02 V/cell	• Inspection method: (1) Visual inspection. Check the parameters displayed on the UPS LCD. (2) Measure. Measure the battery internal resistance using an internal resistance tester. • Troubleshooting: Check the equalized charging voltage, float charging voltage, and internal resistance of a single battery. If the battery charging voltage exceeds the threshold, perform a complete forced equalized charging for the battery string and check the battery string voltage.	Quarterly
5	Battery string voltage	• Equalized charging voltage (2.35 V/cell ±0.02 V/cell) x Voltage of a single battery/2 x Number of batteries in a battery string • Float charging voltage (2.25 V/cell±0.02 V/cell) x Voltage of a single battery/2 x Number of batteries in a battery string	• Inspection method: (1) Visual inspection. Check the parameters displayed on the UPS LCD. (2) Measure. Use a multimeter to measure the output voltage of the battery string. • Troubleshooting: Correct the equalized charging voltage and float charging voltage of the UPS. If the difference between the battery string voltage displayed on the UPS LCD and the measured value is greater than 1%, contact technical support.	Quarterly

No.	Check Item	Acceptance Criteria	Check Method	Check Interval
6	Shallow discharge test (recommended)	During the shallow discharge test, no fault or alarm is displayed on the UPS LCD.	• Check method: Perform a shallow discharge test and check the alarm information on the UPS LCD. Measure and record the voltage of a single battery during shallow discharge. • Troubleshooting: View the alarm information on the LCD of the UPS and handle the alarm. Send the recorded battery voltage to the battery manufacturer to determine whether the battery is normal.	Quarterly
7	Capacity test (recommended)	During the capacity test, no fault or alarm is displayed on the UPS LCD.	• Check method: Perform a capacity test and check the alarm information on the UPS LCD. • Troubleshooting: View the alarm information on the LCD of the UPS and handle the alarm.	Yearly

6.3 Testing Batteries

6.3.1 Lead-Acid Battery Test

6.3.1.1 Forced Equalized Charging Test

Context

NOTICE

Before a forced equalized charging test, ensure that:

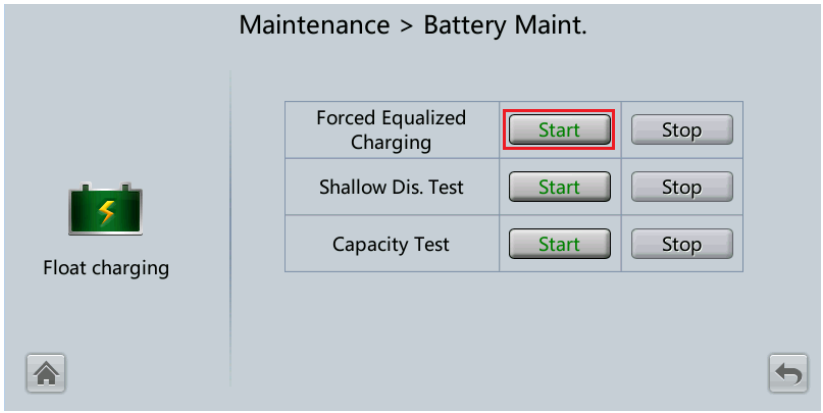
- The mains input is normal.
- Batteries are properly connected.
- Batteries are not in the equalized charging state.

Procedure

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

Step 2 Tap **Start** next to **Forced Equalized Charging** to start a forced equalized charging test.

Figure 6-1 Starting a forced equalized charging test



NOTE

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

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

----End

6.3.1.2 Shallow Discharge Test

NOTICE

Before performing a shallow discharge test, ensure that:

- If the battery has been replaced, choose **System Info** > **Settings** > **Battery Settings** on the LCD and verify that the value of **Installation time** has been changed based on the actual situation before testing the battery.
- The UPS works in normal mode with a load ratio fluctuation less than 10%.
- The UPS does not generate any battery overtemperature, overvoltage, or overcurrent alarm. No generator is connected to the UPS.
- The mains, batteries, charger, and discharger are normal. No overload alarm is generated.

Automatic Shallow Discharge Test

Step 1 On the home screen of the LCD, choose **System Info** > **Settings** > **Battery Settings** and set **Sched. shallow dis. test** to **Enable**.

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

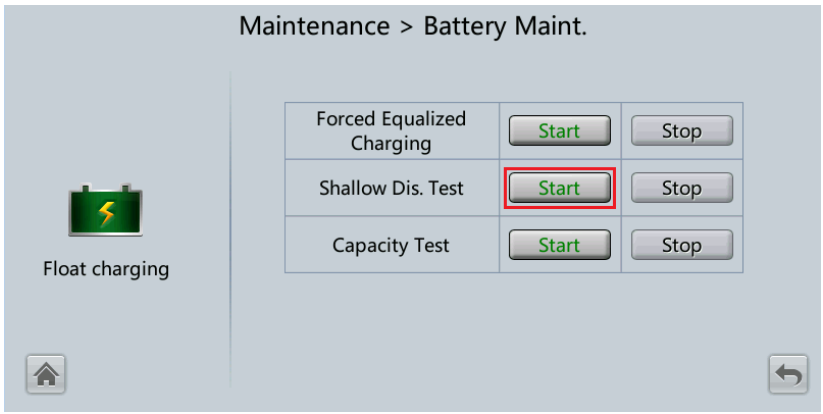
----End

Manual Shallow Discharge Test

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

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

Figure 6-2 Starting a shallow discharge test



NOTE

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

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

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

----End

6.3.1.3 Capacity Test

Context

NOTICE

Before performing a capacity test, ensure that:

