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USER MANUAL

STORE215V/X

Please carefully read the instrucion manual before use
Any updates or revisions will not be notified separately

About this manual

◆ Applicable Products

This user manual provides detailed instructions on the transportation and storage, mechanical installation, electrical connections, system startup and shutdown, troubleshooting, and maintenance of the battery energy storage system. It is intended exclusively for the ECOBSS STORE 215V/X Energy Storage System developed by ECOBSS company.

◆ Intended Audience

This manual is intended for personnel involved in the installation, operation, and maintenance of the product. Readers should possess relevant qualifications and foundational knowledge in electrical and related fields.
All installation and operations must be performed exclusively by qualified technical personnel who meet the following
requirements:

•Complete specialized training and hold recognized qualifications.

•Thoroughly read this manual and understand all related safety precautions.

•Be familiar with local standards and safety regulations for electrical systems.

◆ Symbol usage

To ensure user safety and protect property while using the product, this manual provides relevant information and emphasizes
important points using the following symbols for clarity and effective use.
The following symbols may be used throughout this manual; please read them carefully to enhance your understanding and
effective use of the manual.
The meanings of the symbols that may appear in this document are as follows:

Symbol	Symbol meanings
 DANGEROUS	Signals an emergency hazard that, if not addressed, may lead to death or severe injury.
 WARNING	Used to alert individuals to potential hazards that could result in death or serious injury if not avoided.
 CAREFUL	Used to alert individuals to potential hazards that could result in moderate or minor personal injury if not avoided.
 ATTENTION	Used to convey safety warnings related to equipment or the environment that, if not addressed, may lead to equipment damage, data loss, decreased performance, or other unforeseen consequences.
 DESCRIPTION	Used to emphasize important or key information, best practices, and tips; 'instructions' are not safety warnings and do not pertain to personal, equipment, or environmental hazards.

◆ Usage of symbols on the product

When performing installation, operation, maintenance, and other tasks, please pay attention to the warning symbols on the product, including but not limited to the following:

Symbol	Symbol Meanings
	This symbol indicates the presence of high voltage or electrical charge, and touching it may result in the risk of electric shock.
	Used to warn of potential hazards that, if not avoided, may lead to moderate or minor personal injury.
	This symbol indicates the location of the protective earth (PE) terminal, which must be securely grounded to ensure operator safety.
	Functional Grounding.
	Prevent Trip Hazards.
	Entry Prohibited for Individuals Wearing Pacemakers
	No Smoking
	No Open Flames
	No Climbing
	Do Not Touch
	No Treading
	No Entry
	No Leaning
	Read the instructions before use. Failure to comply may result in danger.
E-Stop	Emergency Stop

◆ Abbreviation

The following abbreviations may appear in this document; unless otherwise specified, they are defined as follows:

No	Abbreviation	Original Text	Chinese Meaning
1	BMS	Battery Management System	电池管理系统
2	BCMU	Battery Cluster Management Unit	电池簇管理单元
3	BMU	Battery Management Unit	电池管理单元
4	PCS	Power Conversion System	双向变流器
5	EMS	Energy Manage System	能量管理系统
6	ESS	Energy Storage System	储能系统
7	BESS	Battery Energy Storage System	电池储能系统
8	PE	Protective conductor	接地线
9	SOC	State of Charge	荷电状态
10	SOH	State of Health	健康状态

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1. Safety Notices

◆ 1.1. General Safety Notices

Before transporting, storing, installing, operating, using, or maintaining the equipment, please read this manual carefully.
Strictly follow the instructions in the manual and adhere to all safety precautions indicated on the equipment and within this manual.
The terms "Note," "Attention," "Caution," "Warning," and "Danger" in the manual do not encompass all safety measures that should be observed; they serve as supplementary safety reminders. You are also required to comply with relevant international, national, or regional standards, as well as industry practices. Our company assumes no liability for violations of general safety operating requirements or for failing to adhere to safety standards in the design, production, and use of the equipment.
This equipment should only be used in an environment that meets the specified design criteria. Failure to do so may result in equipment malfunctions; any resulting functional abnormalities or damage to components will not be covered by the equipment warranty. Additionally, any potential personal injury or property damage arising from such use will not incur compensation from our company.
When transporting, storing, installing, operating, using, and maintaining the equipment, local laws, regulations, and standards must be observed. The safety precautions in this manual are intended to supplement local laws, regulations, and standards.
The company assumes no responsibility for any of the following situations or their resulting consequences:
1) Installation and operating environments that do not comply with the relevant specifications of international, national, or regional standards.
2) Operating outside the conditions specified in this manual.
3) Unauthorized disassembly, modification of the product, or alteration of the software code.
4) Failure to operate in accordance with the operating instructions and safety warnings in the product documentation.
5) Equipment damage caused by abnormal natural events (earthquakes, floods, volcanic eruptions, landslides, lightning strikes, fires, wars, armed conflicts, typhoons, hurricanes, tornadoes, extreme weather, or force majeure).
6) Transport damage caused by you or a third party you appointed.
7) Damage resulting from storage conditions that do not meet the requirements outlined in the product documentation.
8) Damage to the hardware or data caused by negligence, improper operation, or intentional damage by you or a third party.
9) System damage caused by you or a third party, including damage resulting from relocation and installation of the system not in compliance with the requirements of this manual, as well as adjustments, modifications, or removal of identification marks not in accordance with this manual.
10) Defects, failures, or damages caused by actions, events, negligence, or accidents beyond the seller's reasonable control, including power outages, electrical failures, theft, war, riots, civil unrest, terrorism, or intentional or malicious damage.

ATTENTION

Reverse engineering, decompiling, disassembling, dismantling, modifying, implanting, or performing any other derivative operations on the device software is prohibited. You may not study the internal implementation of the device in any manner, obtain the device software source code, steal intellectual property, or disclose any results of performance testing of the device software.

1. Safety Notices

◆ 1.2. Personal Safety

1) It is strictly prohibited to perform any installation processes while the equipment is powered on. Installing or removing cables while energized can cause arcing, electrical sparks, or ignition, which may result in fire or personal injury;
2) Improper or incorrect operations while the equipment is energized may lead to fire, electric shock, or explosion, resulting in injury or loss of property;
3) During operations, it is strictly prohibited to wear watches, bracelets, bangles, rings, necklaces, or other conductive items to prevent the risk of electric shock and burns;

During operations, it is essential to use specialized personal protective equipment, such as
protective clothing, insulated shoes, safety goggles, hard hats, and insulated gloves

◆ 1.2.1. General Requirements

1) Do not disable the device's protective mechanisms or disregard the warnings, cautions, and preventive measures outlined in the manual and on the equipment.

2) During the operation of the equipment, if any faults are discovered that may lead to personal injury or equipment damage, operations should be immediately halted, reported to the responsible personnel, and effective protective measures should be implemented.

3) Do not power on the equipment until the installation is complete or has been confirmed by a qualified professional.

4) Do not directly contact or use other conductors to touch, or indirectly contact powered equipment through wet objects. Before touching any conductive surface or terminal, measure the voltage at the contact point to ensure there is no risk of electric shock.

5) The casing temperature is high during equipment operation, posing a burn hazard. Do not touch.

6) Do not allow fingers, components, screws, tools, or circuit boards to come into contact with the operating fan to avoid injury or damage to the equipment.

7) In the event of a fire, evacuate the building or equipment area and activate the fire alarm, or call the fire emergency number.
Under no circumstances should you re-enter a burning building or equipment area.

1. Safety Notices

◆ 1.2.2. Personnel Requirements

Lifting, transporting, installing, wiring, operating, and maintaining the equipment must be carried out by qualified electrical technicians who comply with local regulations. When operating the equipment, appropriate personal protective equipment that meets local safety requirements must be worn.

Figure 1-1 Dress Code Requirements for Personnel

◆ Operators must meet the following requirements:

1) During installation, operation, and maintenance, it is strictly prohibited to wear conductive items such as watches, bracelets, bangles, rings, and necklaces to prevent the risk of electric shock.
2) When transporting, transferring, installing, wiring, and maintaining, you must comply with the laws, regulations, and relevant standards of the country or region.
3) Familiarize yourself with the entire energy storage system's composition and working principles, and operate according to the descriptions in the manual.
4) You should have received professional training related to the installation and trial operation of electrical equipment, possess a certain level of knowledge in electronics, electrical wiring, and mechanical principles, and be familiar with electrical and mechanical schematics.
5) You should have the ability to respond to emergencies or unexpected situations that may arise during installation or trial operation.

DANGEROUS	1) Before making electrical connections, ensure the equipment is undamaged; otherwise, it may cause electric shock or fire. 2) Improper or incorrect operations may result in accidental incidents such as fire or electric shock. 3) During operations, prevent foreign objects from entering the equipment; otherwise, it may lead to short circuits or damage, reduced power supply to the load, or power outages, as well as personal injury.
WARNING	For equipment that requires grounding, the protective ground wire must be installed first during installation, and it must be the last to be removed when dismantling the equipment.
ATTENTION	Cables must not pass through the equipment's air intake and exhaust openings.

1. Safety Notices

◆ 1.3.1. General Requirements

1) Installation, operation, and maintenance must be carried out according to the steps outlined in the manual. Do not make unauthorized modifications, additions, or changes to the equipment.
2) Do not change the installation sequence or any other procedures without proper authorization.
3) Permission from the local power authority must be obtained before connecting to the grid.
4) Comply with power station safety regulations, including adhering to operational tickets and work permit systems.
5) Temporary barriers or warning ropes must be installed in the work area, and "No Entry" signs must be displayed. Non-staff members are strictly prohibited from entering.
6) Before installing or removing power cables, ensure that the device itself and its upstream and downstream switches are turned off.
7) If any liquid enters the device, immediately turn off the power and do not continue using it.
8) Before operating the equipment, carefully check that the tools used meet the requirements and are registered. After operation,
tools must be collected to prevent them from being left inside the equipment.
9) Before installing power cables, verify that the cable labels are correct and that the cable terminals are properly insulated.
10) When installing equipment, use a torque tool with the appropriate range to tighten screws. Ensure that the wrench is not
misaligned, and the torque value deviation does not exceed the specified 10%.
11) Torque tools must be used to secure screws, with red and blue markings applied for double-checking. After installation

personnel confirm the screws are properly tightened, they should mark the screws with a blue indicator. Once inspection personnel verify the tightness, a red mark should be added. The marking line must extend across the edge of the screw to ensure traceability.
12) After installation, ensure that all electrical component enclosures, insulation sleeves, and protective devices are properly in place to prevent the risk of electric shock.
13) If the equipment has multiple input sources, disconnect all inputs and ensure the equipment is fully powered off before performing any operations.
14) When maintaining downstream electrical or distribution equipment, the corresponding output switch of the power supply equipment must be turned off.
15) During equipment maintenance, "Do Not Switch On" tags must be hung on upstream and downstream switches or circuit breakers, and warning signs posted to prevent accidental reconnection. Power should only be restored after the fault has been completely resolved.
16) During fault diagnosis and troubleshooting, if a power shutdown is required, the following safety measures must be completed: Power Off > Voltage Verification > Grounding > Hanging Warning Signs and Installing Barrier
17) Regularly inspect the terminal screws of the equipment to ensure they are properly tightened and not loose.
18) If any cables are damaged, they must be replaced by qualified personnel to prevent risks.
19) It is strictly forbidden to alter, damage, or cover the labels and nameplates on the equipment. Replace any labels that have become unclear due to prolonged use in timely manner.
20) It is prohibited to clean the internal and external electrical components of the equipment with water, alcohol, or other solvents such as oil.

1. Safety Notices

◆ 1.3.2. Grounding Requirements

1) The grounding impedance of the equipment must comply with local electrical standard requirements.
2) The equipment must be permanently connected to a protective ground. Before operating the equipment, ensure to check the electrical connections to confirm that the equipment is properly grounded.
3) The equipment must be permanently connected to a protective ground. Before operating the equipment, ensure to check the electrical connections to confirm that the equipment is properly grounded.
4) It is prohibited to damage the grounding conductor.
5) For devices using a three-pin socket, it is essential to ensure that the grounding terminal of the three-pin socket is connected to the protective ground.
6) For devices with large touch currents, the protective grounding terminal of the device chassis must be grounded before connecting the input power supply to prevent electric shock from the device's touch current.

◆ 1.3.3. Cables Requirements

1) The selection, installation, and routing of cables must comply with local laws, regulations, and standards.
2) During the installation of power lines, avoid any looping or twisting. If the power line is found to be too short, it must be replaced, and no joints or solder points are allowed in the power line.
3) All cables must be securely connected, well-insulated, and of appropriate specifications.
4) Cable trays and conduits should be free of sharp edges, and protective measures should be in place to prevent cables from being damaged by sharp edges or burrs.
5) If cables enter the cabinet from the top, they should be bent into a U-shape outside the cabinet before entering.
6) Similar cables should be bundled together, appearing straight and neat, with no damage to the outer sheath; different types of cables should be spaced at least 30mm apart and must not be tangled or crossed.
7) Upon completion of wiring or if leaving during the wiring process, use sealing putty to seal cable openings immediately to prevent moisture and small animals from entering.
8) Underground cables must be reliably secured with cable supports and clips, ensuring that cables in backfill areas are tightly fitted against the ground to prevent deformation or damage during backfilling.
9) When external conditions (such as installation method or ambient temperature) change, cable selection must be validated based on IEC-60364-5-52 or local regulations and standards to ensure that current-carrying capacity requirements are met.
10) Cables used in high-temperature environments may experience insulation degradation and damage; maintain a minimum distance of 30mm between the cable and any heating elements or heat sources.
11) In low-temperature conditions, severe impacts or vibrations may cause the plastic outer layer of cables to become brittle and crack. To ensure safety during installation, the following requirements should be followed:

• All cables should be installed at temperatures above 0°C; when handling cables, especially during installation in lowtemperature environments, handle them gently.

• If the storage temperature of the cables is below 0°C, they must be moved to a room temperature environment and stored for over 24 hours before installation.

• Avoid improper handling, such as pushing cables directly off vehicles, to prevent damage and ensure that cable performance, current-carrying capacity, and temperature rise are not adversely affected.

1. Safety Notices

◆ 1.3.4. Antistatic Requirements

Electrostatic charge generated by the human body can damage electrostatic-sensitive components on the circuit board, such as the BMU board.

ATTENTION

1) Before contacting the equipment or handling the circuit board, anti-static gloves must be worn.
2) When holding the circuit board, only the edges that do not contain components should be touched; do not touch the components with your hands.
3) Disassembled circuit boards must be packaged in anti-static materials before storage or transportation.

DANGEROUS

1) It is strictly forbidden to place the equipment in an environment with flammable or explosivegases or fumes, and no operations are allowed in such environments.
2)It is strictly prohibited to store flammable or explosive materials in the equipment area.
3) Placing the equipment near heat sources or open flames, such as fireworks, candles, heaters, or other heating devices, may cause damage to the equipment or pose a fire hazard

◆ 1.4. Environmental Requirement

WARNING

1) It is strictly forbidden to place the equipment in an environment with flammable or explosive gases or fumes, and no operations are allowed in such environments.
2)It is strictly prohibited to store flammable or explosive materials in the equipment area.
3)Placing the equipment near heat sources or open flames, such as fireworks, candles, heaters, or other heating devices, may cause damage to the equipment or pose a fire hazard.

1)The temperature and humidity environment for storing the equipment should be appropriate, with storage in a clean, dry, and well-ventilated area to prevent dust and condensation.

2)It is strictly prohibited to install and operate the equipment outside the specified range of electrostatic requirements; doing so will adversely affect the performance and safety of the equipment.

3) Installation, usage, and operation of outdoor equipment and cables (including, but not limited to, the transportation of equipment, operation of equipment and cables, connecting and disconnecting outdoor signal interfaces, performing highaltitude work, outdoor installation, and opening doors) during adverse weather conditions such as thunderstorms, rain, snow, or winds exceeding level six is strictly prohibited.

4) The installation of the equipment in environments characterized by dust, smoke, volatile gases, corrosive gases, infrared radiation, organic solvents, or excessive salinity is strictly prohibited.

1. Safety Notices

5) The installation of the equipment in environments containing conductive metallic dust or ferromagnetic dust is strictly prohibited.

6) The installation of the equipment in areas conducive to the growth of fungi, mold, or similar microorganisms is strictly prohibited.

7)The installation of the equipment in areas with strong vibrations, high noise levels, or significant electromagnetic interference is strictly prohibited.

8) Site selection must conform to local laws, regulations, and relevant standards.

