



PowerMount-P480-2007KWh

User Manual

Notice

This manual contains important safety instructions, installation, electrical connections, commissioning, maintenance, and troubleshooting of the equipment.

Save the manual!

This manual must be stored carefully and be available at all times.

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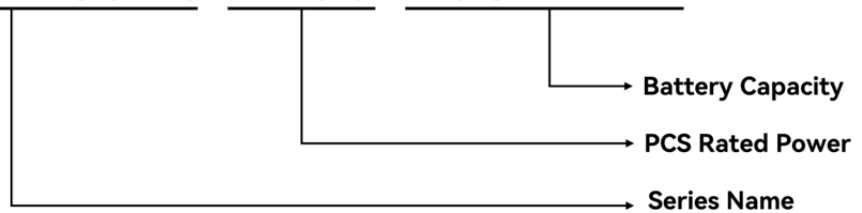
About This Manual

Overview

Please read the product manual carefully before installation, operation, or maintenance of the PowerMount. This manual contains important safety instructions and installation instructions that must be followed during installation and maintenance of the equipment.

Designation explanation of the PowerMount:

PowerMount-P480-2007kWh



	Meaning	Description
1	Series Name	PowerMount: Battery energy storage system
2	PCS Power	480: PCS Rate Power
3	Battery Capacity	2007: Nominal capacity is 2007kWh

Intended Audience

This manual is intended for technical professionals for installation, commissioning and maintenance of the product. The technical personnel have to be familiar with the product, local standards, and electric systems.

Symbol Conventions

The following types of safety instructions and general information appear in this document as described below:

Symbol	Description
	'Danger' indicates a hazard with a high level of risk that, if not avoided, will result in death or serious injury.
	'Warning' indicates a hazard with a medium level of risk that, if not avoided, will result in death or serious injury.
	'Caution' indicates a hazard with a low level of risk that, if not avoided, could result in minor or moderate injury.
	'Notice' indicates a situation that, if not avoided, could result in equipment or property damage.
	'Note' provides tips that are valuable for the optimal operation of the product.

Change History

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

Issue 01 (2025-11-11)

This issue is used for first application

1

Safety Precautions

Before transporting, storing, installing, operating, using and maintaining the equipment, please read this manual first, operate strictly in accordance with the contents of the manual, and follow all safety precautions marked on the equipment and in the manual.

In this manual, "equipment" refers to the products, software, components, spare parts and/or services related to this manual; "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 "instructions" in the manual do not represent all the safety matters that should be followed. You must also comply with relevant international, national or regional standards and industry practices. The company does not assume any responsibility for any violation of safety operation requirements or violation of safety standards for design, production and use of equipment.

This equipment should be used in an environment that meets the design specifications. Otherwise, the possible equipment failure, equipment malfunction or component damage is not within the scope of the equipment quality assurance. Otherwise, the company will not be liable for compensation for personal injury, property loss, etc.

All operations including transportation, storage, installation, operation, use and maintenance must comply with applicable laws, regulations, standards and specifications.

It is prohibited to reverse engineer, decompile, disassemble, adapt, implant or other derivative operations on the device software, study the internal implementation logic of the device, obtain the source code of the device software, infringe intellectual property rights in any way, and disclose the results of any device software performance test.

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

- Equipment damage caused by force majeure factors such as earthquakes, floods, volcanic eruptions, mudslides, lightning strikes, fires, wars, armed conflicts, typhoons, hurricanes, tornadoes, extreme weather, etc.;
- Not operating within the conditions of use described in this manual;
- The installation and use environment do not comply with relevant international, national or regional standards;
- Unqualified personnel install and use the equipment;
- Failure to operate in accordance with the operating instructions and safety warnings in the product and documentation;
- Unauthorized disassembly, modification of products or modification of software codes;
- Damage caused by transportation by you or a third party you entrust;
- Damage caused by storage conditions not meeting the requirements of product documentation;
- The materials and tools you bring with you do not meet the requirements of local laws, regulations and relevant standards;
- Damage caused by your or a third party's negligence, intent, gross negligence, improper operation or reasons not attributable to our company.

1.1 Personal Safety

	● It is strictly forbidden to install or remove cables while energized, as this may cause fire, electric shock or explosion, resulting in casualties or property losses. ● It is strictly forbidden to operate without following the specifications and instructions, as this may cause fire, electric shock or explosion, resulting in casualties or property losses. ● It is strictly forbidden to wear watches, bracelets and other conductive objects when operating and maintaining equipment to avoid electric shock and burns. ● Special insulating tools must be used to avoid electric shock or short circuit failures, and the insulation withstand voltage level must meet local laws, regulations, standards and specifications.
	Special protective equipment must be used, such as insulating gloves, insulating shoes, protective clothing, goggles, safety helmets, reflective vests, etc.

General requirements

- Before installation, on-site personnel must carefully read the entire document and familiarize themselves with the dangers, warnings, cautions, instructions and instructions.
- Before installation, on-site personnel must confirm that all on-site power supply equipment is in the disconnected state, that is, there is no voltage output.
- If the equipment is not installed and confirmed by professionals, on-site personnel should not directly power on the equipment.
- If on-site personnel find a fault that may cause personal injury or equipment damage during equipment operation, they should immediately stop the operation, report to the person in charge, and take effective protective measures.
- When the equipment is running, the casing temperature is high and there may be a risk of burns. On-site personnel are advised not to touch it directly.
- When the equipment is running, it is strictly forbidden for personnel to touch the running fan with body parts or other tools.
- If a fire occurs, on-site personnel should immediately evacuate the building or equipment area and call the fire department immediately.
- Under no circumstances are personnel allowed to re-enter a burning building or equipment area, as toxic and hazardous substances may be present.

Personnel requirements

- Personnel who operate the equipment include professionals and trained personnel. Professional personnel: refers to those who are familiar with the principle and structure of the equipment, have experience in training or operating the equipment, and are aware of the various potential sources of danger and the magnitude of danger during the installation, operation and maintenance of the equipment. Trained personnel: refers to those who have received corresponding technical and safety training and have the necessary experience, are aware of the dangers that may be brought to him when performing a certain operation, and can take measures to minimize the danger to himself or other people.
- Personnel responsible for installing and maintaining the equipment must first undergo rigorous training, master the correct operating methods, and understand various safety precautions and relevant standards of the country/region where they are located.
- Only qualified professionals or trained personnel are allowed to install, operate and maintain the equipment.
- Only qualified professionals are allowed to dismantle safety facilities and repair equipment.
- Personnel involved in special scenarios such as electrical operations, height operations, and special equipment operations must have special operation qualifications required by the local country/region.

- Medium voltage equipment operators must hold a high voltage electrician operating license.
- Replacement of equipment or parts (including software) must be performed by authorized professionals.
- Except for the personnel operating the equipment, no other personnel are allowed to approach the equipment.

1.2 Electrical Safety

	● Before making electrical connections, make sure the device is not damaged, otherwise it may cause electric shock or fire. ● Irregular or incorrect operation may cause accidents such as fire or electric shock. ● During the operation, the threading holes must be sealed to prevent foreign objects from entering the equipment, otherwise it may cause short circuit damage to the equipment and cause personal injury.
	The protective ground wire must be installed first during installation and removed last when removing the equipment.
	No cables are allowed to pass through the air inlet and outlet of the equipment.

General requirements

- Installation, operation and maintenance must be carried out in accordance with the steps in the manual. Do not modify, add or change the equipment without authorization, and do not change the installation sequence without authorization.
- It is necessary to obtain permission from the power department of the country or region before it can be connected to the grid.
- Install temporary fences or warning ropes in the work area and hang a "No Entry" sign. Non-staff members are strictly prohibited from entering.
- Before installing or removing the power cable, the device itself and its front and rear stage switches must be disconnected.
- If you find liquid has entered the device, please turn off the power immediately and do not continue to use it.
- Before operating the equipment, carefully check that the tools used meet the requirements and register them in the book; after the operation, collect them according to the number to prevent them from being left inside the equipment.

- Before installing the power cables, make sure that the cable labels are correctly marked and the cable terminals are well insulated.
- When installing the equipment, you need to use a torque tool with a suitable range to tighten the screws. When tightening with a wrench, make sure the wrench is not skewed and the torque value error does not exceed 10% of the specified value.
- Use a torque tool to tighten the bolts and use a red oil pen to mark them. After the installer confirms that the bolts are tightened, the line marking must cross the edge of the bolt.
- After installation, ensure that all electrical component protective covers, insulating sleeves and other devices are in place to avoid the risk of electric shock.
- If the device has multiple inputs, all inputs of the device should be disconnected and the device can be operated only after it is completely powered off.
- When maintaining the power consumption or distribution equipment behind the power supply equipment, it is necessary to disconnect the corresponding output switch of the power supply equipment.
- When maintaining the equipment, hang a "Do Not Close" sign on the upstream and downstream switches or circuit breakers, and post a warning sign to prevent accidental connection. The power can be turned on again only after the fault is resolved.
- When diagnosing and troubleshooting a fault, perform a second electrical test after a power outage and hang up a sign according to the above maintenance operations.
- If the cable is damaged, it must be replaced by a professional to avoid risks.
- It is strictly forbidden to artificially alter, damage or cover the logos and nameplates on the equipment, and the logos that become unclear due to long-term use must be replaced in a timely manner.
- Do not use water, alcohol, oil or other solvents to clean the electrical components inside and outside the equipment.

Grounding requirements

- Before operating the equipment, check the electrical connection of the equipment to ensure that the equipment is reliably grounded.
- The equipment grounding impedance should meet the local electrical standards.
- It is prohibited to operate the equipment without a grounding conductor installed.
- It is prohibited to damage the grounding conductor.
- For devices using three-core sockets, make sure that the grounding terminal in the three-core socket is connected to the protective ground.
- If it is a large contact current device, before connecting the input power, the protective grounding terminal of the device casing must be grounded to prevent the contact current of the device from causing electric shock to the human body.

Wiring requirements

- The selection, installation and routing of cables must comply with local laws, regulations and specifications.
- According to the environmental conditions (such as humidity, temperature, corrosive gases, mechanical wear, etc.), choose the appropriate cable type (such as high temperature resistant, corrosion resistant, waterproof, fireproof, etc. cable).
- Cables must be clearly labeled for easy identification and maintenance.
- During the power line laying process, it is strictly forbidden to have loops or twists. If it is found that the power line is not long enough, it must be replaced. It is strictly forbidden to make joints or welding points in the power line.
- All cables must be securely connected, well insulated, and of appropriate specifications.
- Cable troughs and wire holes should have no sharp edges, and the cable conduits or wire holes must be protected to prevent the insulation layer of the cables from being damaged by sharp edges, burrs, etc.
- Any irregular operation that may cause cable damage is prohibited, which will lead to a decrease in cable performance, affect current carrying capacity and temperature rise, etc.
- The size of the cable trough must meet 40% of the cable laying space, that is, leave 40% of the space to ensure ventilation and heat dissipation.
- The metal cable duct needs to be grounded, and the spliced parts need to be connected with a jumper ground wire for reliable connection.
- Cables of the same type should be bundled together, with a straight and neat appearance and no outer skin damage; cables of different types should be laid at least 3 cm apart and must not be entangled or crossed.
- After completing the wiring or leaving during the wiring process, you need to immediately use sealing mud to seal the cable opening to prevent moisture and small animals from entering.
- When using armored cables, the armor layer needs to be grounded separately.
- Cable selection should be based on external conditions (such as laying method or annual ambient temperature, etc.) and refer to IEC-60364-5-52 or local laws and regulations. The current carrying capacity must meet the maximum long-term operating current of the system.
- When the temperature is too low, severe impact and vibration may cause the plastic sheath of the cable to crack. To ensure construction safety, the following requirements must be followed:
 - All cables should be laid and installed above 0°C. When moving cables, especially in low temperature environments, they should be handled with care.
 - If the storage temperature of the cable is below 0°C, the cable must be moved to room temperature and stored for more than 24 hours before laying the cable.

1.3 Environmental Requirements

	● It is strictly forbidden to place the device in an environment with flammable or explosive gas or smoke, and it is forbidden to perform any operation in such an environment. ● It is strictly forbidden to store flammable and explosive items in the equipment area. ● It is strictly forbidden to place the device near heat or fire sources, such as fireworks, candles, heaters or other heating devices. Heat may cause damage to the device or cause a fire.
	● The device should be installed in an area away from liquids. It is strictly forbidden to install it under water pipes, air outlets, and other locations where condensation water is likely to occur. It is strictly forbidden to install it under air conditioning outlets, vents, and other locations that are prone to water leakage to prevent liquid from entering the device and causing equipment failure or short circuit. ● When the device is running, do not block the vents and other heat dissipation components to prevent high temperature from damaging the device or causing a fire.

General requirements

- The temperature and humidity environment for equipment storage should be appropriate and within the permitted range of the product. It should be stored in a clean, dry, well-ventilated area and prevent dust and condensation.
- It is strictly forbidden to install and operate the equipment beyond the scope specified by the technical indicators, otherwise it will affect the performance and safety of the equipment.
- It is strictly forbidden to install, use and operate outdoor equipment in severe weather such as lightning, rain, snow, gale of level 6 or above.
- It is strictly forbidden to install the equipment in an environment with dust, smoke, volatile gas, corrosive gas, infrared and other radiation, organic solvents or excessive salt.
- It is strictly forbidden to install the equipment in an environment with metallic conductive dust or magnetic dust.
- It is strictly forbidden to install the equipment in areas where fungi, molds and other microorganisms are likely to grow.
- It is strictly forbidden to install the equipment in areas with strong vibration, strong noise source and strong electromagnetic field interference.
- The installation environment should have a solid ground surface without rubber soil, soft soil or soil that is prone to sinking. It is strictly forbidden to choose

low-lying areas prone to water accumulation or snow accumulation. The site level should be higher than the historical highest water level in the area.

- It is strictly forbidden to install the equipment in a location that can be submerged by water.
- If the equipment is installed in a place with lush vegetation, in addition to routine weeding, the ground under the equipment needs to be hardened, such as using cement or gravel.
- During installation, operation and maintenance, you must first clean up the accumulated water, ice, snow or other debris on the top before opening the door to prevent debris from falling into the equipment.
- When installing the equipment, please ensure that the installation surface is solid and meets the equipment's load-bearing requirements.
- All wiring holes must be sealed. Use sealing mud to seal the wiring holes where wiring has been routed, and use the covers that come with the equipment to seal the wiring holes where no wiring is routed.
- After installing the equipment, the waste wires and some residual garbage in the equipment area, such as empty packaging materials, such as cartons, foam, plastic, cable ties, etc., should be removed.

1.4 Mechanical Safety

	When working at heights, you must wear a safety helmet, safety belt or waist rope and tie it to a firm and sturdy structure. It is strictly forbidden to hang on moving unstable objects or metal with sharp edges to prevent the hook from slipping and causing a fall accident.
	● Tools must be fully prepared and inspected by professional organizations. It is prohibited to use tools that have scars, fail inspections, or have expired. Ensure that the tools are firm and not overloaded. ● During the equipment hoisting process, the transport columns must not be removed to prevent the battery cabinet from tilting and collapsing. After the hoisting is completed, first make sure that the cabinet has been fixed to prevent the cabinet from tilting and collapsing due to unstable center of gravity, causing problems such as injuries to installers and damage to equipment. ● When it is confirmed that on-site equipment requires maintenance, if the equipment needs to be pulled out of the cabinet, be careful with equipment that may be unstable or heavy installed in the cabinet to avoid being crushed or hit. ● It is strictly forbidden to drill holes on the device. Drilling

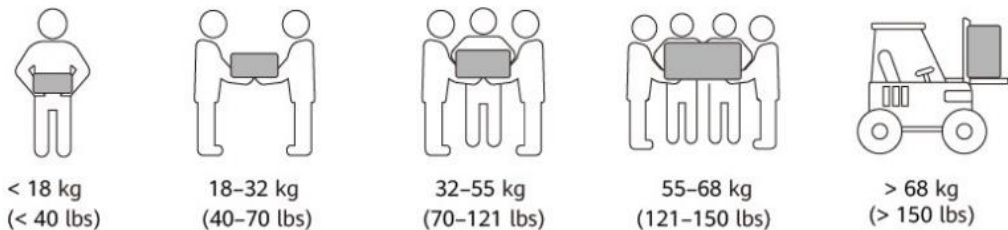
	may damage the sealing, electromagnetic shielding performance, internal components and cables of the device. The metal chips generated may enter the device and cause a short circuit on the circuit board.
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General requirements

- Paint scratches that occur during equipment transportation and installation must be repaired in a timely manner, and long-term exposure to cause rust is strictly prohibited.
- It is prohibited to perform arc welding, cutting and other operations on the equipment without evaluation by our company.
- It is prohibited to install other equipment on the top of the equipment without evaluation by our company.
- When working in the space above the top of the equipment, additional protection should be provided on the top of the equipment to prevent damage to the equipment.
- When performing mechanical work, please use the correct tools and master the correct use of the tools.

Transport safety

- When carrying heavy objects, you should be prepared to bear the weight to avoid being crushed or sprained by the heavy objects.



- When using a forklift to transport, the forklift must be in the middle position to prevent tipping over. Before moving, please fasten the equipment to the forklift with ropes; during moving, special personnel are required to supervise.
- When transporting, choose sea transportation or roads with good road conditions. Do not support rail and air transportation. And during transportation, try to reduce bumps and tilts as much as possible. For land transportation, choose highways to avoid scratches on national roads and rural roads.
- During handling and transportation, it must be kept naturally vertical and is prohibited from being placed flat, upside down or tilted.

Height safety

- Before working at height, conduct a detailed risk assessment and identify potential sources of danger, such as falling objects, electrical equipment, and severe weather.
- Ensure that all workers receive professional high-altitude work training and hold relevant qualification certificates.

- Check the equipment required for aerial work, such as hanging baskets, cranes, etc., to ensure that they are intact and meet safety standards.
- Workers working at heights must wear safety belts, safety helmets, gloves, non-slip shoes and work clothes that meet the standards. The safety belts should be connected to a solid support point or safety rope.
- If the aerial work involves electrical equipment, you must ensure that the work area is away from high-voltage wires, use insulated tools, and strictly abide by the safety regulations for electrical work.
- There should be at least two people working at heights. When one person is working alone, emergency contact methods should be used so that timely help can be obtained in case of an accident.
- Workers working at heights should avoid long-term fatigue work, take regular rests, and maintain sufficient physical strength and concentration.
- During the operation, ensure your body balance and try to avoid standing on one foot or in an unstable place.
- The work site should be equipped with first aid equipment (such as first aid kits) and ensure that personnel know how to use them. If an accident occurs, the rescue procedure should be initiated immediately to ensure that the injured can receive treatment as soon as possible.

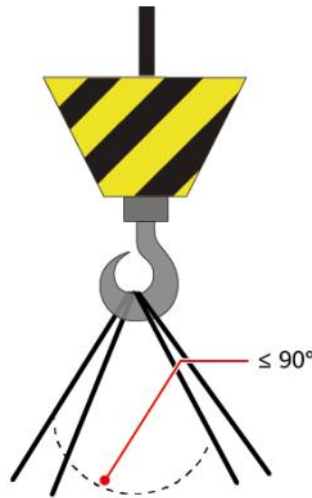
Ladder safety

- When performing height operations that may involve electricity, wooden ladders or insulated ladders should be used.
- For height operations, platform ladders with guardrails are preferred; straight ladders are prohibited.
- Before using a ladder, please make sure that the ladder is intact and that the load-bearing capacity of the ladder meets the requirements. It is strictly forbidden to use the ladder overloaded.
- The ladder must be placed in a stable place and someone must hold the ladder during operation.
- When climbing a ladder, you should keep your body steady and ensure that your center of gravity does not deviate from the edge of the ladder to reduce danger and ensure safety.
- When using a stepladder, the pull rope must be firm and the bottom must be flat.
- Do not stand on the top two steps of the ladder to avoid unstable center of gravity.
- Do not use ladders in windy, rainy or snowy weather to avoid safety hazards caused by slippery environments.

Lifting safety

- Personnel performing lifting operations must undergo relevant training and be qualified before they can take up their posts.
- Temporary warning signs or fences must be erected in the lifting area to isolate it.

- The foundation for lifting operations must meet the load-bearing requirements of the crane.
- Before lifting, make sure the crane weight is greater than the weight of the equipment itself. If you are not sure, please consult the manufacturer.
- Before lifting, ensure that the lifting tools are firmly fixed to a fixed object or wall that meets the load-bearing standards.
- During hoisting, it is strictly forbidden to walk under the crane arm or the hoisted object.
- During lifting, it is prohibited to drag the wire rope or lifting equipment, and it is prohibited to use hard objects to hit them.
- During the lifting process, ensure that the angle between the two cables is no greater than 90° , as shown in the figure below.



Drilling safety

- Before drilling, you should obtain the consent of the customer and the contractor. You must be familiar with the structure and internal layout of the cabinet and understand whether there are electrical components, wiring, conduits, terminal blocks, etc. in the cabinet.
- When drilling, you should wear safety equipment such as goggles and protective gloves.
- When drilling, please avoid pre-buried pipes or lines to avoid short circuits or other hazards.
- Ensure that the electrical cabinet or distribution cabinet is stable during operation to prevent accidents caused by vibration or instability.
- Metal shavings produced when drilling may be a potential fire hazard. Check whether there are flammable materials in the cabinet to prevent fire.
- When drilling, the equipment should be shielded and protected to prevent debris from falling into the equipment. After drilling, the debris should be cleaned up in time.

1.5 Equipment Safety

1.5.1 ESS Safety

 DANGER!	- It is forbidden to open the cabinet door when the system is running. - When the energy storage system fails, please avoid standing at the cabinet door.
 CAUTION!	The scene should be evacuated immediately after the fire sound and light alarm is triggered.
NOTICE NOTICE!	- The energy storage system must be equipped with protective measures such as fences and walls, and safety warning signs must be erected for isolation to prevent unauthorized entry during equipment operation, which could cause personal injury or property loss. - The installation layout of the energy storage system must meet the fire protection distance or firewall requirements specified by local standards, including but not limited to <i>GB 51048-2014 Design Specifications for Electrochemical Energy Storage Power Stations</i>, <i>NFPA 855 Standard for the Installation of Stationary Energy Storage Systems</i> specification requirements. - The energy storage system should also comply with relevant national and regional safety regulations and standards (such as IEC, UL certification, etc.) during use. These standards involve electrical safety, environmental protection and other aspects. - The energy storage system should be inspected regularly on a monthly basis. - The energy storage system should be inspected regularly, no less than once a year.

1.5.2 Battery Safety

 DANGER!	It is strictly forbidden to short-circuit the positive and negative poles of the battery, otherwise it will cause a short circuit. A short circuit will instantly generate a large current and release a large amount of energy, causing the battery to leak, smoke, release flammable gas, thermal runaway, catch fire or explode. To avoid a short circuit, the battery is
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	not allowed to be maintained while it is powered. ● Do not expose the battery to high temperature environments or around heat-generating devices, such as high temperature sunlight, fire sources, transformers, heaters, etc. Overheating of the battery may cause leakage, smoke, release of flammable gas, thermal runaway, fire or explosion. ● The battery is strictly prohibited from being subjected to mechanical vibration, falling, collision, puncture by hard objects and pressure shock, otherwise it may cause battery damage or fire. ● It is strictly forbidden to disassemble, modify or damage the battery (such as inserting foreign objects, squeezing with external force, immersing in water or other liquids) to avoid battery leakage, smoking, release of flammable gas, thermal runaway, fire or explosion. ● It is strictly forbidden to allow the battery terminals to contact other metal objects, as this may cause heating or electrolyte leakage. ● Using or replacing the wrong battery type may cause fire or explosion. Please use the battery type recommended by the manufacturer and do not replace the battery without permission. ● Battery electrolyte is toxic and volatile. When electrolyte leakage or abnormal odor occurs, avoid contact with leaking liquid or gas. Non-professionals should not approach, please contact professionals immediately. Professionals should wear goggles, rubber gloves, gas masks, protective clothing, etc., promptly power off the device, remove the leaking battery, and contact technical engineers for processing. ● The battery is a closed system and no gas will be released under normal operation. If it is subjected to extreme abuse, such as fire, puncture, extrusion, lightning strike, overcharging or other severe conditions that may cause thermal runaway of the battery, it may cause battery damage or abnormal chemical reactions inside the battery, resulting in electrolyte leakage or the generation of gases such as CO and H₂. The site should ensure that the flammable gas emission measures are normal to avoid combustion or corrosion of equipment. ● The gas produced by battery combustion will irritate the eyes, skin and throat, so please take precautions.
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 WARNING!	● The battery should be installed in an area away from liquids. It is strictly forbidden to install it under air-conditioning vents, ventilation holes, machine room outlet windows, water pipes and other places prone to water leakage to prevent liquid from entering the equipment and causing equipment failure or short circuit. ● When installing and commissioning batteries, fire-fighting facilities such as fire sand and carbon dioxide fire extinguishers must be installed in accordance with construction standards and specifications. Before putting into operation, it is necessary to ensure that fire-fighting facilities that comply with local laws, regulations and specifications are in place. ● Before removing the battery packaging, during storage and transportation, ensure that the outer packaging box is intact and undamaged, and place the battery correctly according to the packaging box markings. It is strictly prohibited to place the battery upside down, sideways, upright or tilted. When stacking, comply with the stacking requirements on the outer packaging to avoid any impact or fall that may cause damage to the battery and make it scrapped. ● Tighten the fastening screws of the copper busbar or cable according to the torque specified in the text, and mark the torque identification. Regularly check whether it is tightened, whether there is rust, corrosion or other foreign matter, and clean it. Otherwise, loose connection of the screws will cause excessive voltage drop in the connection, and even generate a lot of heat and burn the battery when the current is large. ● After the battery is discharged and the protection is cut off, the battery is in a low voltage state. The battery should be charged in time and should not be left for a long time, otherwise the battery may be damaged due to over-discharge.
 CAUTION!	Generally, the batteries do not need to be reinstalled on site, as they have been clustered to form a system. If batteries need to be removed or installed under special circumstances, please read the precautions in this chapter carefully.

Statement

The company is not responsible for damage or other consequences of the batteries provided by the company caused by the following reasons:

- Battery damage caused by earthquake, flood, volcanic eruption, mudslide, lightning strike, fire, war, armed conflict, typhoon, hurricane, tornado, extreme weather, force majeure;
- Direct damage to the battery caused by the on-site equipment operating environment or external power parameters not meeting the environmental requirements for normal operation, including but not limited to the actual operating temperature of the battery being too high or too low, unstable power grid conditions and frequent power outages, etc.;
- Battery damage, falling, leakage, rupture, etc. caused by improper operation or failure to connect the battery as required;
- Battery damage caused by delayed activation (leading to over-discharge) after installation is not covered under warranty.
- Battery damage caused by failure to promptly inspect and accept the product or failure to use the product due to your reasons;
- Because you did not set the battery operation management parameters correctly;
- Because you mix the batteries provided by our company with other batteries, resulting in accelerated capacity decay, including but not limited to: mixing with other brands of batteries, mixing with batteries of different rated capacities, etc.;
- Frequent over-discharge of the battery due to improper maintenance, on-site capacity expansion or long-term inability to fully charge the battery;
- Because you did not properly maintain the battery according to the operating manual of the supporting equipment;
- Battery damage caused by failure to store the battery in accordance with storage requirements (such as storage in a humid or rainy environment);
- The battery is overstored due to your failure to charge in time, resulting in capacity loss or irreversible damage to the battery;
- Battery damage caused by you or a third party, including but not limited to: unauthorized relocation or installation of the battery without following the Company's requirements;
- Because you changed the battery usage scenario without informing the company;
- Because you connect additional loads to the battery yourself;
- Because the battery has exceeded the maximum storage period;
- Because the battery has exceeded the warranty period. Batteries that have exceeded the warranty period have certain safety hazards and are not recommended for continued use.

General requirements

NOTICE

NOTICE!

To ensure the safety of battery use and the accuracy of battery management functions, please use batteries configured by our company. If batteries other than those configured by our company are used, our company will not be responsible for any battery-related failures.

- Please use the battery within the specified temperature range. Do not charge when the ambient temperature is below the lower limit of the operating temperature to avoid internal short circuit of the battery due to low temperature charging.
- Before removing the battery packaging, check whether the packaging is intact. Batteries with damaged packaging cannot be used. If damaged, please notify the transporter and manufacturer immediately.
- After the energy storage system is installed, power it on as soon as possible. Because the SOC is low and the transportation process has lasted for weeks or months, if it is not powered on for a long time, the battery may enter an over-discharge state.
- Battery damage (dropping, collision, swelling or dents on the shell, etc.) may cause leakage or release of flammable gas. Do not use damaged batteries. When the battery is damaged such as leakage, structural deformation, etc., please immediately contact the installer or professional maintenance personnel to remove and replace it. Do not store damaged batteries near other equipment or flammable materials. Non-professionals should not approach damaged batteries.
- Before operating the battery, make sure there is no irritation, burnt smell, etc. around the battery.
- During the installation of the battery, it is strictly forbidden to place installation tools, metal parts and sundries on the battery. After the installation is completed, clean up the items on and around the battery in time.
- It is prohibited to install the battery pack in rainy, snowy, foggy or other weather conditions to prevent the battery pack from being corroded by water vapor and rain.
- If the battery is accidentally exposed to water, do not continue to install it, transport it to a safe isolation point and scrap it in time.
- Before installing the battery pack, check that the battery pack shell is not deformed or damaged.
- Determine whether the positive and negative terminals of the battery are accidentally grounded. If they are accidentally grounded, disconnect the battery terminals from the ground. Do not perform welding, grinding or other similar work around the battery to avoid sparks, arcs, and other hazards such as fire.
- If the battery is not used for a long time, it needs to be stored and recharged according to the battery requirements.
- It is prohibited to use equipment that does not comply with local laws, regulations and specifications for charging and discharging.

- During installation and maintenance, the battery circuit should remain disconnected.
- Damaged batteries should be monitored during storage to ensure there are no signs of smoke, flame, electrolyte leakage or heat.
- When the battery fails, the surface temperature may be too high. Avoid contact to avoid burns.
- Do not stand, lean or sit on the device.
- In the backup power scenario, please do not use the battery for the following purposes. If you have special needs, please be sure to confirm the technology with our company.
 - For medical equipment directly related to human life.
 - Used in control equipment such as trains and elevators, which may cause personal injury.
 - For computer systems of social and public importance.
 - Used in locations near medical equipment.
 - Equipment of the same kind as described above.

Short circuit protection

- When installing and maintaining the battery, wear insulating gloves, goggles and other equipment to prevent injury from accidental short circuit.
- When installing and maintaining the battery, the battery should be placed in a well-protected bracket or casing.
- When installing and maintaining the battery, you need to wrap the exposed cable terminals on the battery with insulating tape.
- Prevent foreign matter (such as conductive objects, screws, liquids, etc.) from entering the battery and causing a short circuit.
- Avoid using the battery in high temperature environments. Overheating may cause internal short circuits and fire.

Leakage treatment

NOTICE

NOTICE!

Electrolyte spillage is potentially harmful to the device and can corrode metal objects. Electrolyte is corrosive and contact may cause skin irritation and chemical burns.

- If you come into contact with battery electrolyte and any of the following situations occur, take emergency rescue measures accordingly.
- In case of eye contact: Immediately rinse eyes with plenty of water for at least 15 minutes without rubbing, and seek medical help.
- In case of skin contact: Immediately wash the contacted area with plenty of water and soap for at least 15 minutes and seek medical help immediately.
- If accidentally inhaled: Evacuate the contaminated area, breathe fresh air immediately, and seek medical help.

- If accidentally ingested: Rinse mouth with water immediately for at least 15 minutes, drink clean water or milk as soon as possible to relieve the symptoms, and seek medical help.

Recycling

- Please dispose of used batteries in accordance with local laws and regulations. Do not treat batteries as household waste. Improper battery disposal may cause environmental pollution or explosion.
- If the battery leaks or is damaged, please contact technical support or a battery recycling company for disposal.
- When the battery exceeds its service life and is unusable, please contact a battery recycling company for scrapping.
- Avoid exposing used batteries to high temperatures or direct sunlight.
- Avoid exposing used batteries to high humidity or corrosive environments.
- Faulty batteries are not allowed to be reused. Contact a battery recycling company as soon as possible to scrap them to avoid environmental pollution.

2

Product Introduction

2.1 Overview

The PowerMount energy storage system is an integrated energy storage container that includes batteries, BMS, PCS, auxiliary power system, fire protection system, air conditioning system, and lightning protection and grounding system. It can be installed outdoors, supports parallel expansion of multiple units, and uses a modular design that allows for rapid installation and operation and maintenance. The system can respond quickly to meet power auxiliary service needs.

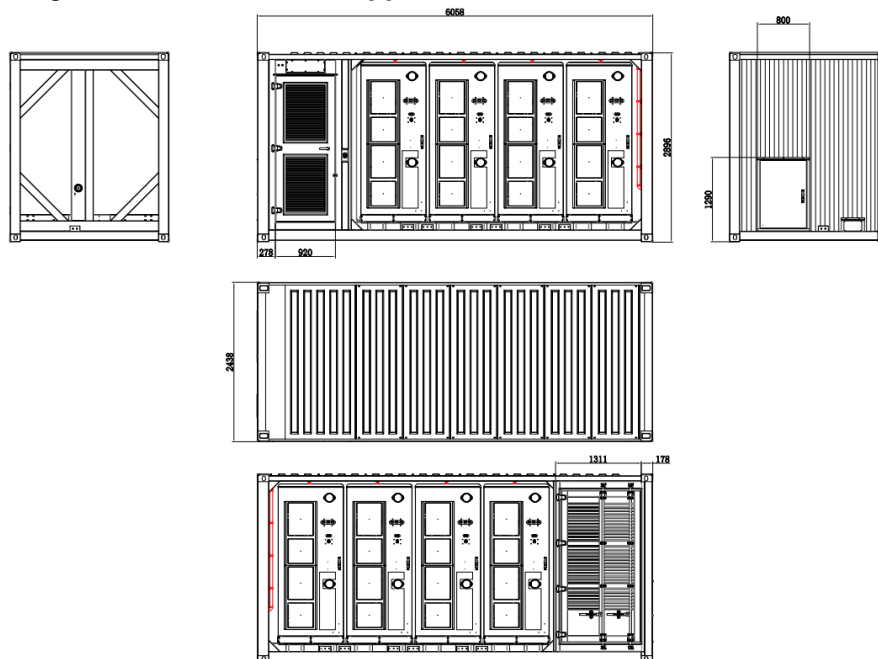
A single PowerMount containerized battery energy storage system is fully equipped with 8 battery cabinets and 1 PCS cabinet.