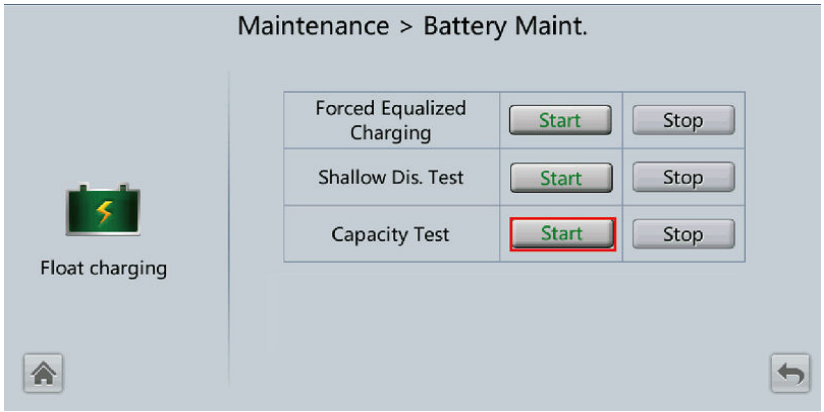
- If the battery has been replaced, choose **System Info** > **Settings** > **Battery Settings** on the LCD and verify that the value of **Installation time** has been changed based on the actual situation before testing the battery.
- The UPS is working in normal mode; float charging or hibernation has lasted for 2 hours after the SOC reaches 100%; the load rate fluctuation is less than 10%.
- The UPS generates no battery overtemperature, overvoltage, or overcurrent alarm. No generator is connected to the UPS.
- The mains, batteries, charger, and discharger are normal. No overload alarm is generated.

Procedure

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

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

Figure 6-3 Starting a capacity test



NOTE

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

- The battery discharge voltage reaches the EOD voltage plus 0.01 V.
- The load fluctuation exceeds 10%.
- A fault alarm is generated.

When the battery discharge voltage reaches the EOD voltage plus 0.01 V, the test is complete. The test data is obtained from the capacity test. Based on monthly capacity test data, select the test data obtained from a capacity test that has the maximum discharge capacity as the current-month test data. Save the test data obtained from the latest 36 tests.

----End

6.3.2 Lithium Battery Test

6.3.2.1 Shallow Discharge Test

Automatic Shallow Discharge Test

NOTICE

Before performing a shallow discharge test, ensure that:

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

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

Manual Shallow Discharge Test

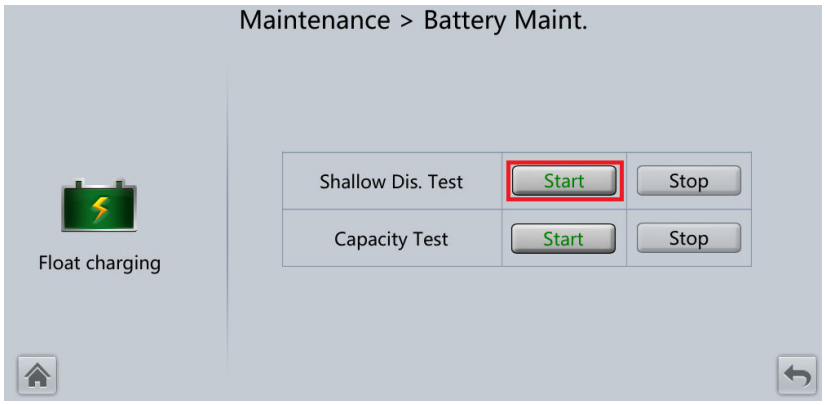
NOTICE

Before performing a shallow discharge test, ensure that:

- The UPS is working in normal mode, the SOC is greater than 95%, the lowest cell voltage is greater than or equal to 3.35 V/cell, and the load rate fluctuation is less than 10%.
- The UPS has generated no battery overtemperature, overvoltage, or overcurrent alarm. No generator is connected to the UPS.
- The mains, batteries, charger, and discharger are normal. No overload alarm is generated.
- The SmartLi has generated no alarms related to lithium batteries.

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

Figure 6-4 Starting a shallow discharge test



NOTE

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

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

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

6.3.2.2 Capacity Test

Context

NOTICE

Before a capacity test, ensure that:

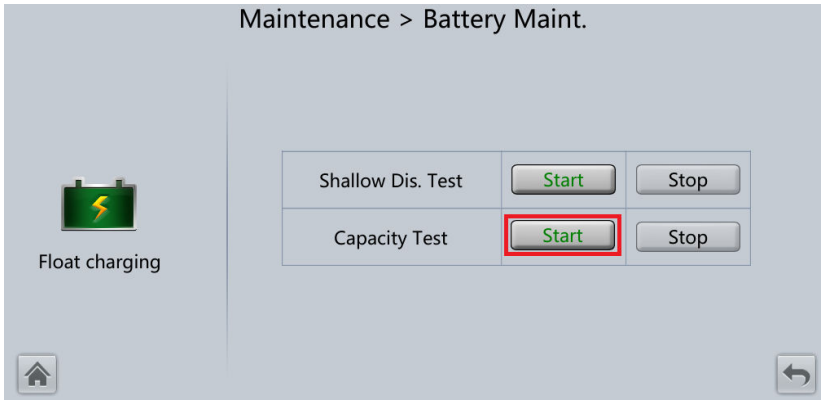
- The UPS is working in normal mode; float charging or hibernation has lasted for 2 hours after the SOC reaches 100%; the load rate fluctuation is less than 10%.
- The UPS has generated no battery overtemperature, overvoltage, or overcurrent alarm. No generator is connected to the UPS.
- The mains, batteries,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

Procedure

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

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

Figure 6-5 Starting a capacity test



NOTE

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

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

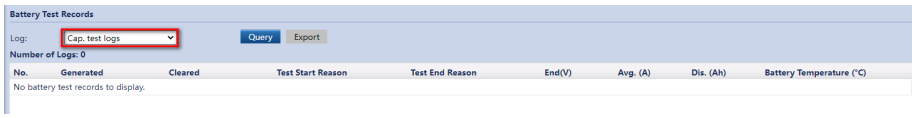
The test is complete when the minimum cell voltage reaches 2.65 V. Data about the most amount of energy discharged is stored once a month for 36 months.