9)The ground at the installation site must be solid and free from rubber soil, soft soil, or areas prone to subsidence. Low-lying areas or regions susceptible to water accumulation are strictly prohibited. The horizontal plane of the site should be above the historically highest water level in the area.

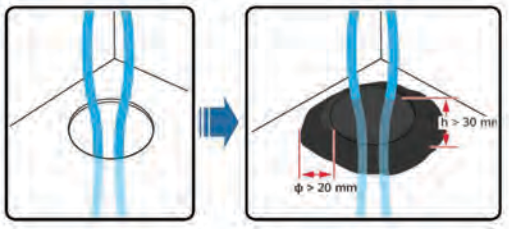
10)It is strictly prohibited to install the equipment in locations that may be submerged by water.

11) If the equipment is installed in a densely vegetated area, in addition to routine weeding, the ground beneath the equipment must be hardened, such as by laying cement or gravel.

12)Before opening the door for installation, operation, or maintenance, ensure that any accumulated water, ice, snow, or other debris on top of the equipment is cleared to prevent debris from falling into the interior of the equipment.

13) When installing the equipment, ensure that the installation surface is sturdy and meets the weight-bearing requirements of the equipment.

14) All cable entry holes must be properly sealed. Use sealing compound to seal the cable entry holes that are utilized, and employ the covers provided with the equipment to seal any unused cable entry holes. The correct standards for the application of sealing compound are illustrated in the figure below:



1. Safety Notices

◆ 1.5. Mechanical Safety

Electrostatic charge generated by the human body can damage electrostatic-sensitive components on the circuit board, such as the BMU board.

DANGEROUS

When performing work at height, safety helmets, safety belts, or harnesses must be worn and secured to sturdy and solid structural components. It is strictly prohibited to suspend them from unstable, movable objects or sharp-edged metals to prevent fall accidents.

WARNING

1)Tools must be fully prepared and inspected by qualified professional institutions. The use of damaged tools or those that have not passed inspection or are beyond their validity period is strictly prohibited. Ensure that tools are secure and not overloaded.
2)Before installing the equipment into the cabinet, ensure that the cabinet is securely fixed to prevent it from tilting or collapsing due to an unstable center of gravity, which could result in injuries to installation personnel or damage to the equipment.
3)When pulling the equipment out of the cabinet, exercise caution with devices that may be unstable or heavy within the cabinet to avoid being crushed or injured.
4)Drilling holes in the equipment is strictly prohibited. Drilling can compromise the equipment's sealing, electromagnetic shielding performance, internal components, and cables. Metal shavings generated from drilling can enter the equipment and cause short circuits on the circuit boards.

◆ 1.5.1. General Requirements

1) Any paint scratches that occur during the transportation and installation of the equipment must be promptly repaired, and exposed scratched areas are strictly prohibited from being left unattended for long periods.
2) Arc welding, cutting, or any similar operations on the equipment are prohibited without prior assessment by our company.
3) The installation of additional equipment on top of the unit is prohibited without prior assessment by our company.
4) When performing work in the space above the equipment, protective measures should be taken to avoid damaging the equipment.
5) Please use the correct tools and ensure you are familiar with the proper methods for using them.

◆ 1.5.2. Safety in Handing Heavy Objects

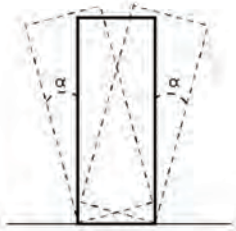
1) When handling heavy objects, choose appropriate handling tools and the right number of people for collaboration based on the weight of the goods to ensure safe packaging and transportation of the items.

1. Safety Notices

Table 2 Coordination during Heavy Lifting

			
W<18kg	18kg≤W<32kg	32kg≤W<55kg	W≥55kg

4) When using a forklift for transportation, the forks must be positioned in the middle to prevent tipping. Before moving, secure the equipment to the forklift with straps, and assign a person to supervise during movement.
5) Exercise caution when moving equipment to avoid collisions or drops.
6) During transportation, choose maritime shipping or good-quality roadways; railway and air transport are not supported. Efforts should be made to minimize bumps and tilting during transit.
7) The tilt angle of the cabinet should meet the illustrated requirements: with packaging, the tilt angle α should be ≤15°, and after removing the packaging, the tilt angle α should be ≤10°.



◆ 1.5.3. Working at Heights Safety

1) Any work performed at a height of more than 2 meters above the ground is classified as high-altitude work, and a supervisor must be assigned for such operations.
2) Personnel must undergo relevant training and obtain the necessary qualification certificates before engaging in high-altitude work.
3) High-altitude work must be halted if steel pipes are wet from rain or other potentially hazardous conditions arise. After such conditions subside, a safety officer and relevant technical personnel must inspect all equipment before work can resume.
4) The work site for high-altitude operations must be marked with clearly defined danger zones and signage, prohibiting entry to unauthorized personnel.
5) Guardrails and signage must be installed around edges and openings at heights to prevent accidental falls.
6) The ground area beneath the high-altitude work site must not be cluttered with scaffolding, planks, or other debris. Ground personnel are strictly prohibited from remaining or passing directly under the high-altitude work area.
7) Ensure that tools and equipment are properly secured to prevent them from falling and causing damage or injury.
8) It is strictly prohibited for personnel to throw objects from heights to the ground or vice versa. Objects should be conveyed using slings, baskets, aerial lifts, or cranes.
9) Simultaneous work on upper and lower levels should be avoided whenever possible. If unavoidable, a dedicated protective canopy must be established between the levels, and tools or materials must not be stacked on the upper level.
10) When dismantling scaffolding after completing work, the process should be carried out layer by layer from top to bottom, and simultaneous disassembly of different levels is strictly prohibited. Measures must be taken to prevent other sections from collapsing during disassembly.

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11) Personnel engaged in high-altitude work must strictly adhere to safety regulations; the company will not be responsible for accidents resulting from violations of these regulations.
12) It is strictly forbidden to engage in horseplay or to rest in high-altitude work areas.

◆ 1.5.4. Ladder Safety

1) When conducting operations at height that may involve electrical work, use wooden ladders or insulated ladders.
2) Prioritize the use of platform ladders with guardrails for elevated tasks; the use of straight ladders is prohibited.
3) Before using a ladder, ensure it is intact and undamaged, and confirm that it meets the required weight capacity. Overloading the ladder is strictly prohibited.
4) The ladder must be placed on a stable surface, and someone must hold the ladder during the operation to ensure safety.
5) When climbing a ladder, maintain a stable posture and ensure your center of gravity does not deviate from the edge of the ladder frame to minimize risks and ensure safety.
6) When using an A-frame ladder, the pull rope must be securely fastened.

◆ 1.5.5. Lifting Safety

1) Personnel involved in lifting operations must undergo relevant training and obtain certification before being allowed to work.
2) Temporary warning signs or barriers must be erected to isolate the lifting area.
3) The foundation for lifting operations must meet the load-bearing requirements for the crane.
4) Before lifting, ensure that lifting tools are securely fixed to objects or walls that meet the weight-bearing standards.
5) During lifting, it is strictly prohibited to walk under the boom or the lifted object.
6) During lifting operations, do not drag wire ropes or lifting devices, and avoid using hard objects to strike.
7) During lifting, ensure that the angle between the two ropes does not exceed 90°, as shown in the diagram below.

1. Safety Notices

◆ 1.5.6. Drilling Safety

1. Prior to drilling, obtain consent from the client and the contractor.
2. During drilling, wear appropriate personal protective equipment (PPE) such as safety goggles and protective gloves.
3. Avoid drilling near embedded pipes or wires to prevent short circuits or other hazards.
4. Protect the equipment by covering it while drilling to prevent debris from falling inside. Ensure that any debris is promptly cleaned up after drilling.

◆ 1.6. Equipment Safety

◆ 1.6.1. Energy Storage System Safety

DANGEROUS

1) It is prohibited to open the cabinet door while the system is in operation.
2) When the energy storage system malfunctions, please avoid standing in front of the cabinet door (including the area within the door's opening range).

DESCRIPTION

The energy storage system must be equipped with protective measures such as fences or walls, and clearly marked with safety warning signs to create an isolated area. This is essential to prevent unauthorized personnel from entering during operation, thus avoiding personal injury or property damage.

1) The installation layout of the energy storage system must comply with the fire safety distance or firewall requirements specified by local standards, including but not limited to the "GB 51048 Design Specification for Electrochemical Energy Storage Power Stations" and the "NFPA 855 Standard for the Installation of Stationary Energy Storage Systems.
2) The energy storage system should undergo regular fire safety inspections, with a frequency of no less than once a month.
3) During live inspections of the system, pay attention to the warning labels on the equipment and avoid standing in front of the cabinet doors
4) After replacing power components or making wiring changes in the energy storage system, it is necessary to manually initiate wiring tests and topology recognition to prevent system operation anomalies.
5) It is recommended that users provide their own recording devices to document the detailed processes of installation, operation, and maintenance of the equipment.

1. Safety Notices

◆ 1.6.2. Battery Safety

DANGEROUS

1).It is strictly prohibited to short-circuit the positive and negative terminals of the battery. A battery short circuit can instantly generate a large current and release a significant amount of energy, leading to battery leakage, smoking, release of flammable gases, thermal runaway, fire, or explosion. To avoid battery short circuits, maintenance must not be performed while the battery is charged.

2).Do not expose the battery to high-temperature environments or place it near heat sources, such as direct sunlight, flames, transformers, or heaters. Overheating may cause leakage, smoking, release of flammable gases, thermal runaway, fire, or explosion.

3).The battery must not be subjected to mechanical vibrations, drops, collisions, punctures, or pressure shocks, as these can damage the battery or cause a fire.

4).It is strictly prohibited to disassemble, modify, or damage the battery e.g., inserting foreign objects, applying excessive force, or immersing it in water or other liquids) to prevent leakage, smoking, release of flammable gases, thermal runaway, fire, or explosion.

5).Ensure that the battery terminals do not contact other metal objects, as this may cause heating or electrolyte leakage.
6).Using or replacing the battery with the incorrect specifications poses a risk of fire or explosion. Always use the battery model recommended by the manufacturer.

7).The battery electrolyte is toxic and volatile. If electrolyte leakage occurs or there is an unusual odor, avoid contact with the leaking liquid or gas. Non-professionals should maintain a safe distance and immediately contact professionals for assistance.Professionals should wear goggles, rubber gloves, gas masks, and protective clothing to safely handle leaking batteries, disconnect the equipment promptly, and remove the leaking battery while also contacting technical engineers for further assistance.

8).The battery is a sealed system and will not release any gases under normal operating conditions. However, in extreme misuse situations (such as exposure to fire, puncturing, squeezing, lightning strikes, overcharging, or other conditions that may lead to thermal runaway), the battery may rupture or undergo abnormal chemical reactions, resulting in electrolyte leakage or the generation of gases (such as CO, H2). Ensure that measures for flammable gas emissions are in place to prevent combustion or equipment corrosion.

9).Gases produced from burning batteries can irritate the eyes, skin, and throat. Please take appropriate protective measures.

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WARNING

1）Batteries should be installed in areas away from liquids. It is strictly prohibited to install batteries directly below air conditioning vents, exhaust openings, wiring windows in equipment rooms, water pipes, or other locations prone to leaks. This is to prevent liquids from entering the equipment and causing malfunctions or short circuits.

2）During the installation and commissioning of the battery, fire safety equipment must be provided according to construction standards and specifications, such as fire sand and carbon dioxide extinguishers. Before the system is put into operation, ensure that fire safety equipment complies with local laws, regulations, and standards.

3）Before removing the battery from its packaging and during storage and transportation, ensure that the outer packaging box is intact and undamaged. Place the box according to the markings on it, and it is strictly prohibited to lay it upside down, sideways, upright, or at an angle. When stacking, adhere to the stacking requirements indicated on the outer packaging to avoid any impact or falling that could damage or render the battery unusable.

4） After removing the battery from its packaging, place it in the required orientation. It is strictly prohibited to lay it upside down, sideways, upright, or at an angle, and avoid stacking to prevent any impact or falling that could damage or render the battery unusable.

5）Tighten the fastening screws for copper bars or cables according to the specified torque mentioned in the document. Regularly check to ensure they are securely tightened and free from rust, corrosion, or other foreign materials, and clean them as needed. Otherwise, loose screws may lead to excessive connection voltage drop and can cause significant heating, potentially damaging the battery during high current situations.

6）After the battery has been discharged, it should be charged promptly; otherwise, it may be damaged due to over-discharge.

Disclaimer: The company shall not be held liable for any damage to the batteries provided by us caused by the following reasons:

1) Damage resulting from force majeure events, including but not limited to earthquakes, floods, volcanic eruptions, landslides, lightning strikes, fires, wars, armed conflicts, typhoons, hurricanes, tornadoes, extreme weather, or other acts of God.

2) Direct damage caused by failure to meet the required environmental conditions or external power parameters for normal battery operation, including but not limited to excessively high or low operating temperatures and frequent power outages due to unstable grids.

3) Battery damage such as leakage, rupture, or malfunction caused by improper operation or incorrect installation.

4) Damage resulting from battery over-discharge due to delayed power connection after installation and integration with the system.

5) Damage caused by delays in acceptance or inspection for reasons attributable to the customer.

6) Incorrect configuration of battery management parameters by the customer.

7) Accelerated capacity degradation resulting from mixing the company's batteries with other batteries, including but not limited to batteries from other brands or with different rated capacities.

8) Frequent over-discharge or inability to fully charge the batteries due to improper maintenance, including system expansions without proper support.

1. Safety Notices

9) Failure to maintain the batteries according to the operation manual, such as neglecting to regularly check and tighten battery terminal screws.
10) Damage caused by improper storage, such as storing batteries in humid or rain-prone environments.
11) Loss of battery capacity or irreversible damage due to overdue storage without timely recharging.
12) Battery damage caused by the customer or third parties, including unauthorized relocation or reinstallation without the company's approval.
13) Changes to the battery's usage scenarios without notifying the company.
14) The addition of extra loads to the battery by the customer.
15) The battery has exceeded the maximum storage period.
16) The warranty period for the battery has expired.

◆ 1.6.2.1. General Requirements

DANGEROUS

1) Do not expose batteries to high-temperature environments or place them near heat-generating equipment (such as direct sunlight, open flames, transformers, or heaters). Overheating may cause fire or explosion.
2) Disassembly, modification, or damage to the batteries is strictly prohibited (e.g., inserting foreign objects or submerging them in water or other liquids), as this may result in leakage, overheating, fire, or explosion.
3) Lithium-ion/Sodium-ion battery energy storage systems pose significant fire risks. Safety risks must be carefully assessed before any battery-related operations.
4) Battery electrolytes are flammable, toxic, and volatile.
5) Thermal runaway in batteries can release flammable gases as well as hazardous gases such as CO and HF.
6) The accumulation of flammable gases from thermal runaway poses risks of deflagration or explosion. Energy storage systems must be handled in accordance with applicable laws, regulations, and industry standards in the region. Rough handling during installation or transportation may result in internal battery short circuits or damage, leading to leakage, rupture, explosion, or fire.

1) Batteries must be stored in a designated storage area within their original packaging, avoiding contact with other materials.
They should not be stored outdoors or stacked too high. The site must be equipped with appropriate fire safety equipment, such as fire extinguishers and fire sand.
2) Do not remove the battery's outer packaging under normal circumstances. If recharging is necessary, it must be performed by trained personnel following the required procedures. After recharging, the battery must be returned to its original packaging.
3) For outdoor scenarios, it is recommended to power on the battery within 24 hours after unboxing. If this is not possible, the battery should be stored indoors in a dry environment free from corrosive gases.
4) Batteries must be placed correctly according to the anti-tilt symbols or labels on the packaging to prevent electrolyte leakage during prolonged storage.
5) Avoid impacts or collisions with batteries.
6) When transporting batteries, handle them in the proper orientation as indicated by the labels. Do not place them upside down or at an incline.
7) Use batteries within the temperature range specified in the manual. Charging is prohibited if the ambient temperature falls below the operating range, as low-temperature charging can cause internal short circuits due to crystallization.

8) Dispose of used batteries in accordance with local laws and regulations. Do not dispose of batteries as household waste, as improper disposal may cause environmental pollution.
9) Do not use damaged batteries (e.g., with dents or other physical damage), as they may release flammable gases. Do not store damaged batteries near undamaged ones.
10) Store damaged batteries away from flammable materials, and non-professionals should not handle or approach them.
11) Monitor damaged batteries during storage to ensure there are no signs of smoke, fire, electrolyte leakage, or abnormal heating.
12) If a battery pack is exposed to water, do not install it. Instead, move it to a secure isolation point and promptly request a replacement.
13) Batteries should be stored in a dry, well-ventilated environment, free from direct sunlight, rain, and infrared radiation. Ensure the surroundings are clean and free from organic solvents, corrosive gases, or other harmful substances.