A single PCS cabinet can be configured with up to 8 energy storage converter modules, with a maximum configurable power of 480kW.

A single battery cabinet consists of 280 280Ah cells connected in series, with an energy of 250.88 kWh.

2.2 Appearance

Figure 2-1 PowerMount appearance and dimensions



Note: The container is 20HQ, and the length, depth and height (L*D*H) are 6058*2438*2896mm.

2.3 Components

2.3.1 Container

Figure 2-2 Container appearance

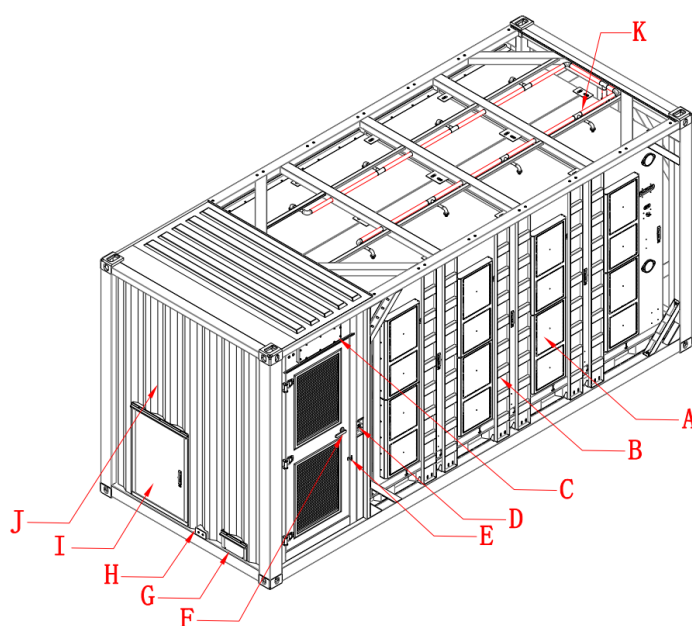


Table 2-1 Container appearance

Position	Name	Description
A	Outdoor battery cabinet	1P280S cells connected in series, single cabinet capacity 250.88kWh
B	Container transport support column	It cannot be disassembled during transportation and hoisting, and needs to be disassembled before use
C	Alarm bell, sound and light alarm installation box	Built-in alarm bell, visual sound and light alarm
D	Container external emergency stop switch (EPO)	In the emergency state of the system, press the trigger emergency stop
E	Container door padlock	Locked for customs transportation
F	Container door lock	Fixed locks designed for operating doors
G	External communication box	External RS485 interface, external emergency stop interface and external TCP interface.
H	Container grounding point	One on each side, grounding bolt M12
I	External main and auxiliary power supply wiring operation door	The main power and auxiliary power connections can be made by opening the operation door.
J	Container electrical equipment warehouse	Built-in PCS cabinet, power distribution control cabinet and other devices
K	Water fire fighting	Control the temperature in an emergency to prevent the fire from spreading.

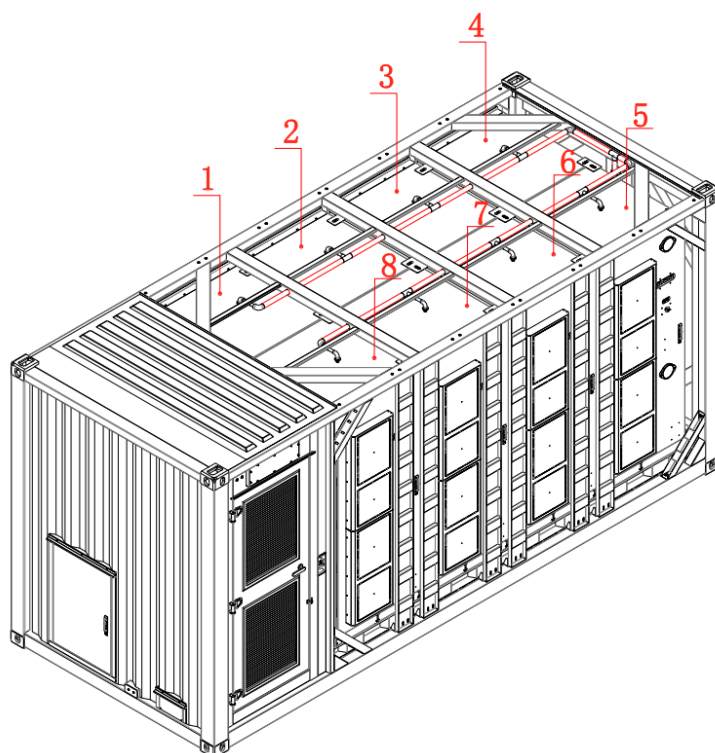
Figure 2-3 Battery cabin position (8 battery cabinets included)


Table 2-2 Battery cabin position

Position	Name	Description
1	No. 1 Battery Cabinet	The first battery cabinet
2	No. 2 Battery Cabinet	The second battery cabinet
3	No. 3 Battery Cabinet	The third battery cabinet
4	No. 4 Battery Cabinet	The fourth battery cabinet
5	No. 5 Battery Cabinet	The fifth battery cabinet
6	No. 6 Battery Cabinet	The sixth battery cabinet
7	No. 7 Battery Cabinet	The seventh battery cabinet
8	No. 8 Battery Cabinet	The eighth battery cabinet

2.3.2 Battery Cabin

Figure 2-3 Battery cabin components (door closed)

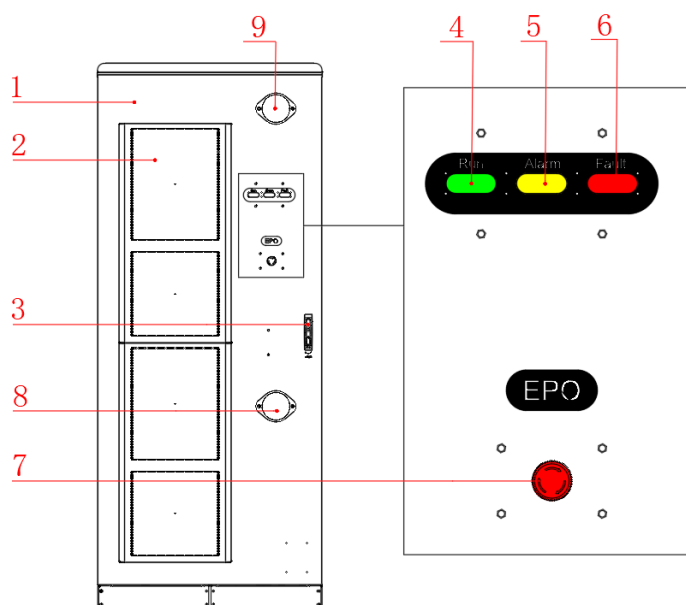


Table 2-3 Battery cabin components (door closed)

Position	Name	Description
1	Cabinet	Battery cabinet housing
2	Air conditioner	Adjust the temperature inside the cabinet, heating/cooling
3	Door locks	Requires a specific key to open
4	Running indicator light	Green light indicates operation, flashing indicates standby
5	Warning indicator	Yellow light indicates that there is an alarm in the system, but it does not affect system operation
6	Fault indicator light	The red light is always on, indicating that there is a fault in the system and the system stops running.
7	Emergency stop button	After pressing the button, the system stops urgently and the BMS box circuit breaker trips
8	Battery cabinet intake valve	It pops up when triggered.
9	Battery cabinet exhaust valve	It pops up when triggered.

Figure 2-4 Battery cabin components (battery pack)

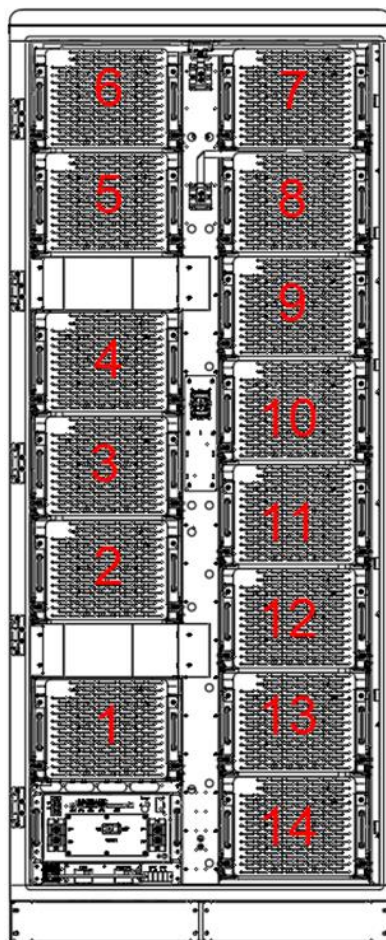
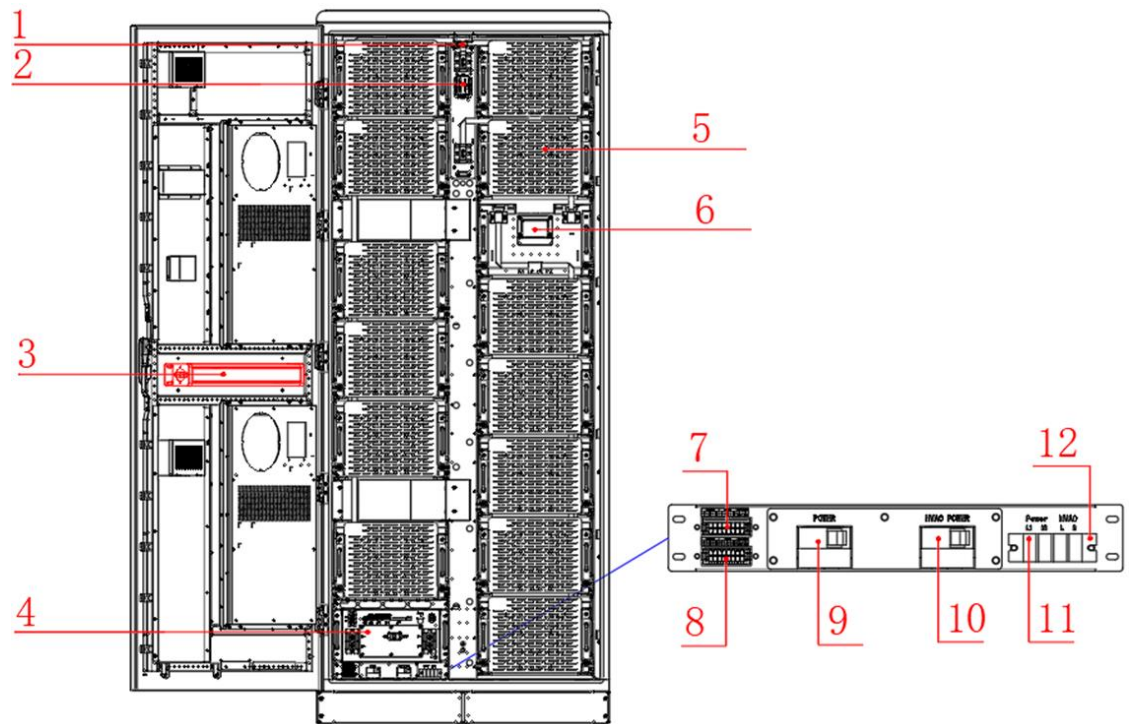


Table 2-4 Battery cabin components (battery pack)

Position	Name	Description
1	No. 1 Battery PACK	The first battery cabinet PACK
2	No. 2 Battery PACK	The second battery cabinet PACK
3	No. 3 Battery PACK	The third battery cabinet PACK
4	No. 4 Battery PACK	The fourth battery cabinet PACK
5	No. 5 Battery PACK	The fifth battery cabinet PACK
6	No. 6 Battery PACK	The sixth battery cabinet PACK
7	No. 7 Battery PACK	The seventh battery cabinet PACK
8	No. 8 Battery PACK	The eighth battery cabinet PACK
9	No. 9 Battery PACK	The ninth battery cabinet PACK
10	No. 10 Battery PACK	The tenth battery cabinet PACK
11	No.11 Battery PACK	The eleventh battery cabinet PACK
12	No. 12 Battery PACK	The twelfth battery cabinet PACK
13	No. 13 Battery PACK	The thirteenth battery cabinet PACK
14	No. 14 Battery PACK	The fourteenth battery cabinet PACK

Figure 2-5 Battery cabin components (door opened)

Table 2-5 Battery cabin components (door opened)

Position	Name	Description
1	Access switch	Monitor cabinet door position for interlocked safety control
2	Maintenance switch	Intermediate disconnection of battery clusters for high-voltage output isolation
3	Firefighting equipment	Perfluorohexone fire extinguishing system
4	High voltage control box	Internally integrated BCM main control module and local controller to monitor battery status in real time
5	Battery module	1P20S cells are connected in series, with integrated BMM to monitor cell temperature, voltage and other parameters
6	BMM module	Monitor battery cell temperature, voltage and other parameters
7	CAN#2 communication	CAN-2 communication (2-way, hand-in-hand connection)
8	RS485#2 communication	RS485-2 communication (2-way, hand-in-hand connection)
9	Power micro-break switch	Control loop power supply control
10	HVAC micro break switch	Air conditioning power supply circuit control
11	Control power supply terminal	Control loop L/N line access
12	Air conditioning power supply terminal	Air conditioning circuit L/N line access

Figure 2-6 Battery pack

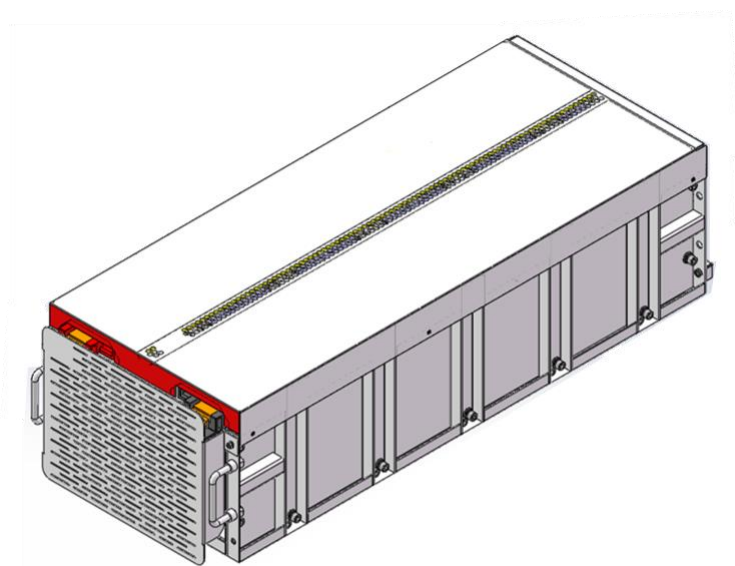
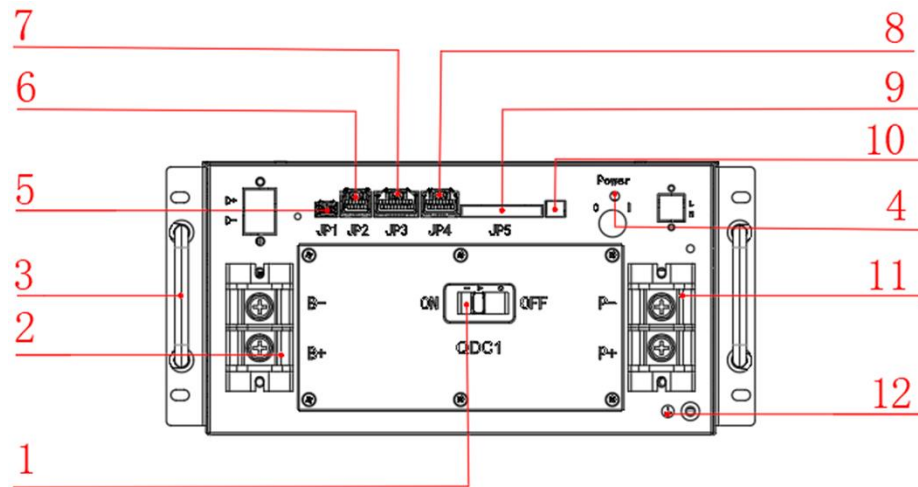
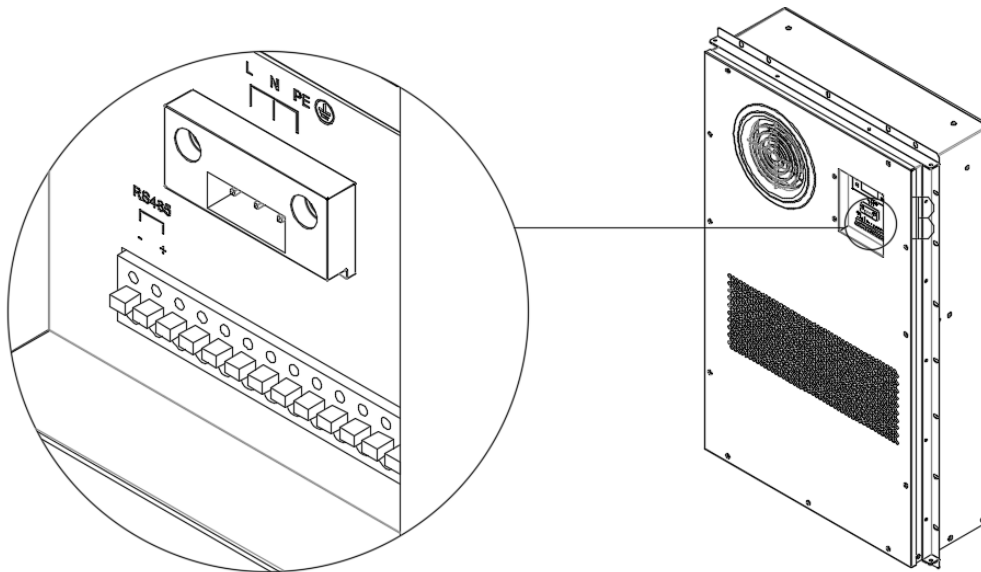


Table 2-6 Battery specifications

Item	Specifications
Rated voltage	64V
Rated capacity	280Ah 17920Wh
Size (W*D*H)	375*960*260
Weight	120kg
Composition	1P20S
Standard charging current	140A
Standard discharge current	140A
Charge termination voltage	3.65V/Cell
Discharge end voltage	2.5V/Cell
Operating temperature	Charging: 0°C ~ +60°C, discharging: -30°C ~ +60
Storage temperature	Short-term storage: -20°C ~ +45°C (<1 month SOC: 20%~60) Long-term storage: 0°C ~ +35°C (<1 year SOC: 30%~60)
Storage humidity	0 to 95%
Long-term storage requirements	6 months normal temperature power supply: charge and discharge once, then reverse charge to 25% SOC

Figure 2-7 High-voltage box components

Table 2-7 High-voltage box components

Position	Name	Description
1	DC circuit breaker	DC circuit disconnection and protection
2	B+/B- terminal block	Total positive and negative connection of battery cluster
3	Handle	Used to pull the control box out of the battery cabinet
4	Running indicator light	Display the power supply status of the control box
5	JP1	DC24V power supply
6	JP2	Fire solenoid valve control, exhaust valve control, status indicator power supply
7	JP3	AC circuit breaker inspection signal, EPO inspection signal, maintenance switch inspection signal, intermediate contactor inspection signal, intermediate contactor signal control, BMM power supply, CAN bus
8	JP4	RS485, CAN communication interface
9	JP5	RS485, CAN debugging interface
10	Dip switch	Used to adjust the matching resistance of RS485 and CAN communication buses
11	P+/P- terminal block	PCS DC side access
12	Grounding hole	High voltage control box grounding point

Figure 2-8 Air conditioner

Table 2-8 Air conditioner

Position	Name	Description
L	Air conditioner power supply live wire terminal	AC230V power supply, 50Hz
N	Air conditioner power supply neutral terminal	
PE	Air conditioner grounding terminal	
RS485+	Air conditioner 485 communication positive electrode	Modbus RTU communication
RS485-	Air conditioner 485 communication negative pole	

A single battery cabinet contains two air conditioners with a cooling capacity of 2000W, and the parameters are as follows.

Table 2-9 Air conditioner specifications

Item	Specifications
Rated voltage	AC230V 50Hz
Rated cooling power	950W
Refrigerant	R134a
Protection level	IP55
Temperature range	-40~55°C
Size	782*482*175mm

Figure 2-9 Fire suppression system components (upper part)

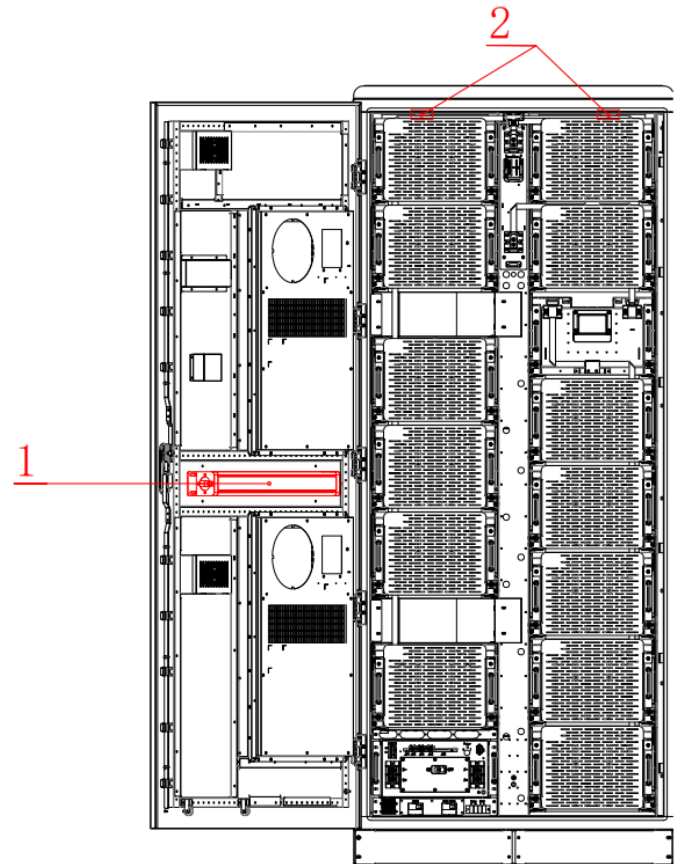


Table 2-10 Fire suppression system components (upper part)

Position	Name	Description
1	Fire extinguishing equipment	Perfluorohexone fire extinguishing agent provides fire safety protection
2	Smoke detectors	Monitor the smoke concentration in the battery cabinet and install it on the top left and right of the battery cabinet

The fire protection system will be activated and release gas in the following situations:

There are two smoke detectors installed in the battery cabin:

- When only one smoke detector is activated, the system will issue a fault message and stop operating.
- When two smoke detectors are activated together or one smoke detector is activated and the battery temperature is greater than 60°C, the system will immediately stop operating and the fire extinguishing device will be energized and release the fire extinguishing agent, thereby achieving the effect of suppressing the fire.

Table 2-11 Built-in perfluorohexone fire extinguisher specifications

Item	Perfluorohexone Fire Extinguisher
Starting voltage/power consumption	24Vdc/6.5W
Agent fill weight	2500g
Startup method	Electric start
Protected volume	$\leq 3.5\text{m}^3$
Discharge Time	$\leq 8\text{s}$
Operating temperature	$-30^{\circ}\text{C} \sim 50^{\circ}\text{C}$
Alarm method	Dry Contact Feedback Signal
Weight	Approx. 6.1kg

Table 2-12 Built-in smoke detector specifications

Item	Smoke Detector
Operating voltage	12V (9V ~ 30Vdc)
Quiescent current	< 5mA
Alarm current	< 35mA
Output format	Relay output
Indicator status	Red is always on, the detector flashes once every 6 seconds when it enters the alarm state, flashes twice every 6 seconds when it enters the monitoring state, and the detector enters the fault state

2.3.3 PCS Integrated Cabinet

PCS can control the charging and discharging process of lithium batteries, perform AC/DC conversion, and directly supply power to AC loads when there is no power grid. PCS is composed of DC/AC bidirectional converter, control unit, etc. PCS controller receives background control instructions through communication, controls the converter to charge or discharge the battery according to the sign and size of the power instruction, and realizes the regulation of active power and reactive power of the power grid.

A single PCS cabinet can be configured with up to 8 energy storage converter modules, with a maximum configurable power of 480kW.

Figure 2-10 PCS cabinet components (secondary circuit powered by a separate source)

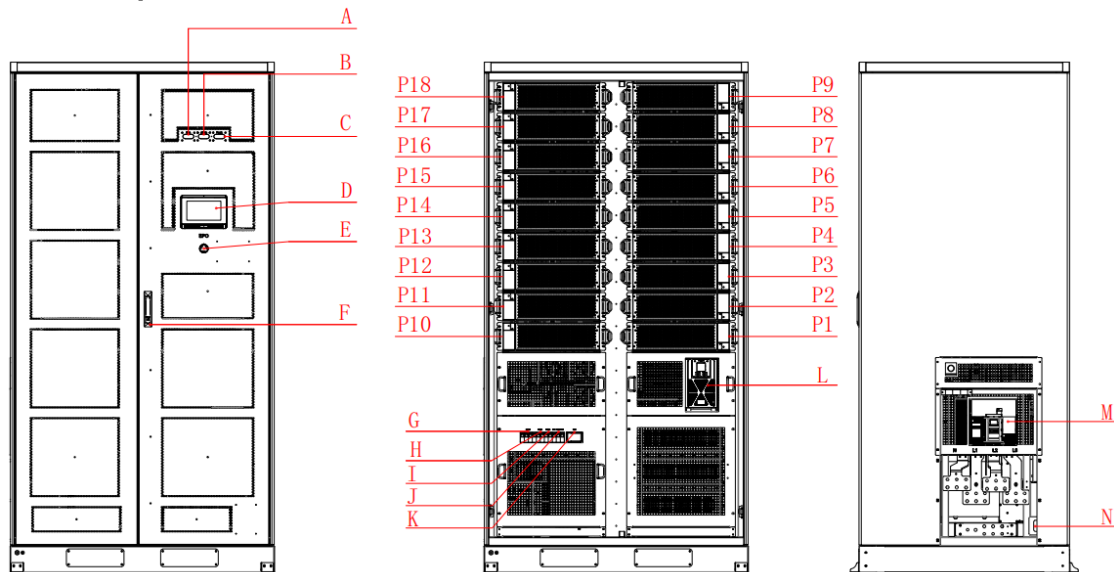


Table 2-13 PCS cabinet components (secondary circuit powered by a separate source)

Position	Name	Description
A	Running indicator light (RUN)	Green, always on when the system is running, flashing when in standby
B	Alarm indicator	Yellow, always on when the system is in alarm
C	Fault indicator light (Fault)	Red, always on when system fails
D	HMI box	HMI System
E	Emergency Stop Button (EPO)	In the emergency state of the system, press the trigger emergency stop
F	PCS cabinet door lock	Open/Close PCS cabinet
G	MCB2	4P miniature circuit breaker, power switch of distribution box, connected to distribution box
H	MCB3	2P miniature circuit breaker, electrical compartment fan power supply control switch
I	MCB4	2P miniature circuit breaker, UPS input power control switch
J	FU1、FU2、FU3	AC fuse, meter sampling circuit
K	EM1	AC side meter
L	UPS	Backup power supply, providing power for system control circuit
M	QAC1	Molded case circuit breaker, AC main power interface
N	X1	Terminal block, AC auxiliary power interface
P1-8	No.1 to No.8 PCS inverter	8 units, P9-18 is optional

Figure 2-11 PCS cabinet components (secondary circuit powered from main circuit)

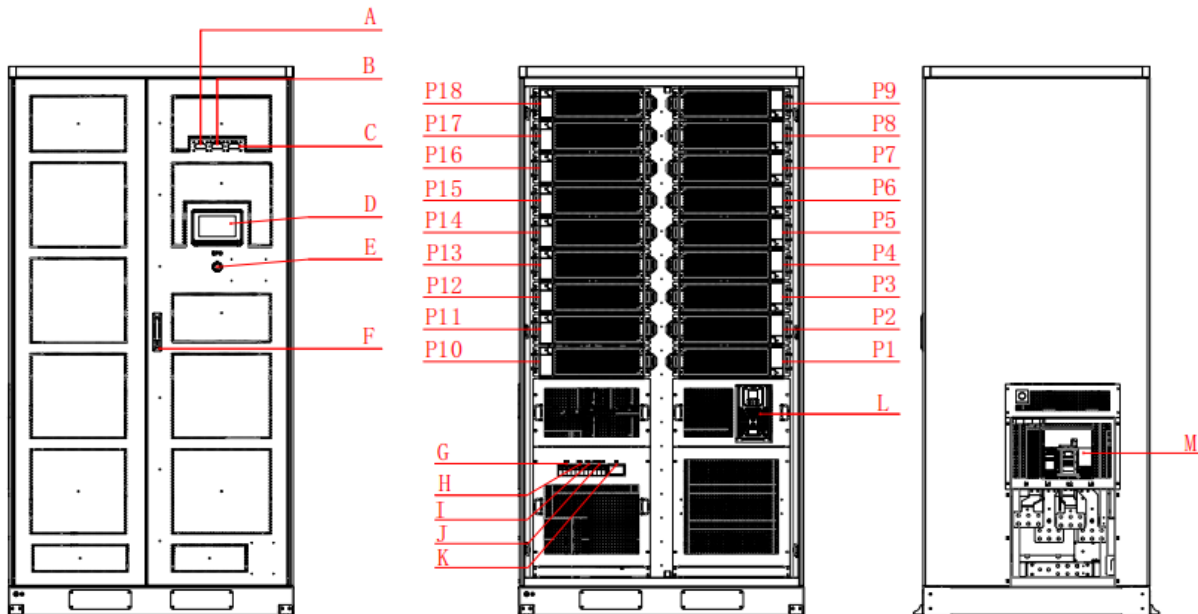


Table 2-14 PCS cabinet components (secondary circuit powered from main circuit)

Position	Name	Description
A	Running indicator light (RUN)	Green, always on when the system is running, flashing when in standby
B	Alarm indicator	Yellow, always on when the system is in alarm
C	Fault indicator light (Fault)	Red, always on when system fails
D	HMI box	HMI System
E	Emergency Stop Button (EPO)	In the emergency state of the system, press the trigger emergency stop
F	PCS cabinet door lock	Open/Close PCS cabinet
G	MCB2	4P miniature circuit breaker, power switch of distribution box, connected to distribution box
H	MCB3	2P miniature circuit breaker, electrical compartment fan power supply control switch
I	MCB4	2P miniature circuit breaker, UPS input power control switch
J	FU1、FU2、FU3	AC fuse, meter sampling circuit
K	EM1	AC side meter
L	UPS	Backup power supply, providing power for system control circuit
M	QAC1	Molded case circuit breaker, AC main power interface
P1-8	No.1 to No.8 PCS inverter	8 units, P9-18 is optional

Table 2-15 PCS cabinet specifications

Type	Item	Parameters
PCS AC parameters	Rated AC power	480kw(8*60KW)
	Wiring method	3P4W+PE
	Rated input grid voltage	230/400Vac
	Rated input grid frequency	50Hz
	Power factor	-0.8~0.8
	Maximum efficiency	98.5%
General parameters	Dimensions (width x depth x height)	1200×950×2300mm
	Weight	About 400kg
	Noise	< 75dB
	Protection level	IP20
	Allowable ambient temperature	-30~60°C (derating above 45°C)
	Cooling method	Air cooling
	Allowable relative humidity	0~95% (no condensation)
	Allowable altitude	3000M (derating will be applied if the bandwidth is greater than 3000m)
Communication parameters	Communication interface	RS485, Ethernet
	Communication protocol	Modbus TCP /RTU

2.3.4 Power Distribution Control Box

The power distribution control integrates multiple miniature circuit breakers and multiple power supply circuits. Its main function is to provide secondary auxiliary power distribution for the system and control the disconnection of the secondary power supply in each BC battery cabinet.

Figure 2-12 Power distribution control box (door closed)

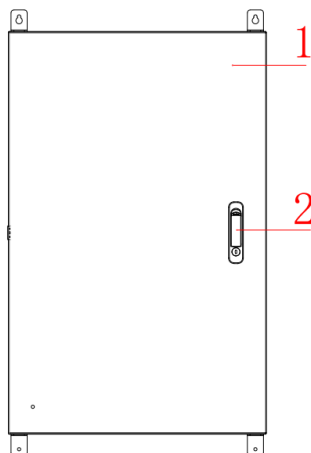


Table 2-16 Power distribution control box (door closed)

Position	Name	Description
1	Cabinet	Distribution box housing
2	Door locks	Open/Close the distribution box cabinet

Figure 2-13 Power distribution control box with 8 battery cabinets (door opened)

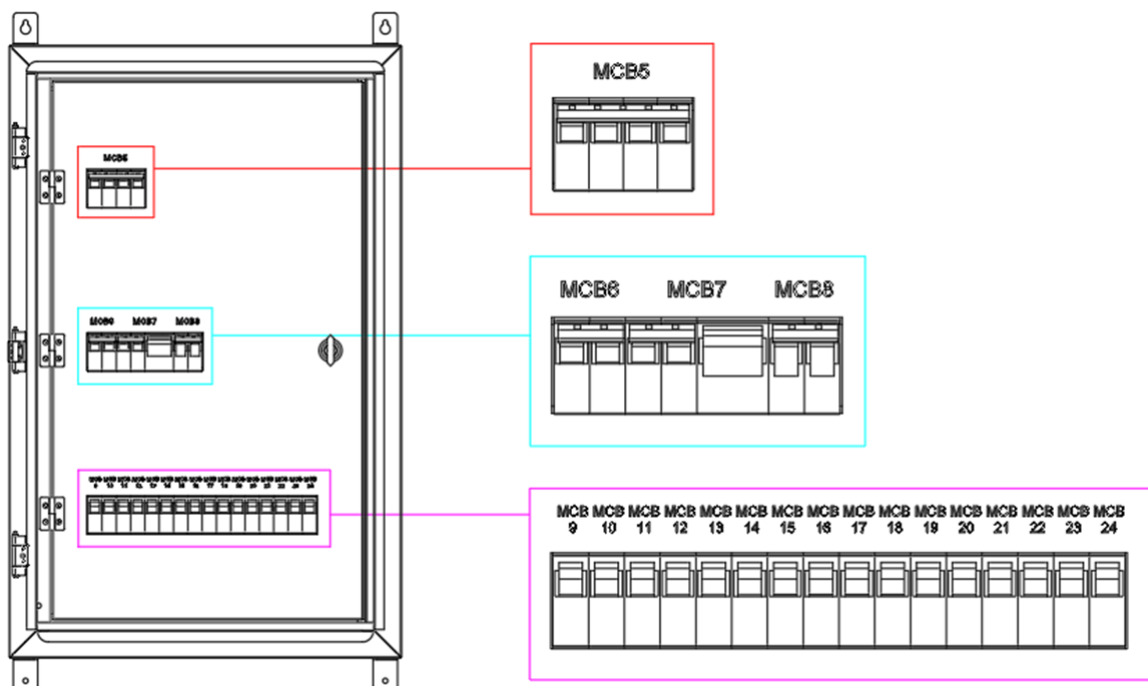


Table 2-17 Power distribution control box (door opened)

Position	Name	Description
1	MCB5	4P miniature circuit breaker, main switch for power supply circuits of air conditioners and fans, etc.
2	MCB6	Main switch for lighting, sockets, emergency lights, and fan power supply circuits
3	MCB7	Socket leakage protection switch
4	MCB8	Battery cabinet control circuit main switch
5	MCB9	No. 1 battery cabinet air conditioning circuit switch
6	MCB10	No. 2 battery cabinet air conditioning circuit switch
7	MCB11	No. 3 battery cabinet air conditioning circuit switch
8	MCB12	No. 4 battery cabinet air conditioning circuit switch
9	MCB13	No. 5 battery cabinet air conditioning circuit switch
10	MCB14	No. 6 battery cabinet air conditioning circuit switch
11	MCB15	No. 7 battery cabinet air conditioning circuit switch
12	MCB16	No. 8 battery cabinet air conditioning circuit switch
13	MCB17	No. 1 battery cabinet control circuit switch
14	MCB18	No. 2 battery cabinet control circuit switch
15	MCB19	No. 3 battery cabinet control circuit switch
16	MCB20	No. 4 battery cabinet control circuit switch
17	MCB21	No. 5 battery cabinet control circuit switch
18	MCB22	No. 6 battery cabinet control circuit switch
19	MCB23	No. 7 battery cabinet control circuit switch
20	MCB24	No. 8 battery cabinet control circuit switch

2.3.5 UPS and Transformer

The system control circuit is designed with a UPS power supply to ensure that the system control circuit can continue to supply power when the main power supply is cut off, avoiding data loss and fire power supply failure due to power outages. It provides short-term power support until the power is restored or switched to the backup power supply. In addition, an isolation transformer is installed at the front end of the UPS to provide electrical isolation, improve safety, reduce high-frequency noise and interference signals, and enhance the reliability and stability of the system control circuit.