----End

6.3.3 Test Data Download

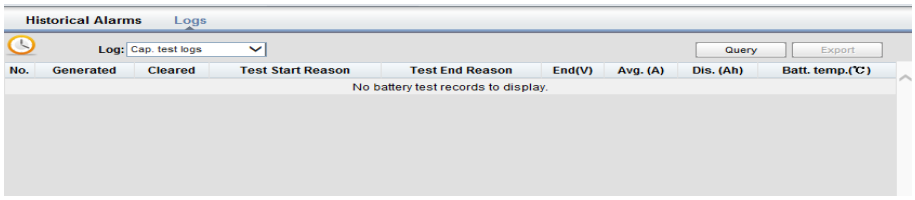
- Web
  a. On the WebUI, choose **Query** > **Battery Test Records**, choose logs that need to be queried from the **Log** drop-down list box, and click **Query**.

  Figure 6-6 Battery Test Records

  b. Select the queried logs and click **Export**.
- Old Web
  a. On the WebUI, choose **Query** > **Logs**, choose logs that need to be exported from the **Log** drop-down list box, and click **Query**.

  Figure 6-7 Logs

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

7 Troubleshooting

CAUTION

- If the UPS is faulty, alarm information is displayed on the LCD. The UPS can be powered on only after critical alarms are handled. Failing to do so may escalate faults or damage the equipment.
- Do not clear alarms by reseating modules.
- Remove a faulty module after confirming that it needs to be replaced. After removing the module, do not insert it into the UPS again.

NOTICE

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

For details about how to rectify common faults, see **Table 7-1**. If any unmentioned faults occur, see the alarm list or contact technical support.

Table 7-1 Troubleshooting

Case	Symptom	Possible Cause	Measure
The rectifier is not normal.	The UPS rectifier cannot work, and the bus voltage is not boosted.	The mains voltage exceeds the upper threshold 280 V or is less than the lower threshold 80 V.	Check whether the mains voltage is beyond the allowed range. If so, contact the electric power company.
		PFC soft-startup fails.	Replace the power module.
		The power module is faulty.	Replace the power module.
The inverter is not normal.	The buzzer is activated, the Fault indicator is on, the inverter is faulty, and the UPS transfers to bypass mode.	Output overload or short-circuit exists.	Reduce the load or troubleshoot the short circuit.
		The power module is faulty.	Replace the power module.
The charger generates an alarm.	The buzzer buzzes, the fault indicator is on, and the charging function fails.	The charger fails.	Replace the power module.
		The charger experiences overcurrent.	Replace the power module.
		The charger experiences undervoltage.	Check whether the configured number of batteries is correct. If the setting is correct but the alarm persists, replace the power module.
The UPS works in bypass mode and does not transfer to inverter mode.	When the mains is normal, the UPS works in bypass mode and does not transfer to inverter mode.	The UPS is set to ECO mode.	Set the working mode correctly.
		The number of bypass transfer times reaches the upper limit.	On the LCD, choose **Clear Faults**.
The bypass is abnormal.	The buzzer buzzes, and the fault indicator is on.	The bypass thyristor is damaged.	Replace the bypass module.

Case	Symptom	Possible Cause	Measure
		The bypass module experiences overtemperature.	Reduce the load, or improve ventilation.

NOTE

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

8 FAQ

8.1 Cold-Starting the UPS Using Batteries

Lead-Acid Battery Cold Start

Step 1 Check that batteries are properly connected. Use a multimeter to measure the voltage of each battery string. The value should be greater than the specified value (Voltage of a single battery x Number of batteries in the battery string).

Step 2 Turn off the mains and bypass input switches in the external input PDC, and switch on the battery circuit breaker. If there are multiple battery strings, switch on the circuit breaker for each battery string and then the general circuit breaker between the battery strings and the UPS.

Step 3 Use a multimeter to measure the voltage of each battery string connected to the UPS. If the voltage is greater than the specified value (Voltage of a single battery x Number of batteries in the battery string), batteries are connected properly.

Step 4 Press and hold down the **BATT START** button on the bypass control module for more than 2 seconds. The system automatically enters the battery cold start state. The MDU displays the initialization progress bar.

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

----End

Lithium Battery Cold Start

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

Step 2 Turn off the mains and bypass input switches in the external input PDC.

Step 3 Power on the lithium battery cabinet by referring to the lithium battery cabinet manual.

Step 4 Use a multimeter to measure the voltages of the positive and negative battery strings connected to the UPS battery input terminals. If the measured values are

consistent with the voltages displayed on the **System Status** screen of the lithium battery cabinet, the batteries are properly connected.

Step 5 When the green indicator on the battery control unit in the lithium battery cabinet blinks at 1 Hz or is steady on, press and hold down the **BATT START** button on the UPS bypass control module for more than 2 seconds. The system automatically enters the battery cold start state. The MDU displays the initialization progress bar.

Step 6 After the MDU initialization is complete, start the inverter.

----End

8.2 Transferring to Maintenance Bypass Mode

Context

NOTICE

- You are advised to install a lock on the maintenance bypass switch. The lock core has a diameter of 5–10 mm.
- Strictly observe the following procedure to transfer the UPS to maintenance bypass mode. Otherwise, loads may power off.
- In maintenance bypass mode, the mains supplies power to the loads directly over the maintenance bypass. If the mains is abnormal, the loads may power off.

Procedure

Step 1 Transfer the UPS to the bypass mode.

Step 2 Turn on the maintenance bypass switch as follows.