◆ 1.6.2.2. Recharging Requirements

1) If more than 8 months have passed since the last recharge, the battery must undergo a recharge operation. Failure to recharge as required may negatively impact the battery's performance and lifespan.
2) For information on the battery’s production date, please consult with the company’s service engineers.

1. Safety Notices

DESCRIPTION

1) Before installing the battery pack, inspect it for any abnormalities. A battery pack is considered abnormal if any of the following conditions are observed:
2) The battery pack casing is visibly deformed or damaged.
3) The voltage between the total positive and total negative terminals is approximately 0V.
4) The impedance between the positive or negative terminal and ground is less than 50kΩ.

◆ 1.6.2.4. Battery Installation Requirements

1) Use only the specified battery model. Using non-specified models may result in battery damage.
2) Inspect the packaging for damage before installation. Do not use batteries with damaged packaging.
3) Place and secure the battery horizontally to ensure stability.
4) Do not place tools, debris, or other objects on the battery during installation.
5) Pay close attention to the polarity during installation. Avoid short-circuiting the battery's positive and negative terminals.
6) Use a torque wrench to tighten the connection terminals securely during installation. Perform regular checks to ensure the terminals remain firmly connected and free from looseness.

DANGEROUS

A short circuit in the battery can generate a sudden surge of high current and release a large amount of energy, potentially causing personal injury and property damage.
1) When performing installation or maintenance on the battery, use insulating tape to cover any exposed cable terminals on the battery.
2) Avoid allowing foreign objects (such as conductive materials, screws, liquids, etc.) to enter the battery, as this could lead to a short circuit.

◆ 1.6.2.5. Hazard and Toxicity Information

1. Safety Notices

◆ 1.6.2.6. Battery Abnormality Handing Measures

DANGEROUS

1) In the event of electrolyte leakage or unusual odors, avoid contact with the leaking liquid or gas. Non-professionals should keep a safe distance and immediately contact qualified personnel for assistance. Qualified personnel should wear safety goggles, rubber gloves, respirators, and protective clothing to prevent harm from electrolyte exposure.
2) The electrolyte is corrosive, and contact may cause skin irritation and chemical burns. If battery electrolyte comes into contact with skin, the following measures should be taken:
1. Inhalation: Evacuate the contaminated area, breathe in fresh air immediately, and seek medical assistance right away.
2. Eye Contact: Rinse the eyes thoroughly with plenty of water for at least 15 minutes without rubbing, and seek medical help immediately.
3. Skin Contact: Wash the affected area with plenty of water and soap immediately, and seek medical assistance without delay.
4. Ingestion: Seek medical help immediately.

In the Event of a Battery Drop:
1) If the battery is dropped (regardless of whether it is packaged) but shows no significant deformation or damage, and there are no obvious odors, smoke, or fire, proceed with operations only after ensuring safety.

2) Warehouse: Evacuate personnel, and have qualified personnel use mechanical tools to transfer the battery to a clear and safe area. Contact the company's service engineers and allow the battery to sit for 1 hour while monitoring the temperature to ensure it remains within ±10°C of room temperature before further handling.

3) On-Site Energy Storage System: Evacuate personnel, close the energy storage system door, and have qualified personnel use mechanical tools to transfer the battery to a clear and safe area. Contact the company's service engineers and allow the battery to sit for 1 hour before handling.

4) If the battery shows obvious odors, damage, smoke, or fire after a drop, immediately evacuate personnel, contact professionals, and alert emergency services. Qualified personnel should use firefighting equipment to extinguish the fire while ensuring safety.

5) Do not continue to use the battery after a drop; contact the company's service engineers for an assessment.

1. Safety Notices

◆ 1.7. Maintenance and Replacement

ATTENTION

1) During the maintenance of the energy storage system, there must be at least two personnel on-site.
2) During equipment maintenance, use insulating materials to cover nearby live components.
3) Do not open the cabinet doors during inclement weather such as rain, snow, thunderstorms, sandstorms, or heavy fog.
4) Before the fan is powered off and stops rotating, do not allow fingers, components, screws, tools, or circuit boards to come into contact with the operating fan.
5) Do not power on the equipment before troubleshooting.
6) When performing live inspections on the system, pay attention to the hazard warning labels on the equipment and avoid standing at the energy storage cabinet door.
7) For equipment other than the battery pack, after powering down, wait 15 minutes to ensure the equipment is de-energized before performing any operations.
8) Switches that need to be disconnected for maintenance must be clearly labeled.
9) After replacing or changing the wiring of the power components in the energy storage system, manually initiate wiring detection and topology identification to prevent abnormal system operation.
10) After completing maintenance and replacement operations, promptly lock the battery cabinet door and securely store the key.

2. Product Information

◆ 2.1. Composition of the Energy Storage System

This product is an energy storage system, which consists of a battery cabinet as the primary structure. Inside the cabinet, the main components include the battery pack (PACK), distribution control box, Power Conversion System (PCS), Battery Management System (BMS), temperature control system, fire protection system, and grounding system. A schematic diagram of the battery cabinet is shown below:

2. Product Information

Figure 2-1 Schematic Diagram of the Battery Cabinet

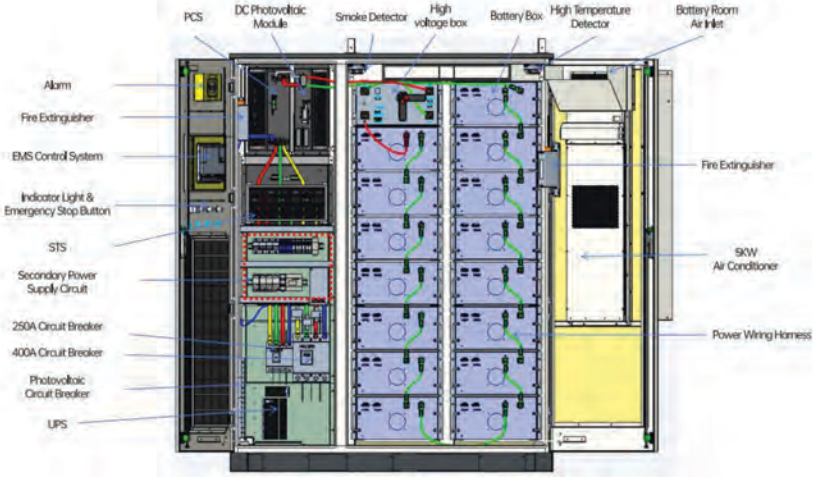


Figure 2-2 Schematic Diagram of the Internal Layout of the Battery Cabinet

2. Product Information

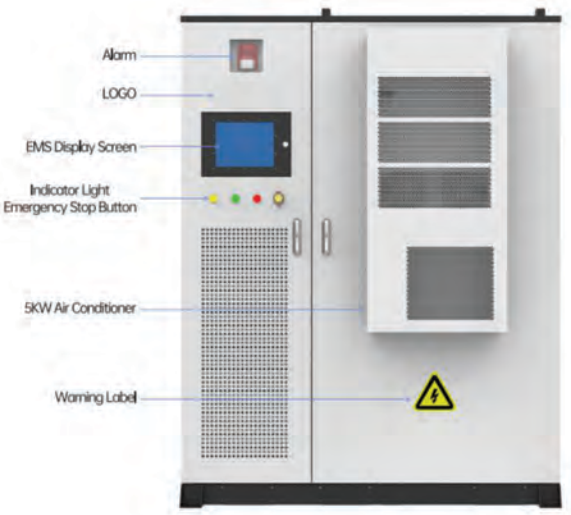


Figure 2-3 Schematic Diagram of the External Structure of the Battery Cabinet

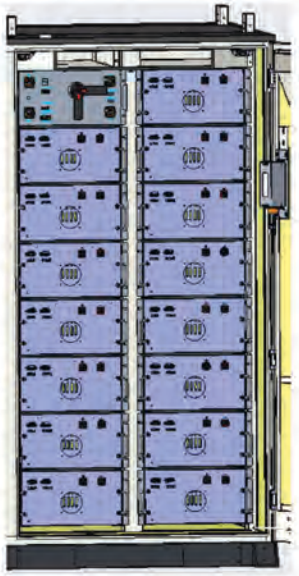
2. Product Information

◆ 2.1.1. Battery Pack

The battery pack mainly consists of 16 cells, 1 fan, 1 Battery Management Unit (BMU), and structural and electrical components for supporting the cells. The pack integrates a temperature control airflow system, and the rated capacity of the battery pack is 14.336 kWh. The specific parameters of the battery pack are as follows:

Table 2-1 Battery Pack Specifications

No	Items	Parameters	Remarks
1	Cell Type	LFP-3.2V-280Ah	
2	Battery Pack Series Configuration	1P16S	
3	Nominal Capacity[Ah]	280	
4	Nominal Energy[kWh]	14.336	
5	Nominal Voltage[Vdc]	51.2	
6	Voltage Range[Vdc]	44.8~57.6	
7	Charge/Discharge Rate	≤0.5CP	
8	Cooling Method	Smart Air Cooling	
9	Operating Temperature Range:[℃]	0 ~ +45	
10	Storage Temperature[℃]	-20 ~ +45	Within 1 month
11	Operating Humidity Range	0~95%RH	Non-Condensing
12	Installation Method	Indoor Battery Rack Installation	
13	Altitude[m]	2500	Derating above 3000 meters
14	Weight[kg]	149±3	



2. Product Information

◆ 2.1.2. High-Voltage Control Box

The high voltage control box is the control component for the entire battery cluster. Its main functions include controlling the main circuit disconnection and ensuring safe management of the charging and discharging processes of the battery cluster, guaranteeing safe, reliable, and stable operation of the batteries. Internally, it mainly consists of an aluminum shell resistor, fuses, shunts, DC contactors, and a casing.

The specifications of the high voltage control box are shown in the table below

Table 2-2 Sub-Control Box Specifications

No	Items	Parameters	Remarks
1	Maximum Voltage[Vdc]	950	
2	Rated Power[kW]	100	
3	Rated Current[A]	152	
4	Maximum Current[A]	185	
5	Temperature Range[℃]	-25 ~ +55	
6	Humidity Range	0~95%RH	Non-Condensing
7	Communication Interface	CAN	
8	Communication Protocol	CAN2.0B	
9	Altitude[m]	2500	Derating is required for operation above 3000 meters.
10	IP Rating	IP20	

The sub-control box product is shown in the figure below:

Figure 2-5 Sub-Control Box Diagram

2. Product Information

◆ 2.1.3. PCS

The main specifications of the PCS are shown in the table below:

No	Items		Parameters
1	Electrical Specifications	DC Input Voltage	600~950V
		AC Input Line Voltage	400V±10%
		Phases	3 Phase 4 Wire
		Power	100kW
		Frequency	50±5Hz
		Power Factor	0.99（Rated Power）
		Maximum Efficiency	98.2%
2	Communication Interface	Dry Contact	EPO/DI/DO
		Communication	RS485/CAN
3	Environmental Specifications	Usage Location	Indoor, free from direct sunlight, dust, corrosive or flammable gases, oil mist, water vapor, dripping water, or salt
		Operating Altitude	Below 2000 meters; derating is required for use above 2000 meters
		Storage Temperature	Normal Temperature
		Operating Temperature	-30ºC ~+60ºC
		Humidity	Less than 95% RH, with no condensation
		Vibration	Less than 5.9 m/s² (0.6g)
4	Structure	IP Rating	IP54
		Net Weight	48kg
		Cooling Method	Intelligent Air Cooling

The PCS module is shown in the figure below:

Figure 2-6 PCS Diagram

2. Product Information

◆ 2.1.4. BMS

This project's BMS system adopts a two-level architecture (BCMU and BMU), primarily used for real-time monitoring of the battery pack. It can detect individual cell voltage, overall voltage, current, temperature, and more, while continuously assessing the operating status of the batteries. The system uploads battery pack status information and alarm signals and can disconnect the output of the battery pack circuit for protection when necessary.

◆ 2.1.4.1. BMU

BMU is a critical component of the Battery Management System (BMS) for energy storage, playing a decisive role in the safe application and lifespan extension of battery packs when used in groups.
The BMU achieves real-time monitoring of battery status by accurately collecting voltage and temperature data from each individual cell. Additionally, the BMU features functions such as temperature information monitoring and collection, passive balancing management of cells, and control of module fans.
Product Function&Features:
1. Individual Cell Voltage Function: Features high accuracy and fast collection speed; widely used in lithium iron phosphate batteries.
2. Temperature Sampling Function: Collects data with high precision and reliability, including 10 channels for individual temperature sampling, with a range of -40 to +125°C.
3. Balancing: 16-channel passive balancing function with a passive balancing current of 100mA.
4. Communication with BCMU: Supports adaptive communication, enabling automatic address coding for all BMUs in conjunction with the BCMU.
5. Fan Speed Control & Fault Feedback Detection: Adjusts fan speed using PWM signals based on temperature control strategies, while also detecting the fault status of the fan.
6. Rich Self-Diagnostic Capabilities: Supports functional safety certification requirements.
7. Complies with 1000V Safety Regulations
8. UL94-V0 Flame Retardant Design.

◆ 2.1.4.2. BCMU

BCMU is the control core of the battery management system. It communicates with the BMU to monitor individual cell voltage,temperature, and other parameters. It also measures external characteristics such as total pack voltage, charge and discharge current, and ground insulation resistance. Using appropriate algorithms, the BCMU estimates and monitors the internal status of the battery (capacity, SOC, SOH, etc.). Based on this data, it manages charge and discharge processes, thermal management, insulation detection, individual cell balancing, and fault alarms. Furthermore, it enables data exchange with the EMS via Ethernet
Product Function&Features:
• Battery Cabinet Monitoring: Collects total voltage, charge and discharge current, and ground insulation resistance of the battery cabinet. Manages charge and discharge processes while performing thermal management within the battery cluster based on temperature control strategies.
• High Reliability Design: The product's software, hardware, and structural designs adhere to relevant professional standards.
• High Safety: Comprehensive protection features with multiple redundancy measures ensure battery protection under various overload and unexpected conditions.
• Strong Anti-Interference Capability: The design considers the electromagnetic environment of high-power storage systems with complex wiring. All components meet high reliability standards, and input/output interfaces and communication ports utilize

effective isolation and filtering to meet stringent electromagnetic application requirements.
Precise Signal Acquisition and SOC Estimation: Utilizes high-precision sampling chips from internationally renowned brands, combining various SOC algorithms with intelligent learning functions to ensure sampling accuracy and SOC estimation reliability.
Rich External Interfaces: Offers a variety of digital, analog, and communication input/output interfaces to meet project requirements.
Reliable Data Storage: Stores alarm, reset, and sampling anomaly information, with the option to export stored data as needed.
Flexible configuration upgrades allow for customization according to different application requirements, with rapid program upgrades available via the CAN communication port using PC software.

◆ 2.1.5. Temperature Control System

This energy storage system employs an air-cooling design. Each battery cabinet is equipped with an integrated air conditioning unit and supporting airflow ducts. These ducts extend to each battery pack, which is fitted with fans that can receive speed control commands from the Battery Management System (BMS). This setup ensures consistent temperature control within the battery cabinet. The temperature control air conditioning system and its airflow ducts are essential components of this design.