Figure 2-14 UPS and transformer (front of PCS cabinet)

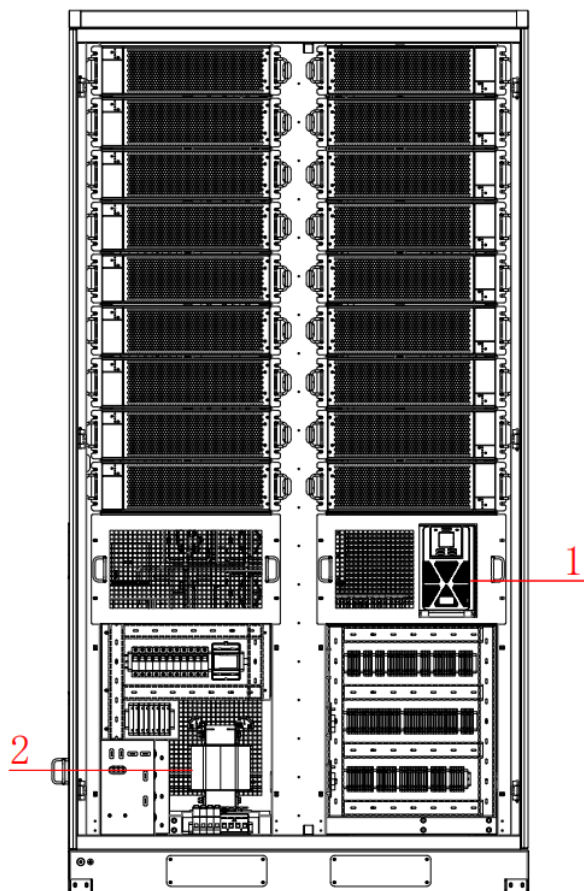


Table 2-18 UPS and transformer (back of PCS cabinet)

Position	Name	Description
1	UPS power supply	Rated voltage 220Vac, rated power 1600W
2	Isolation transformer	380V to 220V transformer, rated power 2000W

Figure 2-15 UPS operation panel

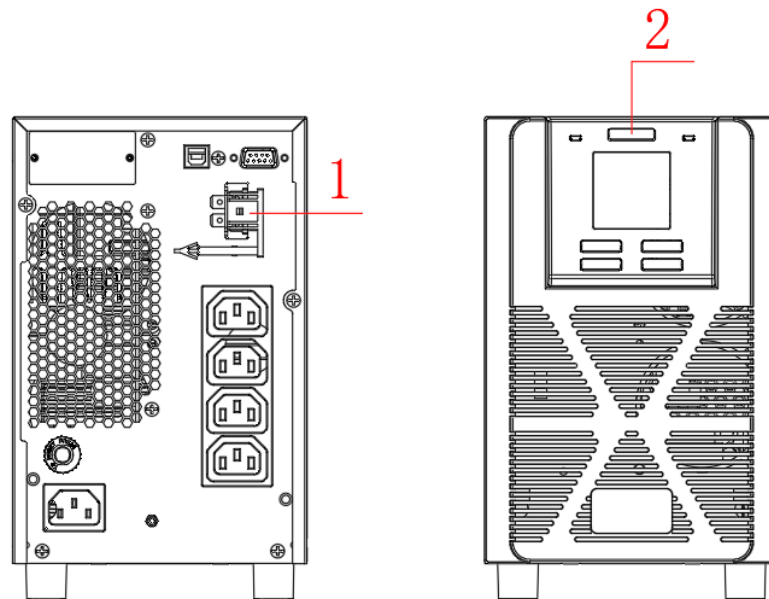


Table 2-19 UPS operation panel

Position	Name	Description
1	UPS battery latch	Need to be plugged in before using UPS
2	UPS start/stop button	Press and hold for 1-2 seconds to start or stop

UPS power supply usage details:

1. After arriving at the site, the battery plug must be inserted before use. There will be a slight sound when inserting, which is normal;
2. Confirm that the grid has power, confirm that the front micro-breaker is closed, and press and hold the UPS power button for 1~2 seconds to supply power to the load and charge the small battery inside the UPS;
3. If the power grid suddenly loses power, it will automatically switch to UPS power supply, and the system's control circuit will be powered normally until the UPS power is exhausted.

2.3.6 External Communication Interface

The external communication is designed inside the weak current box inside the PCS cabinet, mainly including 3 TCP interfaces and 1 RS485 interface.

During installation, open the bottom cover at the lower right corner.

Figure 2-16 External communication interface (terminal box on container side)

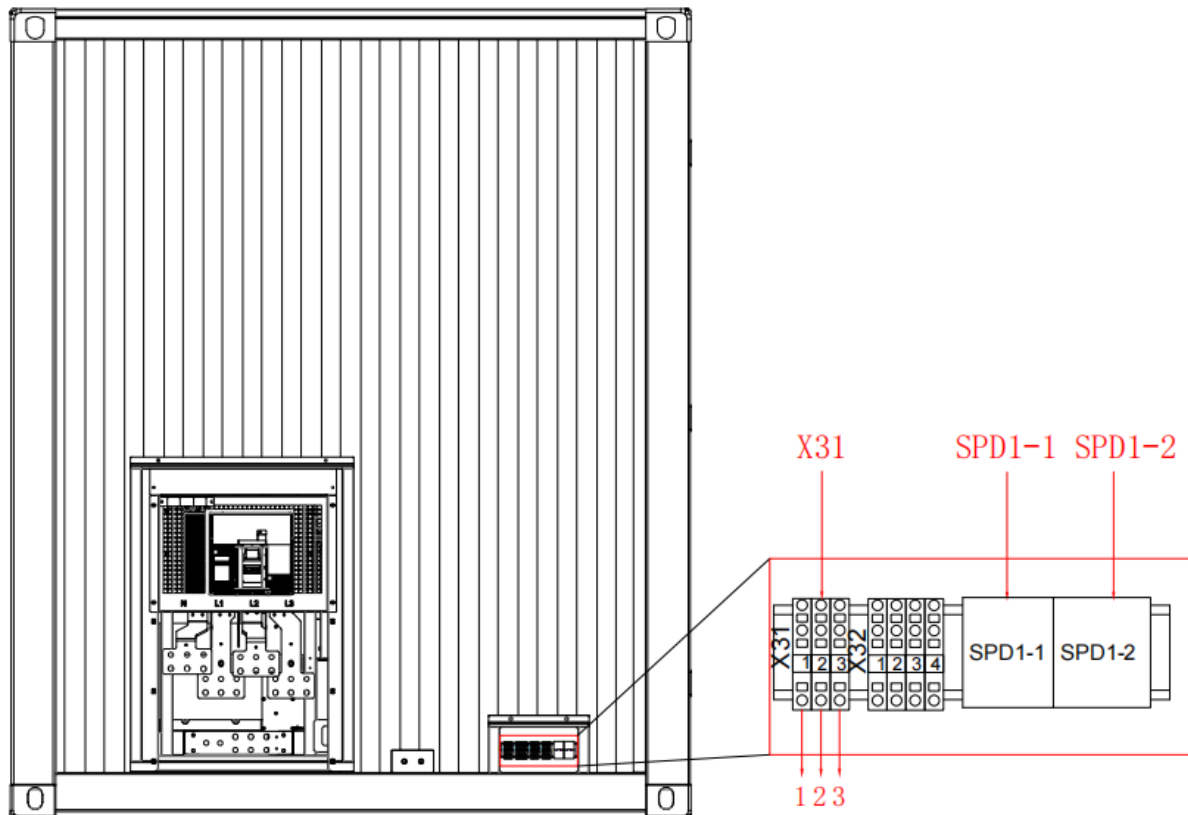


Table 2-20 External communication interface (external terminal box on container side)

Position	Name	Description
SPD1-1	Control network port lightning arrester	Used for customer scheduling control interface, the default IP is 192.168.1.100
SPD1-2	Network port lightning arrester	Used for system networking interface, can connect to the network, IP is automatically obtained by default
X31	Terminal block No. 1	RS485-A connection pin, local controller external RS485 communication
	Terminal block No. 2	RS485-B connection pin, local controller external RS485 communication
	Terminal block No. 3	RS485-G connection pin, local controller external RS485 communication

2.3.7 E-Stop DI and Fire DO Interface

The fire DO and emergency stop DI interfaces are designed inside the weak current box inside the PCS cabinet. When installing, open the bottom cover in the lower right corner.

Fire DO interface trigger conditions:

After the fire protection system in any battery cabinet is discharged, the dry contact signal changes from normally open to normally closed, and the external detection is closed.

Emergency stop DI interface trigger conditions:

Normally it is a normally open signal. When the external input closes the signal, it triggers the system to shut down urgently.

Figure 2-17 E-Stop DI and fire DO interface (external terminal box on container side)

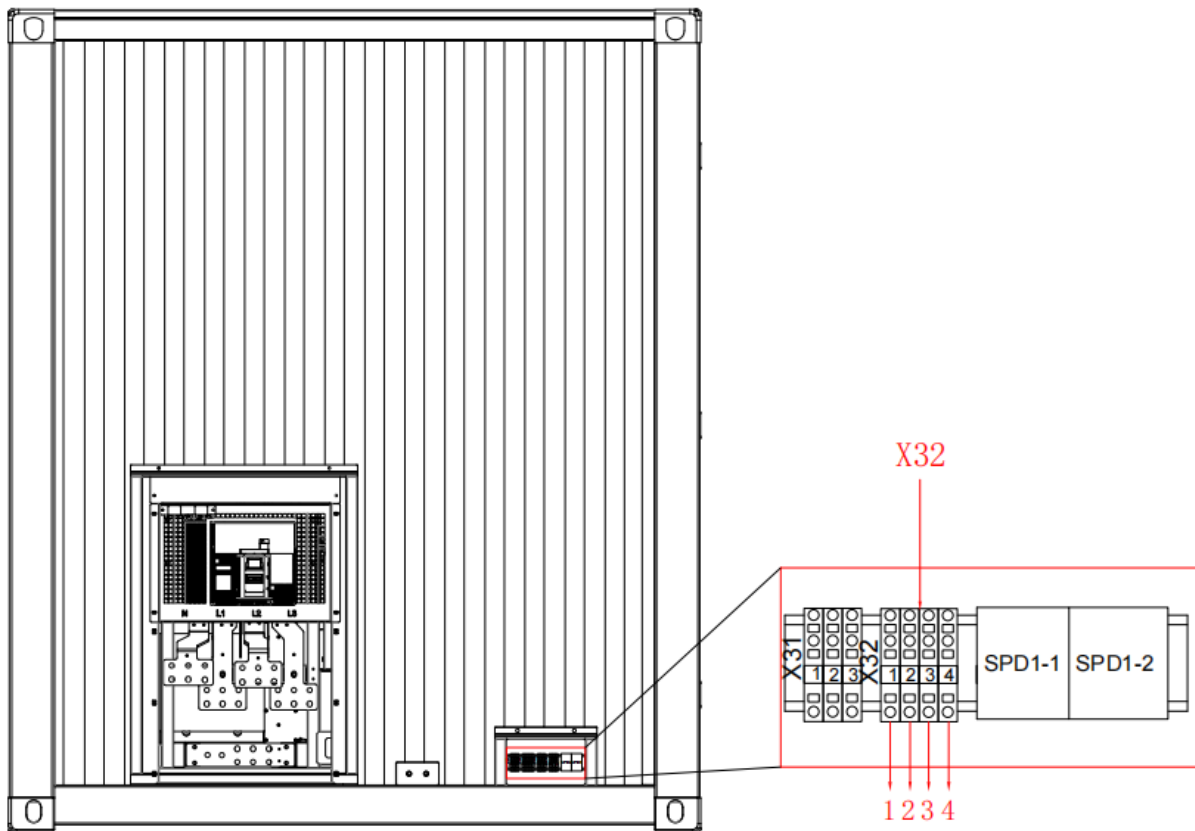


Table 2-21 E-Stop DI and fire DO interface (external terminal box on container side)

Position	Name	Description
X32	Terminal block No. 1	Emergency stop DI interface, passive dry contact NO (normally open)
	Terminal block No. 2	Emergency stop DI interface, passive dry contact C (common point)
	Terminal block No. 3	Fire DO interface, passive dry contact NO (normally open)
	Terminal block No. 4	Fire DO interface, passive dry contact C (common point)

Note: Passive dry contacts are switch signal interfaces without their own power supply, used to control and monitor the status of equipment. They connect or disconnect the circuit through mechanical relays or semiconductor switches, do not

output voltage, and only provide on/off status. Please note that voltage cannot be connected to this interface. Please pay attention to the signal type.

2.4 Electrical Schematic Diagram

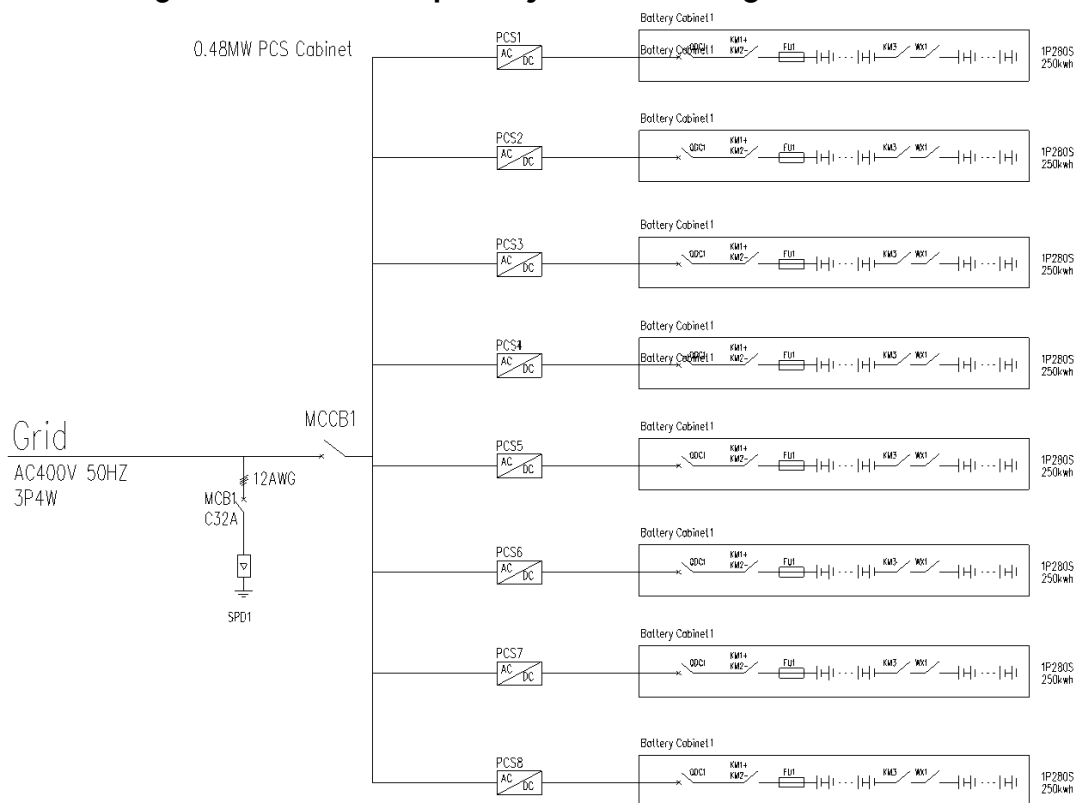
2.4.1 Electrical Primary Schematic Diagram

A single PowerMount containerized battery energy storage system is fully equipped with 8 battery cabinets and 1 PCS integrated cabinet. A single battery cabinet is composed of 14 modules of 1P280S battery units connected in series with an energy of 250.88kWh. The primary circuit access type is 3P4W+PE, and the rated voltage is 400Vac.

PCS Configuration (Rated Power: 480kW):

- PCS Modules: 8 units
- Battery Cabinets: 8 units
- Wiring Ratio: every 1 PCS modules connect to 1 battery cabinets

Figure 2-18 Electrical primary schematic diagram



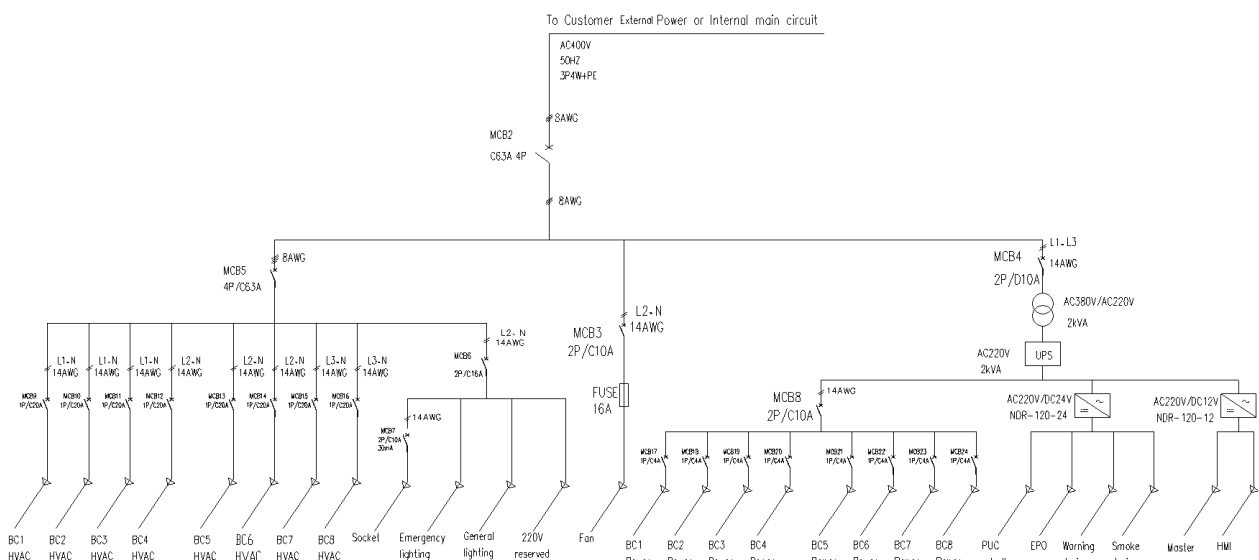
2.4.2 Secondary Control Schematic Diagram

A single PowerMount container battery energy storage system includes a set of distribution control box. The secondary circuit can draw power from the internal main circuit, or it can be directly connected from an external power source through the X1 terminal block. The control circuit draws power from the UPS rear end through a transformer; alternatively. The auxiliary isolation transformer is installed in the PCS cabinet.

The secondary circuit type is 3P4W+PE, and the rated voltage is 400Vac.

The figure below shows the auxiliary secondary schematic diagram of the system, where the air conditioning circuit switches for batteries 1 to 8 are MCB9 to MCB16, and the control circuit switches are MCB17 to MCB24. Battery cabinets can be selected based on actual power requirements.

Figure 2-19 Secondary control schematic diagram



2.5 Network Application

2.5.1 Grid-connected Application Scenarios

Figure 2-20 Single unit electrical connection diagram

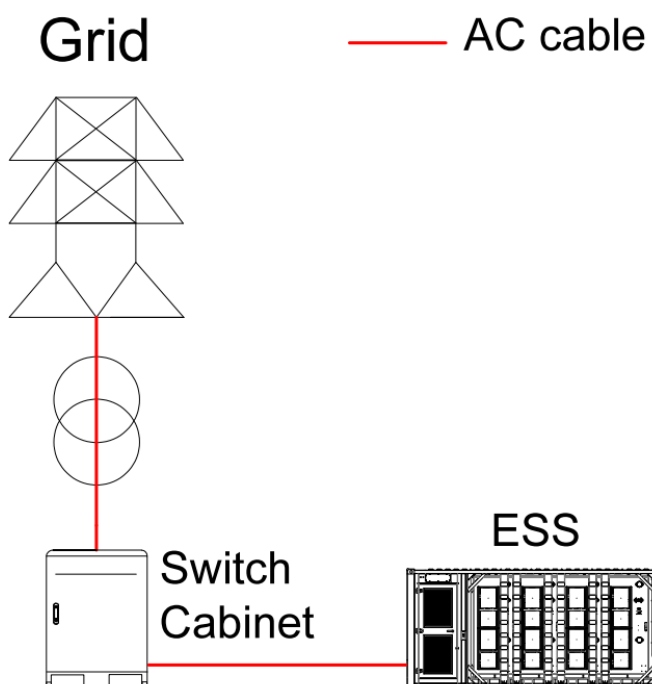
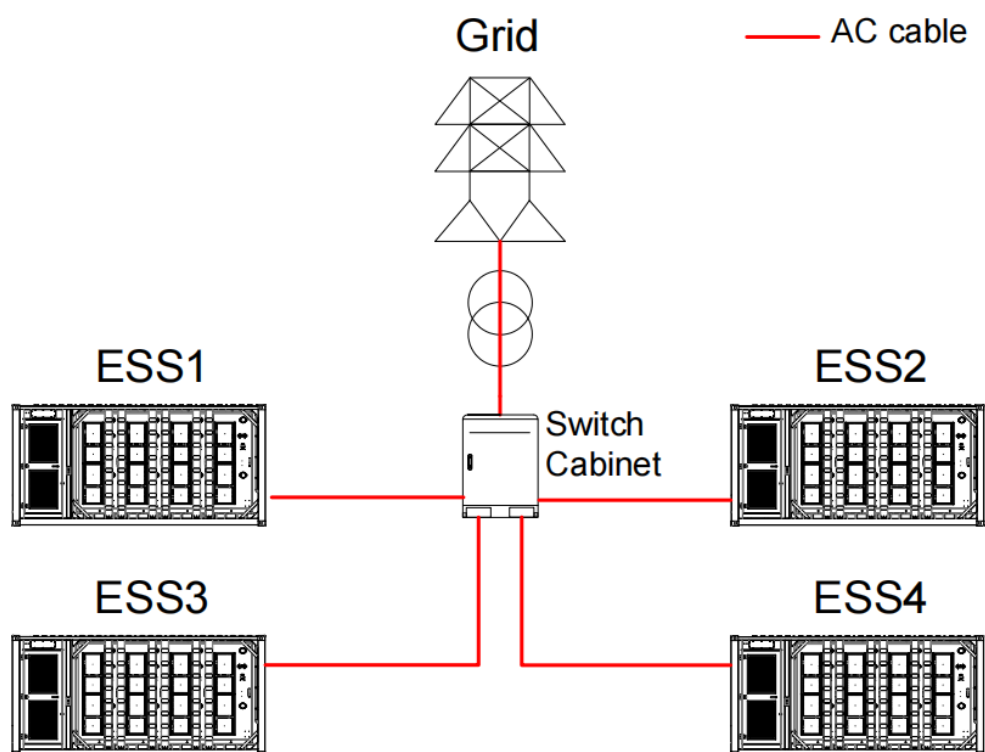


Figure 2-17 Multi-unit parallel connection diagram



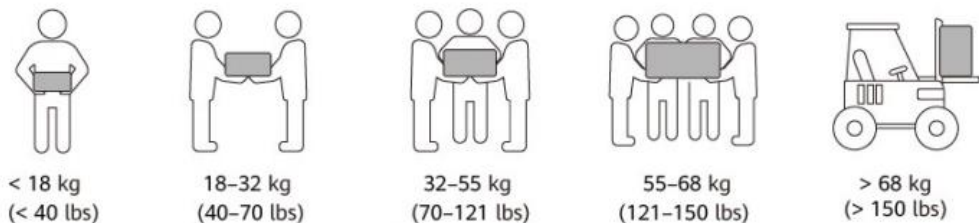
Note:

- The power distribution cabinet, switch cabinet and external cables are provided for external connection.

- The number of distribution cabinets and switch cabinets varies according to the actual load capacity. The diagram is only for reference of power cable connection.
- The picture shows only 4 ESS containers. In fact, there is no limit on the number of grid-connected containers. This is just for illustration.
- The external switch cabinet/transformer shown in the figure is for reference only. In fact, the switch cabinet/transformer can be equipped according to the project plan.

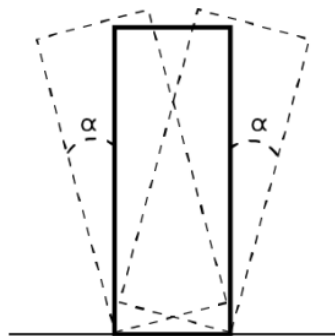
3 Shipping Requirements

- Containers are mainly transported across borders by sea and are suitable for long-distance transportation of bulk goods.
- Containers can also be transported by rail or road for transshipment or final distribution inland at the destination.
- Container transportation needs to be protected and fixed with tarpaulins, net ropes and other devices to ensure that it does not move during transportation to avoid damage to the goods or transportation accidents.
- Regardless of the method, it is necessary to ensure that the container does not move during transportation to avoid damage to the goods or transportation accidents.
- When the container needs to be hoisted, please carefully read the requirements and precautions for hoisting in Chapter 7.2.
- When carrying heavy objects, you should be prepared to bear the weight to avoid being crushed or sprained by the heavy objects.



- When multiple people are carrying heavy objects at the same time, they need to consider factors such as height, make reasonable personnel allocation and division of labor, and ensure balanced weight distribution.
- When two or more people are carrying heavy objects together, one person should be in charge and they should lift or put down the equipment at the same time to ensure a unified pace.
- When moving equipment by hand, you should wear protective gloves, work shoes and other safety protection equipment to avoid injury.
- When carrying equipment by hand, first get close to the object, squat down, and use the strength of your legs to lift the object slowly and steadily. Do not use the strength of your back to lift the object suddenly or twist your torso.
- When moving or lifting the device, hold the device handle or support the bottom edge of the device instead of the handle of the module installed in the device.

- Do not lift heavy objects above waist height quickly. Place the heavy object on a workbench at half waist height or in a suitable place first, adjust the position of your palms, and then lift it.
- When moving heavy objects, you must use balanced and steady force; the moving speed must be uniform and slow; positioning must be smooth and slow to avoid any impact or falling that may scratch the surface of the equipment or damage the equipment's components and cables.
- When carrying heavy objects, be especially careful of workbenches, slopes, stairs and places where it is easy to slip. When carrying heavy objects over thresholds, make sure the door is wide enough for the equipment to pass through to prevent bumps or scratches on your fingers.
- When transferring heavy objects, move your feet instead of twisting your waist. When you need to lift and transfer heavy objects at the same time, point your feet in the direction you want to move them before carrying them.
- When using a forklift to transport, the forklift must be in the middle position to prevent tipping over. Before moving, please fasten the equipment to the forklift with ropes; during moving, special personnel are required to supervise.
- The tilt angle of the cabinet should comply with the requirements shown in the diagram. The tilt angle with packaging is $\alpha \leq 15^\circ$, and the tilt angle after removing the packaging is $\alpha \leq 10^\circ$.



- During the process of handling and transporting the air conditioner, the air conditioner must be kept upright. It is forbidden to lay the air conditioner flat or upside down. If the air conditioner packaging is damaged or the overturned label on the air conditioner packaging changes color, please contact our service engineer for confirmation.

Shipping requirements

	Rough loading and unloading are prohibited, otherwise it may cause battery short circuit, damage (leakage, rupture, etc.), fire or explosion, etc.
	Do not carry the battery by its terminals, bolts or cables to avoid damaging the battery. The battery should be transported in the direction required. It is prohibited to invert, tilt, drop, mechanically impact, expose to rain or snow, or drop into water.

- The battery has passed the certification of UN38.3 (UN38.3: Section 38.3 of the sixth Revised Edition of the Recommendations on the Transport of Dangerous Goods: Manual of Tests and Criteria) and SN/T 0370.2-2009 "Export Dangerous Goods Packaging Inspection Procedure Part 2 Performance Inspection". This product belongs to Class 9 dangerous goods.
- Transportation service providers must be qualified to transport dangerous goods, and the use of convertibles is strictly prohibited.
- The battery can be directly delivered on site to meet the transportation requirements of cars, ships, etc.
- Comply with international dangerous goods transportation regulations and meet the regulatory requirements of transportation regulatory authorities in the country of departure, transit and destination.
- When transporting, choose sea transportation or roads with good road conditions. Railway and air transportation are not supported. Bumping and tilting should be minimized during transportation.
- Sea transportation must comply with the transportation requirements of the International Maritime Dangerous Goods Code (IMDG Code).
- Land transportation shall comply with ADR or JT/T 617 transportation requirements.
- Before transportation, check that the battery packaging is intact and has no odor, leakage, smoke, fire, etc. Otherwise, transportation is prohibited.
- The transport packaging box must be sturdy and should be handled with care and moisture-proof measures during loading, unloading and transportation.
- When moving batteries, be careful to handle them with care, avoid bumping or bumping them, and pay attention to personal safety.
- Unless otherwise specified, dangerous goods cannot be mixed with goods containing food, medicine, animal feed and their additives in the same vehicle or container.
- Unless otherwise specified, when dangerous goods packages are loaded with ordinary goods in the same vehicle or container, they should be isolated in one of the following ways:
 - Use spacers that are the same height as the packages.
 - Maintain a minimum distance of 0.8m on all sides.
- Before transporting faulty batteries (carbonization, leakage, swelling, water ingress, etc.), the positive and negative terminals of the batteries must be insulated. After packaging, place them in an insulated explosion-proof box as soon as possible, and make a record on the outer box, including site name, address, time, phenomenon and other information.
- When transporting faulty batteries away from the site, avoid flammable storage areas, residential areas, or other places where people gather easily, such as public transportation or elevators.

4 Storage Requirements

General requirements

- During the storage period, relevant certificates that comply with product storage requirements must be kept, such as temperature and humidity data, environmental photos, and inspection reports.
- Long-term storage of battery packs is not recommended. Long-term storage of lithium batteries will cause capacity loss. After 12 months of storage at the recommended storage temperature, the irreversible capacity loss of lithium batteries is generally 3%~10%.
- After long-term low-temperature storage at high altitudes, the air conditioner will heat the battery to a certain temperature when the power is turned on before charging and discharging can begin.
- After storage, check whether there is condensed water in the cabinet. Dry it before powering on. Otherwise, it will cause short circuit damage to the battery or electrical components.
- Store in a clean and dry place and avoid dust and water vapor. Do not expose to rain or ground water.
- The ambient air must not contain corrosive or flammable gases.
- Do not store it tilted or upside down.
- When the storage time of equipment other than battery pack is two years or more, it needs to be inspected and tested by professionals before it can be put into use.

Energy storage system storage and recharging

- During long-term storage, it is prohibited to remove the packaging.
- Storage (long-term or temporary) should be on a flat surface.
- The cabinet door must be closed tightly.
- Storage environment requirements:
 - Environment: dry, ventilated, clean, avoid contact with corrosive substances, and the distance from heat sources must not be less than two meters.
 - Short-term storage: $-20^{\circ}\text{C}\sim+60^{\circ}\text{C}$ (<1 month).
 - Long-term storage: $0^{\circ}\text{C}\sim 35^{\circ}\text{C}$ (<1 year) (Long-term storage will affect the performance and service life of the battery).
 - Relative humidity: 5% RH~95% RH (around 45% RH recommended).
- If the system is not used for a long time, please turn off the system, otherwise it may cause battery over-discharge.

- If the system is not used for a long time, regular inspections are also required to check the system appearance, battery power, UPS power, etc.
- If the system is not used for a long time, please charge the system equipment every 3 months to keep the battery SOC above 30%.
- If the battery storage period has expired, it should be reported promptly.
- If the battery is deformed, damaged or leaking, it should be scrapped directly without considering the storage time.

Recharging operation instructions

- Connect the system to the power grid. If there is no power grid, use power generation equipment such as diesel engines (confirm with the supplier) and use the HMI control system to perform low-power charging until the SOC is greater than 30%.
- If there is UPS function, the UPS small battery needs to be recharged. Connect the system to the power grid regularly every three months and open the secondary distribution circuit breaker of the system. At this time, the UPS switch power supply will charge the small battery, and the charging time shall not be less than 2 hours.

5 Site Requirements

5.1 Site Selection Requirements

NOTICE

NOTICE!

The following site selection recommendations refer to the "GB 51048 Design Code for Electrochemical Energy Storage Power Stations", "GB 50016 Code for Fire Protection Design of Buildings", "NFPA 855 Standard for the Installation of Stationary Energy Storage Systems" and other specifications. The specific details still need to comply with relevant local regulations.