Figure 8-1 Turning on the maintenance bypass switch (UPS5000-E-200K-SM)

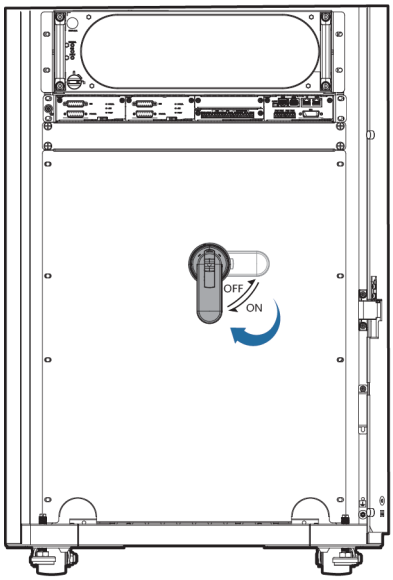


Figure 8-2 Turning on the maintenance bypass switch (UPS5000-E-200K-FM)

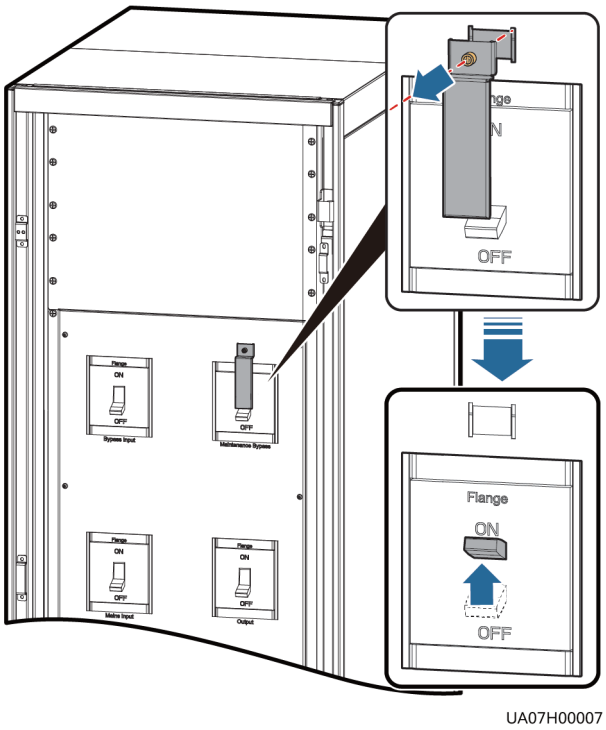


Figure 8-3 Turning on the maintenance bypass switch (UPS5000-E-200K-FM, isolation protection)

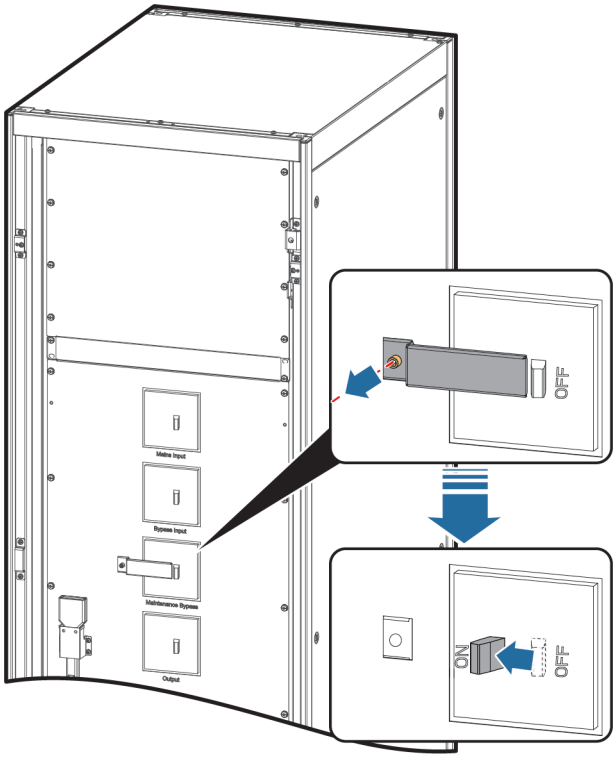


Figure 8-4 Turning on the maintenance bypass switch (UPS5000-E-300K-SM

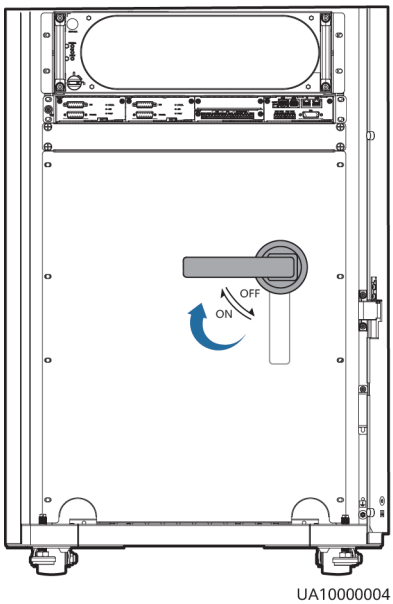


Figure 8-5 Turning on the maintenance bypass switch (UPS5000-E-300K-SMT)

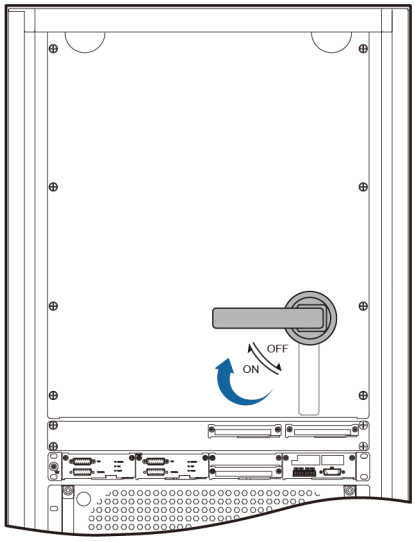


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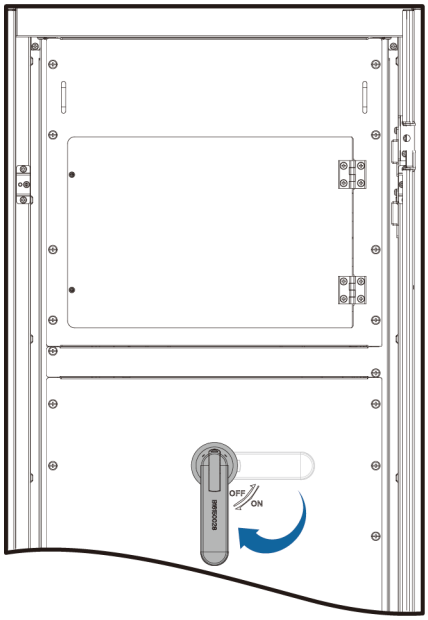
Figure 8-6 Turning on the maintenance bypass switch (UPS5000-E-300K-SMT, isolation protection)



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NOTE

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

----End

8.3 Transferring from Maintenance Bypass Mode to Normal Mode

Context

NOTICE

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

Procedure

Step 1 Turn off the maintenance bypass switch.