◆ 2.1.6. Fire Protection System

This project utilizes an aerosol fire extinguishing agent combination, which is activated by temperature and smoke detection sensors for fire suppression within the entire cabinet. Working Principle: When a fire occurs, the fire extinguishing device is triggered by the open flame igniting the heat-sensitive line. The combustion of the heat-sensitive line activates the aerosol generation agent within the extinguishing device. The heat released from the oxidation-reduction reaction of the aerosol generation agent causes the chemical cooling agent to decompose, enabling both the aerosol generation agent and the cooling agent to work together in extinguishing the fire.
The technical parameters table for the aerosol is as follows:

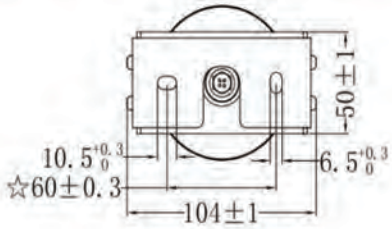
Table 2-4: Aerosol Technical Parameters

No.	Items	Specification
1	Model Specification	QRR0.3GK-U01
2	Operating Temperature Range	-40℃～+55℃
3	Operating Relative Humidity	≤95%RH
4	Smoke Sensitivity and Discharge Time	0.2～0.3dB/m
5	Discharge Delay Time	≤5S
6	Nozzle Thermal Spacing	The thermal spacing for 400℃, 200℃, and 75℃ are as follows: 400℃: 0.05 m ,200℃: 0.12 m, 75℃: 0.3 m
7	Shell Surface Temperature	≤150℃
8	Name and content of oxidizer	Potassium nitrate and strontium nitrate, 50% to 70%, with a single agent content of 300g
9	Net Weight of a Single Unit	860g±30g
10	Specification Dimensions	68.5mm×46mm×255mm
11	Starting Method	Smoke Detection Start / Temperature Detection Start
12	Starting Current	≥700mA
13	Starting temperature	≥170℃

2. Product Information

14	Connection method for multiple units	Combination in series
15	Fire Extinguishing Efficiency	100g/m³-130g/m³
16	Validity Period	10 years

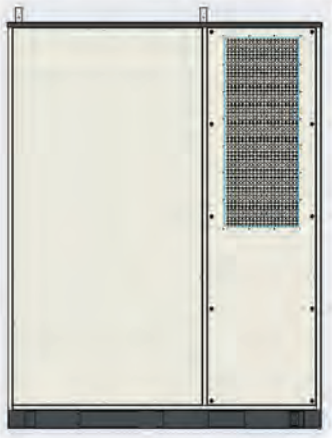
Figure 2-8: Schematic Diagram of Firefighting Equipment (Top View)



◆ 2.1.7. Grounding System

The grounding of the battery cabinet is established with a designated grounding point located outside the cabinet, as shown in the diagram below

Figure 2-9: Location of the Grounding Point for the Battery Cabinet



◆ 2.1.8. Emergency Stop System

The emergency stop functionality in this project is implemented through both electrical and software means, ensuring that the emergency stop action is completed safely.
An emergency stop switch is installed on the front door of the battery cabinet. This switch allows manual operation in emergency situations, enabling immediate control over the battery system's shutdown.

2. Product Information

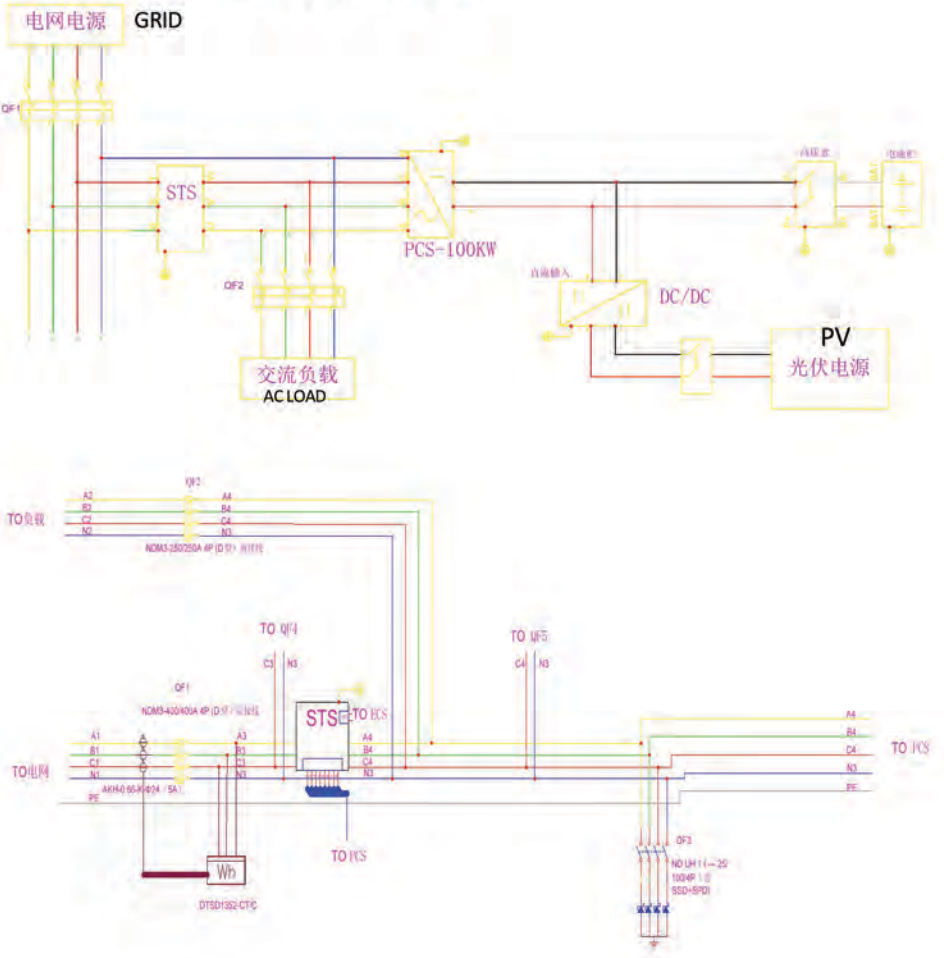
The Battery Management System (BMS) can detect the emergency stop from the cabinet door and aerosol feedback signals, triggering a software-controlled emergency stop.
The Energy Management System (EMS) also monitors the emergency stop from the cabinet door, aerosol feedback signals, and emergency stop signals from the BMS. It can initiate a software-controlled emergency stop based on these inputs.In the event of an emergency requiring manual intervention, the operator can press the red emergency stop button. The location of the emergency stop button is illustrated in the accompanying diagram.

Figure 2-9: Emergency stop button

2. Product Information

◆ 2.2. Electrical Schematic Diagram

2-11: System Electrical Schematic Diagram

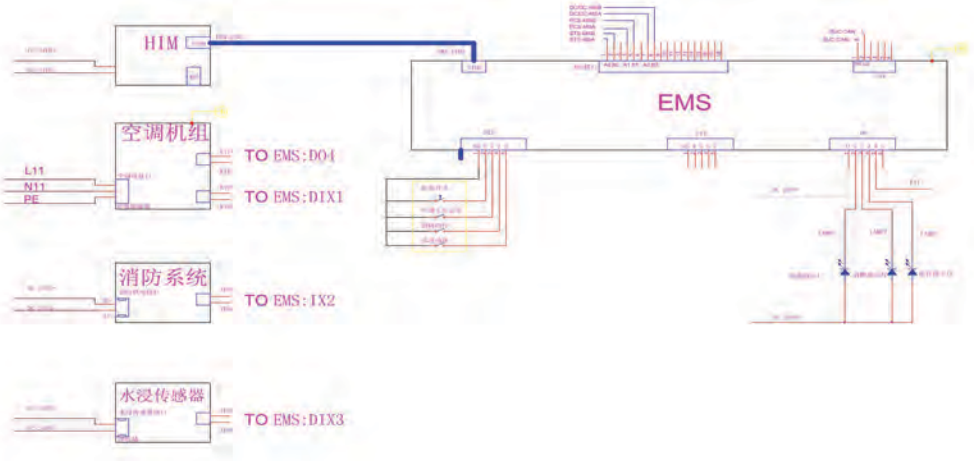


2. Product Information

◆ 2.3. Communication Topology

The system communication topology is shown in the following diagram.

Figure 2-12 System Communication Topology Diagram



2. Product Information

◆ 2.4. Product Specification

Table 2-5 Specifications Parameters

No.	Category	Name	Parameters	Remarks
1	DC Parameters	Cell Type	LFP-3.2V-280Ah	
		Battery Pack Configuration Method	1P16S	Rated 51.2V, 14.336kW
		Battery Rated Capacity[kWh]	215	
		Nominal Voltage [Vdc]	768	
		Voltage Range [Vdc]	672~864	
		Charge and Discharge Rate	≤0.5CP	
		Cooling Method	Forced Air Cooling	
2	AC Parameters (Grid-Connected)	Rated Power	100kW	
		Rated Grid Voltage	400VAC	
		Grid Voltage Range	320~460V	
		Rated Current	152A	
		Fixed Grid Frequency	50Hz/60Hz	
		Grid Frequency Range	45~55Hz/55~65Hz	
		Total Current Waveform Distortion Rate	<3%（Rated Power）	
		Power Factor	>0.99（Rated Power）	
		Adjustable Power Factor Range	-1 (Leading)~1 (Lagging)	
3	System Parameters	Auxiliary Electrical Parameters	2kW-220Vac/50Hz	3N+PE
		Fire Protection System	S-Type Aerosol	
		Corrosion Resistance Level	C4	
		Protection Level	IP54	
		Operating Temperature Range[℃]	-15 ~ +45	
		Storage Temperature[℃]	-20 ~ +55	SOC at 30% to 50%, <6 months
		Operating Humidity Range	0~95%RH	No Condensation
		Installation Method	Outdoor Installation	
		Operating Conditions	Maximum 2 Charge and 2 Discharge per Day	
		System Communication Interface	Ethernet/RS485	
		External System Communication Protocol	Modbus TCP/IEC61850/Modbus RTU	
		Altitude[m]	Within 3000 meters	Derate above 3000 meters
		Dimension[mm]（D*W*H）	2330*1738*1250	
		Weight[kg]	2400kg	

3. Structual Fixing and Installation

◆ 3.1. Installation Environment Requirements

◆ 3.1.1. Site Selection Requirements

ATTENTION

The site selection must meet the requirements of "GB 51048 Design Specification for Electrochemical Energy Storage Power Stations", "NFPA 855 Standard for the Installation of Stationary Energy Storage Systems" and local regulations.

The energy storage system is only suitable for outdoor scenes and needs to be arranged outdoors. It does not support indoor arrangements. The general requirements for site selection are as follows:
1) The installation location cannot be in a low-lying area, and the installation level should be higher than the historical highest water level in the area.
2) The distance from the airport, landfill, river bank or dam should be ≥2000m.
3) Choose an open location to ensure that there are no obstacles within 10m around the site.
4) Keep at least 50m away from residential areas to avoid noise pollution.
5) Have convenient transportation conditions and reliable fire suppression system equipment.
6) Meet the site area required in the near future, and leave room for expansion according to the needs of the entire life cycle.
7) Choose a well-ventilated place.
8) Energy storage systems installed in salt-damaged areas will be corroded and may cause fires. Do not install energy storage systems outdoors in salt-damaged areas. Salt-damaged areas refer to areas within 2000m from the coast or affected by sea breezes. The areas affected by sea breezes vary depending on meteorological conditions (such as typhoons, seasonal winds)
or terrain (dams, hills).

DESCRIPTION

1) When the safety distance of the site selection cannot meet the relevant national standards, it is recommended to choose a new location.
2) If a more suitable location is not available, it is recommended to install a firewall with a fire resistance rating of no less than 3 hours, in accordance with DBJT 15-81-2022, 'Technical Regulations for Fire Resistance Design of Concrete Structures in Buildings.' The firewall thickness should be ≥200 mm, as illustrated in the figure below. Furthermore, considerations for the space requirements related to equipment transportation, installation, and maintenance should also be taken into account.
3) It is recommended to refer to T/CEC 373-2020, which states that the length and height of the firewall should extend 1 meter beyond the outer profile of the prefabricated module. Additionally, in accordance with NFPA 855-2020 'Installation Standard for Stationary Energy Storage Systems,' when there is a 1-hour fire-rated independent firewall, the spacing may be reduced to 914 mm.

The site selection should avoid scenarios not recommended by industry standards and regulations, including but not limited to the following locations, areas, and sites:
1. Areas with strong vibrations, strong noise sources, and significant electromagnetic interference.
2. Locations that generate or contain dust, oil fumes, harmful gases, or corrosive gases.
3. Sites for the production or storage of corrosive, flammable, or explosive materials.

3. Structual Fixing and Installation

4. Locations with existing underground facilities.
5. Ground with adverse geological conditions, such as rubber soil or soft soil layers, that is prone to water accumulation and subsidence.
6. Areas within seismic fault lines or regions with a seismic design intensity greater than nine degrees.
7. Locations directly exposed to hazards from debris flows, landslides, quicksand, or sinkholes.
8. Within the boundaries of mining subsidence (displacement) zones.
9. Areas within the blasting hazard zone.
10. Regions that may be inundated after dam or levee failures.
11. Critical sanitary protection zones for important water supply sources.
12. Protection zones for historical and cultural heritage sites.
13. Crowded areas, high-rise buildings, and underground structures.

Figure 3-1: Relationship Between Firewall Thickness and Fire Resistance Rating

表 5.5.1　墙厚和纵向受力钢筋保护层厚度的最小值

耐火极限（min）	墙厚（mm）/纵向受力钢筋的保护层厚度（mm）			
	μ=0.35		μ=0.7	
	单面受火	双面受火	单面受火	双面受火
60	140/15	140/15	140/15	140/15
90	140/15	140/15	140/20	170/20
120	150/20	160/20	160/30	220/30
180	180/35	200/40	210/45	270/50

注：μ 为组合轴向压力与该力作用点处墙常温轴向承载力之比。

◆ 3.2. Spatial Requirements

To ensure the proper maintenance of equipment inside the cabinet and facilitate the movement of transport tools, it is recommended to reserve sufficient space around the installation position of the cabinet. The minimum dimensions of the reserved space should not be less than the minimum sizes illustrated in the figure below:

1.An installation distance of ≥1000 mm should be maintained on the long side of the energy storage system, and an installation distance of ≥2000 mm should be maintained on the air conditioning installation side.

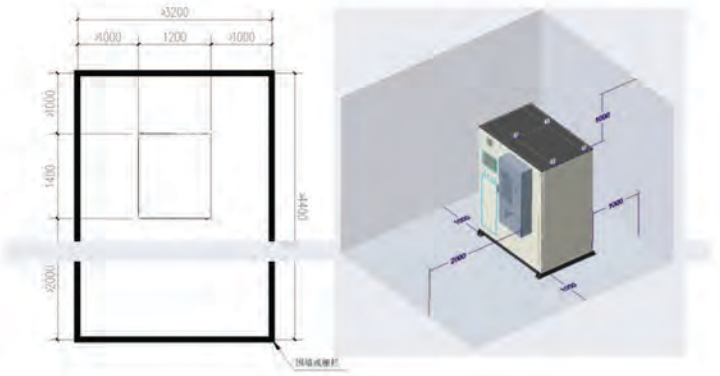
2.A maintenance passage should be established around or on one side of the cabinet, with a net width of ≥1000 mm.

3.It is recommended that the energy storage equipment area be isolated and protected by solid walls or fences. The firewall can replace part or all of the wall, with a thickness of ≥200 mm, as determined by the designer.

4.The spacing designs mentioned above only consider installation and operational requirements; the final spacing must also meet local fire safety requirements.

3. Structural Fixing and Installation

Figure 3-2: Installation Space for Equipment



◆ 3.1.3. Foundation Requirements

WARNING

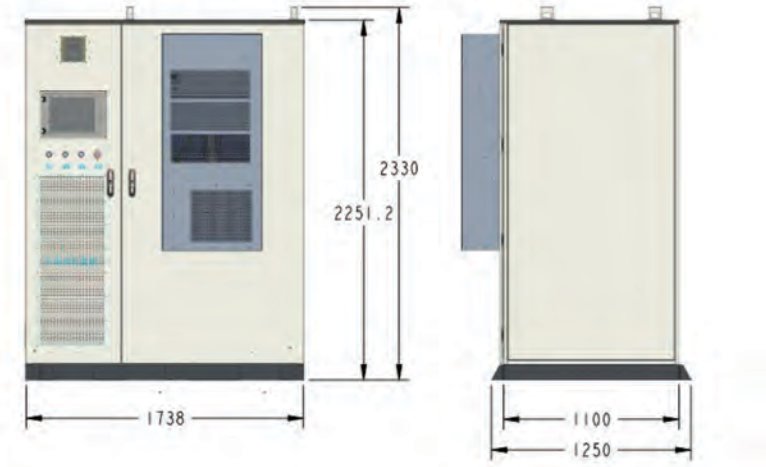
The energy storage battery cabinet is relatively heavy. Before constructing the foundation, a detailed assessment of the site conditions (primarily geological and environmental climate conditions) should be conducted. Only based on this assessment can the design and the storage location for the battery cabinet must have a foundation prepared by a professional construction team, ensuring that sufficient space is left around it for installation and maintenance. If power lines run through a bottom cable well, the foundation must be prepared in advance. The overall design should meet the requirements for lightning protection, waterproofing, rodent and insect prevention, and ventilation.The installation foundation of the battery cabinet must be designed and constructed according to specific standards to meet requirements for mechanical support, cable routing, and future maintenance. Additionally, it must comply with local construction standards for electrical facilities and be designed based on the actual terrain. Below is a typical design diagram for a battery cabinet foundation.