5.1.1 General Requirements

- The installation level should be higher than the historical highest water level in the area and at least 300mm higher than the horizontal ground. The installation location cannot be in a low-lying area.
- The energy storage system or energy storage power station must be set up in an environment without the risk of combustion or explosion.
- The site has convenient transportation conditions and reliable fire suppression system equipment.
- The installation, commissioning and operation phases of the energy storage system should comply with the principle of fire protection first: ≥ 2 gas fire extinguishers should be installed near each unit, such as heptafluoropropane, perfluorohexanone, and carbon dioxide.
- Please reserve a water fire extinguishing system interface at the energy storage system site.
- The site area must meet the requirements in the near term and should leave room for expansion based on the needs of the entire life cycle.
- The energy storage system should be installed at a location greater than 30m away from third-party wireless communication facilities.
- Choose a well-ventilated place.

Site selection should avoid scenarios that are not recommended by industry standards and regulations, including but not limited to the following locations, regions, and places:

- Areas with strong vibration, strong noise sources and strong electromagnetic field interference.
- Places where dust, oil smoke, harmful gases, corrosive gases, etc. are generated or present.
- Places where corrosive, flammable, or explosive items are produced or stored.
- Places with existing underground facilities.
- Unfavorable geological conditions such as rubber soil, soft soil layers, and ground that is prone to water accumulation and sinking.
- Under water reservoirs, water features, and water intake rooms. If it is unavoidable to install it in a place where water may accumulate, water retaining and drainage facilities or measures to raise the ground should be set up.
- Cable trenches should not be used as drainage channels, and openings for cable routing (such as holes where cables pass through partition walls and floor slabs) should be fire-blocked.
- Earthquake faults and earthquake zones with a fortification intensity higher than nine degrees.
- Areas with direct hazards such as mud-rock flows, landslides, quicksand, and caves.
- Within the boundaries of the mining subsidence (dislocation) area.
- Within the explosion danger area.
- Areas that may be flooded if a dam or dike fails.
- Important water supply source sanitary protection areas.
- Historical and cultural relics protection area.
- Crowded places, high-rise buildings, and underground buildings.
- Intersections and busy traffic sections of urban main roads.

Site selection and flood control requirements:

- The design elevation of the station site of a large-scale electrochemical energy storage system (power $\geq 100\text{MW}$) should be higher than the flood water level with a frequency of 1% or the highest historical waterlogging water level.
- The design elevation of the station site for medium and small electrochemical energy storage systems (power $<100\text{MW}$) should be higher than the flood water level with a frequency of 2% or the highest historical waterlogging water level.
- When the design elevation of the station site cannot meet the above requirements, another site should be selected, or different flood and waterlogging prevention measures should be taken according to different situations.
- For energy storage power stations along rivers, lakes, seas and other places affected by wind and waves, the elevation of flood control facilities should take into account the wind and wave height with a frequency of 2% and a safety overheight of 0.5m.
- When a large amount of water flows into or passes through the base from the periphery of the base, it is advisable to set up side ditches or drainage (interception) ditches to carry out surface drainage in an organized manner.

5.1.2 Outdoor Requirements

The general requirements for outdoor energy storage system site selection are as follows:

- There should be no vegetation or flammable plants within 3m of the installation site of the energy storage system or energy storage power station to prevent wildfires caused by high temperatures in summer from causing fires in the energy storage system. (Exemption clause: Single specimens of trees, shrubs or cultivated ground covers that are not likely to transmit fire, such as green grass, ivy, succulent plants or similar plants used as ground covers, should be exempted.)
- The safe distance between the energy storage system and the building should comply with local fire regulations or standards.

Energy storage systems located outdoors should be at least 10 feet (3.048m) away from boundaries, public roads, buildings, flammable materials, hazardous materials, high piles, parking spaces, and other hazardous objects not related to the grid infrastructure.

When one of the following conditions is met, the distance between the energy storage system and the production building can be reduced to 0.914m, and the space requirements for equipment transportation, installation, maintenance, etc. need to be considered.

- The energy storage system has an independent fire wall with a fire resistance of 1h. The length and height of the fire wall should exceed the outer contour of the energy storage system by 1.5m respectively.
- The walls near the energy storage system are provided with non-combustible exterior walls, with no openings or combustible exterior finishes, and the fire resistance rating of the exterior walls meets the 2h fire resistance rating of ASTM E119 or UL 263.

The distance between the exhaust device of the energy storage system and the heating, ventilation, air conditioning air inlets, windows, doors, unloading platforms and fire sources of other buildings or facilities should be greater than 4.6m.

The energy storage system will be corroded if installed in salt-damaged or polluted areas. Please do not install the energy storage system in salt-damaged or polluted areas. The energy storage system can be used in the following or better environments:

- Outdoor environment more than 10km from the coast. It is not recommended to use energy storage system when the distance is 2km~10km from the coast (if it is necessary to use it, please confirm with the dealer or our engineers). When the distance is less than 2km from the coast, it shall not be deployed outdoors and shall be deployed indoors according to indoor requirements.
- The distance to heavy pollution sources such as smelters, coal mines, thermal power plants, etc. is greater than 5,000 meters.
- The distance to moderate pollution sources such as chemical, rubber, and electroplating is greater than 3,000m.

- The distance to light pollution sources such as food, leather, heating boilers, slaughterhouses, centralized garbage dumps, and sewage treatment stations is greater than 500m to 1000m.

It is recommended to use a solid wall or fence to isolate and protect the energy storage equipment area. The fence should have a door lock and the height of the fence should be > 2.2m, the fire wall can replace part or all of the perimeter wall, and the designer can make comprehensive considerations.

Note: When the safety distance of the selected site cannot meet the requirements of relevant standards, it is recommended to reselect the site.

5.2 Space Requirements

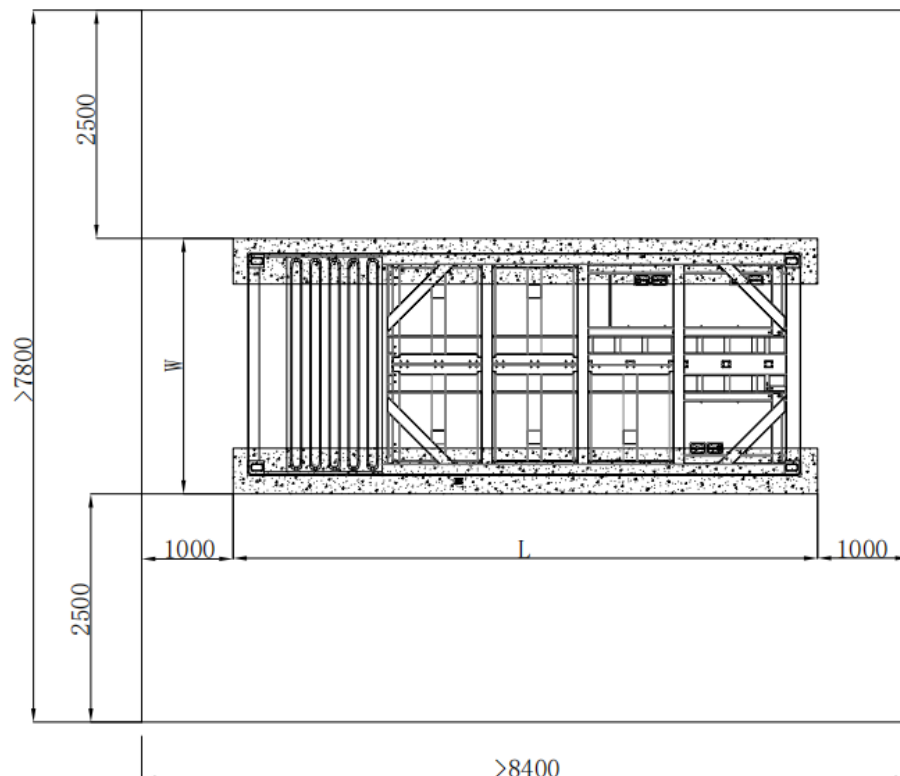
NOTICE

NOTICE!

The following figure shows the minimum space requirements for installation and operation. The equipment space requirements must also meet the site selection requirements (see 5.1).

Figure 5-1 Space requirements for PowerMount

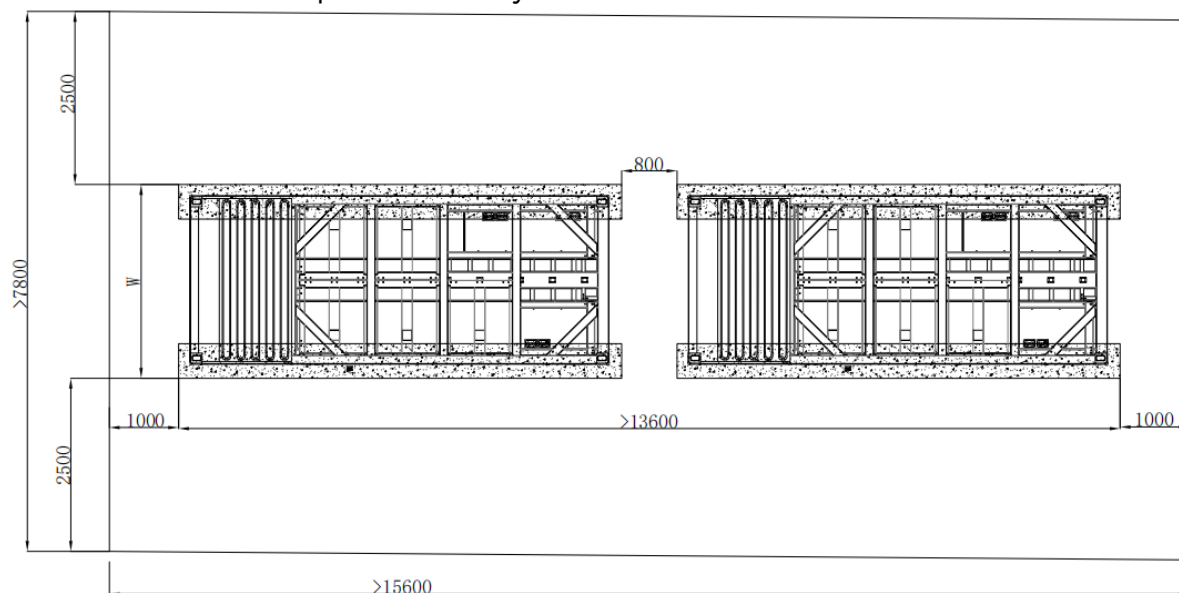
Minimum installation space: 8400mmX7800mm



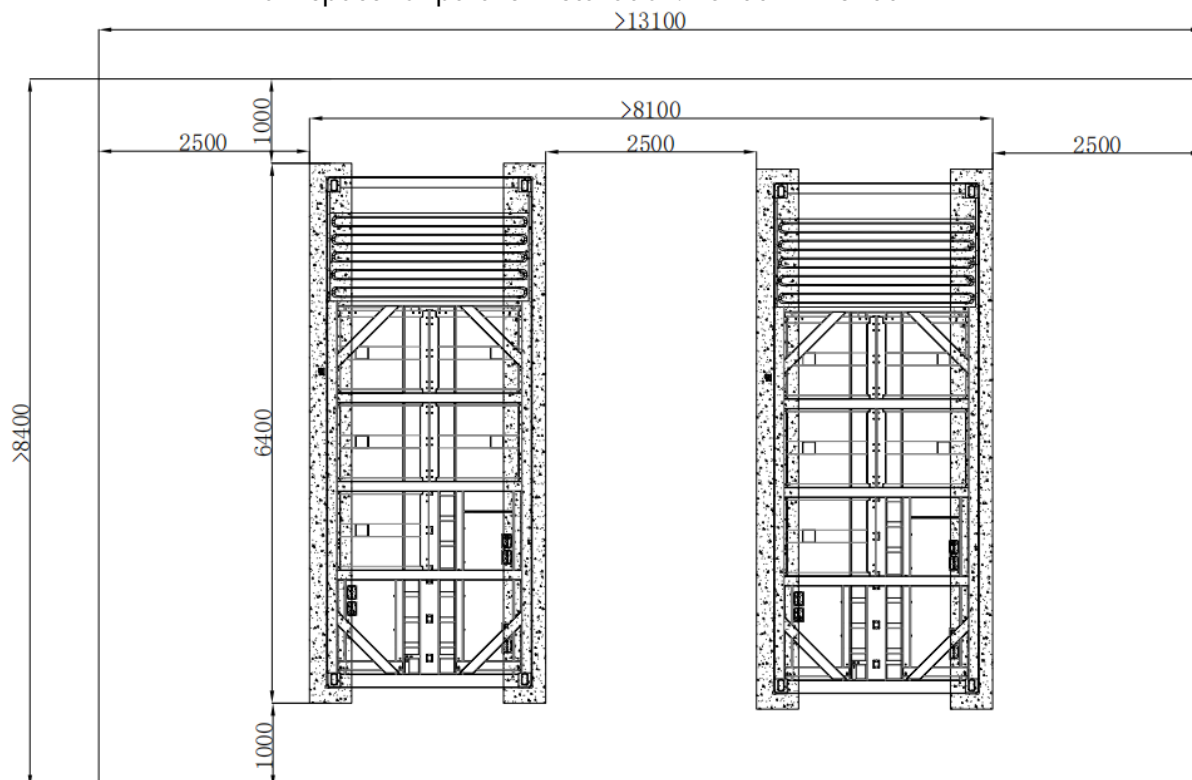
Item	Parameters
Minimum hardening area at the bottom	$L \geq 6500\text{mm}$, $W \geq 3000\text{mm}$

Figure 5-2 Space requirements for 2 PowerMount

Minimum space for side-by-side installation: 15600mmX7800mm



Minimum space for parallel installation: 13100mmX8400mm



5.3 Foundation Requirements

Requirements for foundation design:

- The energy storage system must be installed on concrete or other non-combustible surfaces. The installation surface must be level, firm, flat, and have sufficient bearing capacity. No dents or tilts are allowed.
- The surface of the container base needs to consider the design of cement "convex" pads. The purpose is that after the four corner fittings are fixed, the bottom beam can remain level with the corner fittings so that the force on the container is balanced. For details, see the container foundation diagram and instructions.
- The equipment foundation is configured according to the total weight of the equipment. If the foundation bearing capacity is not met, it needs to be reviewed.
- The bottom of the foundation pit of the equipment foundation must be compacted and filled.
- After the excavation of the equipment foundation, it is strictly forbidden to disturb it with water. If it is disturbed with water, excavation should be continued and replacement should be carried out.
- The horizontal error between the equipment foundation and the cabinet contact surface is $\leq 3\text{mm}$.
- The foundation must be higher than the local historical highest water level and at least 500mm above the horizontal ground.
- Drainage facilities should be built in accordance with local geology and municipal drainage requirements to ensure that no water accumulates at the foundation of the equipment. The foundation construction should meet the drainage requirements of the local maximum historical rainfall, and the discharged water needs to be treated in accordance with local laws and regulations.
- When constructing the equipment foundation, it is necessary to consider the cable outlet of the energy storage system and reserve trenches or cable entry holes.
- The reserved holes in the equipment foundation and the cable inlet holes at the bottom of the equipment should be sealed.
- The foundation diagram cannot be used as the final construction drawing and is for reference only. Users must review the basic design parameters of the energy storage system according to the project site's installation environment, geology, and earthquake resistance requirements, and rely on local units with relevant qualifications to provide construction drawings.

6 Unpacking and Acceptance

NOTICE

NOTICE!

- Upon arrival of the container, check whether the appearance is intact, without damage, rust or paint peeling. If there is paint peeling or damage, please notify the transporter and manufacturer.
- To avoid the equipment from tipping over, please do not remove any structural parts on the container during the lifting phase.
- Once the device is placed, carefully remove the packaging to avoid scratching the device. Keep the device stable during the removal process.
- After unpacking, please check whether the fastening components and detachable parts are loose. If so, please notify the transporter and manufacturer immediately.
- If the installation environment is poor, please take dust and condensation prevention measures after removing the packaging (such as using a dust cover, plastic film or textile cover) to avoid condensation or dust corrosion inside the battery.
- Check that the equipment label is clearly visible. If the label is damaged, please notify the manufacturer.

7

Installing Equipment

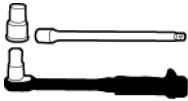
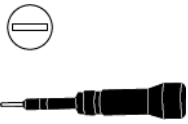
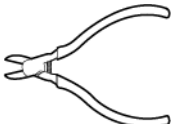
7.1 Preparation before Installation

7.1.1 Preparing Tools



- The tools shown in the pictures are for reference only. Please refer to the actual objects.
- Due to different on-site conditions, this tool list cannot fully list a few tools that may be used. Please ask on-site installers and users to prepare unlisted tools according to actual conditions.

Table 7-1 Installation tools

 Phillips Insulated Torque Screwdriver	 Insulated Torque Socket Wrench (Including extension bar) • Socket specifications: 7mm~19mm • Socket depth ≥ 32mm • Sleeve interface and torque • Matching with torque wrench • Torque range: 1.2N·m~45N·m	 Slotted Insulated Torque Screwdriver	 Diagonal Nose Pliers
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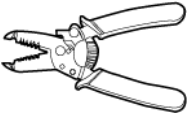
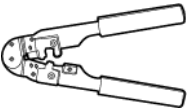
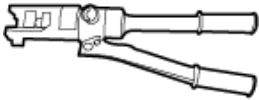
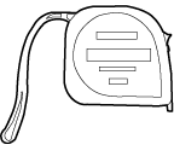
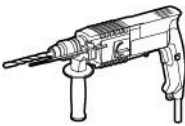
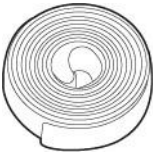
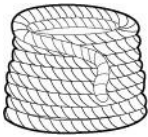
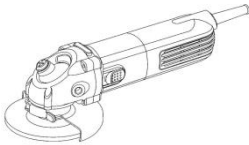
 Wire Strippers Pliers	 Wire Cutting Pliers	 Rubber Hammer	 Knife
 Crystal Head Crimping Pliers	 Hydraulic Pliers	 Multi-meter DC Voltage Range $\geq 1500V$ DC	 Marking Pen
 Steel Tape Measure	 Horizontal Ruler	 Vacuum Cleaner	 Impact Drill
 Impact Drill	 Heat Shrink Tubing	 Hot Air Gun	 Wire Tie
 Insulation Ladder	 Crane	 Lanyard Rope Rope length $\geq 1,845mm \times 4$	 Electric Forklift
 Grinder	-	-	-

Table 7-2 Personal protection tools

 Insulated Gloves	 Protective Gloves	 Goggles	 Dust Mask
 Insulated Shoes	 Reflective Undershirt	 Safety Helmet	 Safety Belt

7.1.2 Pre-installation Inspection



When removing the outer packaging, please take protective measures for climbing and high-altitude operations.

Check the outer packaging

Before unpacking the device, check the packaging for visible damage, such as holes, cracks, or other signs of possible internal damage, and check the device model. If there are any packaging abnormalities or the device model does not match, do not unpack it and contact your dealer as soon as possible.



It is recommended to remove the outer packaging of the equipment within 24 hours before installation.

Check the delivery

After unpacking the device, check that the delivery checklist is complete and that there is no obvious damage. If anything is missing or damaged, contact your dealer.



For the number of items delivered with the box, please refer to the Packing List in the box.
Please keep the key properly after use.

After opening the door, please check the delivery items and quantity according to the "Packing List". If there is anything missing, please contact your dealer as soon as possible for confirmation.

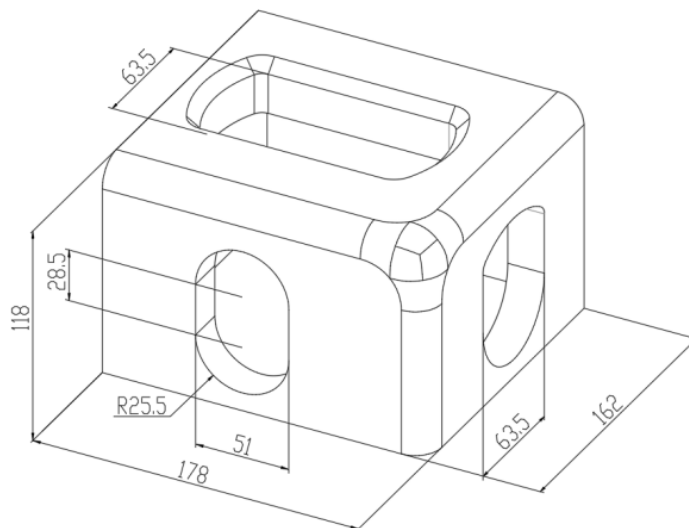
In general, the spare parts list is not the seller's asset and is only temporarily stored as after-sales spare parts.

7.2 Installing ESS

Lifting requirements

- Before lifting, ensure that the crane and lifting rope meet the load-bearing requirements and must not be less than the weight of the container itself.
- When installing or disassembling the hoisting equipment, do not drag on the cabinet to avoid scratching the cabinet.
- Avoid subjecting the container to torque during the lifting process; the ground involved in the crane route should be hardened, and steel plates and other materials should be laid when the crane passes over the existing road surface.
- Before lifting, you need to carefully read and fully understand the safety instructions in the manual.
- Please follow the lifting method recommended in the manual. Incorrect lifting method may cause deformation or damage to the equipment.

Figure 7-1 Lifting bracket



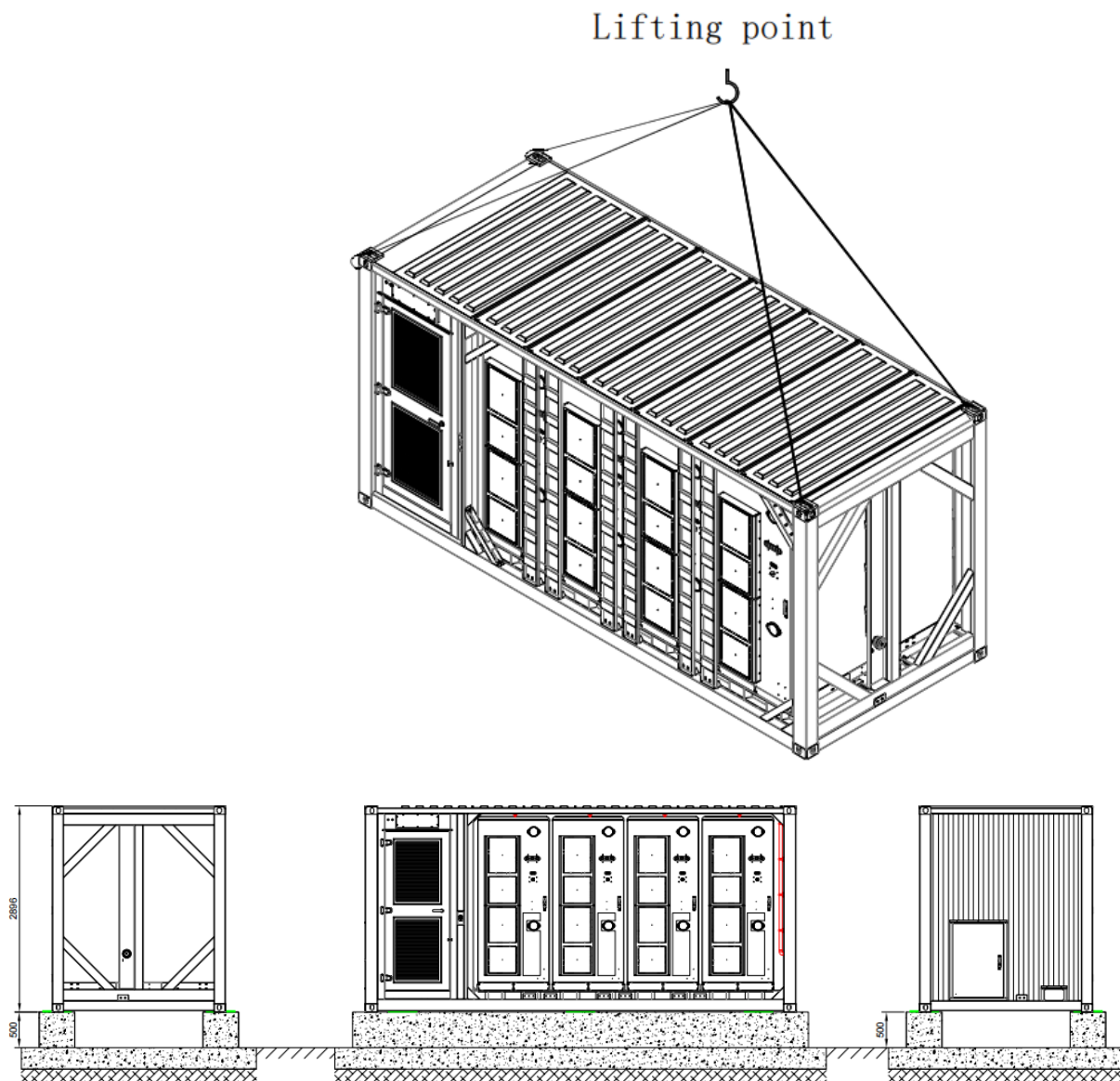
The container hanging points should be selected from the four load-bearing lifting brackets on the top of the container. The main points to note are:

- This lifting method is recommended, but not limited to this method. Users can choose the best lifting method based on actual conditions.

- Recommended number of cranes: 1 crane with a load capacity of no less than 30t is required.
- Select appropriate wire rope according to the size of the lifting brackets and use lifting equipment to fix the four lifting brackets of the container.

Use lifting equipment to lift the container onto the pre-prepared base. The effect is shown in the figure below. Align all points on the container and the base.

Figure 7-2 Container lifting

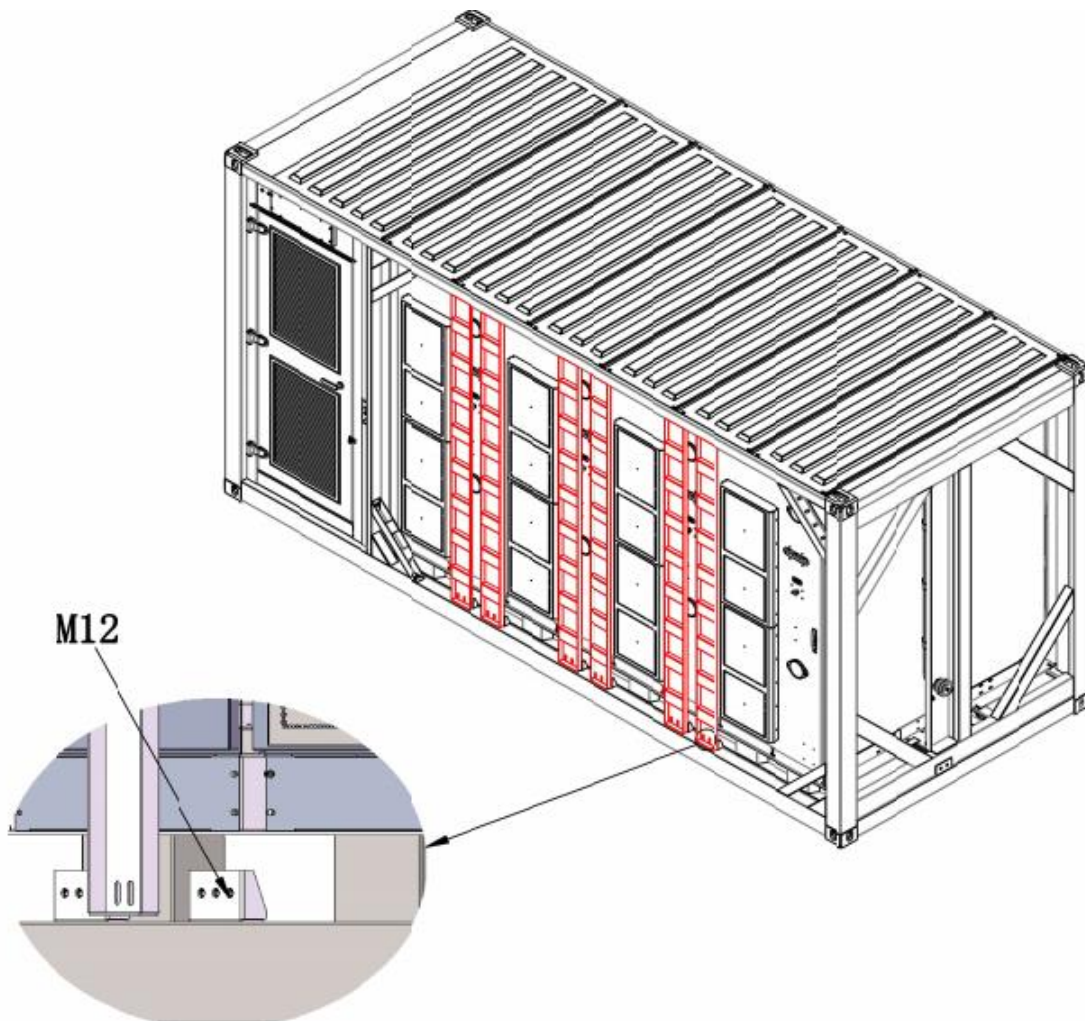


After the equipment is hoisted, please check:

- Whether all four lifting brackets of the container are placed on the concrete support.
- Whether the doors of the container and battery cabinet can be opened and closed normally;

- After the container is installed and fixed on site, ensure that the container no longer needs to be hoisted or moved. At this time, the ground adapter needs to be removed before the battery cabinet door can be opened for subsequent operations. See the figure below for details.

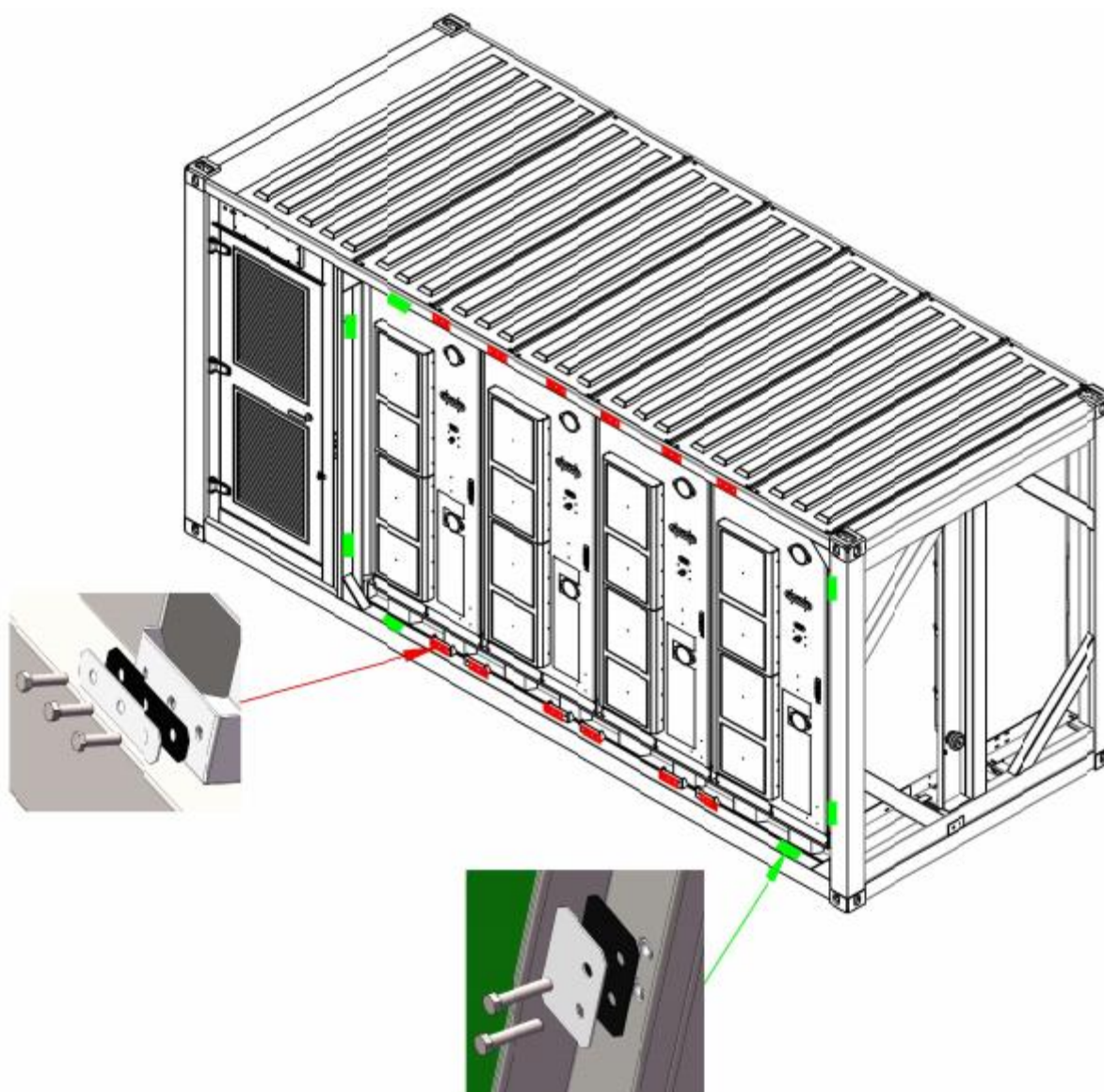
Figure 7-3 Dismantle ground adapter



Note: Please keep the dismantled ground adapter properly. They must be reinstalled during the secondary transportation to avoid serious falling accidents caused by tilting during lifting!

After removing all ground adapters and transport diagonal braces, install anti-corrosion washers and plates to prevent water from entering the bolt holes and causing rust; an M12 socket wrench is required, as shown in the figure below:

Figure 7-4 Install anti-corrosion washer



Note: After installation, white silicone sealant should be used to seal the space between the screws and the anti-corrosion plate, and the sealant should be used to completely cover the bolt head and edges. The green part in the figure represents double holes, and the red part represents three holes.

8

Installing Cables

 DANGER!	Before connecting, make sure the AC cable wiring phase sequence is correct, refer to the wiring diagram in the document. Short circuit may cause death or serious equipment damage.
 WARNING!	Tighten the fastening screws of the copper busbar or cable according to the torque specified in the text, and regularly check whether they are tightened, whether there is rust, corrosion or other foreign matter, and clean them. Otherwise, loose connection of the screws will cause excessive voltage drop in the connection, and even generate a lot of heat and burn the battery when the current is large.
 CAUTION!	When making cables, be sure to stay away from the equipment to prevent cable debris from accidentally entering the equipment and causing fire, personal injury and equipment damage.
 NOTE!	The cable colors involved in all electrical connection diagrams in this chapter are for reference only. The selection of cables should comply with local cable standards (yellow-green two-color wire can only be used for protective grounding).