The **Maint. breaker closed** alarm disappears from the alarm list. View the system running diagram on the LCD or WebUI to check whether the system works in bypass mode.

NOTE

If a lock, stopper, or barrier is configured for the maintenance bypass switch, lock the switch or reinstall the stopper or barrier.

Step 2 Start UPS inverters.

----End

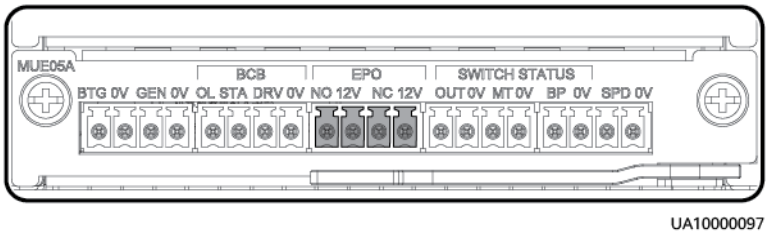
8.4 Performing EPO

NOTICE

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

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

Figure 8-7 EPO ports



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

8.5 Clearing the EPO State

Procedure

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

Step 2 Clear the EPO alarm in the system.

- On the LCD

  Choose **System Info** > **Alarms** and tap **Clear Faults**. In the displayed dialog box, tap **Yes** to clear the EPO alarm.

- On the WebUI

  Choose **Monitoring** > **UPS System > Running Control** and click **Clear Fault**. The EPO alarm is cleared.

- On the old WebUI

  Choose **Monitoring** > **Control** > **System Commands and Tests** and click **Clear Faults**. The EPO alarm is cleared.

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

- On the LCD

  Choose **System Info** > **Alarms** > **Active Alarms** to check that the EPO alarm has been cleared.

- On the WebUI

  Choose **Home** > **Active Alarm** to check that the EPO alarm has been cleared.

- Viewing active alarms on the old WebUI

  Choose **Monitoring** > **Active Alarms** and check that the EPO alarm has been cleared.

Step 4 Start UPS inverters.

----End

8.6 Exporting Data

The following data can be exported:

- Historical alarms
- Active alarms
- Performance data
- Operation logs

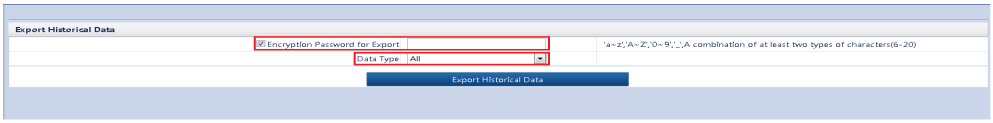
NOTE

This procedure describes how to export historical alarms.

Web

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

   Figure 8-8 Exporting historical data

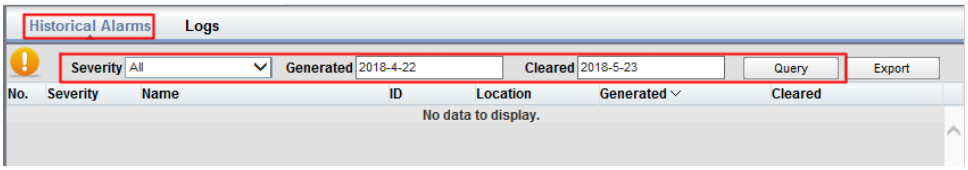
   

2. Click **Export Historical Data** and save the displayed webpage.

Old Web

1. Choose **Query** > **Historical Alarms**, set **Severity**, **Generated**, and **Cleared**, and click **Query** to query the historical alarm information.

   Figure 8-9 Querying historical alarms

   NOTE

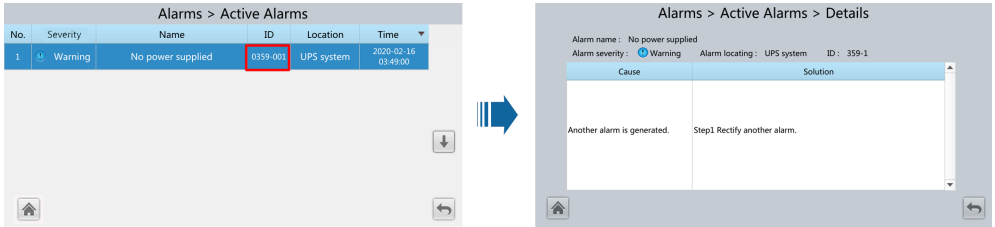
   You do not need to query logs. You only need to choose **Query** > **Logs**, click **Export**, and save the log file.

2. Click **Export** and save the displayed webpage.

8.7 Obtaining Active Alarm Details

Choose **System Info** > **Alarms** > **Active Alarms** on the LCD, and tap an alarm ID to view the alarm details.

Figure 8-10 Active Alarms



8.8 Spare Parts Authorization

Prerequisites

After an unauthorized module is inserted, an alarm is displayed on the LCD, indicating that the module spare part is unauthorized. You need to authorize the module to clear the alarm.

Context

You can authorize the spare parts of the module to clear the alarm indicating that the spare parts of the module are not authorized.

Procedure

Step 1 On the cabinet LCD screen, choose **System Info** > **Maintenance** > **Spare Parts Authorization**. The **Spare Parts Authorization** screen is displayed.

Step 2 Obtain the authorization code by referring to the deployment guide.

Step 3 On the **Spare Parts Authorization** screen, enter the obtained authorization code in the **Service authorization code** text box to authorize spare parts.