The foundation construction must meet at least the following requirements:
1. Soil Compaction: The soil at the installation site must have adequate compaction. It is recommended that the relative compaction of the soil be ≥98%. If the soil is loose, measures must be taken to ensure the foundation's stability.
2. Compaction of Foundation Pit: The bottom of the foundation pit must be compacted and leveled to provide sufficient and effective support for the cabinet.
3. Foundation Design: The foundation must be constructed according to the foundation drawings provided by the supplier or approved by our company, with a surface tolerance of ±5 mm.
4. Elevated Base:The foundation surface should be raised to prevent rainwater from corroding the cabinet's base and interior components.
5. Cross-Section and Height Requirements: The foundation's cross-sectional area and height must meet the specified requirements.

3. Structural Fixing and Installation

6. Drainage Measures: Appropriate drainage measures must be implemented based on the local geological conditions.
7. Concrete Foundation: Construct a concrete foundation with sufficient cross-sectional area and height. The height of the foundation should be determined by the contractor according to the site's geological conditions.
8. Cable Routing Considerations: Cable routing must be taken into account during foundation construction.
9. Maintenance Platform: A maintenance platform should be built around the foundation to facilitate future maintenance.
10. Cable Conduits: Sufficient space must be reserved for AC/DC cable ducts at the inlets and outlets of the cabinet. Cable conduits should be embedded during the foundation construction phase.
11. Conduit Specifications: The specifications and quantity of conduit pipes should be determined based on the cable types and the number of cables entering and exiting.
12. Waterproofing: A drainage system must be constructed to prevent the base or internal equipment from being flooded during heavy rain or the rainy season.
13. Sealing of Embedded Pipes:Both ends of embedded pipes must be temporarily sealed to prevent debris from entering, ensuring smooth cable installation later.
14. Cable Entry Sealing: After cable connections are completed, all cable inlets, outlets, and joints should be sealed with fireproof clay or other suitable materials to prevent rodent intrusion.

Figure 3-3: Installation Foundation of Energy Storage Cabine



3. Structual Fixing and Installation

◆ 3.2. Pre-Installation Inspection

◆ 3.2.1. Tool Preparation

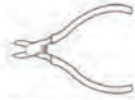
The tools required for equipment installation include installation tools and personal protective equipment (PPE) as listed below:

ATTENTION

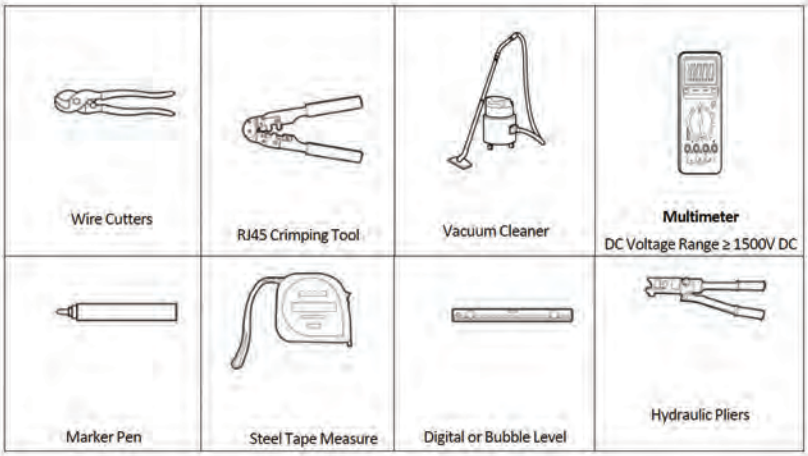
The tools used, such as socket wrenches, torque wrenches, and screwdrivers, must be insulated or equipped with insulated handles for safety.

1) Installation Tools

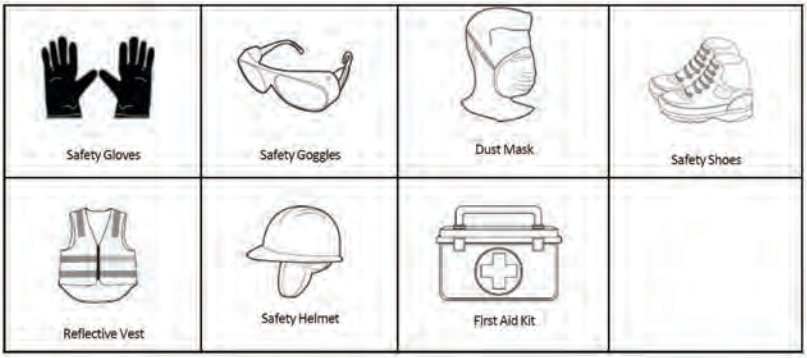
Table 3-1: Common Installation Tools List

 **Impact Drill** (Drill Bits: Φ14mm, Φ16mm, Φ20mm)	 Complete Socket Wrench Set	 Torque Wrench	 Diagonal Cutting Pliers
 Wire Strippers	 Phillips/Flathead Screwdriver	 Rubber Mallet	 Utility Knife
 Heat Shrink Tubing	 Heat Gun	 Cable Ties	 Insulated Ladder

3. Structual Fixing and Installation



2) Personal Protective Equipment (PPE)



◆ 3.2.2. Installation Environment Inspection

Inspect each item according to the site requirements, and proceed with installation only after all requirements are met. The company will not be liable for any losses resulting from forced installation when requirements are not satisfied.

ATTENTION

Marking Safety Zone: Use red construction tape to outline the safety area, removing any obstacles within the zone. Hang construction signs and safety warning signs in visible locations.

3. Structual Fixing and Installation

◆ 3.3. Component Installation

◆ 3.3.1. Securing the Energy Storage System

1) Prepare Installation Tools
Tools that may be required for installing L-shaped anchor connection brackets are as follows:

No	Name	Source of Components
1	Marker Pen	Not Included in the Supply Scope
2	Impact Drill	Not Included in the Supply Scope
3	Anchor Connection Bracket	Not Included in the Supply Scope
4	M16×110 Expansion Bolt	Not Included in the Supply Scope
5	M12×40 Screw	Not Included in the Supply Scope

2) Installation Steps
Use four M12×40 screws to secure the anchor connection bracket to the energy storage system.

DESCRIPTION

The levelness of the concrete support platform is critical for the installation of the energy storage system. Please ensure that the concrete support platform meets the requirements before proceeding with the installation of the energy storage system.

Figure 3-4 Securing the Energy Storage System

3. Structual Fixing and Installation

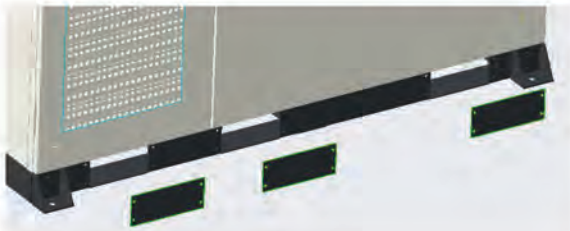
3) Follow-up Action

No	Inspection Items	Inspection Methods	Inspection Standard
1	Check if the bolts and nuts are properly tightened.	Use a wrench to verify the specified torque.	Torque Standards Met
2	Check if the cabinet door opens and closes properly.	Inspect the operation of the system cabinet door's opening and closing.	Able to open and close smoothly.

◆ 3.3.2. Install the front and rear end plates of the base

After the cabinet is securely installed, remove the front and rear end plates of the base and install them onto the base.

Figure 3-5: Installation of Front and Rear End Plates of the Base



4. Electrical Installation

◆ 4.1. Grounding Connection

◆ 4.1.1. Prerequisites

WARNING

It is strictly prohibited to install fuses, switches, or other devices on the protective grounding line.

ATTENTION

The grounding must comply with local electrical safety regulations

1) The installation of the energy storage system has been completed.
2) The grounding requirements have been clarified.

4. Electrical Installation

◆ 3.3.2. Install the front and rear end plates of the base

Protective Grounding Wire Specific Requirements:

Cables	Types	Cable Cross-Sectional Area Range	Outer Diameter of Cables	Source
Protective Grounding Wire	1)Single-Core Outdoor Copper Cable 2)Matching OT/DT Terminals	$4mm^2$~$6mm^2$	4mm~6mm	User-provided
The protective earth conductor size is determined by this table or calculated according to IEC 60364-5-54.				

◆ 4.1.3. Connecting the protective ground wire

ATTENTION

1) Connect the ground wire to the ground bar outside the battery cabinet.
2) The tightening torque of the ground screw M12 is 22 N.m±10%.

Figure 4-1 Connecting the cabinet protection ground wire/plate

4. Electrical Installation

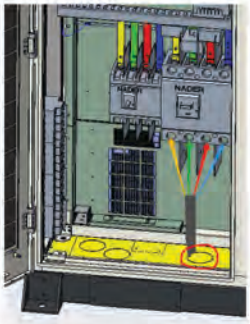
◆ 4.2. AC Grid Connection Wiring

◆ 4.2.1. Background Information

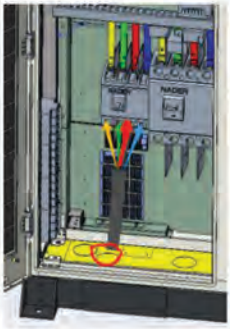
Recommended Cables	Types	Conductor Cross-sectional Area Range	Source
Protective Grounding Wire	Single-Core Outdoor Copper Cable and M8 OT/DT Terminal	Sp ≥ S/2	User-Supplied Items
AC Cable (Multicore)	Four-Core Outdoor Cable (L1, L2, L3, N)	35mm²～ 50mm²	User-Supplied Items
Single-Core AC Cable	Single-Core Outdoor Cable	35mm²～50mm²	User-Supplied Items
Single-Core AC Cable	Single-Core Outdoor Cable	16mm²～50mm²	User-Supplied Items

◆ 4.2.2. Connecting AC Grid Connection Cables

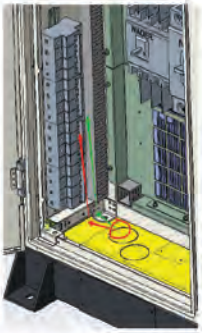
PV Input Connection



Connecting AC Wires



Load Connection Wires



ATTENTION

1) Ensure that all AC cables are undamaged and free from breaks. It is critical to secure a reliable connection for the N (neutral) line; otherwise, it may lead to damage of the AC equipment within the system.
2) After connecting the AC lines, verify that the OT terminals are fully aligned with the copper bus and have a good contact. Ensure that the AC input cables are positioned vertically downwards.
3)The M8 bolts should be pre-installed following the recommended torque value of 12 N·m.

5. Power On & Off

◆ 5.1. Power On

WARNING

1) The energy storage system may only be put into operation after being confirmed by qualified personnel.
2)For energy storage systems that have been out of service for an extended period, a thorough inspection of the equipment must be conducted prior to powering on. The system can only be energized once all indicators meet the required standards.

◆ 5.1.1. Pre-Power-On Inspection

Before Powering On, Please Carefully Verify the Following Items to Ensure Accuracy:
1. Verify Wiring: Ensure all wiring connections are correct.
2. Protection Covers: Confirm that the protective covers inside the equipment are securely installed.
3. Emergency Stop Button: Check that the emergency stop button is in the released position.
4. Ground Fault Check: Inspect to ensure there are no ground faults.
5. Voltage Verification: Use a multimeter to measure the AC and DC voltage on both sides, ensuring it meets the startup conditions and poses no over-voltage risks.
6. Debris Check: Ensure there are no tools or parts left inside the equipment.

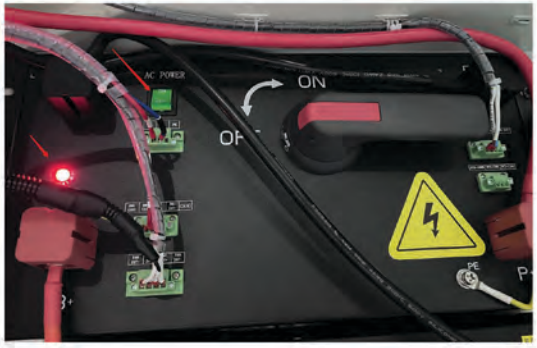
◆ 5.1.2. Power-On Procedure

WARNING

If a circuit breaker trips during the power-on process, pause the closure of other circuit breakers and immediately check the downstream load of the tripped circuit breaker for any short circuits or other issues.

Powering Up the Energy Storage System:
Step 1: Powering Up the Battery Cabinet Auxiliary Power:
1. Press the UPS power switch and follow the on-screen prompts to start up, then close the UPS mains supply switch QF6.
2. Check and confirm that the AC surge protector is functioning properly and that the AC surge protection switch QF3 is in the closed position.
3. Close the power supply switch QF7 to energize the high-voltage cabinet.
4. Close the air conditioning power supply switch QF10.
5. Close the UPS mains supply switch QF4.
6. Close the AC fan power supply switch QF11.
7. Close the 24V switch power supply mains switch QF9.
8. Close the lighting power supply switch QF8.
9. Complete the energization of the auxiliary power.
Step 2: Turn the handle of the DC circuit breaker in the distribution control box to the "ON" position; the LED G/R indicator light on the circuit breaker will glow red.

5. Power On & Off



Step 3: After the low-voltage power has been applied, verify on the EMS main control display that the entire BMS system is operational. The main interface will display the extreme value data of the batteries, and there should be no alerts indicated in either the cluster alarm or stack alarm sections.

Step 4: After confirming that there are no issues, operate the circuit breaker to switch the handle to the ON position. Check the EMS main control display again to ensure there are no alarm messages. If no alarms are present, the system meets the conditions to proceed with the high-voltage power-on procedure, and the control system can be activated.

5. Power On & Off

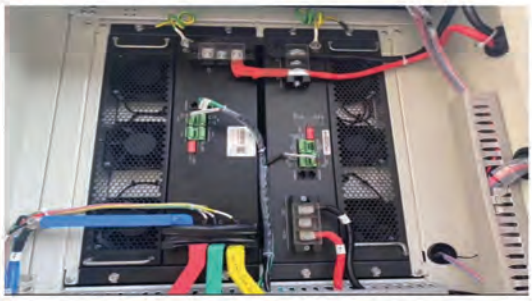
Once the conditions for high-voltage power-on are met, access the equipment information interface. Based on the actual working conditions on-site, select the corresponding operational strategy for practical application. Currently, three modes are supported:
self-consumption, economic mode, and priority grid connection.

Step 5: First, navigate to the equipment information interface and select the desired mode from the strategy information section;
choose the self-consumption mode.

Step 6: After selecting the self-consumption mode from the interface, the EMS will first control the BMS to initiate high voltage power-up. Wait for approximately one minute; when the LED G/R indicator light on the high voltage box changes from a steady red light to a steady green light, it indicates that the high voltage has been successfully activated in the BMS.

5. Power On & Off

Step 7: After the high voltage power-up is successful, the EMS will then control the MPPT to power on. Once the MPPT is successfully powered on, the RUN indicator light will remain lit. (The MPPT is located on the right side.)



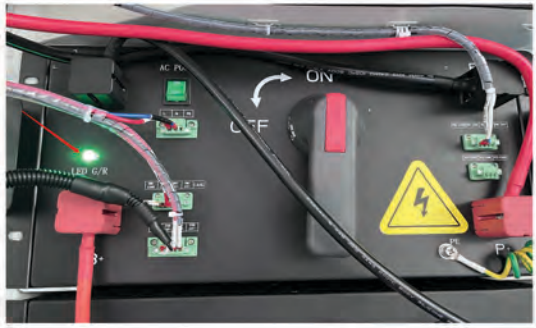
Step 8: After the MPPT powers on successfully, the EMS will control the PCS to start up. The PCS will undergo a soft start process during which the ALARM indicator will light up. After approximately 2 minutes, when the ALARM indicator turns off and the RUN indicator remains lit, the PCS has started successfully. (The PCS is located on the left side.)

Step 9: Once the power-on status indicates "Power-On Complete," the self-consumption mode will be successfully initiated. The operating mode will be set to grid-connected operation, and the system will enter either charging or discharging status. The stack operating status on the main interface will transition from idle to either charging or discharging state.

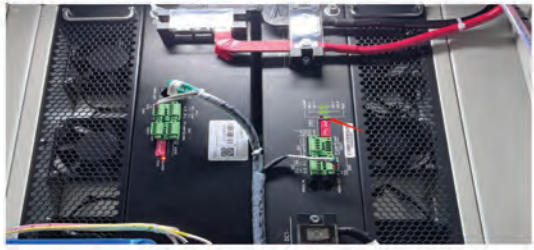
Step 10: Self-Consumption Mode in Off-Grid Operation Begin by selecting the self-consumption mode from the strategy options in the device information interface.