8.1 Preparing cables

 NOTE!	The selection of cable diameter should comply with local cable standards. Factors affecting cable selection include: rated current, cable type, laying method, ambient temperature, cable laying length and line loss. The project site should be laid according to local standards and the guidance and suggestions provided by relevant power departments. The following table is the recommended cable for a normal ambient temperature of 25°C, for reference only.
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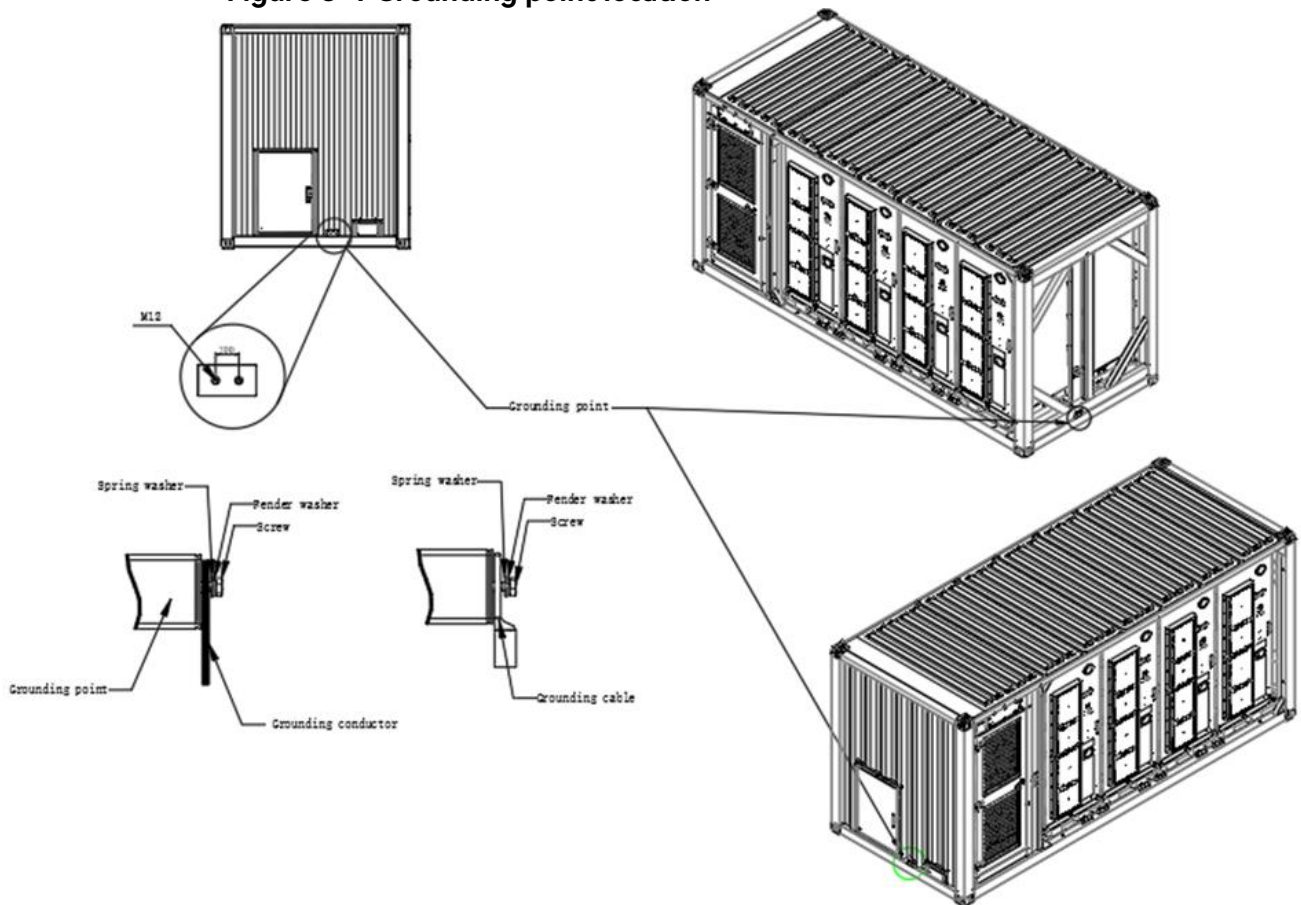
Table 8-1 Cable preparation

Name	Recommended Type	Cross-sectional Area	Terminal
Network cable	At least Category 5 shielded network cable (CAT 5) Internal resistance $\leq 1.5\Omega/10m$	/	Shielded RJ45 crystal plug
RS485 communication line	RVSP-2*0.75mm ² Shielded twisted pair	$\geq 0.75mm^2$	Tube terminal E1010
AC main circuit cable	YJV-0.6/1kV	2*(3*240+2*120mm ²)	SC240-12 SC120-12
Auxiliary circuit cable	UL1015-8AWG	16mm ² > x > 8mm ²	Tube terminal E10-12 OT terminal OT10-8
Other cables	UL1015-18AWG	2.5mm ² > x > 1mm ²	Tube terminal E2510/E1010

8.2 Installing PE Cables

- To prevent dangerous voltages, the PowerMount containerized battery energy storage system must be grounded.
- Connect to the grounding device by using a grounding cable or a grounding flat iron.
- The cross-sectional area of the cable or grounding flat iron connected to the grounding conductor depends on the overcurrent protection device of the equipment. The calculation of the required cross-section depends on national standards and directives.
- Grounding must be designed in accordance with national standards and directives and is the responsibility of the installer.
- Each PowerMount containerized battery energy storage system provides two $\Phi 12$ grounding connection points, which are distributed at both ends of the container and can be fixed with grounding conductors via M12 bolts.

Figure 8-1 Grounding point location



The system is designed with a grounding copper busbar that has a good electrical connection with the cabinet grounding point. Pull a separate grounding wire from the total grounding terminal in the distribution room (generally the grounding point of the power system) to the cabinet casing grounding point, and the cross-sectional area of the grounding conductor should comply with the following requirements.

Table 8-2 Grounding conductor cross-sectional area

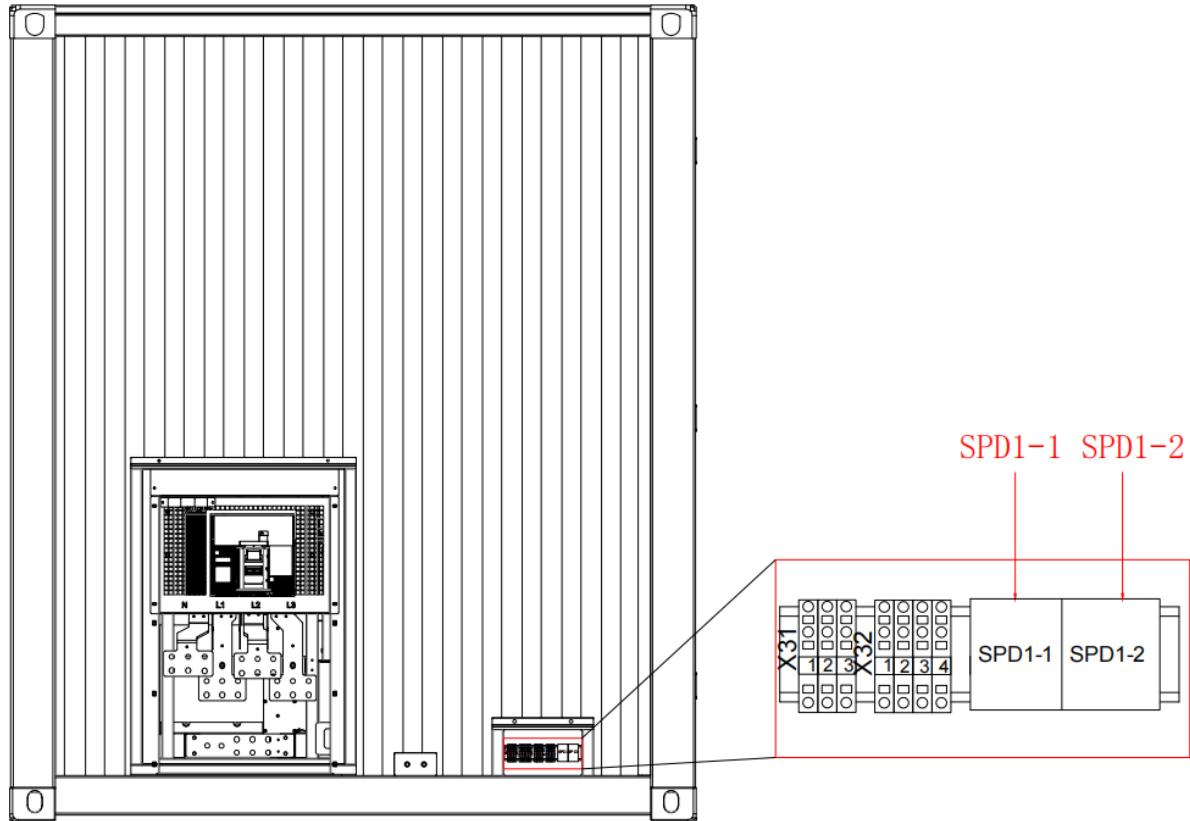
Main Circuit Conductor Cross-sectional Area S (mm ²)	External Protective Earth Conductor S_p (mm ²)
$S \leq 16$	S
$16 < S \leq 35$	16
$35 < S$	$S/2$

The values in this table are valid only when the external protective grounding conductor uses the same metal as the main circuit conductor.

There are grounding points on both sides of the system housing, which can be selected according to the actual on-site installation environment. It is recommended that when the protective conductor (PE) exceeds 50m, repeated grounding should be performed, and the grounding impedance must be less than 4Ω.

8.3 Installing Communication Cables

Figure 8-2 TCP interface location for external communication

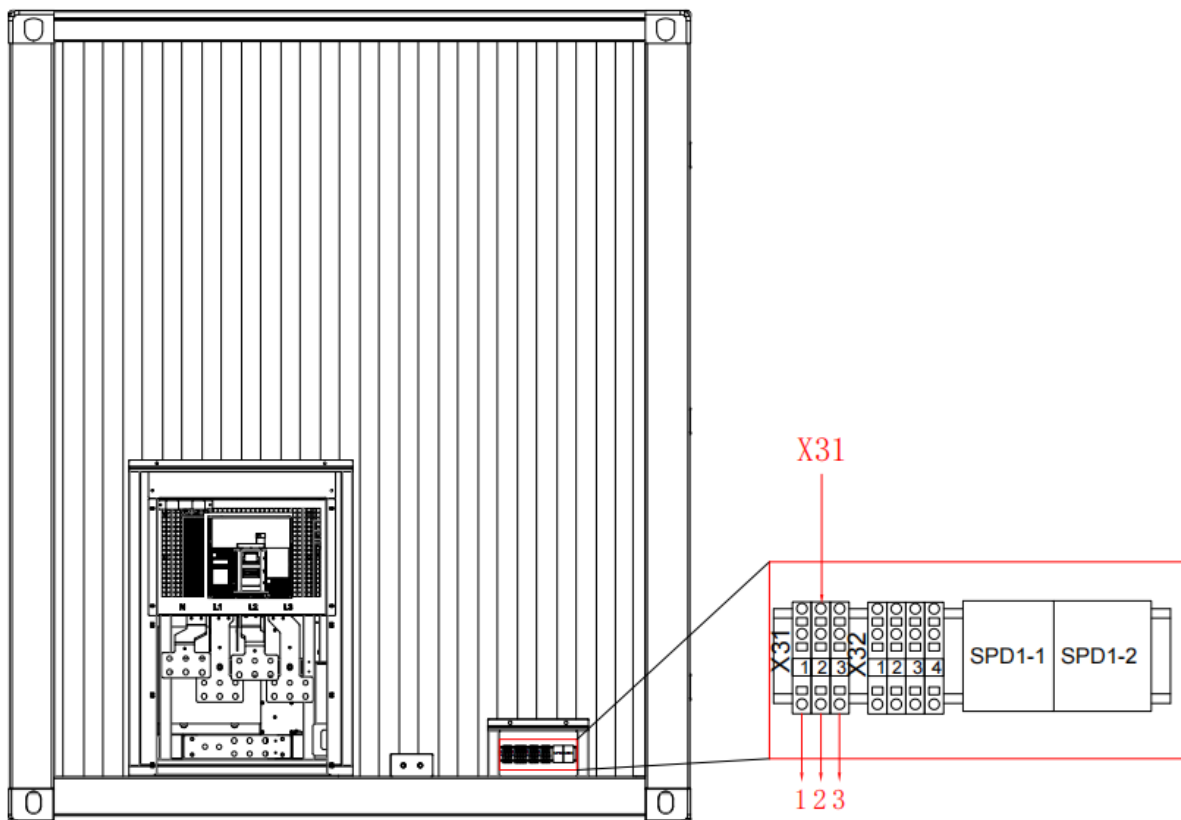


The PowerMount containerized battery energy storage system provides 2 Ethernet communication interfaces.

Table 8-3 Ethernet communication interface

Location	Terminal Blocks	Cable Recommendations	Function
SPD1-1	RJ45 interface	At least Category 5 shielded network cable (CAT5)	Used for customer frequency modulation control interface, the default IP is 192.168.1.100
SPD1-2	RJ45 interface	At least Category 5 shielded network cable (CAT5)	Used for system networking TCP interface, must connect to the network, IP is automatically obtained by default

Figure 8-3 External communication RS485 interface location

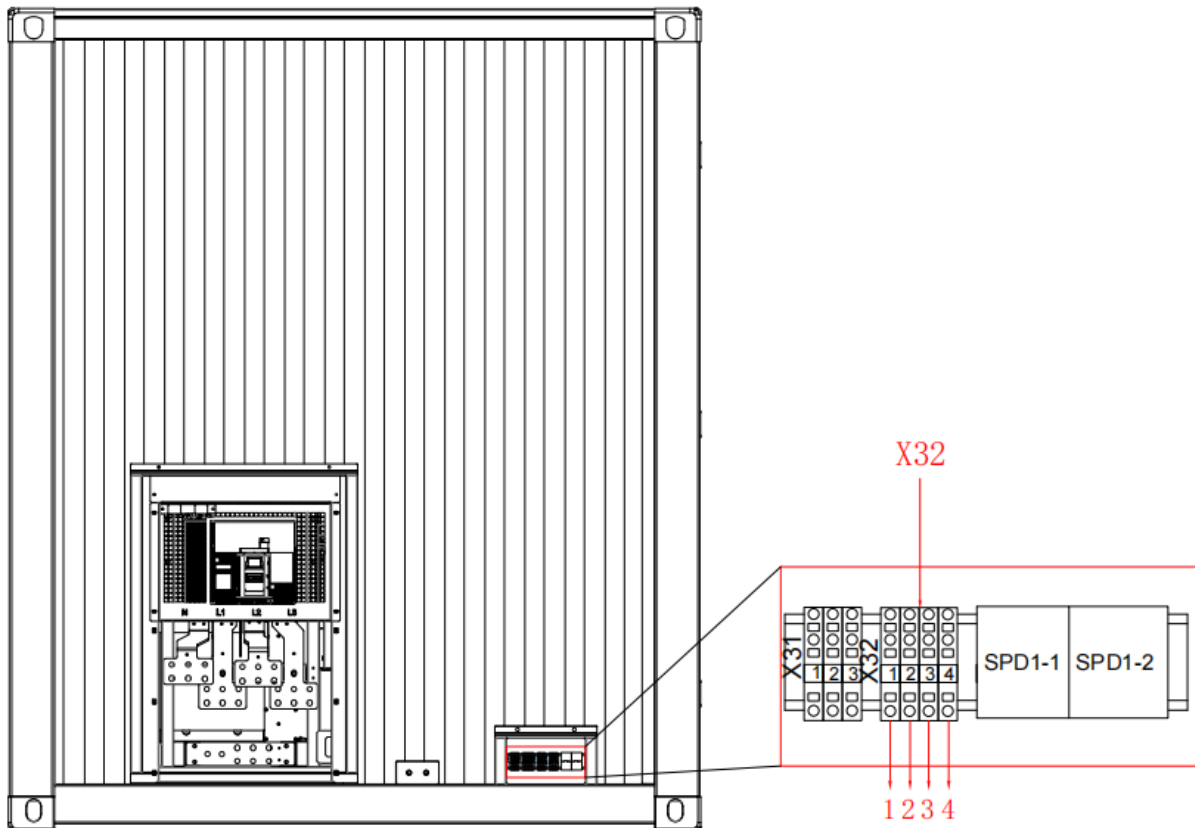


The PowerMount containerized battery energy storage system provides one RS485 communication interface to the outside, of which the X31 external terminal block is the system's external dispatching control communication interface.

Table 8-4 X16 terminal block information

Location	Terminal Blocks	Cable Recommendations	Function
X31 terminal block, pin 1	E1010 Tube Terminal	RVSP-2*0.75mm ² Shielded twisted pair	Control RS485-A pin
X31 terminal block, pin 2	E1010 Tube Terminal		Control RS485-B pins
X31 terminal block, pin 3	E1010 Tube Terminal		Control RS485-C pins

8.4 Installing DI/DO Signal Cables

Figure 8-4 External physical interface locations


The PowerMount containerized battery energy storage system provides two external physical interfaces, of which pins 1 and 2 are external physical interfaces for emergency stop design; pins 3 and 4 are external physical interfaces for fire protection design, and the signal types are all passive dry contacts.

Table 8-5 X14 terminal block information

Location	Terminal Blocks	Cable Recommendations	Description
X32 terminal block, pin 1	E1010 Tube Terminal	18 AWG cable	External emergency stop input physical interface
X32 terminal block, pin 2	E1010 Tube Terminal		
X32 terminal block, pin 3	E1010 Tube Terminal		Fire output external physical interface
X32 terminal block, pin 4	E1010 Tube Terminal		

8.5 Installing Power Cables

8.5.1 Installing Primary Circuit Incoming Cables

Power interface and external communication interface are reserved at the bottom of the container. The size of the AC primary power line threading interface is 370MM*230MM, and the size of the communication interface is $\Phi 50$. The specific hole size needs to be determined according to the actual situation of the customer. After the threading of the bottom of the container is completed, it must be blocked to prevent small animals from entering the interior and causing short circuit damage to the equipment.

The cable must be laid through the same hole. If a single wire is laid through different closed steel pipes, eddy currents will be generated due to electromagnetic induction, causing the line to heat up, which may easily cause a fire in serious cases.

Figure 8-5 Wiring position

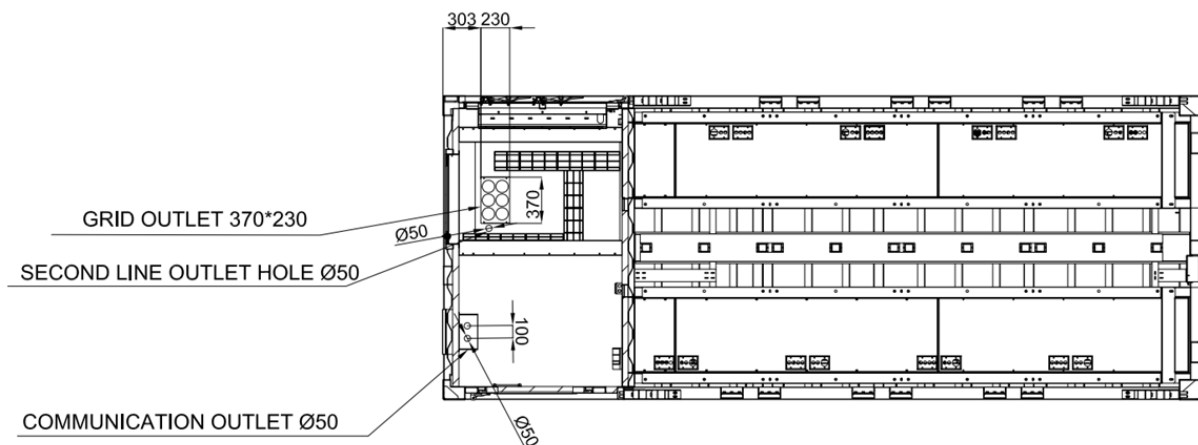
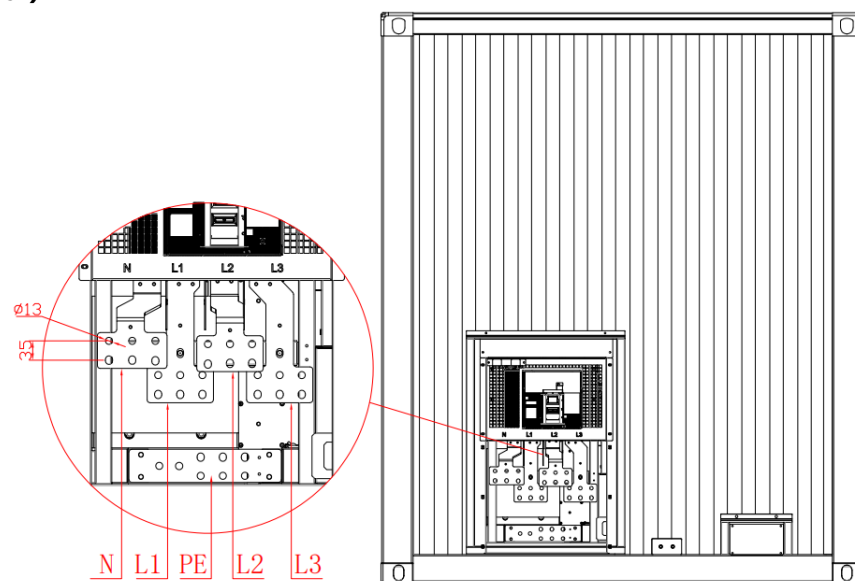


Figure 8-6 Grid-side incoming cable wiring (wiring from the side door of the container)



Open the side door of the container and connect the wires according to the phase sequence position shown in the figure.

Table 8-6 Grid-side incoming cable wiring (wiring from the side door of the container)

Position	Name	Function
N	Circuit breaker N terminal block	Connect the grid incoming line N phase sequence
L1	Circuit breaker L1 terminal block	Connect the grid incoming line L1 phase sequence
L2	Circuit breaker L2 terminal block	Connect the grid incoming line L2 phase sequence
L3	Circuit breaker L3 terminal block	Connect the grid incoming line L3 phase sequence
PE	PE grounding bar	Connect to the grid PE (can be connected to the grounding point of the container shell)

Cable requirements:

All cables must be suitable for temperatures up to +90°C and must comply with national standards and directives.

Copper cables are required. Customers can choose the specification based on their power needs. All cable selections must comply with applicable electrical codes and local regulations.

The current carrying capacity of the cable must be calculated according to IEC 60287, and the maximum current that occurs must not exceed the current carrying capacity of the cable.

When wiring, be sure to pay attention to the connection phase sequence and refer to the circuit breaker copper busbar marking and wiring diagram for details.

Cable fixing:

All cables are fixed to the mother copper busbar with M12 bolts. The installation position is shown in the figure below. The cable needs to be fixed with bolts, spring washers, flat washers, nuts, copper wire ears (used for crimping cables, the specifications are selected according to the cable cross-section installed on site), and copper busbars (multi-hole copper busbars are designed at the lower end of the system circuit breaker).

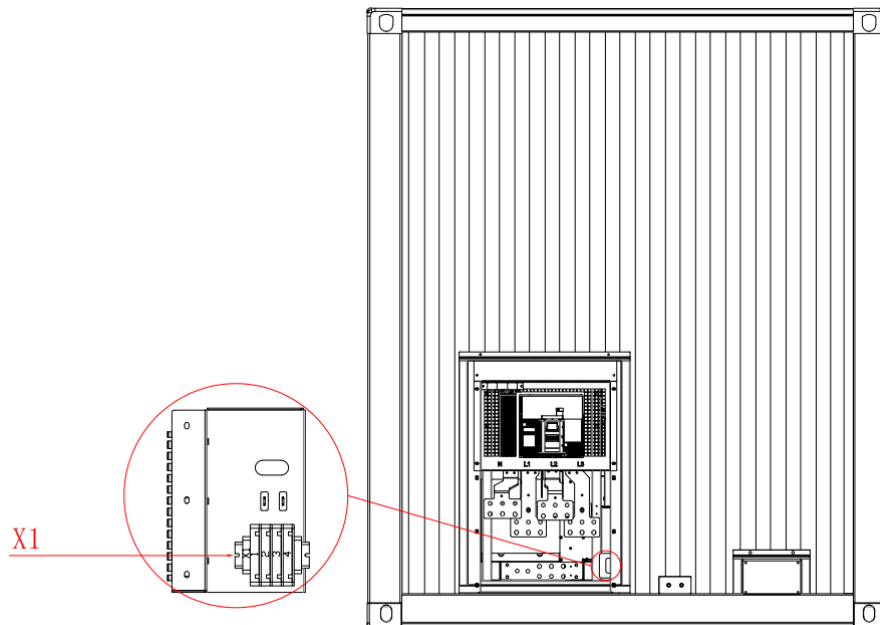
Relevant material recommendations are detailed in the table. The following process requirements should be met during installation. If the project installation site has higher standards, the local standards should be followed:

- The recommended torque for fixing the M12 aperture port is 50N · M;
- The exposed length of the bolt thread should meet the requirement of 1/2d, and the exposed length of the M12 bolt should be 6mm;
- The use of wiring ears should be consistent with the cable material. It is recommended to use copper wires and copper wire ears for installation;

- After the wiring is completed, the bolts need to be marked and regularly inspected for misalignment or looseness.

8.5.2 Installing Secondary Circuit Incoming Cables

Figure 8-7 Grid-side secondary circuit incoming cable wiring (wiring from the side door of the container)



Open the side door of the container and connect the wires according to the phase sequence position shown in the figure.

Table 8-7 Grid-side secondary circuit incoming cable wiring (wiring from the side door of the container)

Position	Name	Function
X1	Terminal block No.1	Auxiliary power supply line input L1
	Terminal block No.2	Auxiliary power supply line input L2
	Terminal block No.3	Auxiliary power supply line input L3
	Terminal block No.4	Auxiliary power supply line input N
PE	PE grounding bar	Connect to the grid PE (can be connected to the grounding point of the container shell)

Cable requirements:

All cables must be suitable for temperatures up to +90°C and must comply with national standards and directives.

Copper cables are required. For short-distance installations, it is recommended to use a cable with a cross-sectional area of no less than 10 mm² per phase cable (refer to Section 8.1 for cable preparation). The final specification selected by the

customer must comply with all relevant power distribution design standards, as well as local national codes and directives.

Any cables found with loose terminals, cracked insulation, oxidized conductors, or abnormal temperature rise must be replaced immediately.

8.5.3 Cable Sealing Requirements and Procedures

Requirements for cable sealing:

- For outdoor or humid environments, waterproof sealing (such as cement, epoxy resin) is required; for indoor dry environments, fireproof cement or sealant can be used.
- The sealing material should be compatible with the cable sheath material (such as PVC, XLPE, etc.) to avoid corrosion.
- In fire protection areas, flame-retardant sealant or fireproof tape should be used.
- The general protection level should reach IP54 (dust-proof, splash-proof water-proof) or higher (such as IP66).

Steps for cable sealing:

- Select tools and materials, such as sealant, cement, waterproof tape, heat shrink tubing, fireproof cement, cable ties, filling ropes, etc.
- Clean the cable surface and the entrance area with alcohol or sandpaper to remove oil stains and dust.
- Fill the gaps in the inner layer with cement or sealant to ensure there are no gaps.
- Wrap the middle layer with waterproof tape (such as 3M 2228) or wrap with fireproof cement, with a thickness of $\geq 2\text{mm}$.
- Wrap the outer layer with heat shrink tubing (heated contraction) or install a sealing box.
- After sealing, fix the cable with cable ties or cable clamps to prevent loosening and failure of the seal.

9 ESS Power-On and Power-Off

9.1 Check before Power-On

9.1.1 General Check

No.	Check Items	Acceptance Criteria
1	Equipment appearance	- The appearance of the equipment is intact and free of rust and paint peeling. If there is paint peeling, please repaint it. - Equipment labels must be clearly visible and damaged labels must be replaced in a timely manner.
2	Cable appearance	- The cable protective layer is intact and has no obvious damage. - The cable hose is intact.
3	Cable connection	- Check whether the phase sequence of cable connection is correct. - The cable connection location is the same as the external wiring point designed for the system. - The terminal manufacturing complies with the specifications and the connection is firm and reliable. - The labels on both ends of each cable are clear and consistent in direction.
4	Cable routing	- The wiring must comply with the principle of separation of strong and weak electricity. - The cables are neat and beautiful. - The wire tie joints are cut neatly without any exposed thorns. - Leave enough margin at the turning point as required and do not tighten it. - The wiring is straight and smooth, and there is no crossing of cables inside the cabinet.
5	Battery pack copper busbar	The copper busbar has no deformation and no damage after plastic dipping.
6	Switch	- The external AC distribution cabinet switch is in OFF state. - The AC side switch of the energy storage system is in the OFF state.

9.1.2 ESS Installation and Check

Cabinet check

No.	Check Items	Acceptance Criteria
1	Install	- The installation shall be in accordance with the design drawings. - The cabinet body is level and all cabinet doors can be opened normally.
2	Appearance	- There should be no cracks, dents or scratches on the cabinet surface. - Please perform touch-up paint.
3	Cabinet grounding	- Each cabinet has at least two grounding points, and the grounding is firm. - Yes, grounding resistance $\leq 4\Omega$.
4	Appendix	The quantity and location of external accessories installed meet the design requirements.
5	Logo	The labels are correct, clear and complete.

Internal check

No.	Check Items	Acceptance Criteria
1	Breaker	The circuit breaker is in the open position.
2	Copper busbar	The copper busbar has no obvious deformation and there is no debris on it.
3	Cables	The cable mounting bolts are tightened and the cables cannot be loosened by pulling.
4	Cable hole sealing	The cable holes have been sealed.
5	Battery pack	The battery packs have no damage on the outside.
6	Foreign body	Remove all foreign objects from the cabinet, such as tools, remaining installation materials, etc.
7	Distribution area baffle	- The baffles in the distribution area shall be free of cracks, dents, scratches, or cracks. - Cracked and loose.
8	Lightning arrester	The lightning arrester is micro-broken and closed, and the status indication is normal.
9	Each subcomponent	The surface of each sub-component is not damaged.
10	Cabinet grounding	The grounding conductor must be reliably connected to the cabinet grounding terminal board or copper busbar.

9.2 Power-On and Power-Off Operations



Please wear insulating gloves and use insulating tools to avoid electric shock or short circuit.

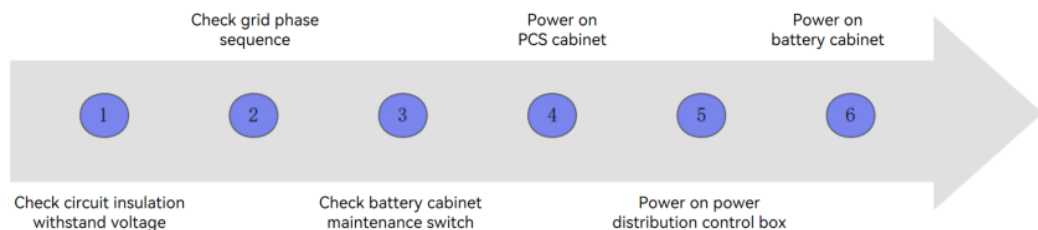


- The voltage and current should be observed and measured while powering on. If any abnormal phenomenon is found, the PCS cabinet, battery cabinet, and power distribution control box in the system should be powered off

	immediately, and the cause should be found out and resolved before powering on again. Storing the battery in a low-power state may cause over-discharge and damage the battery. Please recharge it in time.
NOTICE NOTICE!	If the energy storage system is not in operation for half a year or more after assembly, it must be inspected and tested by professionals before it can be put into operation.

9.2.1 Powering on the ESS

Figure 9-1 ESS power-on process



- Check whether the line insulation resistance and insulation withstand voltage have passed. For externally laid lines, insulation withstand voltage test is required. During the test, ensure that the system main circuit, secondary circuit and lightning arrester and other equipment are in the disconnected state.
- Insulation resistance test voltage level 1000V, (according to standard IEC_62109-1), the three-phase short-circuit insulation resistance of the line to ground should be no less than 10MΩ. And the power frequency withstand voltage of the line should meet the conditions in the following table:

Table 9-1 Insulation withstand voltage

System Voltage (V)	Insulation Withstand Voltage			
	Basic Insulation (V)		Reinforced Insulation (V)	
	AC	DC	AC	DC
≤50	1250	1770	2500	3540
100	1300	1840	2600	3680
150	1350	1910	2700	3820
300	1500	2120	3000	4240
600	1800	2550	3600	5090
1000	2200	3110	4400	6220
1600	2900	4200	5800	8400

System voltage: In TT system, it refers to the voltage relative to the ground.

- Check whether the phase sequence of the power grid is correct.

The system is powered on for the first time, a phase sequence tester is required to check whether the grid phase sequence is normal. The grid incoming lines are

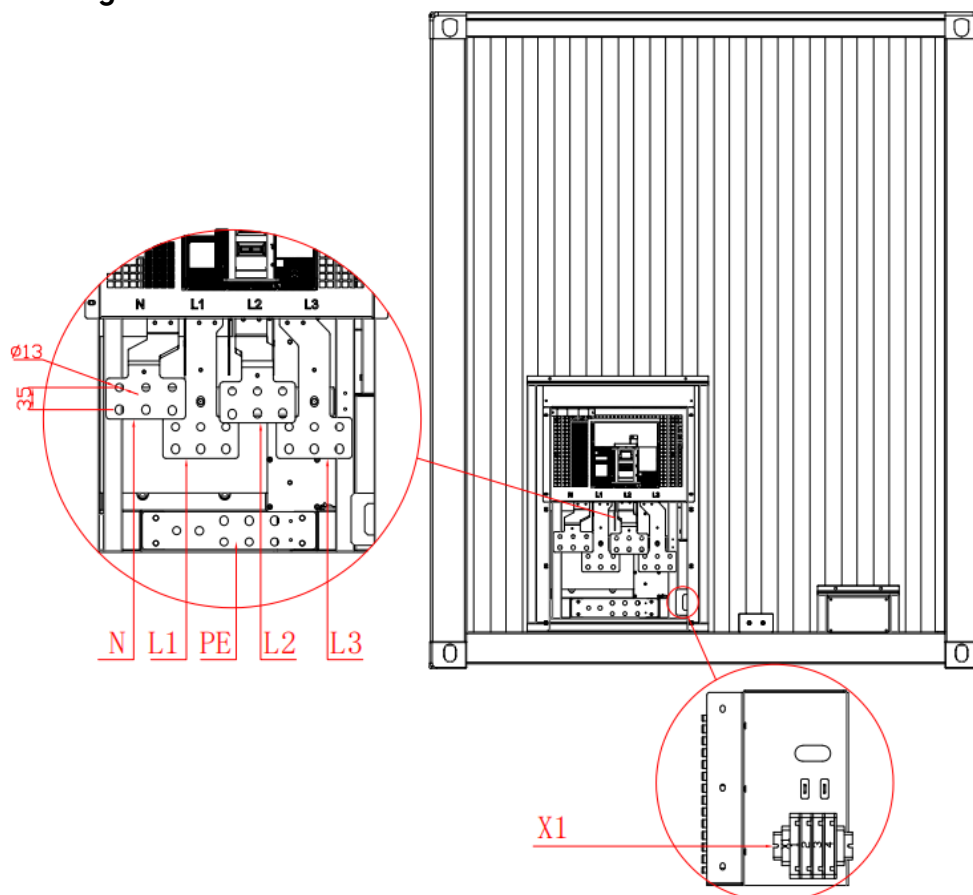
connected to the lower end of the circuit breaker in the PCS cabinet. As described above, the cables are connected from the front door of the PCS cabinet.