----End

9 Technical Specifications

9.1 Physical Specifications

Physical Specifications	UPS5000-E-200K-SM	UPS5000-E-300K-SM	UPS5000-E-200K-FM	UPS5000-E-300K-SMT	UPS5000-E-200K-FM (Isolation Protection)	UPS5000-E-300K-SMT (Isolation Protection)
Cabling mode	Cables are routed from the top or bottom.	Cables are routed from the bottom.	Cables are routed from the top.	Cables are routed from the top.	Cables are routed from the top.	Cables are routed from the top.
IP rating	IP20 (IP21 available if the IP21 component is used)		IP20			
Dimensions (H x W x D)	2000 mm x 600 mm x 850 mm					
Communication	Dry contacts, RS485, and SNMP					
Weight	330 kg. A maximum of four power modules can be installed.	440 kg. A maximum of six power modules can be installed.	390 kg. A maximum of four power modules can be installed.	450 kg. A maximum of six power modules can be installed.	400 kg. A maximum of four power modules can be installed.	460 kg. A maximum of six power modules can be installed.

9.2 Internal Switch Specifications

UPS	Maintenance bypass switch	Mains input switch	Bypass input switch	Output switch
UPS5000-E-200K-SM	1000 V AC/400 A/3P	-	-	-
UPS5000-E-200K-FM	690 V AC/400 A/3P	690 V AC/400 A/3P	690 V AC/400 A/3P	690 V AC/400 A/3P
UPS5000-E-300K-SM	1000 V AC/630 A/3P	-	-	-
UPS5000-E-300K-SMT	1000 V AC/630 A/3P	-	-	-

9.3 Environmental Specifications

Item	Specifications
Operating temperature	0–40°C
Storage temperature	–40°C to +70°C
Humidity	0%–95% RH (non-condensing)
Altitude	0–4000 m When the altitude is higher than 2000 m, the power is derated as described in IEC 62040-3. The upper limit of the altitude is 4000 m.

9.4 Safety Regulations and EMC

Item	Specifications
Safety	EN62040-1 IEC62040-1 YD/T2165

Item	Specifications
EMC	EN 62040-2 IEC 62040-2 IEC 61000-2-2 IEC 61000-4-2 EN 61000-4-6 EN 61000-4-3 IEC 61000-4-4 IEC 61000-4-5 IEC 61000-4-8

9.5 Mains Input Electrical Specifications

Item	Specifications
Input system	Three-phase four-wire + PE. If current is allowed in the PE wire, input without the N wire is supported.
Rated input voltage	380 V AC/400 V AC/415 V AC (line voltage)
Input voltage	80–280 V AC (phase voltage) ● At 40°C: The UPS works at full load when the voltage is 187–280 V AC and is derated to 40% load when the voltage is 187–80 V AC. ● At 30°C: The UPS works at full load when the voltage is 176–280 V AC and is derated to 40% load when the voltage is 176–80 V AC.
Rated frequency	50 Hz/60 Hz
Input frequency	40–70 Hz
Input PF	● > 0.99 (full load) ● > 0.98 (half load)
THDi	● THDi ≤ 3% (full linear load) ● THDi ≤ 5% (full non-linear load)
Overvoltage category	OVC II

9.6 Bypass Input Electrical Specifications

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

9.7 Battery Specifications

NOTICE

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

Item	Specifications

Battery voltage (lead-acid battery)	• 12 V battery: 30–44 batteries. 34 batteries: battery inverter output power is derated to 90%; 32 or 30 batteries: battery inverter output power is derated to 80%.
	• 2 V battery: 180–264 batteries. 204–214 batteries: battery inverter output power is derated to 90%; 180–204 batteries: battery inverter output power is derated to 80%.
	• The number of batteries in the positive battery string must be the same as that of batteries in the negative battery string.
	NOTE
	  • The number of batteries is 0 by default and needs to be set based on site requirements. Batteries have no neutral wire, and an odd number of batteries are supported.
	  • When the UPS works in normal mode, if the actual load rate exceeds the threshold that could trigger battery derating, an output overload alarm is generated.

Battery management	Intelligent battery management

Item	Specifications
One-button cold start	In the case of a mains failure, batteries can start the UPS to power loads.
Charger output power	Under rated conditions, the maximum charge power of a module is 5 kW.
Charger current limit	Maximum 10 A for a module
Battery string sharing	Battery string sharing is supported in a parallel system. No battery string is shared by default.
Charging voltage (lead-acid battery)	• Equalized charge voltage: 2.3–2.4 V/cell, default: 2.35 V/cell (30–42 batteries) • Equalized charge voltage: 2.3–2.4 V/cell, default: 2.35 V/cell (44 batteries) • Float charge voltage: 2.23–2.3 V/cell, default: 2.25 V/cell (30–44 batteries)

9.8 Output Electrical Specifications

Item	Specifications
Output system	Three-phase four-wire + PE
Voltage	380 V AC/400 V AC/415 V AC±1% (line voltage)
Frequency	• In normal mode, the mains frequency is synchronized with the bypass input frequency. • In battery mode, the frequency is 50 Hz or 60 Hz (tolerance ± 0.05%).
Total harmonic distortion of output voltage (THDv)	• ≤ 1% (100% linear load) • ≤ 4% (100% non-linear load)
Output PF	1
Transfer time	• 0 ms (uninterruptible transfer) • ≤ 20 ms (interruptible transfer)
Output voltage unbalance	Voltage unbalance: ±3%; phase unbalance: 120±2°