5. Power On & Off

Step 11: After selecting the self-consumption mode from the interface, the EMS will first control the BMS to initiate high-voltage power-up. Wait for approximately one minute; when the LED G/R indicator on the high-voltage cabinet changes from a steady red light to a steady green light, it indicates that the high-voltage power-up of the BMS was successful.



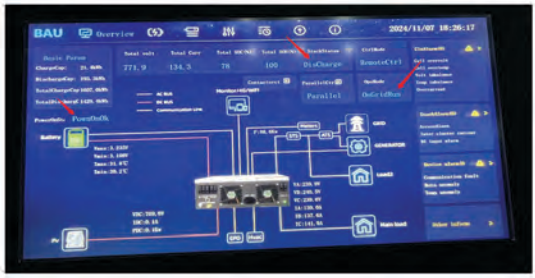
Step 12: After the high-voltage power-up is successful, the EMS will then control the MPPT to power on. Once the MPPT powers on successfully, the RUN indicator light will remain lit.



Step 13: After the MPPT powers on successfully, the EMS will control the PCS to power on. The PCS undergoes a soft start process, during which the ALARM indicator will initially light up. After approximately two minutes, when the ALARM light goes out and the RUN light remains lit, the PCS has powered on successfully (PCS is on the left side).

5. Power On & Off

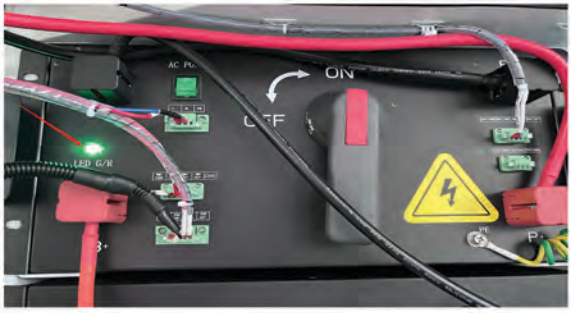
Step 14: The power status is "Powered On," and the startup of the self-consumption mode is complete. The operating mode switches to off-grid operation. The system enters a charging or discharging state, and the stack operation status on the main interface will transition from idle to either charging or discharging.



Step 15: Economic Mode Based on the peak and off-peak periods of the local power grid, set Peak Period 1, Peak Period 2, and Off-Peak Period. A password is required for the settings: 123456. After completing the settings, select Economic Mode. When setting Peak Period 1 and Peak Period 2, ensure that the time for Peak Period 1 occurs before that of Peak Period 2. The times for the three periods must not overlap, and it is recommended that the operating interval for each period should not be less than 10 minutes.

Step 16: After selecting Economic Mode, the EMS will first control the BMS to perform high-voltage energization according to the peak and off-peak time periods. After waiting for about one minute, the LED G/R indicator light on the high-voltage box will change from a steady red to a steady green, indicating that the BMS has successfully achieved high voltage.

5. Power On & Off



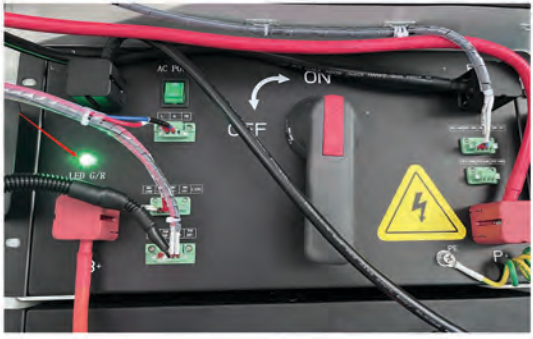
Step 17: Once the BMS successfully establishes high voltage, the EMS will proceed to initiate the startup of the PCS. During the soft-start process, the ALARM indicator will illuminate initially. After approximately two minutes, when the ALARM light extinguishes and the RUN light remains illuminated, the PCS has successfully powered on (the PCS is located on the left side).

Step 18: Once the economic mode is successfully initiated, the system will enter either charging or discharging mode (discharging during peak periods and charging during valley periods). The stack's operating status on the main interface will transition from idle to either charging or discharging state. (Note: In off-grid mode, the economic mode will not be executed.)

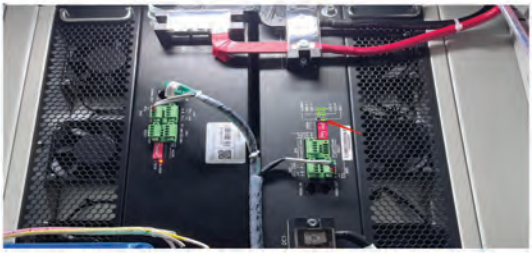
Step 19: Priority to Grid Mode First, select the "Priority to Grid" mode through the device information interface under the strategy information section.

5. Power On & Off

Step 20: After selecting the "Priority to Grid" mode through the interface, the EMS will first control the BMS to apply high voltage.
After approximately one minute, the LED G/R indicator light on the high voltage cabinet will change from a steady red light to a steady green light, indicating that the BMS has successfully received high voltage.

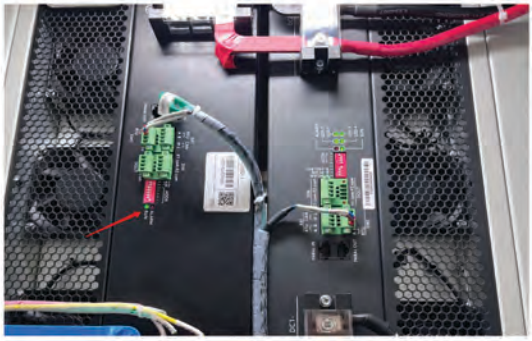


Step 21: After the high voltage is successfully energized, the EMS will proceed to control the MPPT for startup. Once the MPPT is successfully powered on, the RUN indicator light will remain illuminated. (The MPPT is located on the right side.)



Step 22: After the MPPT successfully powers on, the EMS will control the PCS for startup. The PCS undergoes a soft start process, during which the ALARM indicator will illuminate. After approximately two minutes, when the ALARM light turns off and the RUN light remains illuminated, the PCS has successfully powered on. (The PCS is located on the left side.)

5. Power On & Off



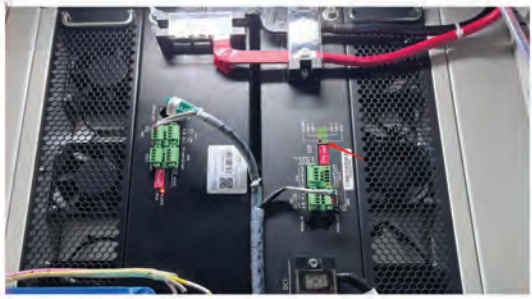
Step 23: The power status is "Powered On." The startup of the grid priority mode is complete, and the system enters either charging or discharging mode. The stack operating status on the main interface will transition from idle to either charging or discharging. (Note: The grid priority mode will not be executed when operating off-grid.)

Step 24: Grid-connected Microgrid Mode
First, navigate to the device information interface and select the microgrid mode from the strategy information options.

Step 25: After selecting the microgrid mode through the interface, the EMS will first control the BMS to initiate high voltage power-up. After approximately one minute, the LED G/R indicator light on the high voltage cabinet will change from a steady red to a steady green, indicating that the BMS has successfully powered up to high voltage.

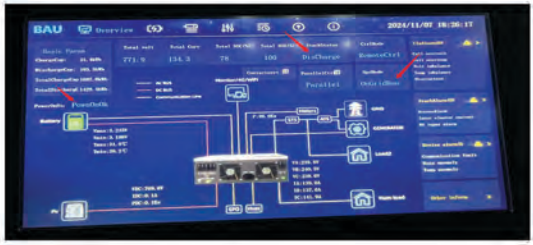
5. Power On & Off

Step 26: After the high voltage power-up is successful, the EMS will then control the MPPT to power on. Once the MPPT is successfully powered on, the RUN indicator light will remain steadily lit. (The MPPT is located on the right side.)



Step 27: After the MPPT is successfully powered on, the EMS will control the PCS to power on. The PCS undergoes a soft start process, during which the ALARM indicator will light up initially. After approximately 2 minutes, when the ALARM light turns off and the RUN light remains steadily lit, the PCS is successfully powered on.

Step 28: The power status is "Power On," indicating that the microgrid mode has been successfully initiated, and the operating mode is now grid-connected. The system enters either a charging or discharging state, and the operating status on the main interface transitions from idle to either charging or discharging mode.

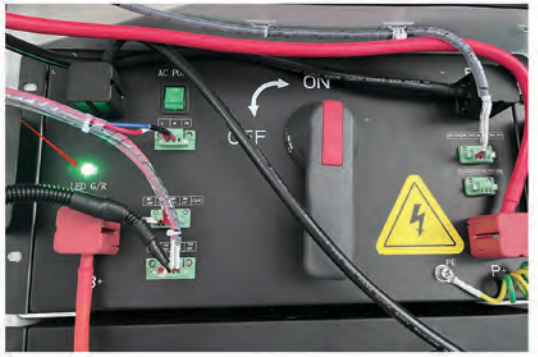


Step 29: Microgrid Mode in Off-Grid Operation
First, select the microgrid mode from the device information interface under the strategy information mode selection.

5. Power On & Off

Step 30: After selecting the microgrid mode from the interface, the EMS will first control the BMS to apply high voltage. After waiting for approximately one minute, the LED G/R indicator light in the high voltage box will change from a steady red to a steady green, indicating that the high voltage has been successfully applied to the BMS.

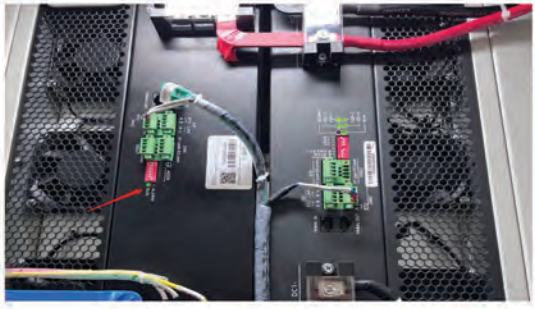
Step 31: After selecting the microgrid mode from the interface, the EMS will first control the BMS to apply high voltage. After waiting for approximately one minute, the LED G/R indicator light in the high voltage box will change from a steady red to a steady green, indicating that the high voltage has been successfully applied to the BMS.



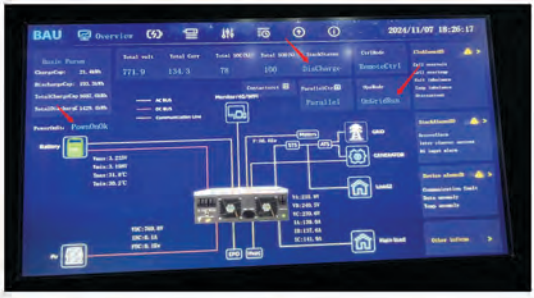
5. Power On & Off

Step 35: EMS Data Export
Insert a USB flash drive into the EMS USB port. Navigate to the Historical Information > Data Information interface, and select "Export."

Step 33: Once the MPPT successfully powers on, the EMS will proceed to control the PCS to power on. The PCS undergoes a softstart process, during which the ALARM indicator will illuminate initially. After approximately two minutes, when the ALARM indicator turns off and the RUN light remains illuminated, the PCS has successfully powered on (PCS is located on the left side).



Step 34: The power status is now "Power On." The microgrid mode has been successfully initiated, and the operating mode is set to off-grid. The system enters either charging or discharging mode, and the stack operation status on the main interface transitions from idle to either charging or discharging state.



5. Power On & Off

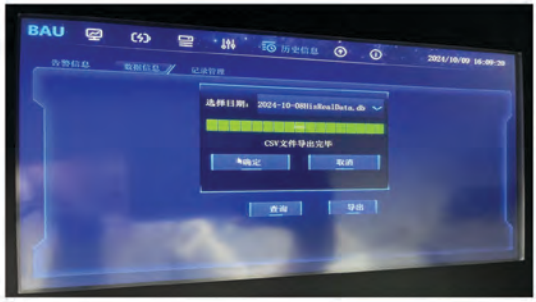
Step 35: EMS Data Export
Insert a USB flash drive into the EMS USB port. Navigate to the Historical Information > Data Information interface, and select "Export."

Step 36: In the following window, enter the password 123456 and click OK.

Step 37: After the following window pops up, select the files corresponding to the desired export date and click OK.

Step 38: Wait for the progress bar to reach 100%. When the prompt indicates that the CSV file export is complete, the export

5. Power On & Off

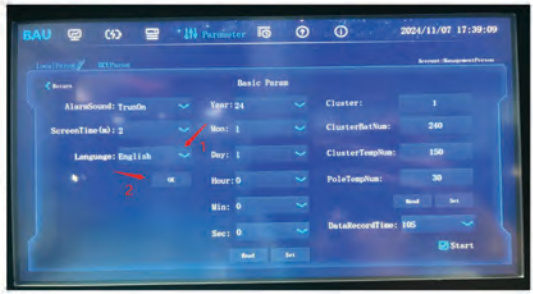


Step 39: Switch to the parameter settings interface. The operator selects "Administrator" and enters the password: 445566; then clicks Confirm.

Step 40: Select Local Parameters
Choose Local Parameters and then select Basic Parameters to enter the Basic Parameter Settings interface.

5. Power On & Off

Step 41: Access the local parameter settings interface and select the language as English.



Step 42: Return to the previous screen and select "Restart System." After restarting, go to the settings menu, choose the "Language" option, and switch to the desired language to complete the setup.

◆ 5.2. Power Off

Power down the energy storage system as follows:

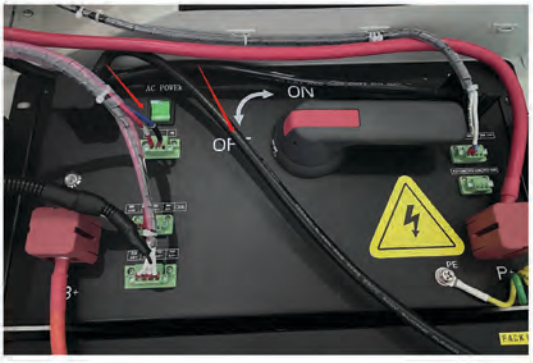
Step 1: During system operation, if shutdown is required, go to the device information interface, navigate to "Data Information," and select "One-Click Shutdown." Click "Set" to initiate the soft shutdown process for the entire system.

5. Power On & Off

Step 2: After the soft shutdown process is complete, the power status on the main information interface will display "Not Powered On.

Step 3: The RUN indicators on the PCS and MPPT will change from a steady green light to a flashing green light, and the LED G/R on the high-voltage box will switch from green to red, indicating that the high-voltage shutdown has been completed.

Step 4: To completely shut down or perform maintenance on the system, first follow the soft shutdown procedure. Once the system shutdown is confirmed, operate the circuit breaker handle, switch it to the OFF position, and then set the AC POWER switch to OFF.



5. Power On & Off

Step 5: Turn the handle of the DC circuit breaker in the sub-control box to the OFF position to open the circuit breaker. Then, in Step 4, power down the auxiliary power of the battery cabinet.

- Turn off the lighting power supply switch QF8.
- Turn off the 24V power supply mains switch QF9.
- Turn off the AC fan switch QF11.
- Turn off the UPS mains switch QF6, press the UPS power button, and follow the on-screen prompts to shut it down.
- Turn off the air conditioning power switch QF10.
- Turn off the UPS power supply switch QF4.
- Turn off the main AC switch QF2.
- Auxiliary power shutdown is complete.

The system shutdown is finished.

◆ 5.3. System Abnormal Power Off

◆ 5.3.1. Shutdown in the Event of a Fire Incident

Please contact local fire department professionals promptly.

◆ 5.3.2. Emergency Shutdown Due to Fault

Please contact our after-sales personnel promptly.

6. Routine Maintenance

◆ 6.1. Pre-Maintenance Guidelines

WARNING

1) Do not perform maintenance on the battery cabinet during rainy, humid, or windy weather. If such conditions cannot be avoided, our company will not be liable for any resulting damages.
2) Avoid opening the cabinet doors during heavy rain, snow, or fog when humidity is high. Additionally, after closing the cabinet doors, ensure that the sealing strips around the doors are not twisted.
3) To minimize the risk of electric shock, do not perform any maintenance or repair operations beyond those outlined in this manual. If needed, please contact our customer service personnel for maintenance and repairs.