- Check whether the external cable connection torque meets the standards and whether there are markings.

Table 9-2 External cable connection

Position	Name	Description
N	Circuit breaker N terminal block	Connect the grid incoming line N phase sequence
L1	Circuit breaker L1 terminal block	Connect the grid incoming line L1 phase sequence
L2	Circuit breaker L2 terminal block	Connect the grid incoming line L2 phase sequence
L3	Circuit breaker L3 terminal block	Connect the grid incoming line L3 phase sequence
PE	PE grounding bar	Connect to the grid PE (can be connected to the grounding point of the container shell)
X1	Terminal block No.1	Auxiliary power supply line input L1
	Terminal block No.2	Auxiliary power supply line input L2
	Terminal block No.3	Auxiliary power supply line input L3
	Terminal block No.4	Auxiliary power supply line input N

Figure 9-2 External cable connection



- Check whether the MSD maintenance switch of the battery cabinet is installed.

The MSD maintenance switch of each battery cabinet is not plugged in at the initial state. Please insert the plug and lock it;

Figure 9-3 Battery cabinet MSD maintenance switch (when not plugged in)

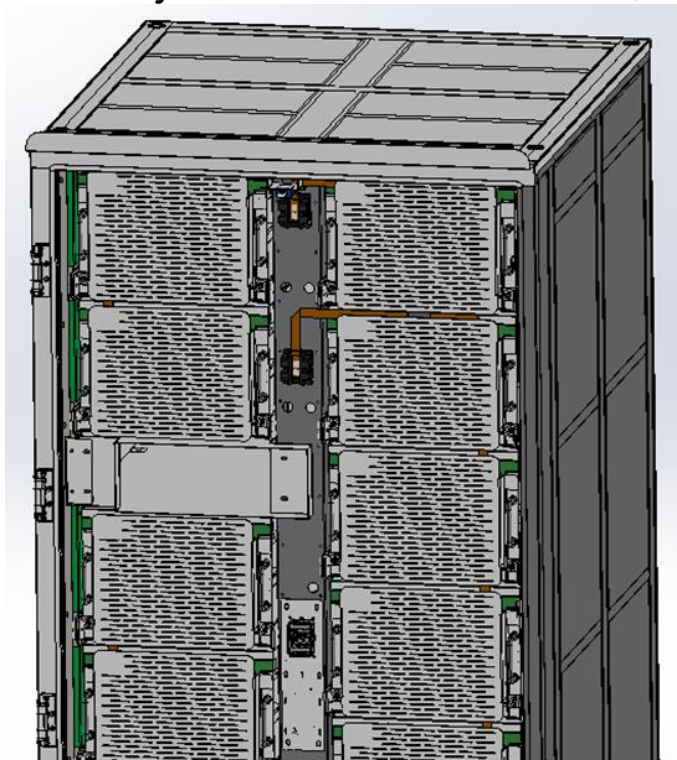
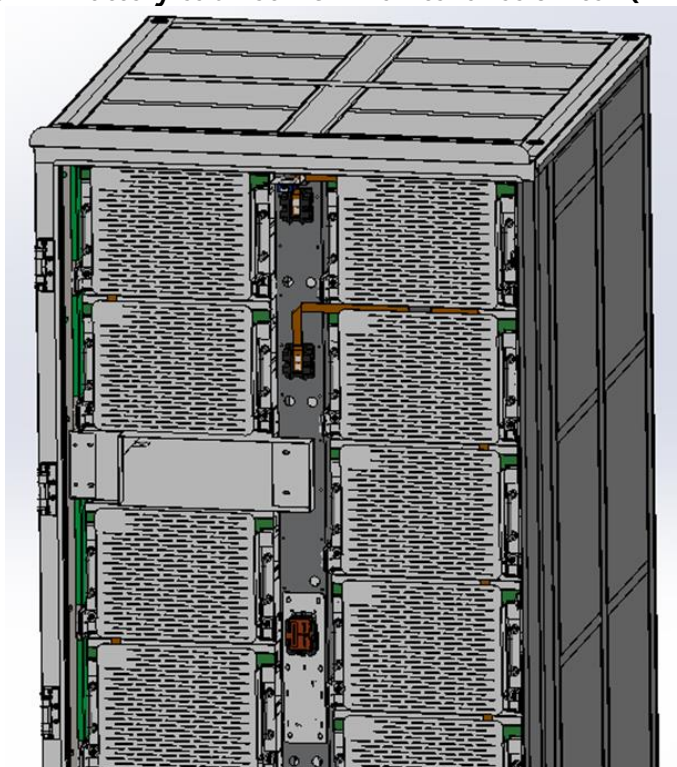


Figure 9-4 Battery cabinet MSD maintenance switch (when inserted)



Note: After insertion, press the red lock on the plug firmly to lock it, and perform a plug-in and unplug test to confirm that the MSD maintenance switch plug will not loosen.

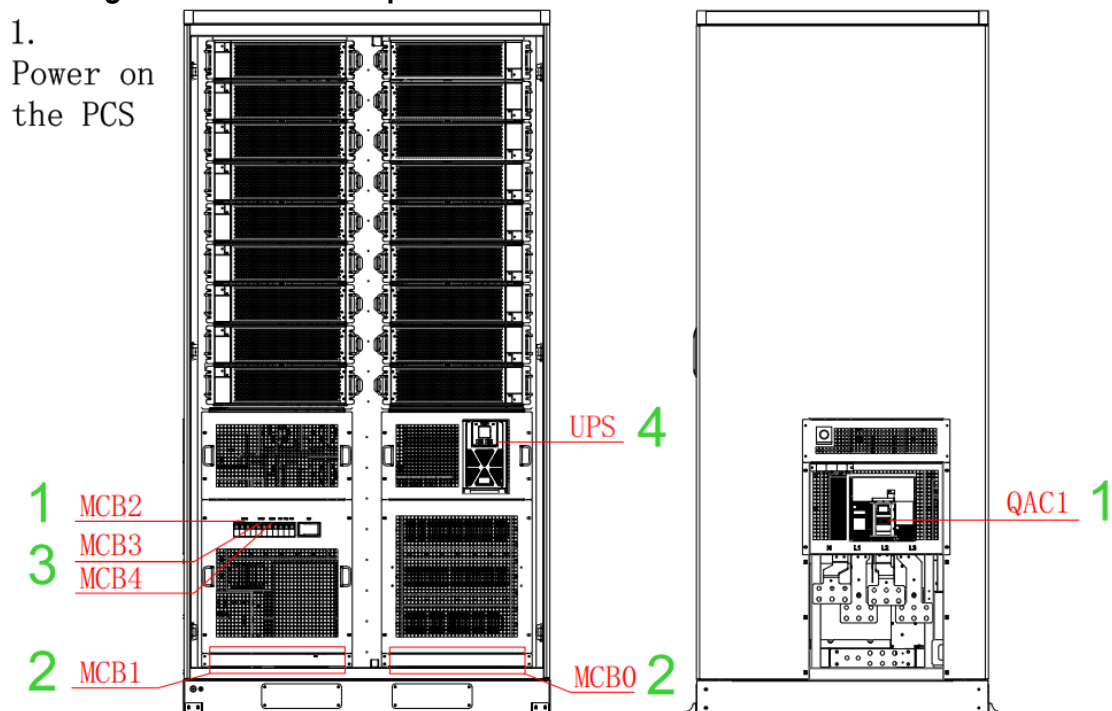
Power-on operation of PCS cabinet

Check whether all EPO buttons on the container are in reset state (including but not limited to: emergency stop button outside the container door, emergency stop button on the PCS cabinet door, emergency stop button on the power distribution control box). If not, rotate the button clockwise to reset it; please power on in the order of numbers in the figure below.

1. Close the AC molded case circuit breaker QAC1 and MCB2 in each PCS cabinet;
2. Close the lightning arrester protection micro-breaker MCB0, MCB1 in each PCS cabinet
3. Close the reserved micro-breakers MCB3 and MCB4;
4. Press the UPS start button. Before use, please confirm whether the UPS battery latch is inserted. For details, refer to the description of the UPS in 2.3.5.

After all operations are completed, confirm whether the power supply, indicator lights, and HMI are normal, and there are no abnormal phenomena such as sparks, burning, and tripping.

Figure 9-5 Power-on operation of PCS cabinet



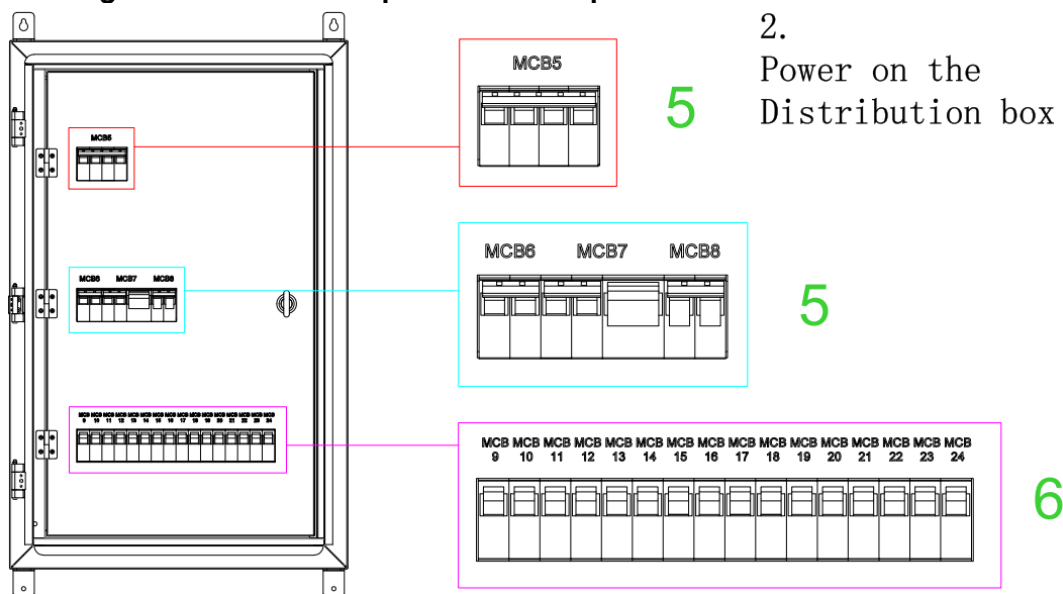
Power-on operation of the power distribution control box and UPS:

Please power on according to the numbering sequence in the figure below.

1. Close the MCB5, MCB6, MCB7, and MCB8 miniature circuit breakers in the power distribution control box.
2. Close the MCB9 to MCB24 miniature circuit breakers (the specific operation depends on the actual number of battery cabinets configured, see 2.3.4 for details).

After all operations are completed, confirm whether the power supply and voltage are normal, and there are no abnormal phenomena such as sparks, burning, tripping, etc.

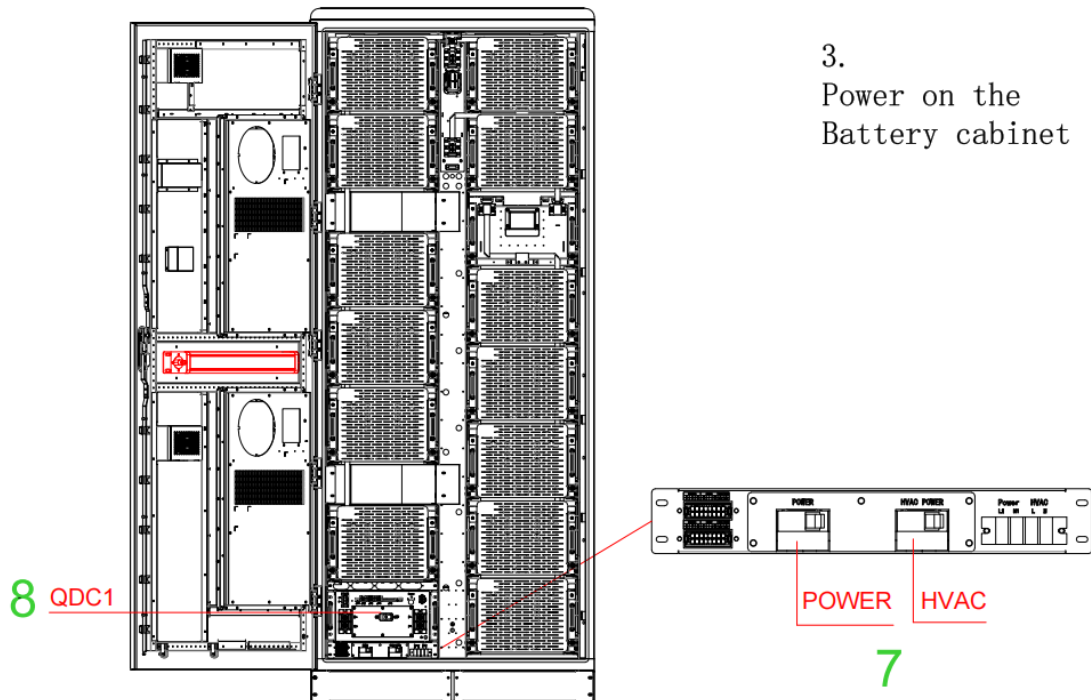
Figure 9-6 Power-on operation of the power distribution control box and UPS



Power-on operation of the battery cabinet:

1. Check whether the EPO button on each battery cabinet is in the reset state. If not, rotate the button clockwise to reset it. Please power on according to the numbering sequence in the figure below.
2. Close the MCB1 (POWER control circuit) and MCB2 (HVAC air conditioning control circuit) miniature circuit breakers on the BMS control box at the bottom of each battery cabinet.
3. Check whether the power indicator light on the BMS control box is on normally;
4. Check whether the status indicator light on the battery cabinet door is lit normally and flashing green;
5. Finally, close the DC circuit breaker QDC1 and turn it to the ON state.
6. Repeat the operation until all battery cabinets are powered on, and confirm whether the power supply is normal and there are no abnormal phenomena such as sparks, burning, tripping, etc.

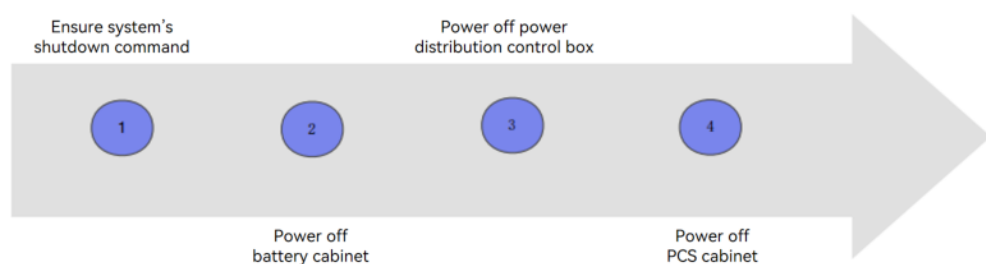
Figure 9-7 Power-on operation of the battery cabinet



9.2.2 Powering off the ESS

Precondition: Confirm that the system has been shut down and the system is not running.

Figure 9-8 ESS power-off process

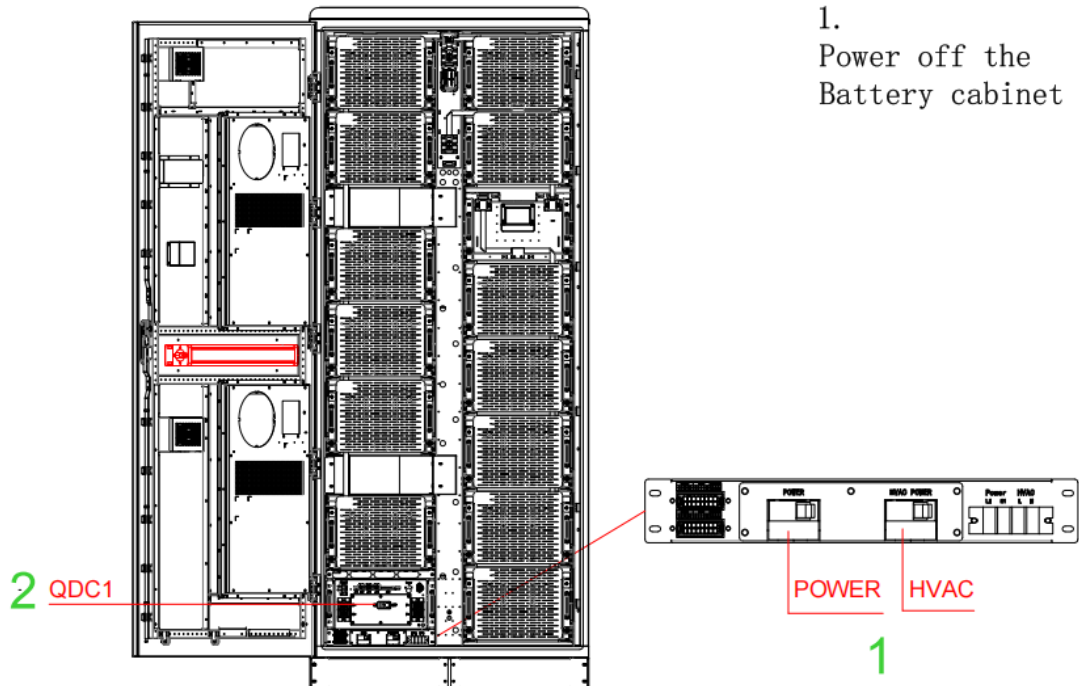


Power off the battery cabinet

Please power off according to the numbering sequence in the figure below.

1. Open the MCB1 (POWER control circuit) and MCB2 (HVAC air conditioning control circuit) miniature circuit breakers in each battery cabinet;
2. Open the DC circuit breaker QDC1 in each battery cabinet;

Figure 9-9 Power off the battery cabinet



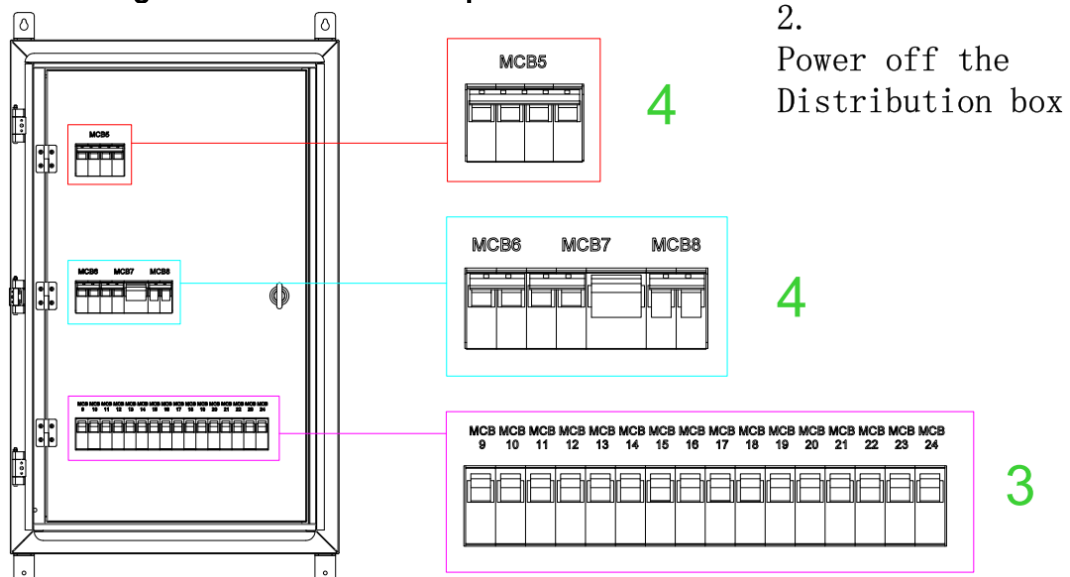
1. Power off the Battery cabinet

Power off the power distribution control box

Please power off according to the numbering sequence in the figure below.

1. Switches such as MCB9 to MCB24 miniature circuit breakers in the power distribution control box.
2. Switches such as MCB5, MCB6, MCB7, MCB8 miniature circuit breakers in the switch distribution control box.

Figure 9-10 Power off the power distribution control box



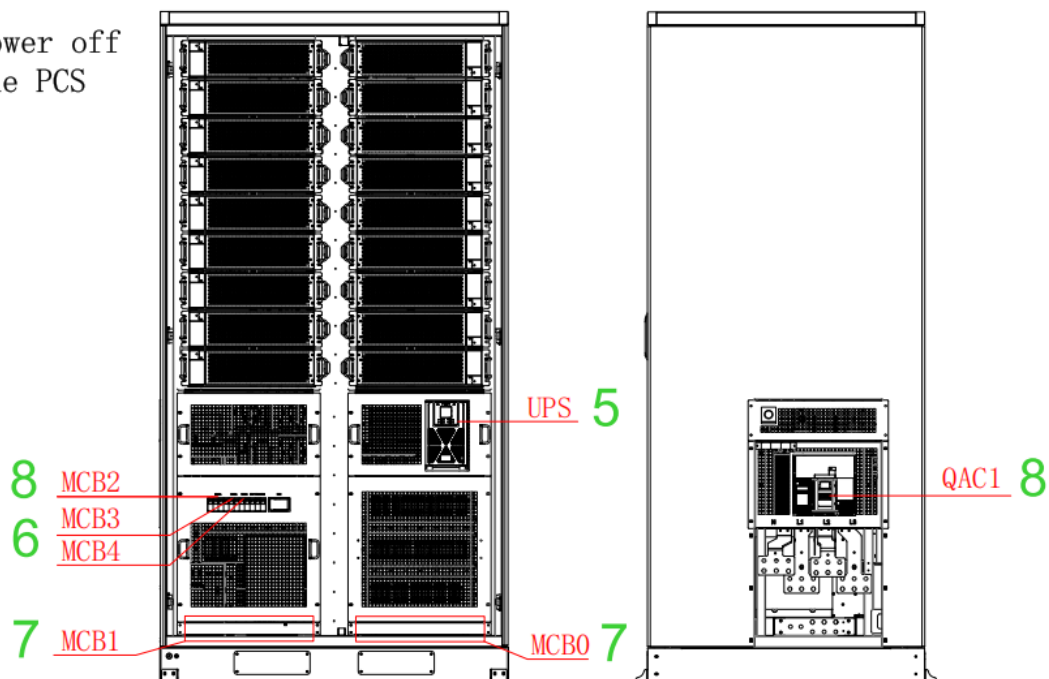
2. Power off the Distribution box

Power off the PCS cabinet

1. Press and hold for 1~2 seconds to turn off the UPS power supply. For details, see the description in 2.3.5.
2. PCS cabinet has reserved micro-breakers MCB3 and MCB4 for disconnection.
3. Open the lightning arrester in each PCS cabinet to protect the micro -breaker MCB0, MCB1.
4. Disconnect the AC molded case circuit breaker QAC1 and MCB2 in each PCS cabinet.

Figure 9-11 Power off the PCS cabinet

3.
Power off
the PCS



10

ESS Commissioning

Prerequisites

- All equipment on site has completed on-site commissioning.
- The system has been powered on successfully and all alarms have been eliminated.
- The site is equipped with debugging equipment that can be used for commissioning.

10.1 Local Startup

The device is powered on, check whether the device status is in the flashing state of the running indicator, if so, continue the following operation; if the product has an alarm or fault, enter the HMI interface, click [Fault Alarm Information Page], take a picture of the fault information, and contact the product dealer to apply for after-sales service. For details, see Chapter 11.

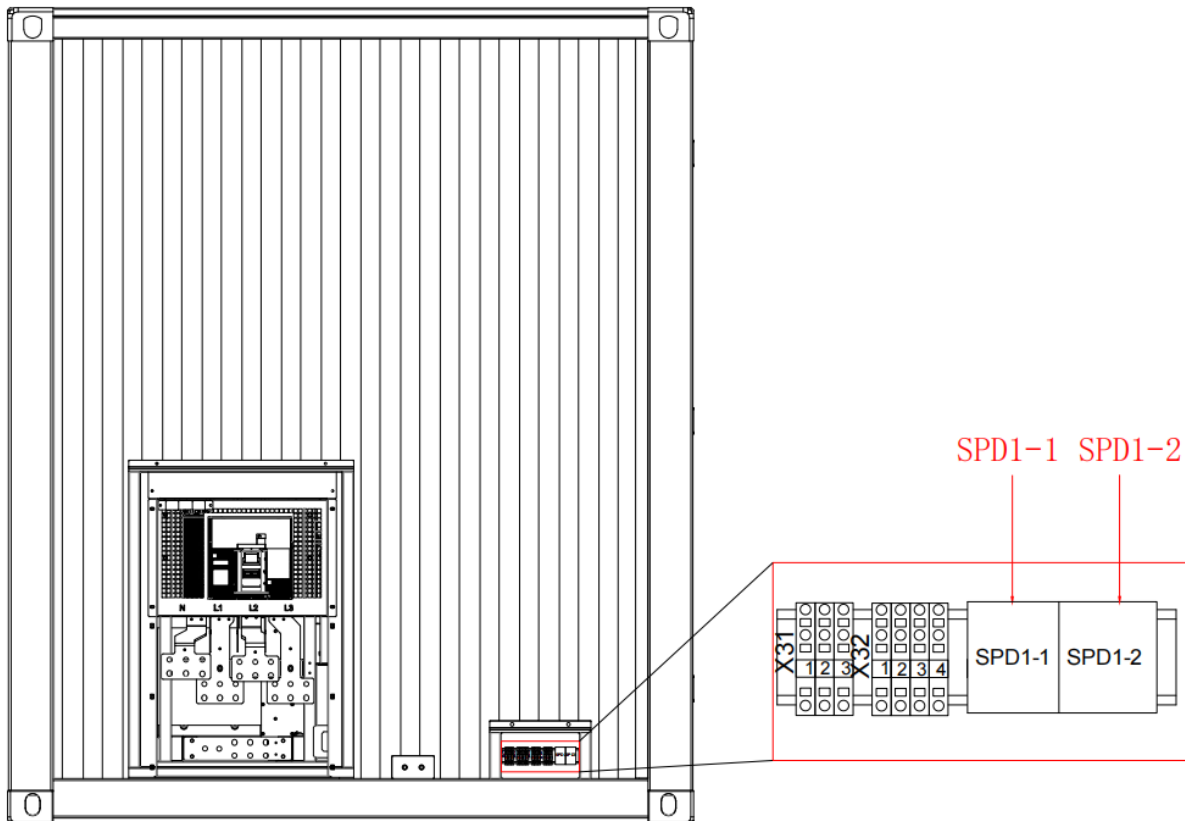
- After there is no fault information, the system can be started directly through the HMI. For how to operate the HMI, please refer to the introduction to the human interaction interface in Chapter 11.
- If not through HMI, you can communicate with the energy storage system through external communication equipment, control the system and read system information according to the communication protocol.

10.2 Communication Configuration

1. The device is powered on and connected to the computer via a network cable. The system supports power scheduling and is connected via a remote interface. The external control interface is divided into two types: TCP/IP and RS485. The access point configuration is as follows:

The default TCP interface for scheduling control is SPD1-1. For installation, see the communication cable installation details in Chapter 8.3.

Figure 10-1 SPD 1 and SPD 2 location



TCP/IP_IP: 192.168.1.100 (IP address can be modified through host configuration)

Device Address: 1

Port number: 502

Steps to modify the module IP address:

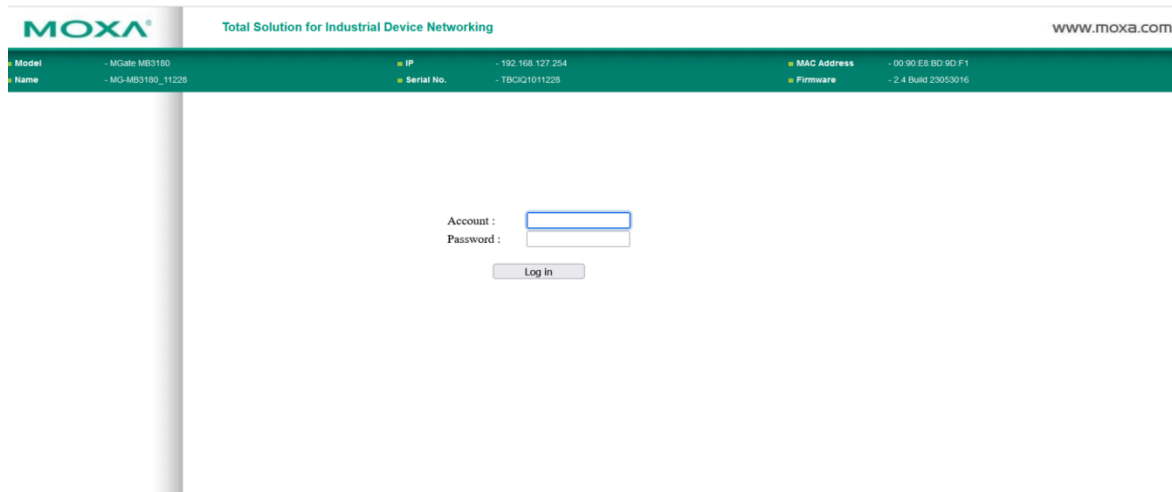
- Confirm that the module is powered normally and the indicator light is on.

Figure 10-2 Check indicator light



- Connect the computer and the module's NET interface with an Ethernet cable, change the computer's IP to 192.168.127.xxx, log in to 192.168.127.254 through the browser, and use the username: admin and password: moxa.

Figure 10-3 MOXA login



The screenshot shows the MOXA login page. At the top, there is a header with the MOXA logo, the tagline "Total Solution for Industrial Device Networking", and the website "www.moxa.com". Below the header is a table displaying device information:

Model	- MGate MB3180	IP	- 192.168.127.254	MAC Address	- 00 90 EB BD 9D F1
Name	- MG-MB3180_11228	Serial No.	- TBCQ1011228	Firmware	- 2.4 Build 23053016

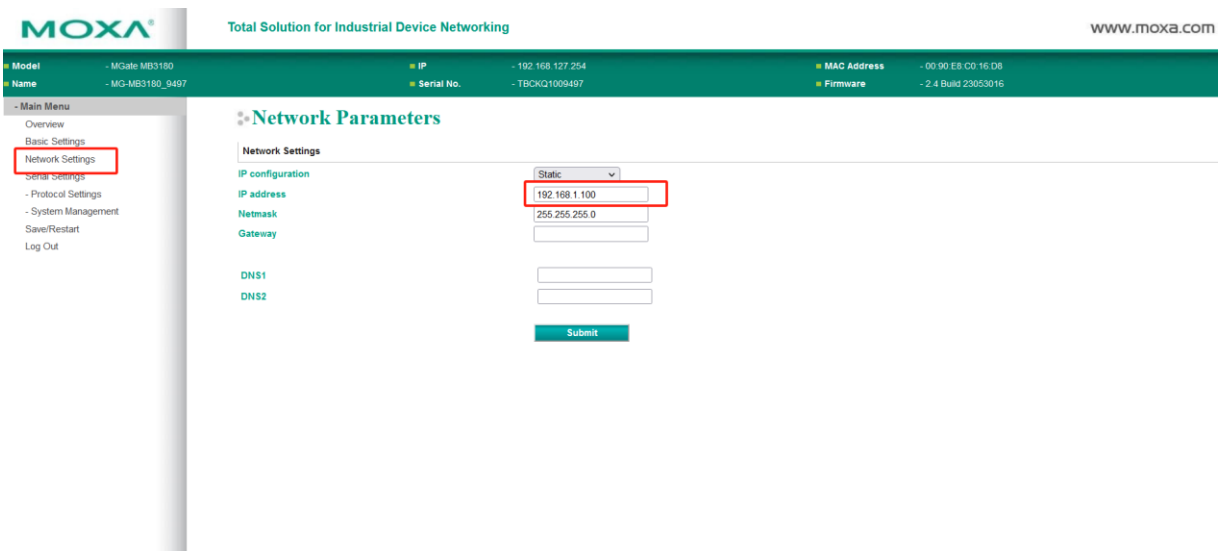
Below the table is a login form with the following fields:

Account :

Password :

- Set the TCP port IP. The default shipping configuration is 192.168.1.100.

Figure 10-4 Set IP address of TCP



The screenshot shows the MOXA Network Parameters page. At the top, there is a header with the MOXA logo, the tagline "Total Solution for Industrial Device Networking", and the website "www.moxa.com". Below the header is a table displaying device information:

Model	- MGate MB3180	IP	- 192.168.127.254	MAC Address	- 00 90 EB C0 16 D8
Name	- MG-MB3180_9497	Serial No.	- TBCQ1009497	Firmware	- 2.4 Build 23053016

Below the table is a sidebar menu with the following items:

- Main Menu
- Overview
- Basic Settings
- Network Settings**
- Serial Settings
- Protocol Settings
- System Management
- Save/Restart
- Log Out

The main content area is titled "Network Parameters" and contains the following fields:

Network Settings

IP configuration:

IP address:

Netmask:

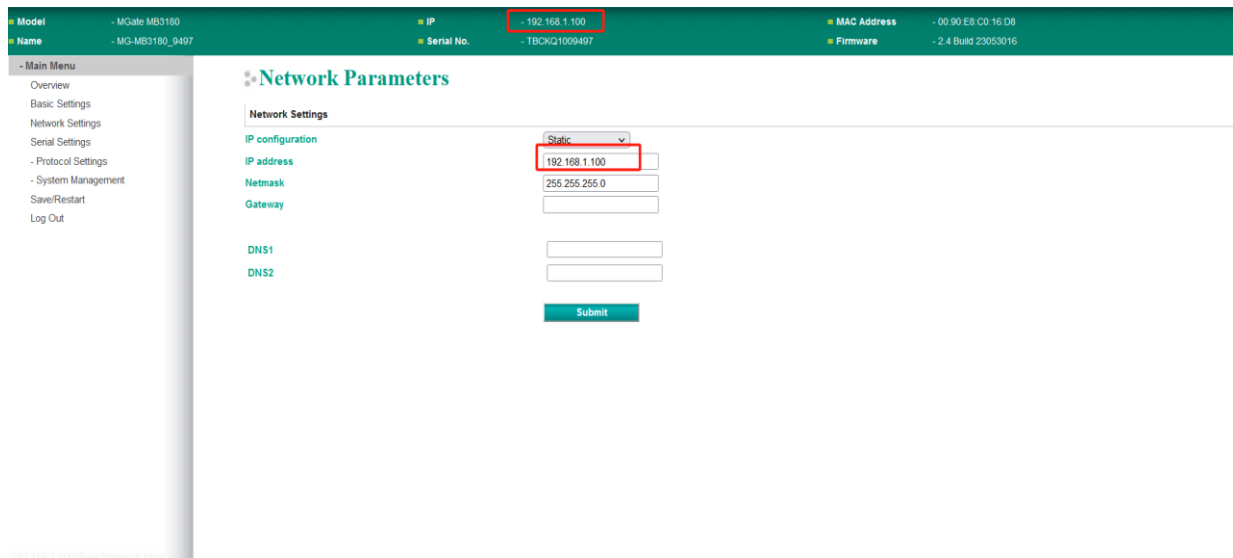
Gateway:

DNS1:

DNS2:

- Use 192.168.9.100 to view the configuration.