Item	Specifications
Overload capability	Inverter overload capability: ● 100% < load ≤ 110%: transfer to bypass mode after 60 min or longer ● 110% < load ≤ 125%: transfer to bypass mode after 10 min (tolerance ± 0.1 min) or longer ● 125% < load ≤ 150%: transfer to bypass mode after 1 min or longer ● Load > 150% or a short circuit occurs: run for 200 ms Bypass overload capability: ● Temperature ≤ 30°C, load ≤ 135%: run for a long time ● Temperature ≤ 40°C, load ≤ 125%: run for a long time ● Load > 1000%: 100 ms
Output short-circuit current capacity	● 380 V output, 0–30°C ambient temperature, load ≤ 35%: output L-N short-circuit current greater than 230% of the rated current ● 380 V output, 30–40°C ambient temperature, load ≤ 20%: output L-N short-circuit current greater than 230% of the rated current ● 400 V output, 0–30°C ambient temperature, load ≤ 35%: output L-N short-circuit current greater than 240% of the rated current ● 400 V output, 30–40°C ambient temperature, load ≤ 20%: output L-N short-circuit current greater than 240% of the rated current ● 415 V output, 0–30°C ambient temperature, load ≤ 35%: output L-N short-circuit current greater than 250% of the rated current ● 415 V output, 30–40°C ambient temperature, load ≤ 20%: output L-N short-circuit current greater than 250% of the rated current The short-circuit current can be withstood for 200 ms.
Inverter output short-circuit capability	300K: 909 A

9.9 System Electrical Specifications

Item	Specifications
Redundancy design	The auxiliary power supplies, centralized controllers, and parallel signals use redundancy design.
No-load loss	• 200K: 2 kW • 300K: 2.5 kW
ECO in a parallel system	Supported
Power distribution system	TN-C, TN-S, TN-CS, TT

A (Optional) TN-C System Application

If the TN-C system is adopted, short-circuit the input N and PE.

NOTE

The following cable connections are for reference only.

Figure A-1 Connecting the input N and PE (UPS5000-E-200K-SM)

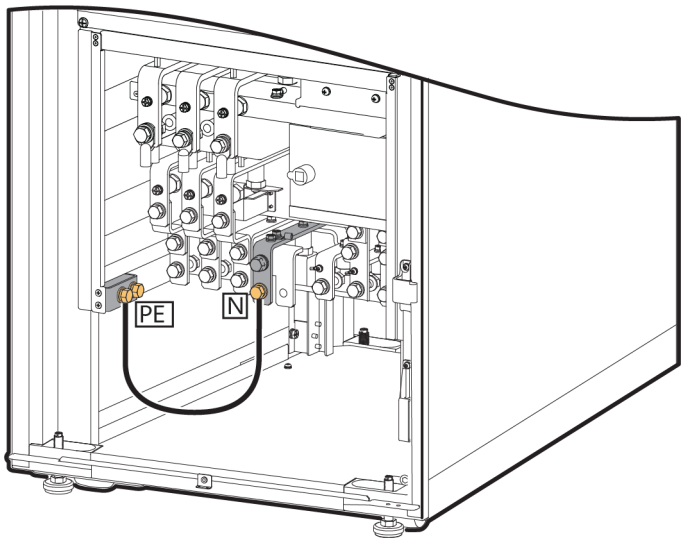


Figure A-2 Connecting the input N and PE (UPS5000-E-200K-FM)

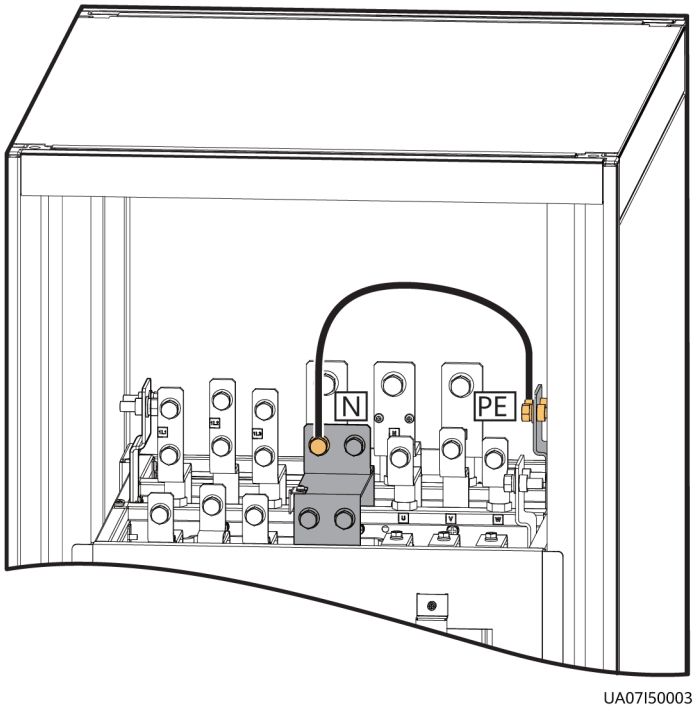


Figure A-3 Connecting the input N and PE (UPS5000-E-200K-FM, isolation protection)

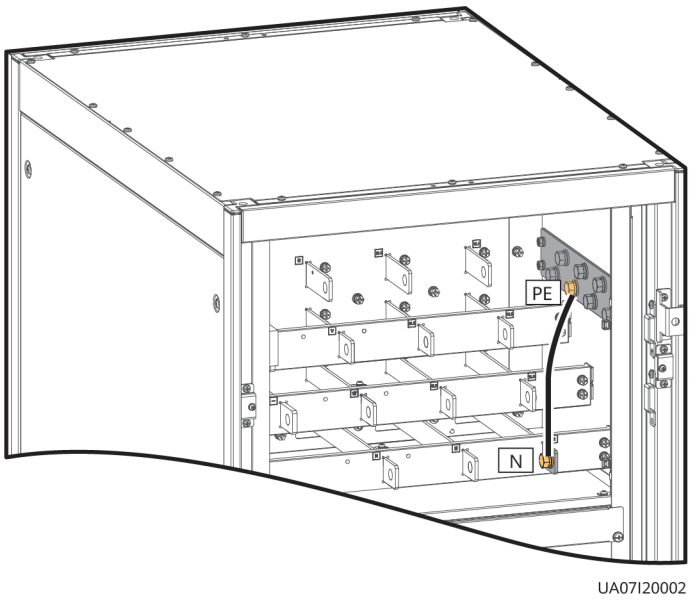


Figure A-4 Connecting the input N and PE (UPS5000-E-300K-SM)