◆ 6.2. Cabinet Maintenance Project List and Schedule

The following are recommended maintenance intervals; however, the actual maintenance schedule should be adjusted based on the specific installation environment of the product. Factors such as the scale of the power station, installation location, and on-site conditions can all affect the maintenance cycle. If the operating environment is subject to significant wind, sand, or dust, it may be necessary to shorten the maintenance intervals and increase the maintenance frequency.

ATTENTION

During maintenance or shutdown periods, capacity loss resulting from the following conditions lasting continuously for more than 120 hours will not be covered under warranty:
1)The battery discharge voltage falls below the minimum battery voltage of 2.5V
2)The battery pack's State of Charge (SOC) is at 0%

6. Routine Maintenance

◆ 6.2.1. Maintenance Work (Every Two Years)

No.	Item list	Inspection Methods
1	System Status and Cleaning	Inspect the following items, and if any do not meet the requirements, please correct them immediately: · Check for any damage or deformation of the battery cabinet and internal equipment. · Listen for any unusual noises from the internal equipment during operation. · Check if the temperature inside the battery cabinet is excessively high. · Verify that the humidity and dust levels inside the battery cabinet are within normal ranges. Clean if necessary. · Check if the air intake and exhaust openings of the battery cabinet are blocked.
2	Warning Labels	Check that warning labels and tags are clear and visible, without any damage or dirt. Replace them if necessary.
3	Cable Shielding Grounding	Inspect the cable shielding to ensure it is in good contact with the insulating sheath, and verify that the grounding busbar is securely fastened.
4	Lightning Protection Devices and Fuses	Check that the lightning protection devices and fuses are securely fastened.
5	Corrosion Inspection	Check for any oxidation or rust inside the outdoor cabinet.

6. Routine Maintenance

◆ 6.2.2. Mainenance Work (Once a Year)

No.	Item list	Inspection Methods
1	External Cabinet Inspection	Inspect the following items, and if any do not meet the requirements, please correct them immediately: 1) Check for the presence of flammable materials on top of the battery cabinet. 2) Inspect the welding points between the battery cabinet and the foundation steel plate to ensure they are secure and free from rust. 3) Check the cabinet shell for any damage, paint peeling, or oxidation. 4) Verify that the cabinet door locks can be opened and closed smoothly. 5) Ensure that the sealing strips are properly secured.
2	Internal Cabinet Inspection	Inspect the interior of the energy storage system cabinet for any foreign objects, dust, dirt, or condensation.
3	Air Intake and Exhaust Openings	Check the air conditioning temperature and dust levels. If necessary, use a vacuum cleaner to clean the air conditioning unit.
4	Wiring and Cable Arrangement	Inspection work should only begin after all internal equipment of the energy storage cabinet has been completely powered down! During the inspection, if any non-compliance is found, please correct it immediately: · Check whether the cable arrangement is standard and if there are any short circuits or other issues. If any abnormalities are found, correct them immediately. · Inspect all cable entry and exit holes on the battery cabinet to ensure they are properly sealed. · Check for any signs of water ingress inside the battery cabinet. · Inspect the connections of the power cables for looseness and retighten them according to the previously specified torque. · Check for any damage to the power and control cables, especially looking for cuts on the surface where they contact metal surfaces. Also, verify that the insulation tape on the power cable terminals is intact and has not come loose.
5	Grounding and Equipotential Bonding	1. Check that the grounding connections are correct, and ensure that the grounding resistance does not exceed 4Ω. 2. Ensure that the equipotential bonding connections within the energy storage system cabinet are properly established and compliant with the required standards
6	Fans	1.Check the operational status of the fans. 2.Inspect the fans for any obstructions. 3.Listen for any unusual noises while the fans are running.
7	Screws	Check for any loose screws or fallen screws inside the battery cabinet.

6. Routine Maintenance

◆ 6.2.3. Mainenance Work (Every Six Months to One Year)

No.	Item list		Inspection List
		1)	Check the emergency stop button to ensure its stopping function operates correctly
1	Safety Features	2)	Simulated Shutdown
		3)	Inspect the warning labels and other signage on the unit. If any labels are unclear or damaged, please replace them promptly.
		1)	Check the cleanliness of the circuit boards and components.
		2)	Check the temperature and dust levels of the air conditioning unit. If necessary, use a vacuum cleaner to clean the air conditioning module and other components.
2	Internal Component Inspection	3)	If necessary, please replace the air filter.
			Note: It is essential to check the ventilation of the air conditioning intake.
			Otherwise, if the air conditioning system cannot effectively cool, it may fail due to overheating.
		1)	Perform regular inspections for corrosion on all metal components (every six months).
3	Component Maintenance	2)	Annual inspection of contactors (auxiliary switches and micro switches) to ensure their mechanical operation is in good condition.
		3)	Check the operating parameters, particularly the voltage and insulation parameters.

◆ 6.3. Cabinet Maintenance

◆ 6.3.1. Cleaning the Cabinet Exterior

Situation 1 : It is recommended to clean the top surface first, followed by the sides. You can clean directly or rinse with water while cleaning. In cases where the surface is soiled by water stains and dust, it can be effectively cleaned.
Cleaning Materials: Cloth, water, alcohol, or other non-corrosive cleaners.

Pictures	Maintenance Steps
	1.Use a cloth (or other scrubbing tool) dampened with water to wipe down the soiled areas on the surface. 2. If water does not effectively clean the surface, use 97% alcohol to wipe until the surface cleanliness meets an acceptable level. (You may also try using a locally common non-corrosive cleaner.)

6. Routine Maintenance

Situation 2: The surface exhibits soiling and damage to the paint, resulting in marks that cannot be adequately cleaned. In this instance, it is advisable to consider repainting or applying protective coatings to restore the surface to an acceptable condition.

Pictures	Maintenance Steps
	1. Use sandpaper to smooth out areas with raised paint or scratches on the surface, ensuring a smooth finish.
	2. Use a cloth dampened with water or 97% alcohol to wipe the damaged areas, effectively removing surface stains.
	3. After the surface has dried, use a soft-bristle brush to apply touch-up paint to the scratched areas, ensuring that the application is as even and consistent as possible.

Maintenance Materials: Sandpaper, cloth, water, alcohol, paintbrush, and paint.

Situation Three: The primer is damaged, exposing the substrate.
Maintenance Materials: Sandpaper, cloth, water, alcohol, zinc-rich primer, brush, paint.

Pictures	Steps
	1. Use sandpaper to smooth the painted areas with damage, removing any surface rust and burrs to ensure a smooth finish.

6. Routine Maintenance

2.Use a cloth dampened with water or 97% alcohol to wipe the damaged areas, removing surface stains and dust.

3.Once the surface is dry, apply a zinc-rich primer to the exposed areas for protection, ensuring complete coverage of the bare substrate.

4.After the primer has dried, use a soft brush to touch up the damaged areas, ensuring the paint is applied evenly and consistently.

DESCRIPTION

1) Inspect the protective paint on the exterior of the energy storage cabinet for any peeling or flaking. If any issues are detected, please repair them promptly.
2) The exterior of the energy storage cabinet should undergo a complete repainting with specialized protective paint every five years.

◆ 6.3.2. Inspection of Door Locks and Hinges

After completing the cleaning tasks, inspect the door locks and hinges of the energy storage cabinet to ensure they are functioning properly and in good condition. If necessary, apply suitable lubrication to the lock cylinders and hinges to ensure smooth operation.

◆ 6.3.3. Inspect the Sealing Strips

Sealing strips in good condition are essential for effectively preventing water ingress into the battery cabinet. Conduct a thorough inspection; if any damage is found, please replace them immediately.

7. Alarm / Fault Reference

◆ 7.1. EMS Alarms / Faults

EMS Alarms / Faults List is shown as above

Table 7-1: EMS Alarms / Faults List

No.	Alarm Name	Fault Cause	Recommended Action
1	BMS Communication Loss	1. BMS is not powered. 2. Loose communication harness.	1. Verify that the BMS is receiving power properly; 2. Check the connection harness for looseness or damage.
2	PCS Communication Loss	1. PCS is not powered. 2. Loose communication harness.	1. Verify that the PCS is receiving power properly; 2. Check the connection harness for looseness or damage.
3	Meter Communication Loss	1. Meter is not powered. 2. Loose communication harness.	Check if the meter is powered properly; Inspect the connection harness for looseness or damage.
4	Aerosol Signal Alarm	1. Smoke or localized overheating within the battery cabinet. 2. Fire in the battery cabinet.	1. Continuously monitor remotely for 30 minutes for any other anomalies (e.g., abnormal temperature, battery voltage, battery temperature, hydrogen concentration). If anomalies are detected, remotely shut down the system. During remote monitoring, do not approach the battery cabinet or open the cabinet door. 2. If no other anomalies are observed remotely, send trained personnel to the site to monitor from a safe distance for an additional 30 minutes. If smoke or fire is detected, remotely shut down the system, evacuate personnel, and call emergency services. 3. If both remote monitoring and on-site observation show no anomalies, cautiously open the battery cabinet door to check for aerosol discharge. If aerosol is present, contact the service hotline; if not, replace the faulty aerosol module.
5	Electrical Emergency Stop Signal Alarm	Emergency stop button on the battery cabinet has been pressed or is damaged.	1. If the emergency stop button was pressed accidentally, reset it. 2. Replace the emergency stop button if it is damaged.
6	BMS Emergency Stop Signal Alarm	1. Battery has a level 3 alarm. 2. Emergency stop button has been pressed or is damaged.	1. Inspect the battery cabinet for any abnormalities and monitor the BMS remotely for level 3 alarm messages; 2. Reset or replace the emergency stop button as necessary.

7. Alarm / Fault Reference

◆ 7.2. BMS Alarms

The following is the BMS alarm/fault list

Table 7-2 BMS Alarm/Fault List

No	Alarm Name	Fault Causes	Recommended Actions
1	Pack Fan Failure	1. Insufficient power supply. 2. Fan damage or obstruction by foreign objects.	1.Check whether the 48V power supply to the fan is reliably connected. 2.Inspect the fan blades for damage, remove any foreign objects around the fan, and investigate any power supply abnormalities before reinstalling the fan.
2	BMU Hardware Failure	BMU Damage	1. Restart the BMU by power cycling it. 2. Reconnect the BMU. 3. If the issue persists, replace the BMU.
3	BCMU Hardware Failure	BCMU Damage	1. Restart the BCMU by power cycling it. 2. Reconnect the BMU 3. If the issue persists, replace the BMU
4	Fuse Failure	Fuse Damage	Replace the fuse.
5	Contactor Sticking Fault	1. The contactor is damaged 2. Incorrect wiring of the contactor feedback contacts.	1. Replace the Contactor. 2. Correct the wiring.
6	BMU Communication Failure	Loose Communication Connector	Replace the communication wiring harness.
7	Current Sensor Fault	1. Loose shunt sampling wire 2. Damaged or reversed shunt 3. Faulty acquisition module	1. Secure the shunt sampling signal wire again. 2. Measure the shunt to ensure it is functioning correctly and that the signal output is normal. If the issue persists, replace the shunt. 3. Replace the BCMU.
8	NTC Fault	Sampling Anomaly	Restart, disassemble, or replace the BMU.
9	Emergency Stop Signal Alarm	The emergency stop button on the battery cabinet door has been pressed or the emergency stop button is damaged.	1. Manually reset the pressed emergency stop button. 2. If the emergency stop button is damaged, replace it.
10	Water immersion signal alarm	The battery cabinet is flooded, or the water immersion sensor is damaged.	1.Please check if there is any accumulated water inside the battery cabinet. If so, ensure it is fully drained. 2.Please verify whether the water immersion sensor inside the battery cabinet is functioning properly. If it is damaged, replace the faulty equipment; if it is intact, manually clear the alarm.

7. Alarm / Fault Reference

11	Aerosol Signal Alarm	Smoke or Localized Overheating Detected in the Battery Cabinet, or Fire Has Occurred.	Please monitor the situation remotely for 30 minutes to check for any other anomalies (e.g., abnormal temperature, battery voltage issues, abnormal battery temperature, or combustible gas concentration). If any abnormalities are detected, please shut down the remote system. During remote monitoring, do not approach the battery cabinet or open the cabinet door. If no other anomalies are detected during remote monitoring, arrange for trained personnel to observe the situation from a safe distance for 30 minutes. If there is any smoke or fire, shut down the remote system, ensure that on-site personnel evacuate to a safe distance, and call emergency services. If both remote monitoring and on-site observation show no anomalies, it is safe to open the battery cabinet door to check for aerosol release. If aerosol is present, please contact the service hotline; if not, this indicates a failure in the aerosol module, which should be replaced.
12	AC Surge Protector Fault	AC Surge Protector Fault	Please check if the signal line connection of the AC surge protector is loose. Please check if the indicator of the AC surge protector has changed color. Please check if the indicator of the AC surge protector has changed color.
13	Total Voltage Overvoltage Alarm Levels One/Two/Three	The total battery voltage exceeds the alarm thresholds for levels one/two/three.	Let it sit for more than 30 minutes or discharge until it returns to normal.
14	Total voltage under-voltage level 1/2/3 alarm.	The total battery voltage is below the alarm thresholds for levels one/two/three.	Wait for more than 30 minutes or charge the system until it returns to normal levels.
15	Individual cell overvoltage level one/two/three alarm.	The voltage of the individual battery cell is above the level one/two/three alarm threshold.	Allow to rest for more than 30 minutes or discharge until normal levels are restored.
16	Single-cell undervoltage level 1/2/3 alarm.	The battery cell voltage is below the level 1/2/3 alarm threshold.	Allow the battery to sit for more than 30 minutes or charge it to restore normal levels.
17	Discharge current exceeds level one/two/three alarm thresholds.	Scheduled power exceeds specified limits.	Issue a reasonable scheduled power allocation.

7. Alarm / Fault Reference

18	Charging current exceeds Level 1/2/3 alarm threshold.	Excessive dispatch power.	Issue a reasonable dispatch power.
19	Discharge battery temperature high warning: Level 1/2/3.	1. The cooling fan connector is loose. 2. The cooling fan is malfunctioning. 3. The air conditioning refrigerant is ineffective. 4. The air conditioning cooling system has not started.	1. Reconnect the fan connector. 2. Provide separate power to the fan and check if it operates normally. 3. Replace the refrigerant. 4. Inspect the cooling system.
20	Discharge battery under-temperature level 1/2/3 alarm.	The air conditioning heating system has not been activated.	Check the heating system.
21	Charging battery over-temperature level one/two/three alarm.	Loose connection of the cooling fan plug. Malfunction of the cooling fan. Refrigerant in the air conditioning system is ineffective. The air conditioning cooling system has not been activated.	Reconnect the cooling fan plug. Provide separate power to the fan and check its operation. Replace the refrigerant. Inspect the cooling system.
22	Charging battery low temperature level 1/2/3 alarm.	The air conditioning heating system has not been activated.	Check the heating system.
23	Insulation resistance is too low - Level 1/2/3 alarm.	Moisture or excessive dust accumulation. Ground short circuit condition. Poor contact in power lines.	Remove moisture and dust. Use instruments to measure the system's insulation resistance to ground. 3. Check the reliability and firmness of the power lines.
24	High Voltage Box Connector Temperature Too High - Level One/Two/Three Alarm	Fan failure in the control box; 48V power supply is abnormal.	Please verify the functionality of the fan power supply, and replace the fan if necessary.
25	Single cell voltage difference level one/two/three alarm.	The voltage difference between battery clusters is greater than 30V	Single cluster charging and discharging to level the total cluster pressure
26	Single cell temperature difference 1/2/3 level alarm	The cooling fan plug is loose The cooling fan is faulty The air conditioning coolant is ineffective The air conditioning refrigeration system is not started.	1. Reconnect the fan plug cable. 2. Supply power to the fan separately and check whether the fan is normal. 3. Replace the coolant. 4. Check the refrigeration system.
27	Low SOC level one/two/three alarms	Battery SOC is lower than the first/second/third level alarm threshold	Let it sit for more than 30 minutes or charge until it returns to normal.

7. Alarm / Fault Reference

◆ 7.3. PCS Alarm

Please refer to the alarm/fault list in the PCS user manual to troubleshoot the problem.

◆ 7.4. Air Contitioning Alarm

The following is a list of air conditioner alarms/faults.