Figure 10-5 Check configuration



2. The system needs to be connected to the Internet. The customer needs to provide an external network to physically connect the system. The default TCP interface for the Internet is SPD1-2. For installation, see the communication cable installation details in Chapter 8.3.

The IP address is automatically obtained by default and no configuration is required.

Note: The router or switch in the customer network must provide DHCP service to assign IP addresses.

3. The default RS485 interface for dispatch control is the X31 terminal block 1/2/3 pins. For installation, refer to the communication cable installation details in Chapter 8.3.

RS485: baud rate 38400

Device Address: 1

Data bits: 8

Check digit: No check

Stop bits: 1

10.3 Scheduling Instructions

Data is read and scheduled according to the product protocol. The main functions include start, stop, charge, discharge, etc. Detailed scheduling protocol is provided separately.

- After the system start/stop command input exceeds the limit, the system will not perform any action and will not modify the erroneous command.
- When the system power input exceeds the limit, the system will actively modify the command to the maximum charge and discharge power.

- The system full charge and empty stop are determined based on the voltage of a single battery. It is fully charged when the highest voltage is 3.55V, and empty when the lowest voltage is 2.8V. When the system is full, the charging power will not be sent further, and only the discharging power will be executed. When the system is empty, the discharging power will not be sent further, and only the charging power will be executed. After full charge and empty, the reverse power will automatically restore the limit after the SOC changes.
- If the system-level full and empty protection fails, the BMS-level full and empty protection will be activated, and manual recovery is required after the activation.
- The system SOC is a reference value, which is calculated based on the battery configuration and current value. However, the battery capacity and current value have errors and are not accurate. Therefore, it is not recommended to use SOC as a criterion for full or emptying for system scheduling.
- Multiple TCP connections cannot exist at the same time. The underlying layer is 485 communication, and multiple connections will cause communication conflicts.
- Multiple threads cannot request data simultaneously over a single TCP connection.
- The recommended interval time for each frame message is more than 100ms.

11 HMI Human-machine Interface

11.1 Page Introduction

11.1.1 Main Page

You can view the overall real-time operation information and status of the system, and issue commands such as system start and stop, active power, etc. (click button "2" to unlock before issuing). The system main page and unlock page are shown in the figure:

Figure 11-1 Main page

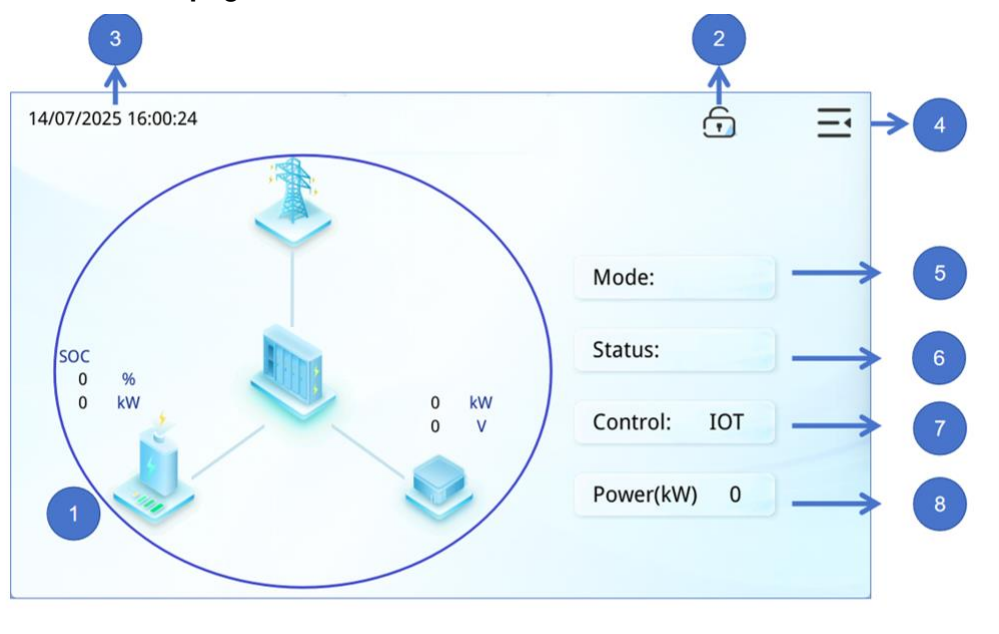
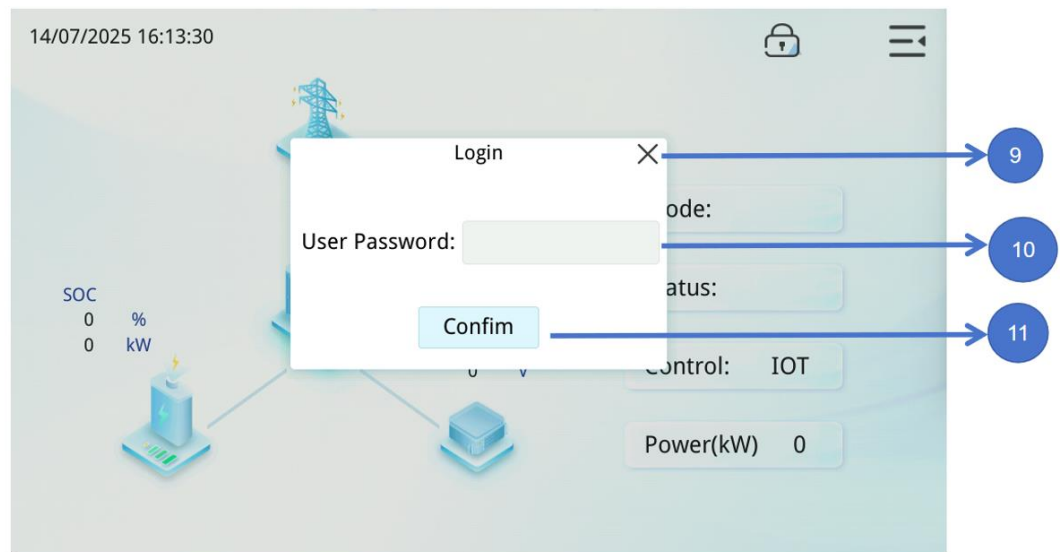


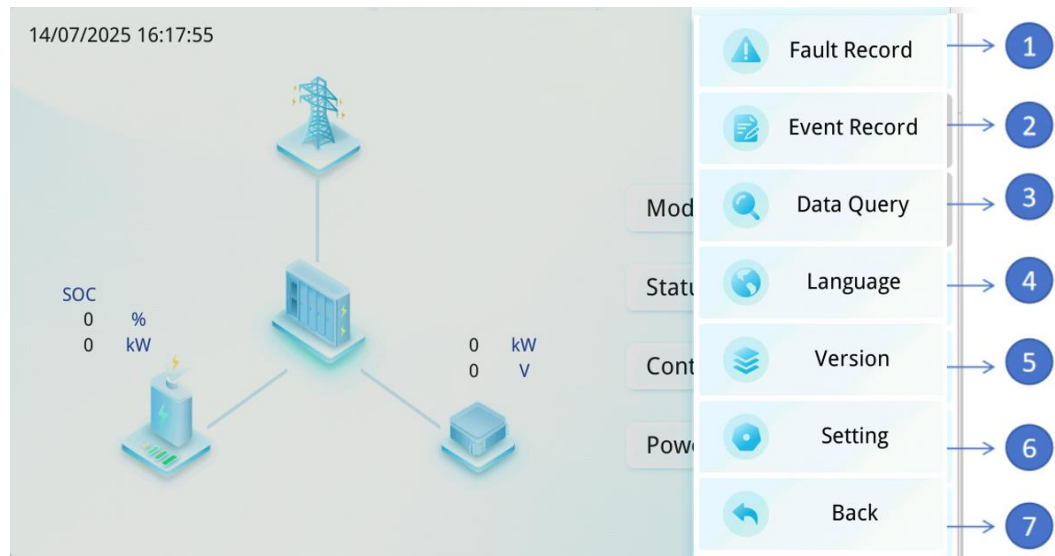
Figure 11-2 Login pop-up window



No.	Name	Function
1	Overall system status	Check the running status of the overall system. Click here to view detailed information
2	Control unlock button	Click the button to open the unlock pop-up window
3	Time setting button	Long press the button to set the system time
4	Function selection button	Click the button to open the function selection page
5	Mode switch button	Click the button to switch system mode
6	State switch button	Click the button to switch the system status
7	Control switch button	Click the button to switch system control
8	Power release button	Click the button to send the system power
9	Back to Home Button	Click the button to jump to the system home page
10	Password input button	Click the button to enter the system control password
11	Password confirmation button	Click the button to confirm the system control password input

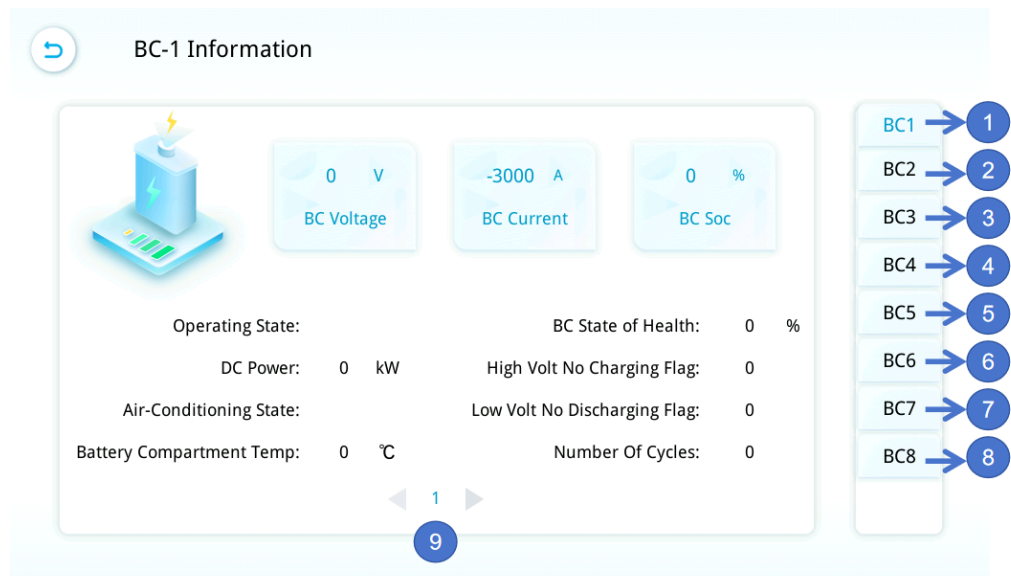
11.1.2 Function List

Figure 11-3 Function list page



No.	Name	Function
1	Fault alarm information page button	Click the button to jump to the system fault alarm information page
2	Event Log Button	Click the button to jump to the system event log page (the function is not yet developed and cannot be accessed temporarily)
3	Data query button	Click the button to jump to the system data query page (the function has not been developed and cannot be accessed temporarily)
4	Language switch button	Click the button to switch the language displayed on the system page
5	Version query button	Click the button to jump to the system version information page
6	System settings button	Click the button to jump to the system settings page
7	Back to Home Button	Click the button to jump to the system home page

11.1.3 Battery Information Page

Figure 11-4 Battery information page


No.	Name	Function
1-8	Battery cabinet	Click to view the data of the corresponding battery cabinet
9	Battery cabinet information	Click the Previous or Next button to access battery cabinet information page 1 or 2

11.1.4 System Information Page

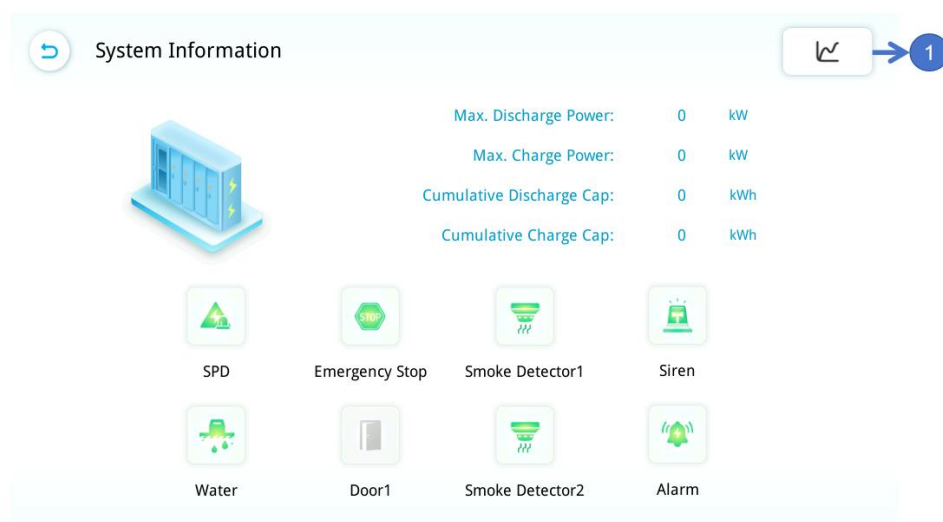
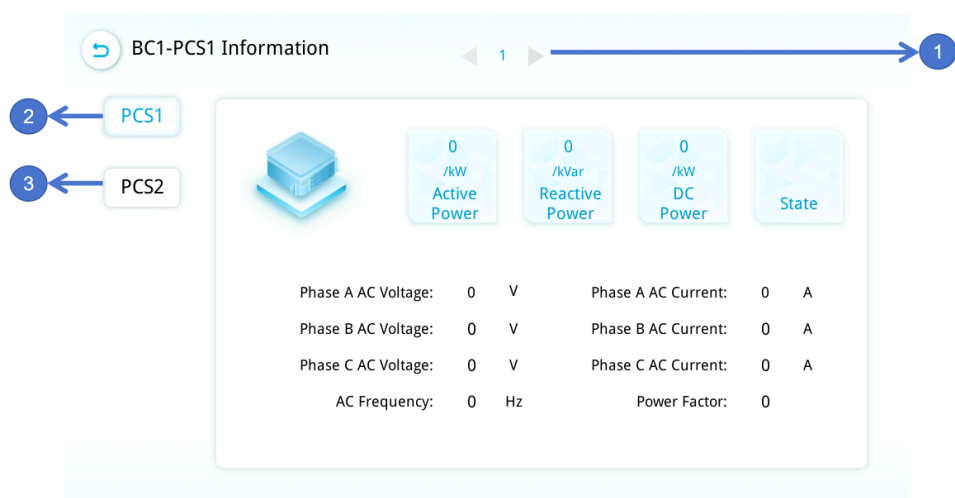
Figure 11-5 System information page


Figure 11-6 Line Chart


No.	Name	Function
1	Line Chart	Display power chart of the overall system (clickable)

11.1.5 ACDC Information Page

Select and click the "2" icon on the main page to enter the system information page, where you can view the detailed ACDC operating parameter information of the battery cabinet.

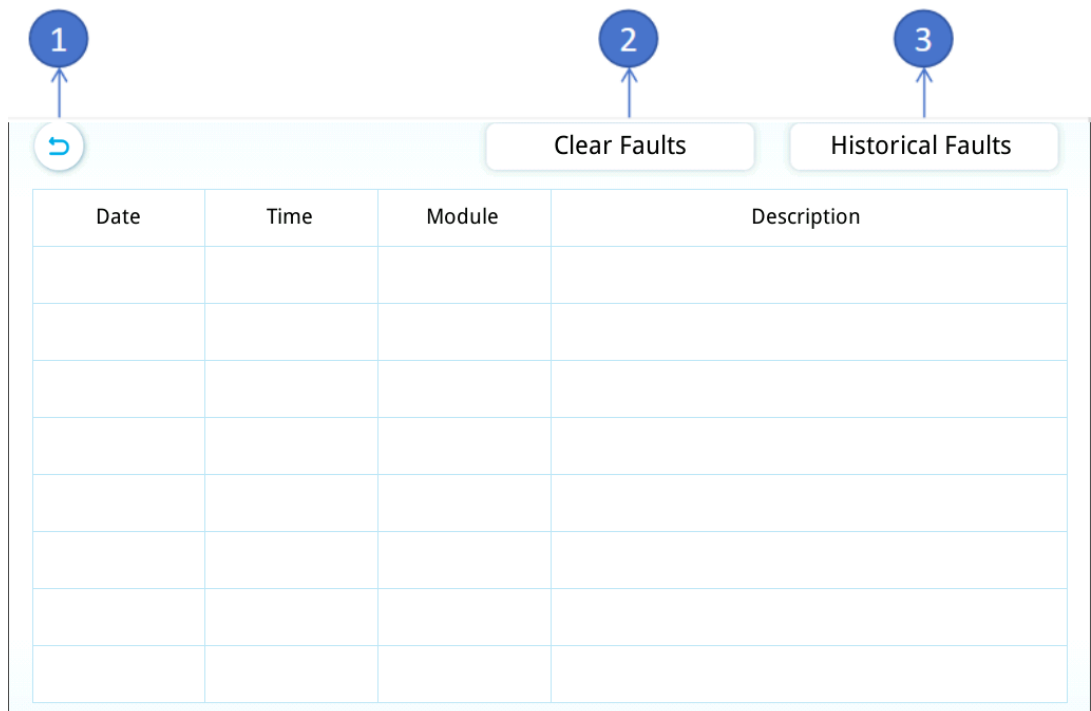
Figure 11-7 ACDC information page


No.	Name	Function
1	Viewing of PCS data corresponding to the battery cabinet	The current data for the first battery cabinet is PCS1. It can be switched left or right to access the PCS data of the corresponding battery cabinet.
2	Switch to PCS1	The current data interface of the PCS1 in the battery cabinet.
3	Switch to PCS2	The current data interface of the PCS2 in the battery cabinet.

11.1.6 Fault Alarm Information Page

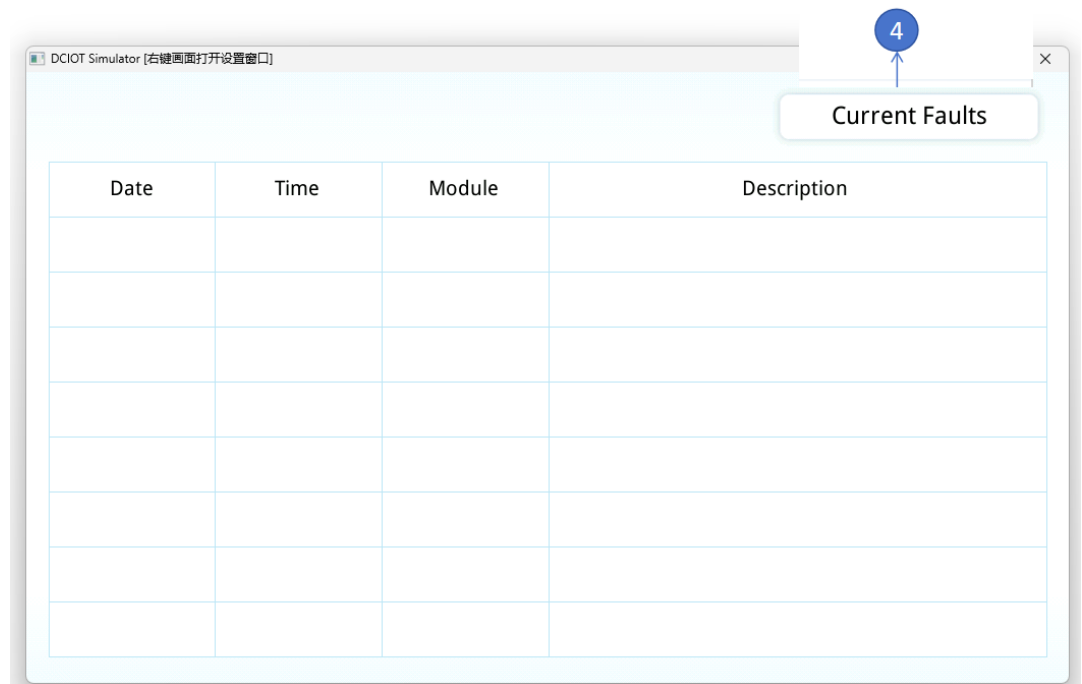
Fault alarm information page: Click the "1" button in the function selection list to enter the system fault alarm information page to view the current fault alarm information of the system.

Figure 11-8 Fault alarm information page



Click "History Faults" to enter the historical fault alarm page.

Figure 11-9 Historical fault alarm page

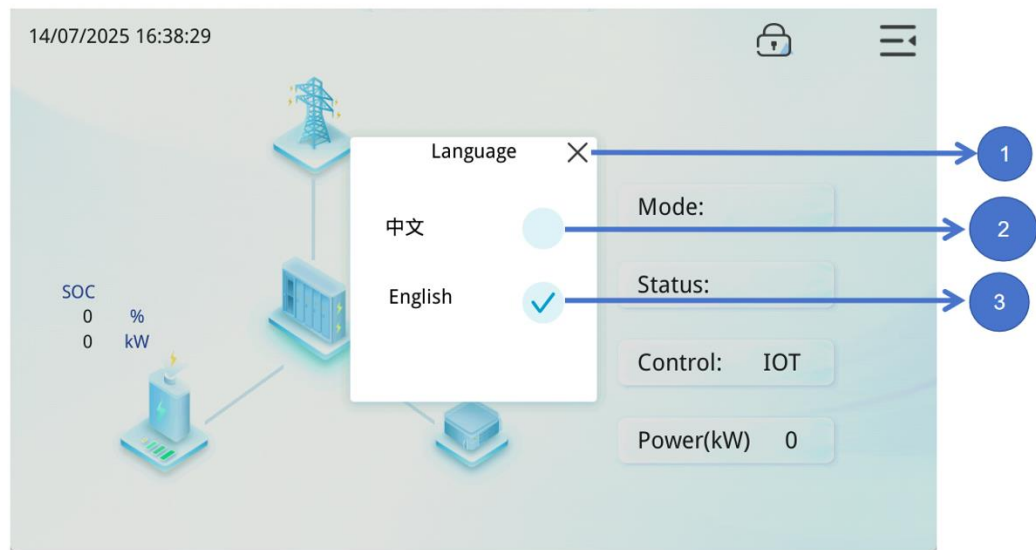


No.	Name	Function
1	Home button	Click the button to jump to the system home page
2	Clear Fault Button	Click the button to clear the current fault alarm information
3	Historical fault alarm page button	Click the button to jump to the historical fault alarm page
4	Current fault alarm page button	Click the button to jump to the current fault alarm page

11.1.7 Language Switching Page

Click the "4" button in the function selection list. The language switching pop-up window opens.

Figure 11-10 Language switching page



No.	Name	Function
1	Close popup button	Click the button to close the language selection pop-up window
2	Chinese selection button	Click the button to switch the system language to Chinese
3	English selection button	Click the button to switch the system language to English

11.1.8 Version Information Page

Click the "5" button in the function selection list to enter the system version information page, where you can view the version information of all current modules in the system.

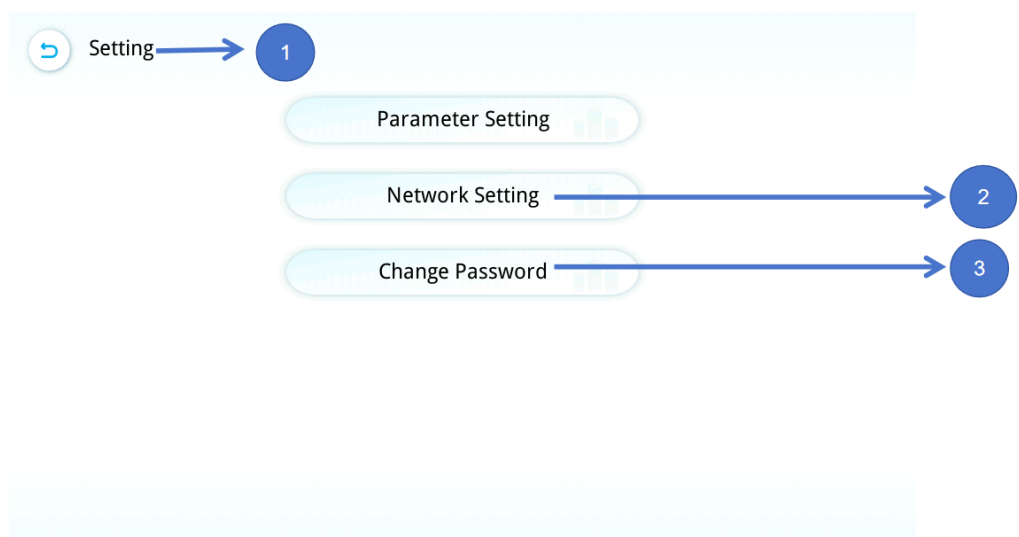
Figure 11-11 Version information page



11.1.9 System Settings Page

Click the "6" button in the function selection list to enter the system settings page.

Figure 11-12 System settings page



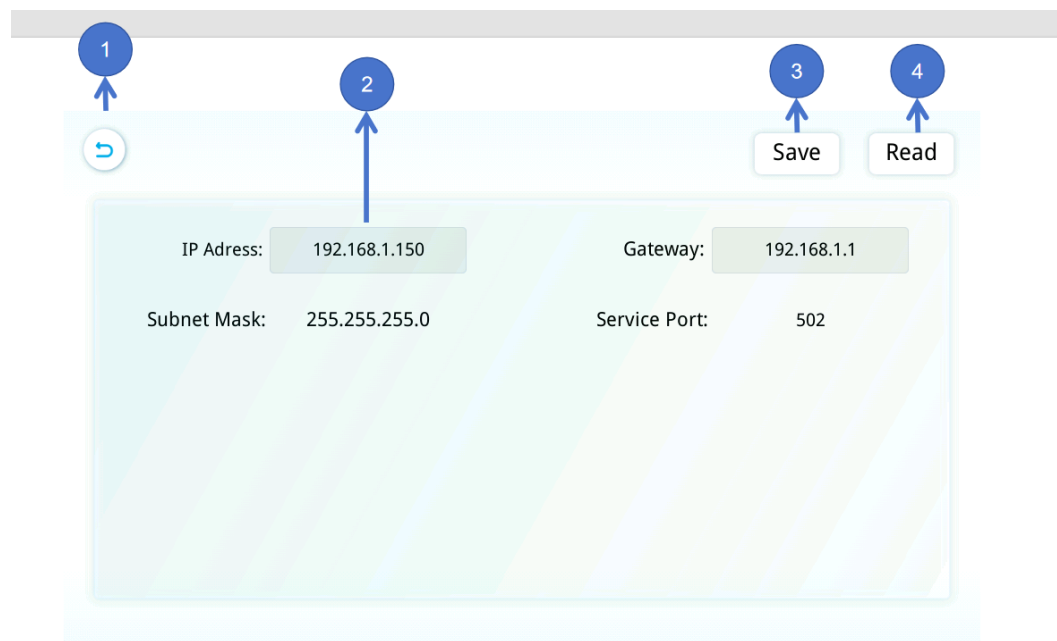
No.	Name	Function
1	Home button	Click the button to jump to the system home page
2	Network settings button	Click the button to jump to the network settings

No.	Name	Function
		page
3	Change password button	Click the button to open the password change pop-up window

11.1.10 Network Settings Page

Click the "3" button on the System Settings page to enter the Network Settings page, where you can modify the network IP address.

Figure 11-13 Network settings page

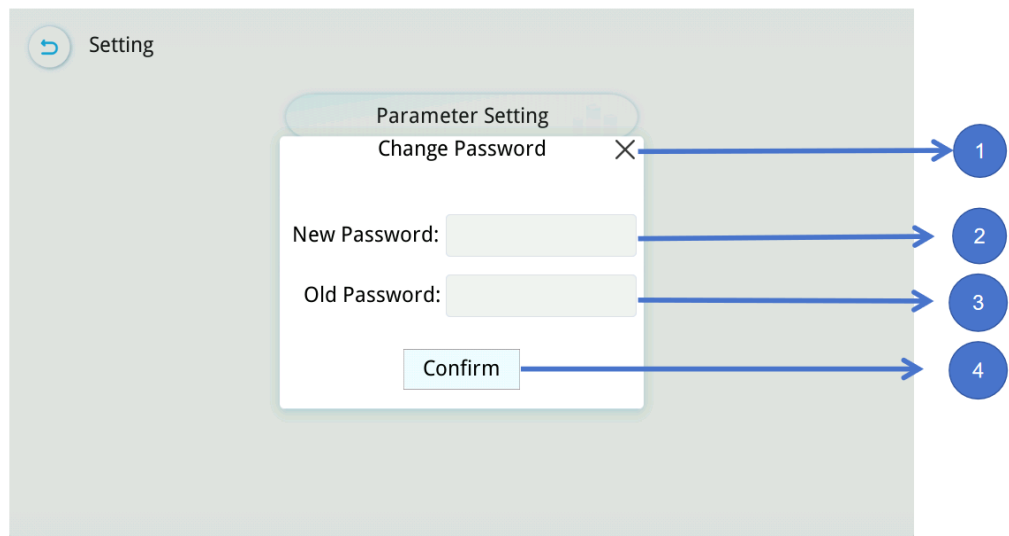


No.	Name	Function
1	System settings button	Click the button to jump to the system settings page
2	IP Settings Button	Click the button to modify the IP address
3	Save Button	Click the button to save the IP address settings
4	Read button	Click the button to read the current IP address settings

11.1.11 Change Password Page

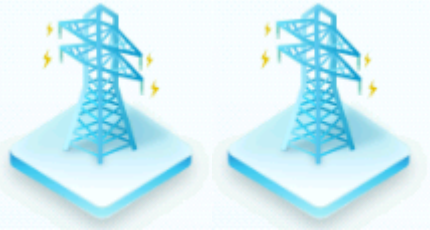
Click the "4" button on the system settings page to open the password change pop-up window, where you can change the password for unlocking the main page. If you forget your old password, enter "000000" to set a new password.

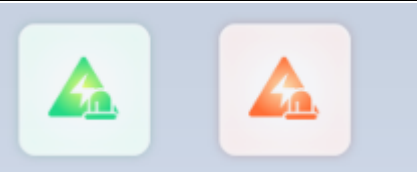
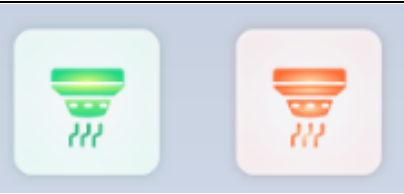
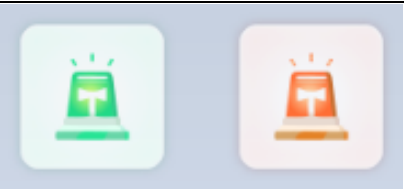
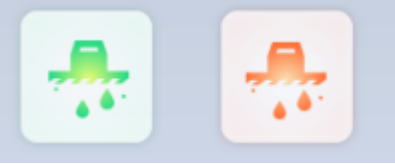
Figure 11-14 Password change page

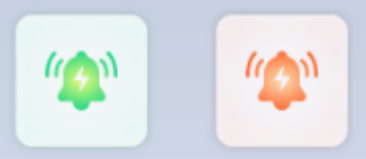


No.	Name	Function
1	System settings button	Click the button to jump to the system settings page
2	New password input button	Click the button to enter a new password
3	Old password input button	Click the button to enter your old password
4	Confirm button	Click the button to confirm the new password setting

11.2 Icon Introduction

Icon	Description
	Grid icon (not clickable)
	Battery icon (clickable)

Icon	Description
	ACDC icon (clickable)
	System information icon (clickable)
	Control lock icon (clickable) unlocks or locks system controls
	Lightning protection icon (not clickable) gray represents normal state, red represents trigger state
	Smoke sensor icon (not clickable) gray represents normal state, red represents triggered state
	Emergency stop icon (not clickable) gray represents normal state, red represents trigger state
	Alarm icon (not clickable) gray represents normal status, red represents triggered status
	The flood icon (not clickable) is gray for normal status and red for triggered status.