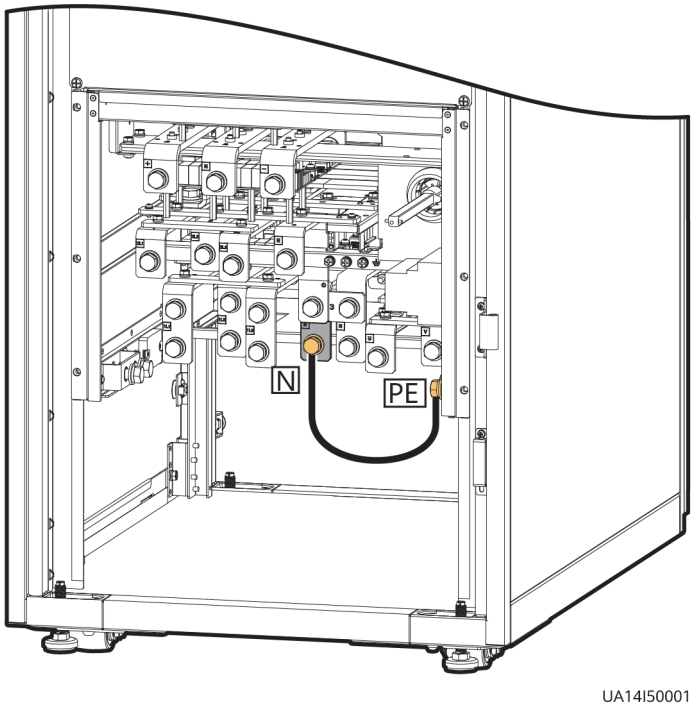


Figure A-5 Connecting the input N and PE (UPS5000-E-300K-SMT)

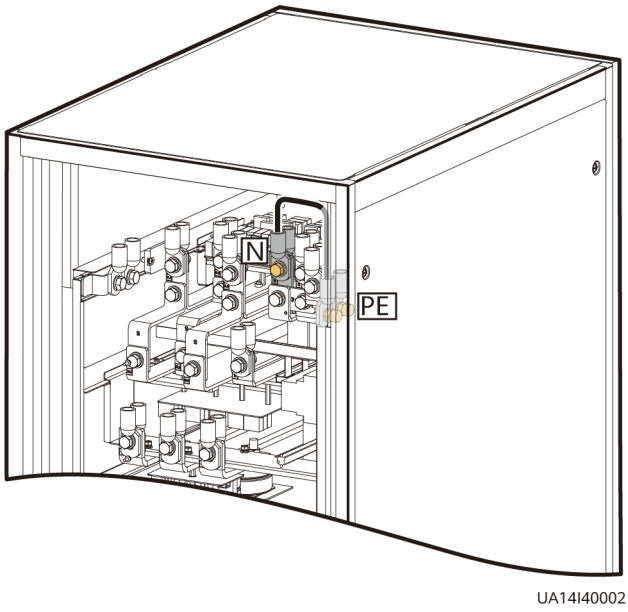


Figure A-6 Connecting the input N and PE (UPS5000-E-300K-SMT, isolation protection)

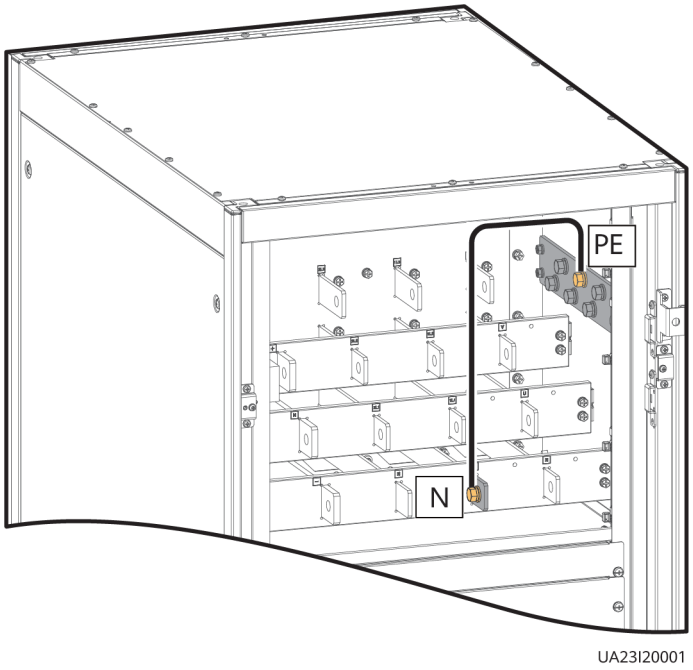


Table A-1 Recommended cross-sectional areas for cables

Model	Current (A)	Recommended Cross-Sectional Area (mm^2)
UPS5000-E-200K-SM/FM	335.4	95
UPS5000-E-300K-SM/SMT	533.1	150

B User Interface

NOTE

For details, see the *UPS5000-E Monitoring Module User Manual*.

C Alarm List

NOTE

For details about alarms, see the *UPS5000 Alarm Reference*.

D Acronyms and Abbreviations

A	
ASIC	application-specific integrated circuit
ATS	AC transfer switch
AWG	American wire gauge
B	
BSC	bus synchronization controller
BCB-BOX	battery circuit breaker box
BBB-BOX	battery bus bar box
C	
CAN	control area network
CE	Conformite Europeenne
D	
DSP	digital signal processing
E	

ECO	economic control operation
EPO	emergency power off
ECM	energy control module
EOD	end of discharge
F	
FE	fast Ethernet
I	
IEC	International Electrotechnical Commission
L	
LCD	liquid crystal display
M	
MDU	monitor display unit
N	
NC	normally closed
NO	normally open
NTC	negative temperature coefficient
P	
PE	protective earthing
PDU	power distribution unit
R	
RS485	Recommended Standard 485

S	
SNMP	Simple Network Management Protocol
SOC	state of charge
SOH	state of health
STS	static transfer switch
T	
THDi	total distortion of the input current waveform
THDv	total harmonic distortion of output voltage
U	
UPS	uninterruptible power system
USB	Universal Serial Bus
V	
VRLA	valve-regulated lead acid battery