Table 7-4 Air conditioner alarm/fault list

No	Alarm Name	Cause of Fault	Recommended Actions
1	Return Air Temperature Sensor Fault Alarm	1.The return air temperature sensor wiring is loose. 2.The sensor is damaged, with either an open circuit or a short circuit.	1.Please select an appropriate time to shut down the system and implement safety precautions. 2.Please check if the wiring is loose. 3.Please replace the return air temperature sensor.
2	Return Air Humidity Sensor Fault Alarm	1.The return air humidity sensor wiring is loose. 2.The sensor is damaged, with either an open circuit or a short circuit.	1.Please select an appropriate time to shut down the system and implement safety precautions. 2.please select an appropriate time to shut down the system and implement safety precautions. 3.Please replace the return air humidity sensor.
3	Supply Air Temperature Sensor Fault Alarm	1.The supply air temperature sensor wiring is loose. 2.The sensor is damaged, with either an open circuit or a short circuit.	1.Please select an appropriate time to shut down the system and implement safety precautions. 2.Check if the wiring is loose. 3.Please replace the supply air temperature sensor.
4	High Temperature Alarm	After the unit has been running continuously for 10 minutes, the return air temperature exceeds the high temperature alarm threshold	1.Check the air conditioning parameter "High Temperature Alarm Threshold" to ensure that it is set appropriately. 2.If the parameter is set correctly, please check for other related alarms for the air conditioning system and perform maintenance according to the corresponding repair recommendations. If there are no other related alarms, please shut down the air conditioner and contact the service hotline.
5	Low Temperature Alarm	After the unit has been running continuously for 10 minutes, the return air temperature falls below the low temperature alarm threshold	1.Check the air conditioning parameter "Low Temperature Alarm Threshold" to ensure that it is set appropriately. 2.If the parameter is set correctly, please check for other related alarms for the air conditioning system and perform maintenance according to the corresponding repair recommendations. If there are no other related alarms, please shut down the air conditioner and contact the service hotline.
6	High Humidity Alarm	After the unit has been running continuously for 10 minutes, the return air humidity exceeds the high humidity alarm threshold.	1.Check the air conditioning parameter "High Humidity Alarm Threshold" to ensure that it is set appropriately. 2.If the parameter is set correctly, please check for other related alarms for the air conditioning system and perform maintenance according to the corresponding repair recommendations. If there are no other related alarms, please shut down the air conditioner and contact the service hotline.
7	Low Humidity Alarm	If the unit operates continuously for 10 minutes and the return air humidity falls below the low humidity alarm threshold.	1.Check the air conditioning parameter "Low Humidity Alarm Threshold" to ensure it is set appropriately. 2.If the parameter is correctly set, inspect the system for any other related alarms and follow the corresponding maintenance recommendations. If no additional alarms are present, shut down the unit and contact the service hotline.
8	High Pressure Alarm	1. High-pressure switch disconnected 2. Loose high-pressure wiring	1. Check if all system valves are fully open. 2. Inspect the condenser for dirt or blockages; if found, clean the condenser. 3. Verify that the condenser fan is functioning properly. 4. Ensure high-pressure wiring is securely connected.

7. Alarm / Fault Reference

9	High-Pressure Lock Alarm	1.Three high-pressure or condenser high-temperature alarms occur within one hour. 2.A high-pressure or condenser high-temperature alarm persists for 10 minutes without resolution.	1. Ensure all system valves are fully open. 2. Check the condenser for dirt or blockages; clean the condenser if necessary. 3. Verify that the condenser fan is operating normally. 4. Confirm that high-pressure wiring is securely connected.
10	Low Pressure Alarm	1. Low-pressure switch is disconnected. 2. Loose low-pressure wiring.	1. Check if all system valves are fully open. 2. Inspect the refrigerant levels for insufficiency or leaks. 3. Ensure low-pressure wiring is securely connected.
11	Low Pressure Lock Alarm	1. Three low-pressure or evaporator low-temperature alarms occur within one hour. 2. A low-pressure alarm or evaporator low-temperature alarm persists for 10 minutes without resolution.	1.Check if all system valves are fully open. 2.Check if the refrigerant levels are insufficient or if there are any leaks. 3.Check that the low-pressure wiring is securely connected.
12	Condenser Temperature Sensor Fault Alarm	1.Wiring is unstable or incorrectly connected. 2.Sensor is damaged, resulting in an open circuit or short circuit.	1.Please select an appropriate time to shut down the system and implement safety precautions. 2.Check if the wiring is loose. 3.Replace the condenser temperature sensor.
13	Evaporator Temperature Sensor Fault Alarm	1.The wiring of the evaporator temperature sensor is disconnected. 2.The sensor is damaged, causing an open circuit or short circuit.	1.Please choose an appropriate time to shut down the system and implement proper safety precautions. 2.Please check if the wiring is loose. 3.Please replace the evaporator temperature sensor.
14	High Condenser Temperature Alarm	Condenser temperature exceeds the high-temperature alarm threshold.	Please check for other related alarms on the air conditioner and perform maintenance according to the corresponding repair recommendations. If no other related alarms are present, please shut down the air conditioner and contact the support hotline.
15	Evaporator Low Temperature Alarm	Evaporator temperature is below the low-temperature alarm threshold.	Please check for other related alarms on the air conditioner and carry out maintenance according to the corresponding repair recommendations. If no other related alarms are present, please shut down the air conditioner and contact the support hotline.

Appendix

ACrimping OT/DT Terminals

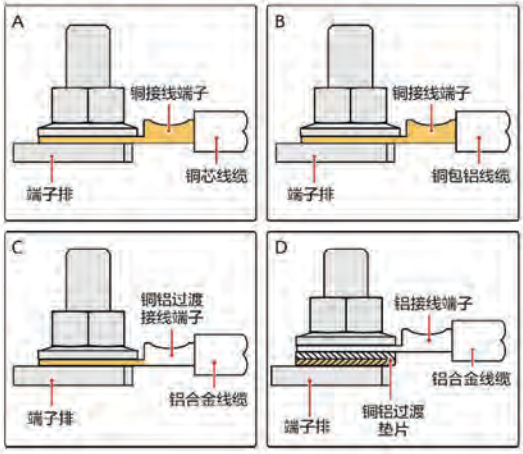
A.1 Requirements for OT/DT Terminals

1) When using copper core cables, please use copper terminals.
2) When using copper-clad aluminum cables, please use copper terminals.
3) When using aluminum alloy cables, please use copper-aluminum transition terminals, or aluminum

DESCRIPTION

Terminals in conjunction with copper-aluminum transition washers.
1. It is strictly prohibited to connect aluminum terminals directly to terminal blocks, as this can lead to electrochemical corrosion, compromising the reliability of the cable connections.
2.When using copper-aluminum transition terminals or aluminum terminals in conjunction with copperaluminum transition washers, they must comply with the requirements of IEC 61238-1.
3.When using copper-aluminum transition washers, please pay attention to the correct orientation. Ensure that the aluminum side of the washer contacts the aluminum terminal, while the copper side contacts the terminal block.

Figure 1: Requirements for OT/DT Terminals



Appendix

A.2 Crimping OT/DT Terminals

DESCRIPTION

1.When stripping the wire, please avoid damaging the conductor.
2.The cavity formed by the crimping of the conductor crimping piece of the OT/DT terminal should fully enclose the conductor, ensuring that the conductor is tightly integrated with the OT/DT terminal and is secure without any looseness.
3.Heat shrink tubing or insulating tape can be used to cover the crimped area. The following is an introduction using heat shrink tubing as an example.
4.During the use of a heat gun, please take precautions to prevent damage to the equipment.

Figure 2: Crimping OT Terminals

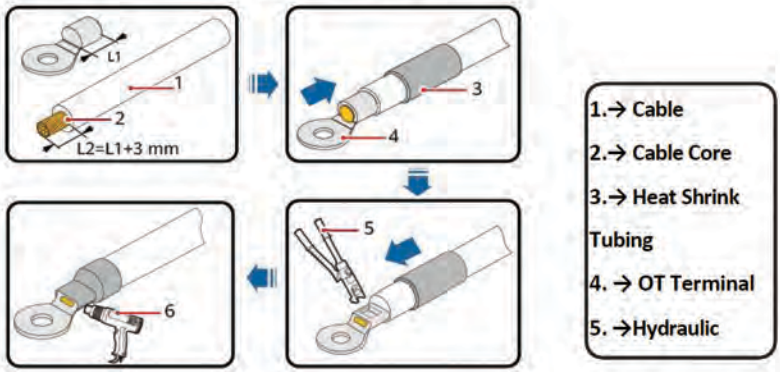
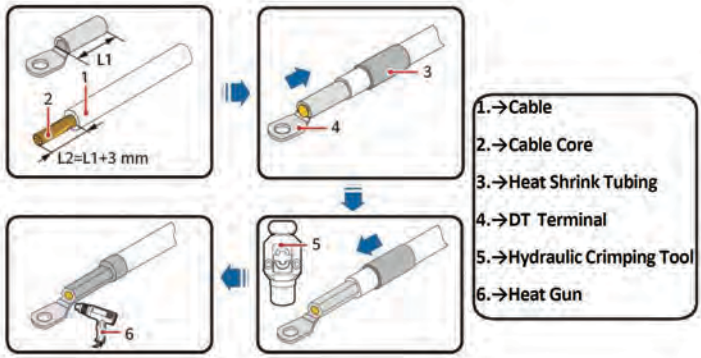


Figure 3: Crimping DT Terminals



How to Touch Up Paint

◆ B.1 Prerequisites

1.It is strictly prohibited to perform touch-up painting outdoors in adverse weather conditions such as rain, snow, strong winds, or sandstorms without adequate shelter.
2.Paint that meets the requirements has been prepared according to the color samples provided at the time of shipment.

◆ B.2 Touch-Up Painting Instructions

The appearance of the equipment should be kept in good condition. If there is any paint chipping, it should be touched up immediately.

DESCRIPTION

Visually inspect the extent of the paint damage on the equipment and prepare the necessary tools and materials. The quantity of materials should be assessed on-site based on the touch-up requirements.

Appendix 1: Touch-Up Painting Instructions

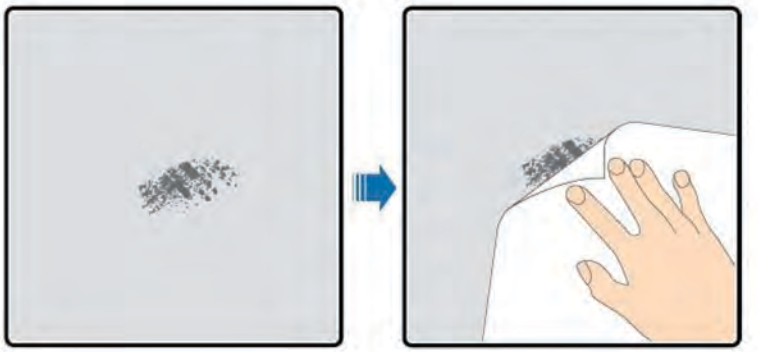
<table>
<tr><th>Degree of Paint Damage</th><th>Tools and Materials</th><th>Operating Procedures</th><th>Instructions</th></tr>
<tr><td>Shallow Scratches (No Exposure of Steel Substrate)</td><td rowspan="2">Aerosol paint or paint, paintbrush (for small area touch-ups), fine sandpaper, anhydrous ethanol, cotton cloth, spray gun (for large area touch-ups).</td><td rowspan="2">Refer to B.3 Steps 1 + Step 2 + Step 4 + Step 5 for operation.</td><td rowspan="5">The topcoat (acrylic paint) color should reference the color samples provided at the time of shipment, along with the Pantone numbers indicated on the samples. For minor scratches and small area stains or rust, it is recommended to use aerosol paint or a paintbrush. For extensive scratches and large area stains or rust, a paint spray gun should be used for application. The paint film should be as thin and uniform as possible, avoiding the formation of droplets, and the surface should remain smooth. After approximately 30 minutes of drying, the touch-up surface can proceed to subsequent operations.</td></tr>
<tr><td>Stains or rust that cannot be wiped off</td></tr>
<tr><td>Deep Scratches (Primer Damage Exposing Steel Substrate)</td><td>Aerosol paint or paint, zinc-rich primer, paintbrush (for small area touch-ups), fine sandpaper, anhydrous ethanol, cotton cloth, spray gun (for large area touch-ups).</td><td>Follow Steps 1 + Step 2 + Step 3 + Step 4 + Step 5 for operation.</td></tr>
<tr><td>Damage to Logo and Graphics</td><td colspan="2">For damage to the logo and graphics, please provide the logo dimensions and color codes. Contact a local advertising spray service provider to develop a repair plan based on the logo size, color, and extent of the damage, and proceed with the repair work accordingly.</td></tr>
<tr><td>Dents from Impact</td><td colspan="2">For impact damage with an area less than 100 mm² and a depth less than 3 mm, use unsaturated polyester resin filler (Poly-Putty base) to level the surface, then proceed with the touch-up painting process for deep scratches.
For impact damage with an area greater than 100 mm² or a depth greater than 3 mm, please consult a local supplier to provide a specific repair plan based on the situation.</td></tr>
</table>

◆ B.3 Operating Procedures

Step 1: Gently sand the damaged area with fine sandpaper to remove any dirt or rust.

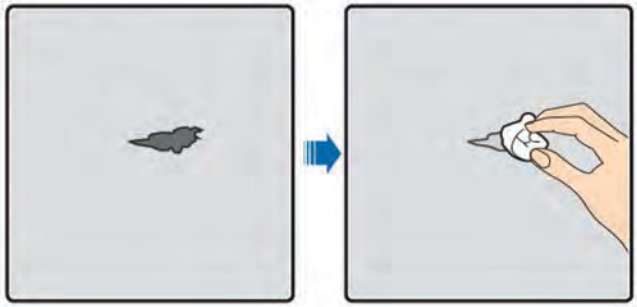
How to Touch Up Paint

Figure 4: Sanding the Coating Damage with Fine Sandpaper



Step 2: Dampen a cotton cloth with anhydrous ethanol and wipe the sanded or repair area to remove surface dirt and dust, then dry with a clean cotton cloth.

Figure 5: Treating the Coating Damage with Anhydrous Ethanol



8. Routine Maintenance

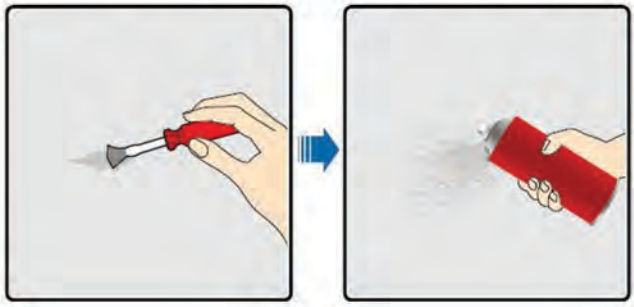
Step 3: Apply a zinc-rich primer to the damaged areas of the coating using a brush or spray gun.

DESCRIPTION	1) If the repair area has exposed the substrate, it is essential to first apply epoxy zinc-rich primer. Once the primer is dry and the substrate is no longer visible, proceed with applying the acrylic topcoat. 2)Choose an epoxy zinc-rich primer or select an acrylic topcoat that matches the color of the equipment's surface coating.

Step 4: Depending on the extent of the coating damage, select one of the following methods—spray paint, brush application, or spray gun—to evenly apply paint to the damaged area until all traces of coating damage are no longer visible.

DESCRIPTION	1. It is important to apply the paint in a thin and even layer, avoiding any droplet formation. Ensure that the surface remains smooth throughout the application process. 2. For equipment with multi-colored patterns, prior to touch-up painting, use tape and white paper to cover areas of other colors that are not damaged. This will prevent contamination of the non-damaged areas during the touch-up process.

Figure 6: Touching Up the Coating Damage on the Equipment



Step 5: After painting, allow it to sit for approximately 30 minutes, then check the touch-up area to ensure it meets the requirements.

DESCRIPTION	1) The repainted area should match the color of the surrounding areas. Use a colorimeter to measure the color difference, ensuring that the ΔE value is ≤3. If a colorimeter is not available, verify that there are no noticeable edges between the repainted area and its surroundings. Additionally, the coating should be free of any imperfections such as bumps, scratches, peeling, or cracks. 2)For spray application, it is advisable to apply three coats initially and then evaluate if the result meets the specified requirements. If the result does not meet the standards, repeat the spray application until the desired outcome is achieved.

WARRANTY CONDITIONS

The warranty conditions for ECOBSS energy storage systems are avaiable for download at ecobss.com.

Chang'an Building, No. 56,
Second Industrial Zone, Houting Community,
Shajing Street, Bao'an District, Shenzhen
e-mail: contact@ecobss.com WWW ecobss.com