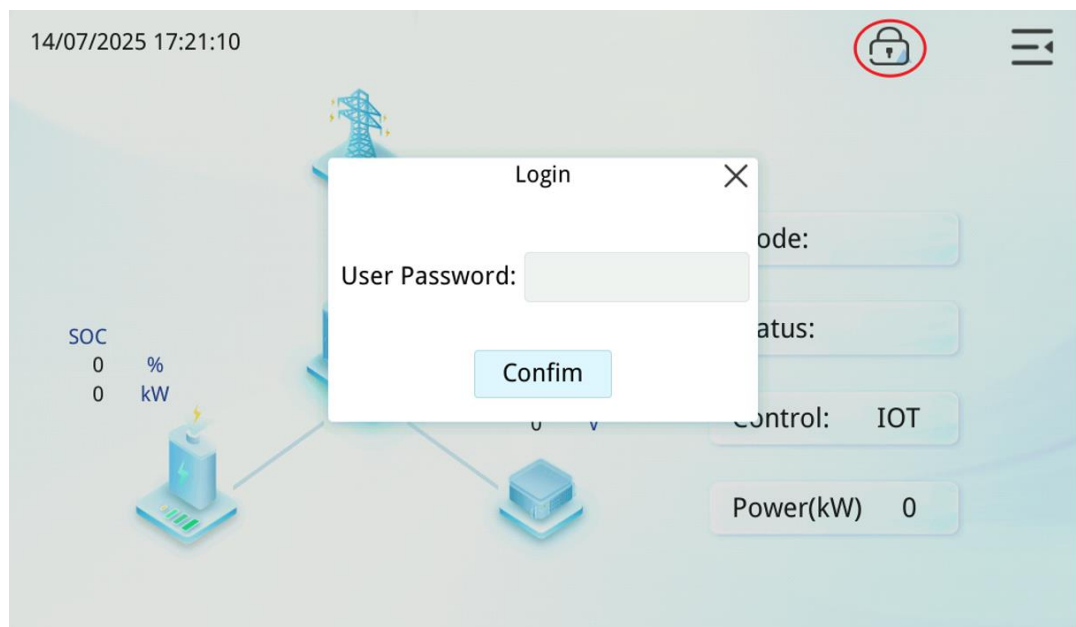
Icon	Description
	Fire icon (not clickable) gray represents normal state, red represents trigger state
	Access control icon (not clickable) green for closed state, yellow for open state
	Alarm bell icon (not clickable) green for closed state, yellow for open state

11.3 Operating Instructions

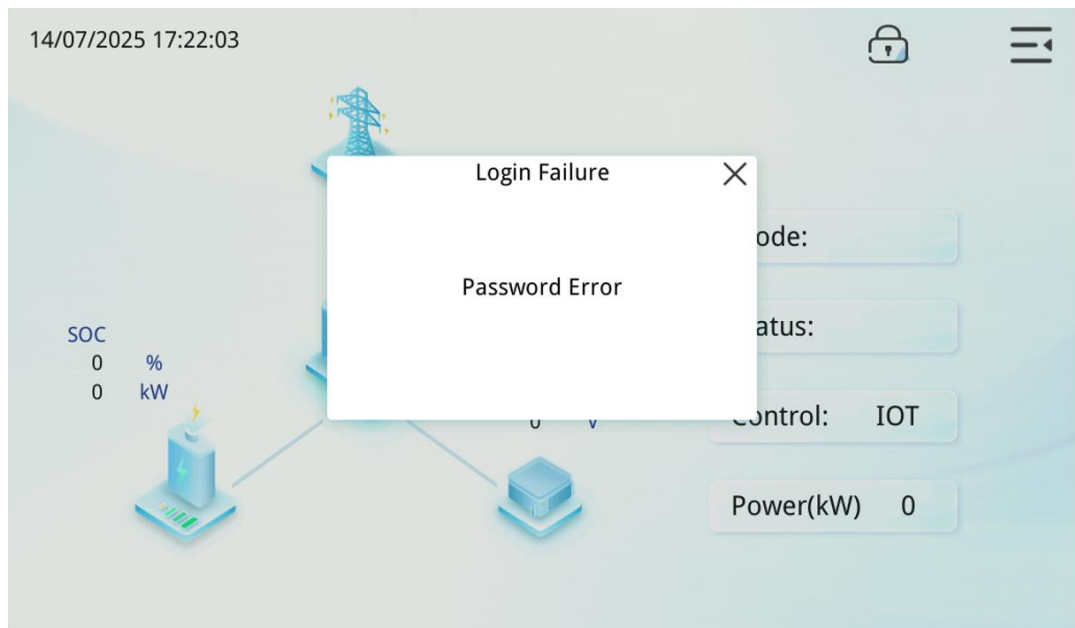
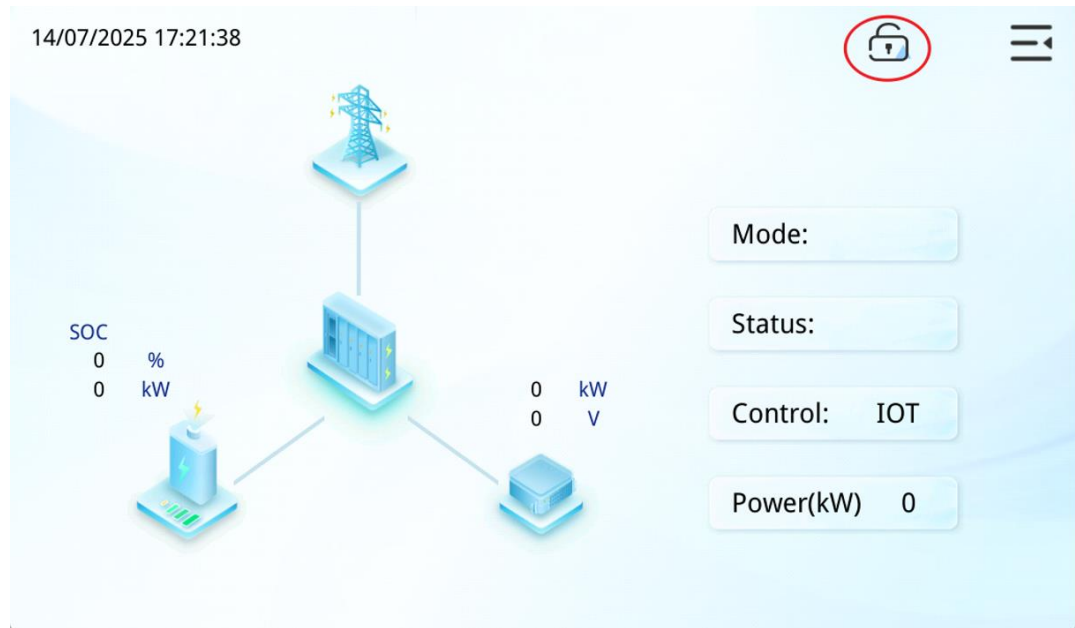
11.3.1 Control Unlock

Procedure

Step 1: Click the lock icon button on the main page, and the login interface pops up as shown:



Step 2: Enter the login password (initial password 888) and click the OK button. If the login is successful, the picture will be shown. If the login fails, the failure prompt will be displayed.



Note: If the screen is not clicked within 5 minutes, the system will automatically lock. The user can also click the unlock icon button to lock in advance.

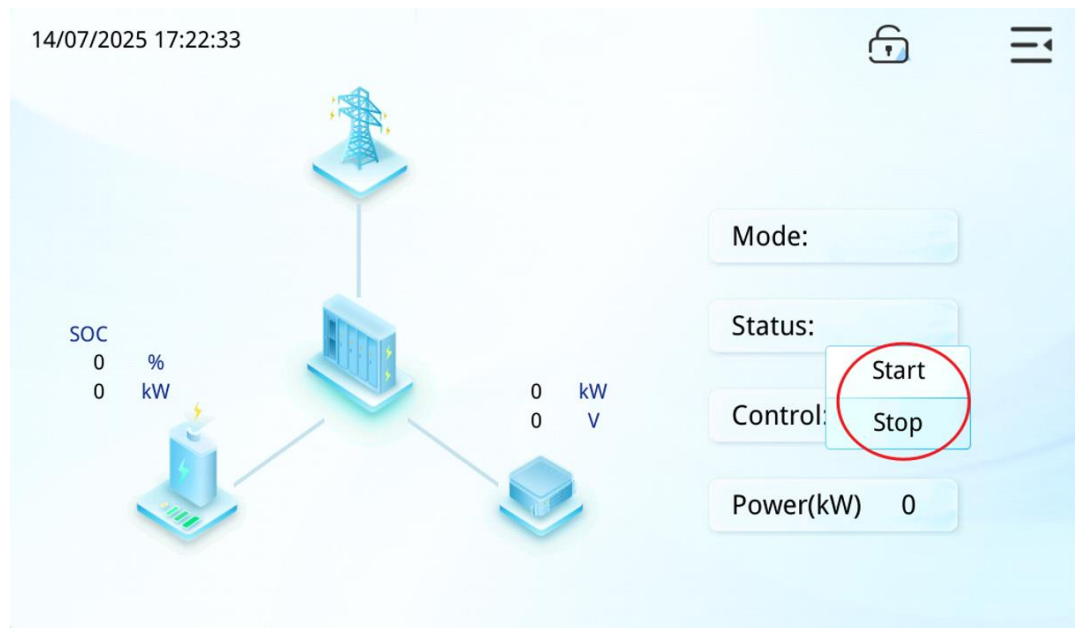
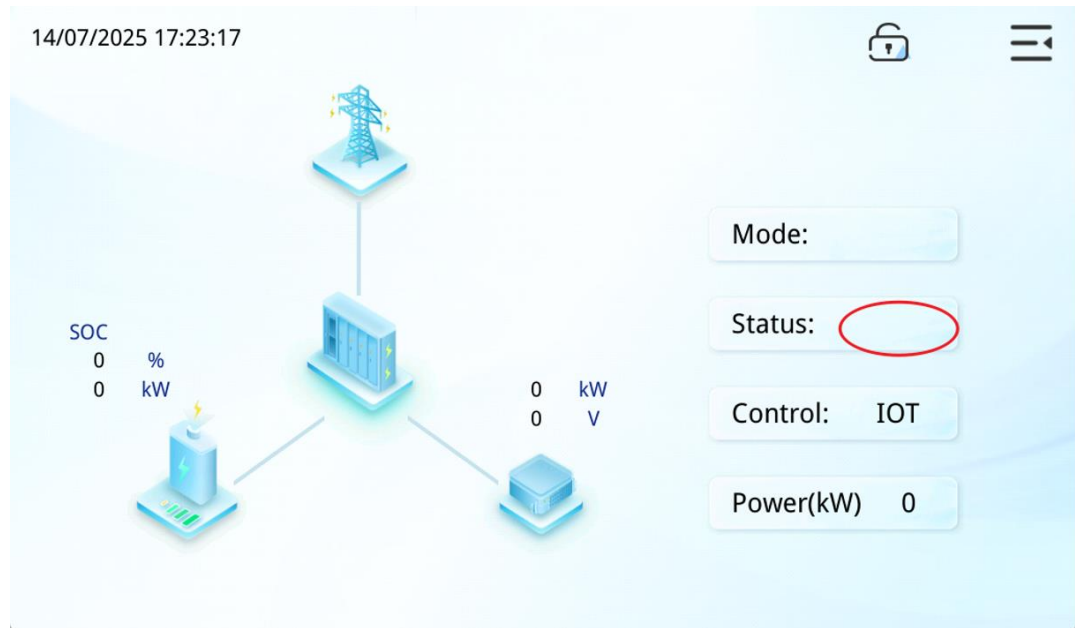
11.3.2 System Startup and Shutdown

Prerequisites

1. Control is unlocked
2. Control is local

Procedure

Step 1: Click on the system status, and a status selection menu will pop up as shown below:



Step 2: Click System Start or Stop.

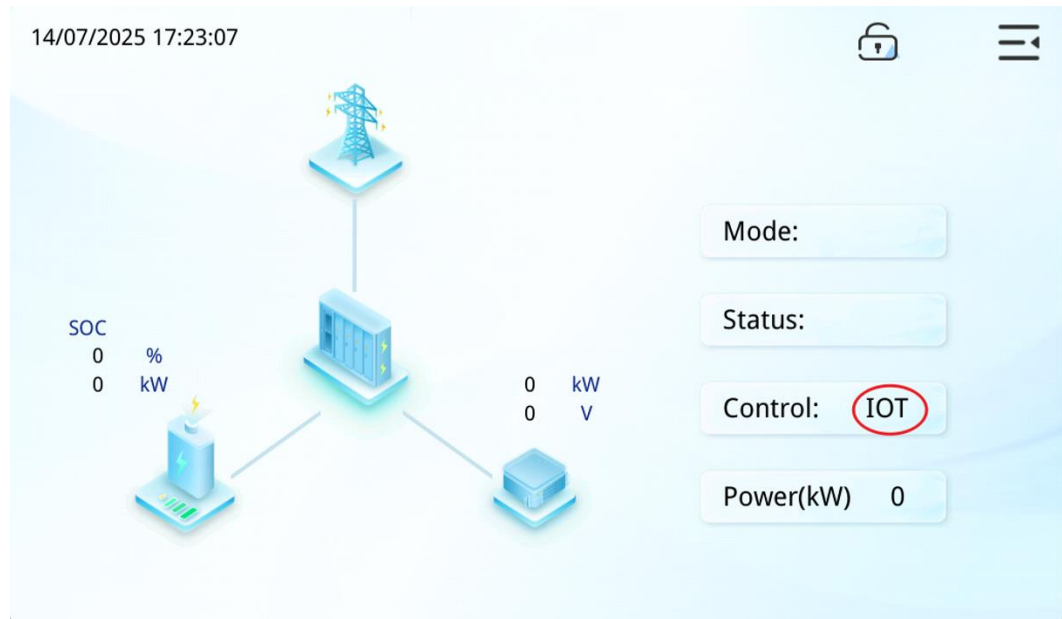
Note: It takes 1-2 minutes for the system to start, and there is a progress bar below.

11.3.3 System Control Switching

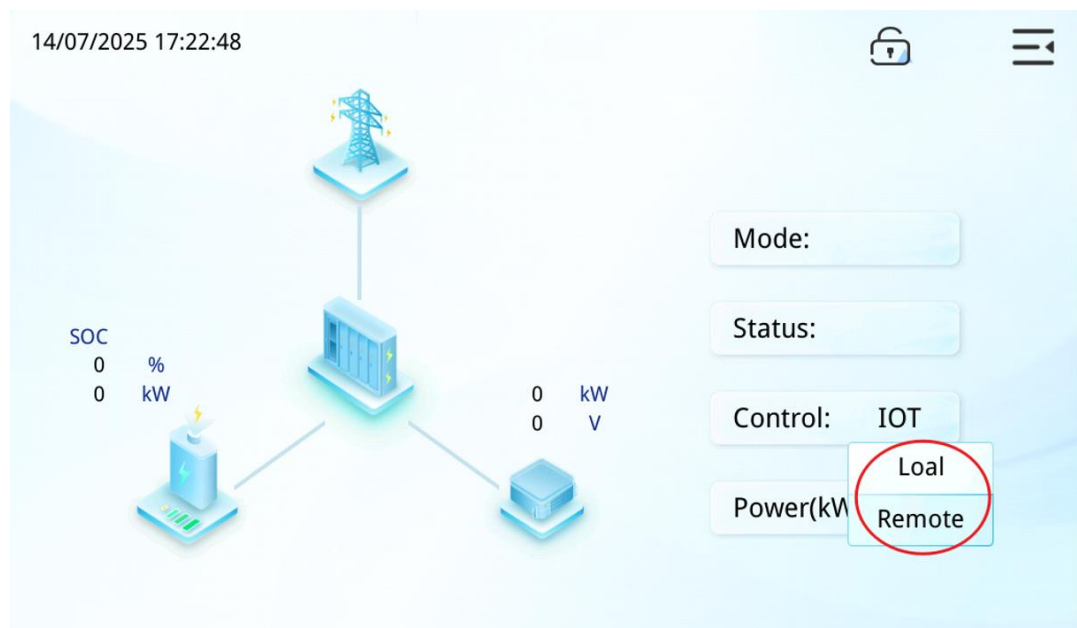
Prerequisite: Control is unlocked

Procedure

Step 1: Click on the system control, and the control selection menu will pop up as shown below:



Step 2: Click Local or Remote.



11.3.4 System Power Dispatch

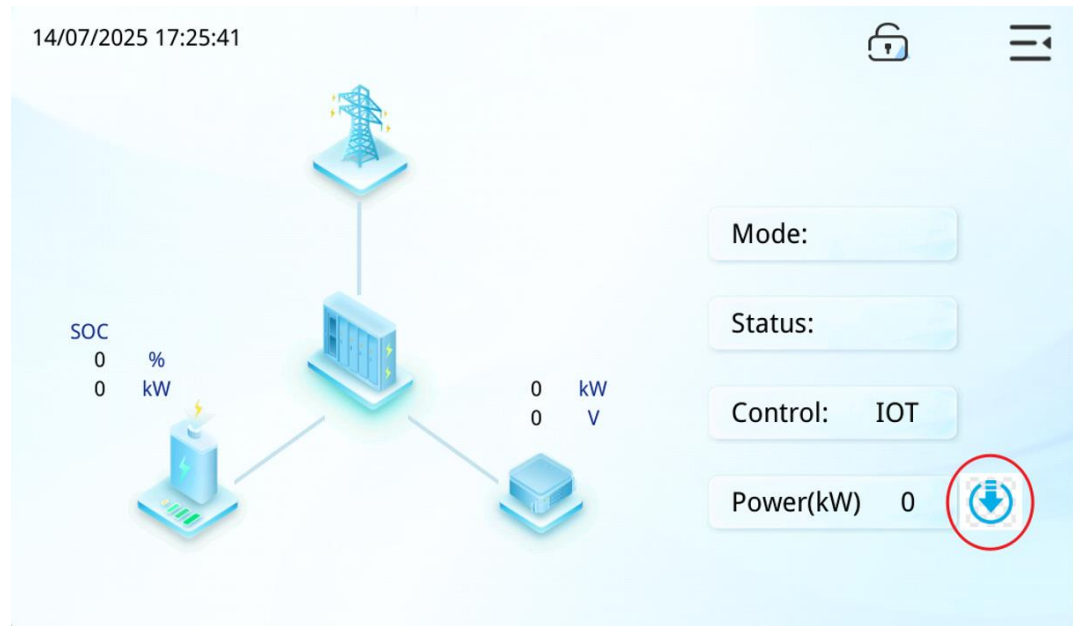
Prerequisites

1. Control is unlocked
2. The system has started
3. Control is local

Procedure

Step 1: Click on the value to enter the power.

Step 2: Click the Send button, as shown in the figure:

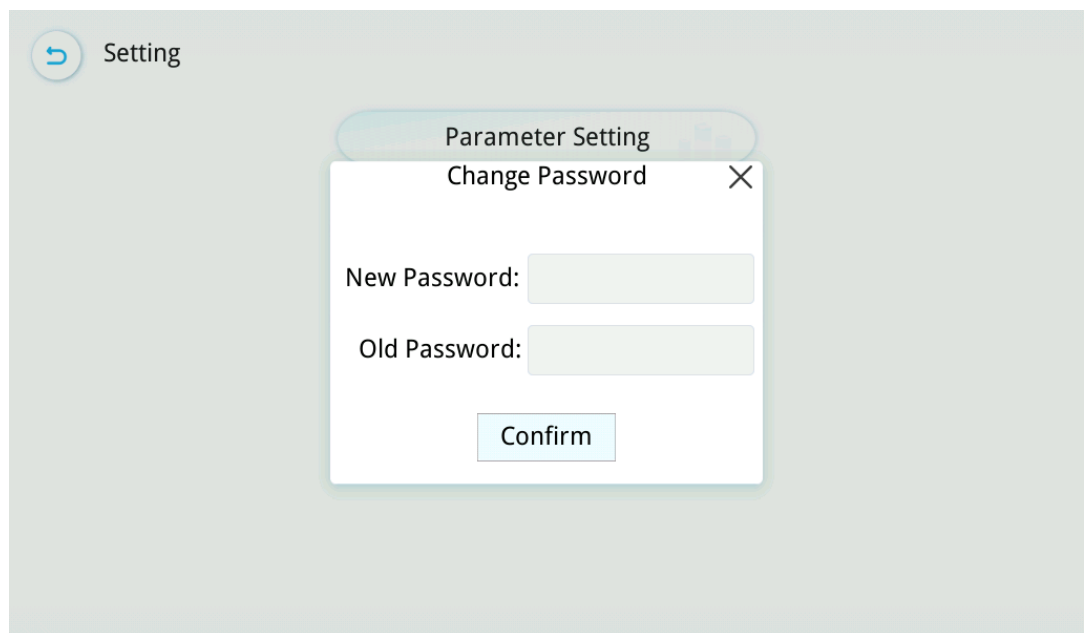


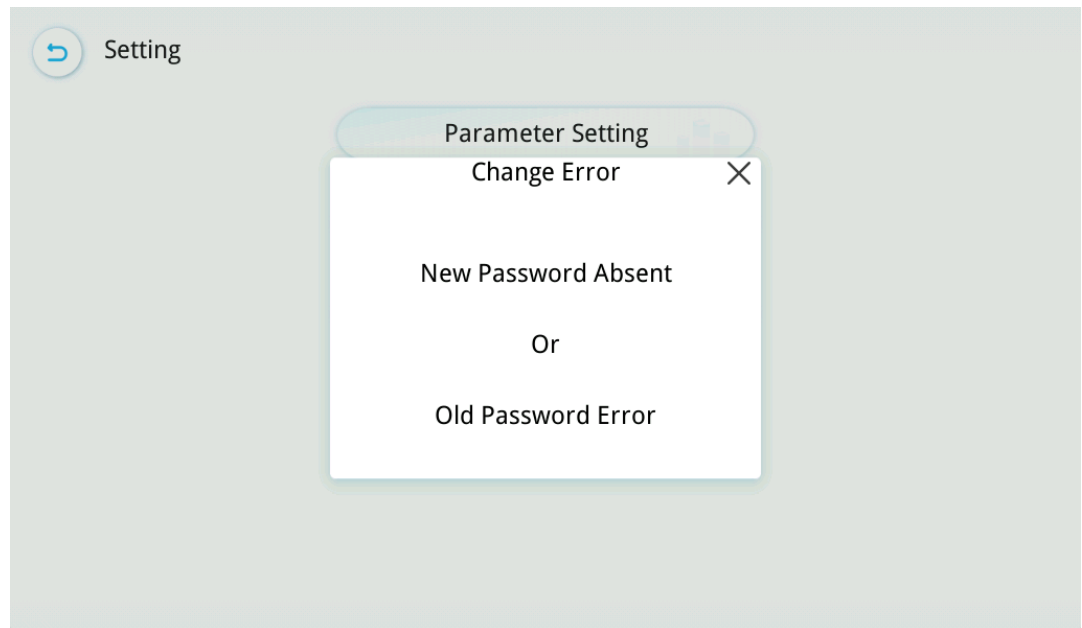
11.3.5 Control Password Modification

Procedure

Step 1: Click the Change Password button to open the Change Password pop-up window.

Step 2: Enter the new password and old password respectively, and then click the Confirm button. If the modification is successful, the password modification pop-up window will be automatically closed. If the modification fails, a failure prompt will be displayed, as shown in the figure:





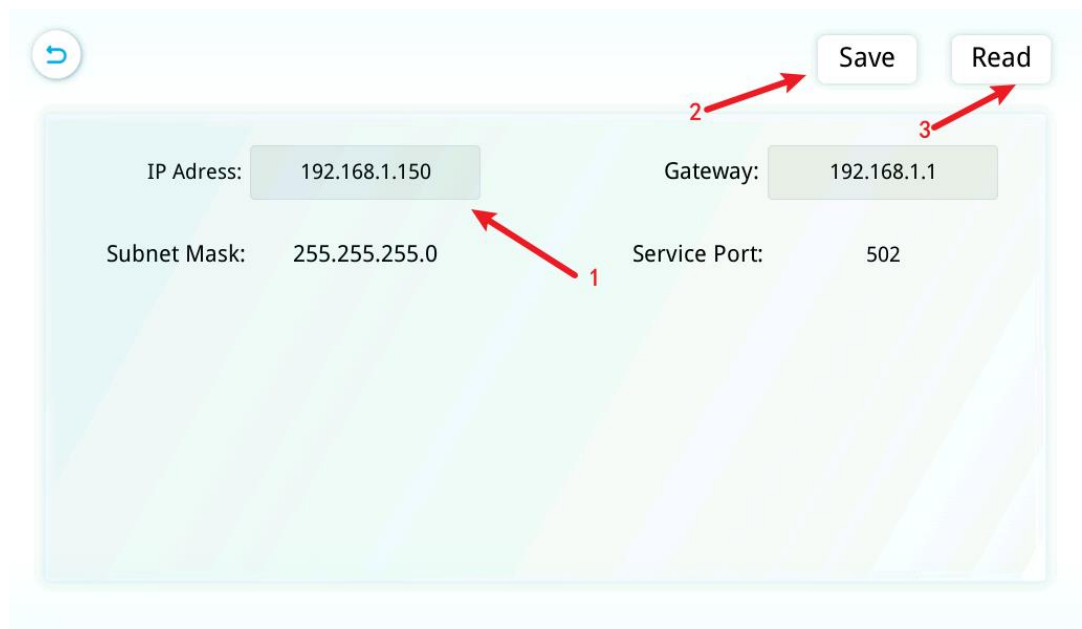
11.3.6 IP Modification

Procedure

Step 1: After entering the network settings page, click the IP modification button to change the required IP.

Step 2: Click the Save button to save your settings.

Step 3: (Optional) Click the Read button to check whether the file is saved successfully, as shown in the figure:



Note: After IP modification, the device needs to be restarted for it to take effect.

12

Operation and Troubleshooting

After the BESS containerized battery energy storage system is put into operation, regular inspection and maintenance of the system equipment is required. According to the maintenance time and maintenance items, the inspection and maintenance of the equipment are divided into two types:

Regular inspection and maintenance (recommended once a quarter) and annual maintenance (once a year).

Customers can make adjustments based on the environment and actual needs of the equipment installation site.

12.1 Quarterly Operation and Maintenance Requirements

Subsystem	Check Item	Method	Solution	Remarks
Container	Container appearance	Check the exterior for damage or rust and whether repainting is needed	Touch up paint	---
	Container flooding	Check whether there is any sign of water inside the container	Contact the manufacturer to investigate the cause of the flooding.	---
	Container nameplate	Check whether the nameplate on the container has fallen off	Re-post nameplate	---
	Container door lock	Check whether the cabinet door lock can be opened smoothly	Contact the manufacturer to eliminate the cause of the fault	---
	Container interior cleaning	Check and clean the interior of the container	Clean up the internal debris	---
	Container top	Check and clean the top of the cabinet to see if there is any accumulation of fallen leaves, branches or debris.	Clear the fallen leaves, branches or debris on the top of the cabinet	---
	Container rubber strip	Check whether the container rubber strips are falling off or damaged	Fix or replace the rubber strip	---

Subsystem	Check Item	Method	Solution	Remarks
	External emergency stop of container	Check whether the emergency stop switch on the outside of the container is working properly. Press the emergency stop switch to shut down the system.	Contact the manufacturer to find out the cause of the fault	Live inspection
Container interior lighting	Lighting tube	Check that all lighting tubes are working properly	Contact the manufacturer to find out the cause of the fault and replace the lighting tube	Live inspection
	Emergency lights	Check that all emergency lights are working properly	Contact the manufacturer to check the cause of the fault and replace the emergency light	Live inspection
Power distribution control box	Visual inspection	Visually check whether all components and circuits in the power distribution control box are damaged.	Check the cause of damage and replace the damaged device	---
PCS cabinet	PCS cabinet indicator light	Check whether the PCS cabinet indicator is normal	Contact the manufacturer to find out the cause of the fault	Live inspection
	PCS module indicator	Check whether the PCS module indicator is normal.	Contact the manufacturer, troubleshoot the cause of the fault, and replace the PCS module.	Live inspection
	PCS module fan	Check whether the PCS module fan is working properly	Contact the manufacturer, troubleshoot the cause of the fault, and replace the PCS module.	Live inspection
	Visual inspection	Visually inspect all components in the PCS cabinet, especially the power cables and bolts to see if they are burnt or have obvious damage.	Contact the manufacturer to find out the cause of the fault	---
	Lightning arrester	Visually check whether the lightning arrester window is still green	Replacement of lightning arrester	---
	Breaker	Check if the circuit breaker is working properly	Contact the manufacturer, check the cause of the fault, and replace the circuit breaker switch	---
	PCS cabinet door lock	Check whether the cabinet door lock can be opened smoothly	Contact the manufacturer to find out the cause of the fault	---
Battery cabinet	Battery cabinet appearance	Check the exterior for damage or rust and whether repainting is needed	Touch up paint	---

Subsystem	Check Item	Method	Solution	Remarks
	Battery cabinet identification	Check whether the warning sign on the battery cabinet has fallen off.	Re-post warning signs	---
	Battery cabinet indicator light	Check whether the indicator light of the battery cabinet is working properly	Contact the manufacturer to find out the cause of the fault	Live inspection
	Breaker	Check if the circuit breaker is working properly	Contact the manufacturer, check the cause of the fault, and replace the circuit breaker	---
	Battery cabinet door	Check whether the battery cabinet door is closed tightly	Close the battery cabinet door again	---
	Battery cabinet rubber strip	Check whether the battery cabinet door rubber strip is damaged or falling off	Fix or replace the rubber strip	---
	Battery cabinet leaking	Check if there is any leakage in the battery cabinet	Contact the manufacturer to find out the cause of the fault	---
	Battery cabinet door lock	Check whether the battery cabinet door lock can be opened smoothly	Contact the manufacturer to find out the cause of the fault	---
	Battery cabinet door lock rod	Check whether the battery cabinet door lock rod is deformed	Replace the battery cabinet door lock rod	---
	Battery power cable/bronze	Visual inspection for obvious damage or burning	Contact the manufacturer to find out the cause of the fault	---
	Battery module appearance	Visually inspect the battery to see if it is bulging or leaking.	Contact the manufacturer to replace the battery module	There is a pungent smell when leaking
	Battery terminal	Visual inspection for obvious damage or burning	Contact the manufacturer to find out the cause of the fault	---
	Air conditioner	Check whether the air conditioner is operating normally and whether there is any abnormal sound.	Contact the manufacturer to replace the battery module	Live inspection
		Check if the air conditioner drain outlet is blocked	Unclogging the air conditioning drain	---
	Fire extinguishing hose	Visually check whether the fire pipe pressure gauge pointer is in the green normal area	Contact the manufacturer to refill the gas or replace the fire hose	---

Subsystem	Check Item	Method	Solution	Remarks
	Smoke sensor	Is the smoke sensor indicator light flashing normally?	Contact the manufacturer to find out the cause of the fault	The smoke indicator light flashes approximately once every 6 seconds.

12.2 Annual Operation and Maintenance Requirements

Subsystem	Check Item	Method
Container	Container appearance	Repair paint on damaged or rusted areas of containers
	Container grounding	Check the grounding of the container and confirm the grounding resistance
	Container dust screen	Use vacuum cleaner to clean dust from container dust screen
	Inside the container	Vacuum the inside of the container to remove dust
Power distribution control box	Dust removal in power distribution control box	Use vacuum cleaner to clean the dust inside the power distribution control box
PCS cabinet	Dust removal inside the cabinet	Use a vacuum cleaner to clean the dust on the copper plate, terminals, mesh holes, etc. in the PCS cabinet.
	Power cable	Check whether the power connection wires and connection terminals in the cabinet are damaged or burnt.
	Power connection	Check the power line connection terminals for looseness and tighten them. If loose, use a torque wrench to re-torque them for torque marking.
	Ground connection	Check whether the grounding wire connection in the cabinet is reliable and whether the grounding wire fixing terminal is loose. If it is loose, use a torque wrench to re-torque it for torque marking.
Battery cabinet	Battery cabinet appearance	Battery cabinet paint or rust repair
	Dust removal in battery cabinet	Use a vacuum cleaner to clean the dust inside the battery cabinet
	Power cable	Check whether the power connection wires and connection terminals in the battery cabinet are damaged or burnt.
	Power connection	Check the power line connection terminals for looseness and tighten them. If loose, use a torque wrench to re-torque them for torque marking.
	Ground connection	Check whether the grounding wire connection in the cabinet is reliable and whether the grounding wire fixing terminal is loose. If it is loose, use a torque wrench to re-torque it for torque marking.

	Air conditioner	Check the cleanliness of the condenser and clean it with compressed air
	Fire fighting	Clean the dust from the fire nozzle
System	SOC verification	The system is discharged at rated power until the system discharge protection is cut off, and then left to stand for 30 minutes; The system charges at rated power until the charging protection is cut off, and the system is left to stand for 30 minutes, and the charging data is recorded; The system discharges at rated power until the system discharge protection is cut off, and the discharge data is recorded.

12.3 Fault Diagnosis and Troubleshooting

12.3.1 Troubleshooting Procedure

1. Status record: After a fault occurs, before operating any switch, the fault information, indicator light status and the position of each switch on the local HMI should be recorded immediately.
2. Fault type identification: After recording all indications, refer to the fault information table to analyze the cause of the fault. If you are not sure of the type of fault, please contact the supplier or technical support engineer.
3. Fault record: After the fault type is identified, the result will be sent to the supplier or technical engineer. The information fed back by the user is extremely important for maintenance work.
4. On-site repair: After determining the cause of the fault, if the damaged parts need to be replaced, you can contact the supplier or technical support engineer and ask them to provide guidance documents for replacing parts or provide remote guidance.

12.3.2 Fault Recording and Analysis

1. View fault records through the local HMI.
2. Common fault handling is as follows, and more fault content can be found in the protocol document.

No.	Fault Name	Possible Cause	Solution
1	BC communication interruption	Battery cabinet communication failure	Check whether the communication line is well connected.
2	BC is not available	BC battery cabinet does not start or is faulty	Check whether the battery cabinet is started
3	ACDC is not available	PCS not started or faulty	Check whether the PCS module is started
4	ACDC DC port	Battery not activated	The battery cabinet will disappear

No.	Fault Name	Possible Cause	Solution
	undervoltage		automatically after it is started.
5	Emergency stop fault	EPO outside the container or EPO on the PCS door is triggered	Check the EPO button on the container/PCS cabinet/power distribution control box/battery cabinet and rotate it to reset.
6	IO controller communication interruption	IO controller communication failure	Check the IO controller communication harness
7	Water immersion failure	Water in the battery cabinet	Check whether the battery cabinet door is closed. Check whether the battery cabinet is soaked in water
8	Single cell high voltage failure	Single cell voltage > 3.6V	Notify the manufacturer to handle
9	Single battery low voltage fault	Single cell voltage <2.8V	Notify the manufacturer to handle
10	BMM communication failure	BMM module is damaged or communication is faulty	Check the BMM communication harness
11	Access sensor failure	The door is not closed	Just close the container/battery cabinet door
12	Lightning arrester failure	AC lightning arrester failure	Check the AC lightning arrester on the primary and secondary incoming lines

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Technical Data

Item	PowerMount-P480-2007KWh
Battery parameters	
Battery cell	LiFePO4-280Ah
Battery module	
Module string	1P20S
Battery string	1P280S (14 pack)
Battery cluster system	8*1P280S
Cycle Life	8000cycles@25°C
Battery capacity (BOL)	2007kWh
Battery voltage range	784V ~ 994V
AC side parameters	
Grid type	AC400V, 3P4W+PE
Rated output power	480KW (8*60KW)
Rated voltage	AC400V
Rated frequency	50Hz
Rated output current	693
Power factor	0.8cap~0.8ind
Overload capacity	110%, 1mins; 120%, 5s
General parameters	
Protection level	Outdoor installation (battery cabinet: IP55, electrical cabinet: IP54)
Cooling method	Battery cabinet: industrial air conditioning, electrical cabinet: forced air cooling
Corrosion resistance	C3
Operating temperature	-30°C ~ 60°C (Derating when above 50°C)
Relative humidity	0~95% (non-condensation)
Working altitude	<3000m
Fire protection system	Perfluoro
Noise	≤75dB
Size	20HQ Container (6058mm*2438mm*2896mm)
Weight	About 26079kg (with 8 battery cabinets)
Communication interface	Ethernet, RS485

Item	PowerMount-P480-2007KWh
Communication protocol	Modbus TCP, Modbus RTU
Certification	
System: IEC 61000, IEC 62477, IEC 62619, UN3536 Battery cell: IEC 62619, UL 1973, UL 9540A, UL 1642 PCS: EN 50549, VDE 4105, VDE 4110, G99, NC-RFG, TOR-TypA and B	



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